Australian Government
Anti-Dumping Commission

EXEMPTION INQUIRY EX0015

CERTAIN HOLLOW STRUCTURAL SECTIONS EXPORTED TO AUSTRALIA FROM THE PEOPLE'S REPUBLIC OF CHINA, THE REPUBLIC OF KOREA, MALAYSIA AND TAIWAN

KASIA NOMINEES PTY LTD

REPORT TO THE PARLIAMENTARY SECRETARY TO THE MINISTER FOR INDUSTRY AND SCIENCE

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PUBLIC FILE VERSION

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2 SUMMARY AND RECOMMENDATIONS

This inquiry is in response to an application by Kasia Nominees Pty Ltd (Kasia) requesting an exemption from dumping duty and countervailing duty (collectively, the measures) under Sections 8(7)(a) and 10(8)(a) of the *Customs Tariff (Anti-Dumping) Act 1975*[1] (the Dumping Duty Act) in relation to the export from the People's Republic of China (China), the Republic of Korea (Korea), Malaysia and Taiwan of certain hollow structural sections (HSS).

This report sets out the facts on which the Parliamentary Secretary to the Minister for Industry and Science (the Parliamentary Secretary) may rely to exempt goods from measures.

2.1 Recommendation

The Anti-Dumping Commission (the Commission) has found that like or directly competitive goods to the goods subject to the exemption inquiry are offered for sale in Australia to all purchasers on equal terms under like conditions having regard to the custom and usage of trade. Accordingly, the conditions of sections 8(7)(a) and 10(8)(a) of the Dumping Duty Act for granting an exemption are not satisfied.

The Commission recommends to the Parliamentary Secretary that Kasia's application in respect of the exemption from measures of certain HSS exported from China, Korea, Malaysia and Taiwan to Australia be denied.

2.2 Application of law to facts

2.2.1 Authority to make decision

Sections 8(7) and 10(8) of the Dumping Duty Act set out, *inter alia*, the matters to be considered by the Minister[2] in deciding whether to use his discretion to exempt goods from dumping duty and countervailing duties. The provisions allow for the granting of exemptions from these duties in several circumstances.

Sections 8(7)(a) and 10(8)(a) set out that the Minister may exempt goods from measures where he is satisfied that:

> *Like or directly competitive goods are not offered for sale in Australia to all purchasers on equal terms under like conditions having regard to the customs and usage of trade*.

2.2.2 Application and supporting submission

On 9 December 2013, Kasia wrote to the Commission requesting an exemption from measures in relation to its imports of certain HSS subject to the measures.

On 19 December 2013, the Commission wrote to Kasia in relation to its application, requesting further information in support of its application. Kasia lodged a submission in response to this request on 3 February 2014.

[1] A reference to a division, section or subsection in this report is a reference to a provision of the Dumping Duty Act unless otherwise specified.

[2] In this case the applicable Minister, the Minister for Industry, and Science delegated responsibility for anti-dumping matters to the Parliamentary Secretary on 16 September 2013.

2.2.3 Initiation of inquiry

After examining the application and the additional submission in support of the application, the Commissioner was satisfied that:

- the claims put forward in the application and additional submission warranted further inquiry;
- an exemption inquiry should commence; and
- a final report and recommendation to the Parliamentary Secretary, presenting evidence on which the Parliamentary Secretary may rely to exercise his discretion under Sections 8(7)(a) and 10(8)(a), be prepared.

2.3 Findings and conclusions

The Commission has made the following findings and conclusions based on available information:

- there is an Australian industry producing like or directly competitive goods to the goods subject to the exemption inquiry; and
- these like or directly competitive goods are offered for sale in Australia to all purchasers on equal terms under like conditions having regard to the custom and usage of trade.

Based on these findings the Commissioner recommends to the Parliamentary Secretary that Kasia's application in respect of the exemption from anti-dumping measures be denied.

3 BACKGROUND TO MEASURES

3.1 Investigation 177 and goods subject to measures

In June 2012, the Australian Customs and Border Protection Service (ACBPS) completed an investigation (Investigation 177) into the alleged dumping and subsidisation of HSS exported to Australia from China, Korea, Malaysia, Taiwan and the Kingdom of Thailand (Thailand).

The then Minister for Home Affairs accepted ACBPS' recommendations at the conclusion of this investigation that certain HSS from China, Korea, Malaysia and Taiwan had been dumped and/or subsidised and that dumping and subsidisation had caused material injury to the Australian industry. This resulted in the measures being imposed on certain goods exported to Australia from China, Korea, Malaysia and Taiwan. The investigation was terminated in so far as it related to Thailand.

The reasons for the Minister's decision in this case are contained in Trade Measures Report No.181 (REP 177).

A dumping duty notice and countervailing duty notice were published notifying of this decision on 3 July 2012. Australian Customs Dumping Duty Notice (ACDN) No. 2012/31 contains details of the measures.

The goods subject to the measures are:

> *certain electric resistance welded pipe and tube made of carbon steel, comprising circular and non-circular hollow sections in galvanised and non-galvanised finishes. The goods are normally referred to as either CHS (circular hollow sections) or RHS (rectangular or square hollow sections). The goods are collectively referred to as HSS (hollow structural sections). Finish types for the goods include in-line galvanised (ILG), pre-galvanised, hot-dipped galvanised (HDG) and non-galvanised HSS.*

The goods subject to measures are currently classified to the tariff subheadings of Schedule 3 to the *Customs Tariff Act 1995*:

Tariff subheading	Statistical codes
7306.30.00	31, 32, 33, 34, 35, 36, 37
7306.61.00	21, 22, 25
7306.69.00	10

3.2 Ongoing investigation – HSS from Thailand

On 10 June 2014, OneSteel ATM (ATM) lodged an application requesting that the Minister publish a dumping duty notice in respect to HSS exported to Australia from Thailand.

After consideration of the application, an investigation was initiated on 21 July 2014 (Investigation 254), and public notification of the initiation of the investigation was published in *The Australian* on that day. Anti-Dumping Notice (ADN) No. 2014/49 refers to the initiation of the investigation and contains details of the goods subject to that investigation. This investigation is ongoing at the time of publication of this report.

4 EXEMPTION PROVISIONS

4.1 Legislative requirements for an exemption

Kasia has applied for an exemption under subsections 8(7)(a) and 10(8)(a) of the Dumping Duty Act, which provides that an exemption may be granted where the Minister is satisfied that:

> *like or directly competitive goods are not offered for sale in Australia to all purchasers on equal terms under like conditions having regard to the custom and usage of trade.*

4.2 Definition of "like or directly competitive goods"

Although not expressly defined by the Dumping Duty Act, the term "like or directly competitive goods" has been interpreted in the context of safeguards measures under Article 2 of the *World Trade Organization (WTO) Agreement on Safeguards* (Safeguards Agreement). Guidance on the interpretation of 'like or directly competitive goods' in the context of safeguards may offer assistance to the interpretation of 'like or directly competitive goods' as it appears in subsections 8(7)(a) and (8)(a) of the Dumping Duty Act.

The Productivity Commission examined the meaning of 'like or directly competitive goods' in the context of its 2008 *Safeguards Inquiry into the Import of Pigmeat*. In that inquiry, the Productivity Commission looked to the definition of 'like goods' provided in the context of the general procedures for safeguard inquiries issued by the Australian Government, that is, '*Like product* means a product which is identical, i.e. *alike in all respects* to the product under consideration, or in the absence of such a product, another product which, although not alike in all respects, has characteristics *closely resembling* those of the product under consideration.[3]' This definition closely reflects the definition of "like goods" found in subsection 269T(1) of the *Customs Act 1901* (Customs Act), which defines 'like goods' as:

> *…goods that are identical in all respects to the goods under consideration or that, although not alike in all respects to the goods under consideration, have characteristics closely resembling those of the goods under consideration.*

The term 'directly competitive' was considered separately by the Productivity Commission. Citing the WTO Appellate Body, the Commission found that 'directly competitive has been interpreted as encompassing goods with distinct physical characteristics, provided they compete for the same market.'[4]

In assessing this, the Productivity Commission had regard to relevant WTO jurisprudence, as the term "like or directly competitive goods" has been considered by the WTO Dispute Settlement Body (DSB) in a number of cases. The primary characteristics of goods to which the DSB had regard in these cases include:

- the competitive commercial relationship between goods in the marketplace[5];

[3] Commonwealth of Australia Special Gazette, No. S 297, 1998 cited by Productivity Commission *Safeguards Inquiry into the Import of Pigmeat*.
[4] WTO, Appellate Body, *Japan – Taxes on Alcoholic Beverages* (DS 8).
[5] *Korea — Alcoholic Beverages* (WT/DS75/AB/R, WT/DS84/AB/R) at 114

- interchangeability and substitutability, or whether the goods provide "alternative ways of satisfying a particular need or taste";[6]
- Commercially interchangeability of products;[7]

In *Korea — Alcoholic Beverages*, the prevailing view of the DSB in that matter was that:

> *'The term "directly competitive or substitutable" describes a particular type of relationship between two products, one imported and the other domestic. It is evident from the wording of the term that the essence of that relationship is that the products are in competition. This much is clear both from the word "competitive" which means "characterized by competition", and from the word "substitutable" which means "able to be substituted". The context of the competitive relationship is necessarily the marketplace.[8]'*

In *Japan – Taxes on Alcoholic Beverages*, the DSB expressed the view that a comparison of the 'commercial uses of the products, not of their characteristics'[9] is central to the determination of their competitive nature in assessing whether products are 'directly competitive.'

Therefore, for the purposes of assessing the application for exemption from measures is that the term "like or directly competitive goods" involves a comparison of the imported and domestically produced goods, where the domestically produced goods are either:

- alike in all respects, or where not alike in all respects have characteristics closely resembling those of the imported goods; or
- a competitive commercial relationship exists between the goods in the marketplace having regard to the commercial uses of the products.

4.3 Definition of "custom and usage of trade"

Although the domestically produced goods may be "like or directly competitive goods", the Minister may still grant an exemption to measures in circumstances where the "like or directly competitive goods" are NOT offered for sale in Australia to all purchasers on equal terms under like conditions having regard to the "custom and usage of trade".

The term "customs and usage of trade" is not defined in the *Dumping Duty Act*. However, it is a term used in common law in the interpretation of implied terms in contracts. Within this category are contracts within a particular trade or industry where it may be possible to say that custom or trade usage dictates that a particular term is implied in each transaction in that particular trade or industry. In such cases, a term in the custom and usage of trade may be implied where it is necessary to give the contract business efficacy[10]. In considering what is in the custom and usage of trade, the Courts have considered the following factors[11]:

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[6] ibid at 115
[7] *US — Cotton Yarn*, (WT/DS192/AB/R) at 96-98
[8] *Korea — Alcoholic Beverages* (WT/DS75/AB/R, WT/DS84/AB/R)
[9] *Japan – Taxes on Alcoholic Beverages* at 6.22
[10] *Castlemaine Tooheys Ltd v Carlton & United Breweries Ltd* (1987) 10 NSWLR 468, Sup Ct NSW Court of Appeal
[11] *Con-Stan Industries of Australia Pty. Ltd v. Norwich Winterthur Insurance (Australia) Ltd.* (1986) 160 CLR 226, High Court of Australia

1) the actual existence of a custom or usage that will justify the implication of a term into a contract;

2) evidence that custom or usage relied upon is so well-known and acquiesced in that everyone making a contract in that situation can reasonably be presumed to have imported the term into the contract. However, the custom need not be universally accepted; and

3) a person may be bound by a custom notwithstanding the fact that he or she had no knowledge of it.

5 INQUIRY PROCESS, KEY SUBMISSIONS MADE AND NARROWING OF GOODS SCOPE

5.1 Exemption application

On 9 December 2013, Kasia wrote to the Commission requesting an exemption from the measures in relation to its imports of a certain sub-set of the goods subject to the measures. The non-confidential version of Kasia's exemption application forms **Non-Confidential Attachment 1**.

5.1.1 Goods the subject of exemption application

The goods the subject of the exemption application and subsequent inquiry were defined in Kasia's application as follows:

> *electric resistance welded pipe made of carbon steel, comprising circular and hollow sections normally referred to as CHS (circular hollow sections) having a hot-dipped galvanised (HDG) finish, and a nominal size (NB) of 25, 32, 40 or 50 millimetres (the exemption goods).*

Throughout this report, the above description is referred to as the original goods subject to the exemption application or 'HDG CHS'.

However, the above definition was revised by Kasia following initiation of the inquiry to be a sub-set of the original goods subject to the exemption application:

> *electric resistance welded pipe made of carbon steel, comprising circular and hollow sections normally referred to as CHS (circular hollow sections) having a nominal size (NB) of either 25, 32, 40 or 50 millimetres exported to Australia from China, Korea, Malaysia and Taiwan comprising ALL of the following:*
>
> *a) an air-blown hot-dipped galvanised finish;*
> *b) a zinc coating mass of 300g/m^2.*

Throughout this report, the above definition is referred to as the amended goods subject to the exemption application or 'air-blown HDG CHS'.

See Section 5.4 for further discussion of this amendment to the goods subject to the exemption application.

5.1.2 Claims made in application

Kasia's application for an exemption alleged:

- in the 12 months prior to submitting the application, no enterprise produced and sold in Australia goods that are identical in all respects to the goods subject to the exemption application ; and
- in the 12 months prior to submitting the application no enterprise produced and sold in Australia goods that are like or directly competitive to the goods subject to the exemption application.

Kasia relied on a confidential attachment to its application as evidence that like or directly competitive goods are not produced in Australia. This attachment comprised correspondence from a distributor of HSS manufactured by an Australian industry

member, who advised that they were able to supply the original goods subject to the exemption application (and hence the amended sub-set), but this would be imported as the product is no longer made in Australia.

5.1.3 Submission in support of the application

In its correspondence to Kasia of 19 December 2013, the Commission observed that Kasia's application provided evidence in relation to one Australian HSS manufacturer, but did not address all other known manufacturers of HSS.

The Commission indicated that Kasia would need to address whether any other known Australian manufacturer of HSS produced like or directly competitive goods to those subject to the exemption application before the Commission would consider that sufficient evidence had been provided to warrant an exemption inquiry.

In response, Kasia lodged its submission in support of the application on 3 February 2014. Kasia submitted that no other known manufacturer of HSS in Australia produces like or directly competitive goods to those subject to the exemption application.

In making this submission, Kasia noted that, while Australian HSS manufacturers have produced certain types of galvanised CHS (specifically in-line or pre-galvanised CHS), by reason of different standards and end-uses, there are limitations to the degree to which these products may be substituted for HDG CHS.

5.1.4 Initiation of exemption inquiry

On 19 February 2014, the Commission accepted Kasia's application for an exemption of measures, and initiated an Exemption Inquiry (EX0015) into the allegations made in the application for the inquiry and supporting submission.

5.2 Australian Industry Questionnaire

On the date of initiation of the exemption inquiry, the Commission sent all three known members of the Australian industry for HSS an Australian Industry Questionnaire, inviting them to respond to Kasia's application. These industry members are:

- Independent Tube Mills Pty Ltd (ITM);
- Orrcon Operations Pty Ltd (Orrcon); and
- OneSteel Australian Tube Mills (ATM).

All three known industry members responded to the Australian Industry Questionnaire. Due to the timing of the issue of the questionnaire, it queried the Australian industry members in relation to the original goods subject to the exemption application and not the amended goods subject to the exemption application. Discussion was subsequently had with ATM on the amended goods subject to the exemption.

In their responses, both ITM and Orrcon submitted that they did not object to the granting of the exemption.

Non-confidential versions of the responses to the Australian Industry Questionnaire form **Attachment 2**.

ATM's response objected to the granting of an exemption in relation to the original goods the subject of the application. ATM submitted that it does produce goods that are identical to the goods subject to the exemption application (and hence like or directly competitive). It included a listing of invoices for what it contended was Australian-produced HDG CHS in the size range that includes 25, 32, 40 and 50 NB.

ATM advised that this HDG CHS is produced from black CHS that is manufactured at ATM's facilities, 'batch-galvanised' by a third party in Australia and then sold by ATM.

5.3 Supplementary Australian Industry Questionnaire and meeting with ATM

Following receipt of ATM's response to the Australian Industry Questionnaire, the Commission forwarded a Supplementary Australian Industry Questionnaire to ATM for completion on 1 April 2014. This questionnaire also related to the original description of the goods subject to the application for exemption (HDG CHS).

This questionnaire sought further information in relation to importations of HDG CHS by ATM or its affiliates, access to ATM's batch-galvanised HDG CHS by its customers, differences and similarities between imported and locally-manufactured HDG CHS and reasons for using an external galvaniser.

On 15 April 2014, the Commission met with representatives of ATM, prior to the company's submission of its response to the Supplementary Australian Industry Questionnaire. During this meeting, ATM again submitted its objection to the exemption of the original goods subject to the exemption application (at this stage, the description had not been amended).

ATM submitted that it and other Australian industry members (namely Orrcon) manufacture and supply like or directly competitive goods to those subject to the exemption application, and an exemption from measures is not warranted.

During this meeting, ATM explained that galvanised HDG CHS can be classified into three categories:

1. Pre or in-line galvanised CHS

    - zinc coating mass of approximately 100g/m^2
    - able to be manipulated (bent and shaped)
    - able to be directly welded
    - ATM's production of this is sold under the DuraGal® and DuraGal Plus® trademarks

2. Air-blown HDG CHS (produced through a semi-automatic hot-dip galvanising process)

    - zinc coating mass of approximately 300g/m^2
    - able to be manipulated
    - difficult to directly weld

3. Batch-galvanised HDG CHS

    - zinc coating mass between 500 and 600 g/m^2 or possibly more (based on steel thickness)
    - cannot be readily manipulated
    - cannot be directly welded

The original goods subject to the exemption application encompasses both categories 2 and 3 above, while the amended goods subject to the exemption application relate only to category 2 goods.

ATM also explained that:

- ATM currently supplies the following galvanised CHS to the Australian market:
    - batch-galvanised HDG (category 3); and
    - pre and in-line galvanized CHS (category 1).
- The batch-galvanised CHS ATM supplies is made from black pipe that is manufactured by ATM and then 'batch' galvanised by a local external provider.
- Air-blown HDG CHS is not imported or sold by ATM, but imported product may be sourced by ATM's customers from other suppliers for on-sale to their own customers.
- Australian made batch-galvanised HDG CHS (category 3) is like to, and directly competitive with, imported HDG CHS (both category 2 and 3). Additionally, ATM's pre or in-line galvanised CHS (DuraGal® and DuraGal Plus) is directly competitive with HDG CHS in numerous applications, specifically those that require the product to be manipulated and welded.

A full Record of Meeting of this meeting was placed on the inquiry's Public Record, and is attached as **Attachment 3**.

On 29 April 2014, ATM responded to the Supplementary Australian Industry Questionnaire (a non-confidential version of the response is available on the Public Record). The company also submitted responses to outstanding questions raised by the Commission in the meeting of 15 April 2014. These submissions reiterated the points discussed in the 15 April 2014 meeting.

ATM's response to the Supplementary Australian Industry Questionnaire included evidence of the production of HDG HSS in Australia for one sale selected by the Commission from ATM's invoice listing provided in its response to the Australian Industry Questionnaire. The Commission was able to use this evidence to trace the selected CHS through from manufacture into black pipe by ATM, to external batch hot-dipped galvanising, and sale to ATM's customer. The Commission considers this to be sufficient proof that the batch galvanising of ATM-produced CHS has occurred in Australia.

The response further addressed points of difference and similarities between imported air-blown galvanised HDG CHS (category 2) and Australian-produced batch galvanised HDG CHS (category 3).

ATM's response to the Supplementary Australian Industry Questionnaire forms **Attachment 4**.

5.4 Narrowing of scope of goods subject to exemption

Following the publication of ATM's response to the Supplementary Australian Industry Questionnaire and the Record of Meeting, Kasia (under its trading name 'DE

Engineers') lodged a submission to the inquiry that sought to narrow the definition of the goods subject to the exemption inquiry.

This revised the definition to the amended goods subject to the exemption application outlined in Section 5.1.1. This revision narrowed the goods description to HDG CHS of specific nominal bore (NB) that has been 'air-blown' and has a zinc coating mass of 300g/M^2. This effectively confines Kasia's application to category 2 HDG CHS (air-blown HDG CHS).

The Commission has accepted this narrowing of scope by Kasia and has assessed the claims made in Kasia's application only in relation to this narrower description of the exemption goods.

5.5 Investigation 254 verification meetings with ATM

Following the narrowing of the scope of the inquiry to amended goods subject to the exemption application, the Commission met with ATM to undertake verification of the company's data submitted in its application for an investigation into HSS exported to Australia from Thailand (Investigation 254).

During that discussion, the Commission explained that Kasia now sought to only exempt the amended goods subject to the exemption application (i.e. air-blown HDG CHS). The Commission queried whether ATM objected to the granting of an exemption in relation to the amended description.

In response ATM explained:

- it would continue to object to an exemption being granted in relation to the amended goods subject to the exemption application because air blown HDG HSS would still compete in the same market as pre and in-line galvanised CHS and batch-galvanised HDG CHS;
- it is of the view that "air blowing" is merely an additional process to control the thickness of zinc on the surface of the CHS;
- it considers that "air blown" HDG CHS is a direct substitute for Duragal® and Duragal Plus® galvanised CHS that it manufactures domestically, as well as the batch-galvanised HDG CHS manufactured by ATM and an external galvaniser;
- Duragal® and Duragal Plus® products can and have been used as a substitute for HDG CHS, and it is only in the marine environment for medium to long term applications that Duragal® and Duragal Plus® are not substitutable for HDG CHS.

The details of this discussion are contained in ATM's *Australian Industry Visit Report* for Investigation 254, available on the Commission's Public Record.

5.6 Information relied upon

In coming to the conclusions and recommendations in this report, the Commission has had regard to all available information, including:

- the application for exemption and submission lodged by Kasia in support of the application;

- responses to the Australian Industry Questionnaire and Supplementary Australian Industry questionnaire for this inquiry (see Chapter 5);
- general submissions made to the exemption inquiry;
- information gathered by the Commission during the original investigation into HSS (Investigation 177), and the ongoing investigation to HSS from Thailand (Investigation 254);
- information gathered during meetings with ATM; and
- information gathered by the Commission through independent research.

6 AUSTRALIAN INDUSTRY'S CAPACITY TO PRODUCE "LIKE OR DIRECTLY COMPETITIVE" GOODS

6.1 Australian production of galvanised CHS

Available evidence suggests that the following types of galvanised CHS are produced and sold in Australia:

- pre-galvanised and in-line galvanised CHS (category 1); and
- batch-galvanised HDG CHS (category 3).

No evidence exists that identical goods to the goods subject to the exemption application (the amended goods subject to the exemption application - air-blown HDG CHS with a coating mass of 300g/M^2) are produced in Australia.

In terms of pre-galvanised and in-line galvanised CHS, the Commission understands that all three Australian industry members manufacture this in Australia. These are sold under various trading names, including:

- Duragal® and Duragal Plus® - ATM
- AllGal® and MAXI-TUBE® - Orrcon
- ITM-GAL™ - ITM

Orrcon's MAXI-TUBE® differs from traditional galvanised CHS (zinc coated) in that its coating comprises of zinc, aluminium and magnesium.[12]

Product catalogues for the above products (available for download from each company's website) form **Attachment 5**. The product catalogue for Orrcon's imported air-blown HDG CHS is also contained in this attachment, as are printouts from one of ATM's distribution customers' website in relation to ATM's galvanised products.

6.2 Australian Industry's production of like goods

As outlined in Section 4.2, the Productivity Commission has examined the term 'like or directly competitive' goods, and considered that 'like goods' in the context of a safeguards inquiry means identical goods (alike in all respects) or, in the absence of these, goods having characteristics closely resembling those of the product under consideration.

This definition closely reflects the definition of "like goods" found in subsection 269T(1) of the Customs Act. The Commission has therefore adopted this interpretation of 'like or directly competitive goods' for the purposes of its assessing this exemption inquiry.

The assessment as to whether the Australian industry produces like goods is outlined below.

[12] As outlined on Orrcon's webpage www.orrconsteel.com.au.

6.2.1 Is Australian production alike in all respects?

Available evidence (outlined in Chapter 5) suggests that Australian-produced galvanised CHS is not identical in all respects to the goods subject to the exemption application (air-blown HDG CHS). Differences are examined below.

Pre-galvanised and in-line galvanised CHS v air blown HDG CHS

Available evidence (outlined in Chapter 5) suggests that the following physical differences may exist between pre-galvanised and in-line galvanised CHS (category 1) and air-blown HDG CHS.

- Thickness of zinc coating (see Section 5.3 above).
- Galvanising of ends – in-line and pre-galvanised CHS commonly does not have galvanised ends (i.e. where the pipe is cut to length). Air-blown HDG CHS is cut prior to being galvanised in a zinc bath, and hence the CHS' ends are galvanised as well.
- Internal wall galvanising – some in-line galvanised CHS is only galvanised on its external wall and not internally. As outlined above, air-blown HDG CHS is dipped in a galvanising bath that coats both the inner and outer wall of the CHS.

Batch galvanised HDG CHS v air-blown HDG CHS

Available evidence (outlined in Chapter 5) suggests that the following physical differences may exist between batch-galvanised HDG CHS (category 3) and air-blown HDG CHS.

- Thickness of zinc coating (see Section 5.3 above).
- Finish appearance:
    - the loading of CHS in a 'cage' or jig for batch galvanising to create HDG CHS can leave surface imperfections on the CHS that are not present on air-blown HDG CHS;[13] and
    - batch-galvanised HDG commonly has zinc 'dags' and excessive internal zinc providing an inconsistent surface area, inconsistent zinc coating and less aesthetically appealing finish;[14]
    - air-blown HDG CHS has a more smooth and even surface finish than batch-galvanised HDG CHS.[15]
- Straightness – batch-galvanised CHS is at increased risk of warping during the production process, resulting in pipe that is not straight enough to meet the necessary Australian standards[16] (although ATM Has submitted that this is not really an issue with CHS)[17].

[13] Orrcon submission to Investigation 177, *Submission in Response to Statement of Essential Facts No. 177*, 14 May 2012.
[14] As outlined in Final Report 177 for the original investigation into HSS.
[15] Orrcon submission to Investigation 177, *Submission in Response to Statement of Essential Facts No. 177*, 14 May 2012, and discussions with ATM during the industry verification visit for Investigation 254.
[16] Orrcon submission to Investigation 177, *Submission in Response to Statement of Essential Facts No. 177*, 14 May 2012.
[17] Refer to *Record of Meeting between the Commission and ATM*, 15 April 2014– Attachment 3.

6.2.2 Does the Australian production have characteristics closely resembling those of the imported goods?

Having determined that the Australian industry's production of galvanised CHS is not identical to the goods subject to the exemption application, the Commission has examined whether the Australian-produced galvanised HDG CHS has characteristics closely resembling those of the imported goods.

In doing so, the Commission has applied the considerations used by the Commission in the context of determining whether the goods have characteristics closely resembling each other in determining 'like goods' in relation to sections 269TB(1), 269TAC(1) and 2369TG and TJ(1) and TJ(2) of the Customs Act. These considerations are detailed in Chapter 2 of the *Dumping and Subsidy Manual*.

Although the *Dumping and Subsidy Manual* does not explicitly state that these considerations apply to assessing 'like goods' in an exemption context, it is considered reasonable to apply this approach given the Productivity Commission's determination of the term 'like goods' in considering 'like or directly competitive' goods, which is similar to the definition of 'like goods' in the Customs Act.

The Commission finds that notwithstanding some physical differences, batch-galvanised HDG CHS and pre-galvanised or in-line galvanised HDG CHS have characteristics closely resembling air-blown HDG CHS and are therefore 'like goods' to air-blown HDG CHS.

The Australian manufactured goods and the exemption goods possess:

- physical likeness, being:
    - CHS;
    - made from hot-rolled welded steel;
    - available in the NB sizes nominated in the application
    - coated (galvanised) in a zinc coating
- commercial likeness (examined in more detail at Section 6.3 below), being:
    - directly competitive;
    - interchangeable in some applications;
    - able to be switched between by consumers in some applications; and
    - sold through the same distribution channels
- functional likeness (examined in more detail at Section 6.3 below), being:
    - used for the same end use in some applications and performing similar functions
- production likeness, being:
    - electric resistance welded CHS, made from hot-rolled steel though a rolling, forming and welding process;
    - galvanised by either being:
        - dipped into a molten zinc bath (batch-galvanised HDG CHS); or
        - coated with a zinc layer either during HSS production or prior to production (where the raw material is galvanised prior to tolling and welding).

6.3 Does a competitive commercial relationship exist between the Australian production and air-blown HDG CHS?

Having found that the Australian industry does produce like goods to air-blown HDG CHS, the Commission considers that it may not be necessary to determine whether

the Australian production is directly competitive to air-blown HDG CHS. However, this assessment has been performed for the purposes of this report in any case.

From the available information, the Commission understands the following:

- ATM's batch-galvanised HDG CHS and imported air-blown HDG CHS are able to be used for some, though not all, of the same applications and end uses. There may be some applications where only air-blown HDG CHS is fit for purpose. For example, applications requiring the corrosion protection of HDG CHS and where the CHS is required to be manipulated. This is because the zinc coating of air-blown HDG CHS is thick enough to withstand the relevant erosion risks[18], while being thin enough to allow the requisite manipulation[19] as explained by ATM during the meeting of 15 April 2014 (see Attachment 3);
- ATM's pre and in-line galvanised HDG CHS and air-blown HDG CHS are able to be used for some, though not all, of the of the same applications and end uses, as evidenced by product brochures and website advertising material included in Attachment 5 that list common uses for ATM's DuraGal® and DuraGal Plus® CHS and HDG CHS that include agriculture, engineering construction, residential and non-residential construction, manufacturing, mining and transport and storage;
- evidence exists of end users using pre-galvanised and in-line galvanised HDG CHS for the same end uses as air-blown HDG CHS, suggesting a degree of interchangability (see Attachment GEN 9 of ATM's *Australian Industry Visit Report* for Investigation 254);
- batch galvanised HDG CHS, pre-galvanised or in-line galvanised CHS and air-blown HDG CHS are distributed to the market via the same distribution chain, being either sold to distribution businesses by the Australian manufacturer or by importers of HSS, then on-sold to end users or smaller distributors; and
- the Australian-made galvanised CHS is capable of performing the same functions as air-blown HDG CHS, including being used for parts of fences, cattle yards and outdoor structures[20].

In light of the above, the Commission finds that, although there are some applications in which only air-blown HDG CHS may be suitable (and hence it does not compete with the Australian industry's production), the Australian industry does produce goods which are directly competitive with air-blown HDG CHS.

6.4 Conclusion

The Australian industry produces like and directly competitive goods to air-blown HDG CHS.

[18] In-line and pre-galvanised HDG CHS does not have a thick enough coating for this
[19] Batch-galvanised HDG CHS has a thicker zinc coating and this may not be suitable for bending and welding.
[20] As detailed in the various product catalogues of Australian and imported galvanised CHS (see Attachment 5).

7 AUSTRALIAN INDUSTRY'S CAPACITY TO PRODUCE "LIKE OR DIRECTLY COMPETITIVE" GOODS ON COMMERCIAL TERMS

As outlined at Section 4.1, Section 8(7)(a) or 10(8)(a) allows for the granting of an exemption in relation to certain goods where:

> *like or directly competitive goods are not offered for sale in Australia to all purchasers on equal terms under like conditions having regard to the custom and usage of trade.*

Consequently, if an Australian industry produces like or directly competitive goods (which has been established above in relation to air-blown HDG CHS), and it can be shown that they are not offered for sale in line with the above, an exemption may still be granted under the Dumping Duty Act.

There has been no suggestion by Kasia or any other interested party that the Australian industry does not offer their like or directly competitive goods to all purchasers on equal terms under like conditions having regard to the custom and usage of trade, and hence the Commission has not examined this in detail.

However, the Commission notes that ATM has submitted:

> *All of ATM's customers (steel distributors) are able to access Australian-made HDG CHS equally, subject to minimum order requirements and customer-specific established terms of trade (e.g. credit terms, deliver terms).*[21]

This suggests that ATM offers its Australian-produced like or directly competitive goods to all customers in line with the requirements of Sections 8(7)(a) and 10(8)(a).

[21] Refer to *Record of Meeting between the Commission and ATM*, 15 April 2014– Attachment 3.

8 RECOMMENDATION

The Commission finds that like or directly competitive goods are offered for sale in Australia to all purchasers on equal terms under like conditions having regard to the custom and usage of trade, and accordingly the conditions of Sections 8(7)(a) and 10(8)(a) of the Dumping Duty Act for granting an exemption are not satisfied.

Accordingly, the Commission recommends that the Parliamentary Secretary not exempt the goods the subject of the application from the measures.

9 ATTACHMENTS

Attachment 1	Exemption Application
Attachment 2	Responses to the Australian Industry Questionnaire
Attachment 3	Record of Meeting between the Commission and ATM, 15 April 2014
Attachment 4	Response to the Supplementary Australian Industry Questionnaire - ATM
Attachment 5	CHS product brochures

APPLICATION - KASIA NOMINEES PTY LTD (NON-CONFIDENTIAL)

APPLICATION FOR MINISTERIAL EXEMPTION OF GOODS FROM A DUMPING DUTY AND/OR A COUNTERVAILING DUTY NOTICE

APPLYING TO

Certain Hollow Structural Sections Exported from The People's Republic of China, the Republic of Korea, Malaysia and Taiwan

APPLICANT

Kasia Nominees Pty Ltd (T/A DE Engineers)

Pursuant to

Subsections 8(7) and 10(8) of the *Customs Tariff (Anti Dumping) Act 1975* (Cth)

APPLICATION FOR MINISTERIAL EXEMPTION FROM DUMPING AND/OR COUNTERVAILING DUTY

Kasia Nominees Pty Ltd, an importer of goods on which the following notices have been, or may be, published:

☒ a dumping duty notice ; and/or

☒ a countervailing duty notice,

in respect of

Certain Hollow Structural Sections exported to Australia from The People's Republic of China (**China**), the Republic of Korea (**Korea**), Malaysia and Taiwan,

hereby requests that the Minister, by notice in writing exempt the following goods:

electric resistance welded pipe made of carbon steel, comprising circular and hollow sections normally referred to as CHS (circular hollow sections) having a hot-dipped galvanised (HDG) finish, and a nominal size (NB) of either 25, 32, 40 or 50 millimetres (**the Exempt Goods**)

from:

☒ dumping duties pursuant to:

- ☒ paragraph 8(7)(a) of the *Customs Tariff (Anti Dumping) Act 1975* (***Dumping Duty Act***); and/or
- ☐ paragraph 8(7)(b) of the *Dumping Duty Act*; and/or

☒ countervailing duty pursuant to:

- ☒ paragraph 10(8)(a) of the *Dumping Duty Act*; and/or
- ☐ paragraph 10(8)(aa) of the *Dumping Duty Act*.

Evidence in support of this application for ministerial exemption is provided as follows:

☒ that like or directly competitive goods are not offered for sale in Australia to all purchasers on equal terms under like conditions having regard to the custom and usage of trade pursuant to paragraphs 8(7)(a) and 10(8)(a) of the *Dumping Duty Act* is provided in section B-1, and/or,

☐ that a Tariff Concession Order under Part XVA of the Customs Act 1901 in respect of the exempt goods is in force pursuant to paragraphs 8(7)(b) and 10(8)(aa) of the *Dumping Duty Act* is provided in section B-2

The following supporting information is contained in attachments to this application:

☒ Name, street and postal address, and form of business of the applicant (for example, company, partnership, sole trader) – see section A-1

☒ Name; title/position; telephone and facsimile numbers; and e-mail address of a contact within the organisation – see section A-2

☒ Name of consultant/adviser (if any) representing the applicant and a copy of the authorisation for the consultant/adviser – see section A-3

☒ Full description of the exported goods to which the application relates (the Exempt Goods) – see section A-4

☒ The tariff classification/statistical code of the Exempt Goods – see section A-5

Signature: .....
for and on behalf of Kasia Nominees Pty Ltd

Name: Kevin Prater

Position: General Manager

Applicant Company: Kasia Nominees Pty Ltd

Date: The 9th day of Dec 2013

APPLICATION FOR MINISTERIAL EXEMPTION

ATTACHMENT A – Applicant and Exempt Goods details

A-1 Name, street and postal address, and form of business of the applicant (for example, company, partnership, sole trader)

Applicant name	:	Kasia Nominees Pty Ltd
ABN	:	26 529 822 454
Entity type	:	Proprietary company
Street address	:	131 Clayton St Bellevue WA 6065
Postal address	:	Refer street address

A-2 Name; title/position; telephone and facsimile numbers; and e-mail address of a contact within the organisation

Company contact	:	Kevin Prater
Title/position	:	General Manager
Telephone contact	:	08 9274 2632
Facsimile contact	:	08 9274 6618
E-mail	:	kevin@deengineers.com.au

A-3 Name of consultant/adviser (if any) representing the applicant and a copy of the authorisation for the consultant/adviser

Consultant name	:	Arthur Vlahonasios
Position	:	International Trade Remedies Advisor
Organisation	:	Australian Industry Group
Telephone contact	:	03 9867 0267
Facsimile contact	:	03 9867 0157
E-mail	:	arthur.vlahonasios@aigroup.asn.au

Attach an Authority to deal with representative at **Appendix A-3**.

A-4 Full description of the exported goods to which the application relates

The exported goods to which the application relates are electric resistance welded pipe made of carbon steel, comprising circular and hollow sections normally referred to as CHS (circular hollow sections) having a hot-dipped galvanised (HDG) finish, and a nominal size (NB) of either 25, 32, 40 or 50 millimetres exported to Australia from China, Korea, Malaysia and Taiwan.

A-5 The tariff classification/statistical code of the imported goods

The goods are classified to tariff subheadings 7306.30.00 (statistical codes 31, 32, 33, 34, 35, 36 and 37), 7306.61.00 (statistical codes 21, 22 and 25) and 7306.69.00 (statistical code 10) in Schedule 3 of the *Customs Tariff Act 1995*.

APPLICATION FOR MINISTERIAL EXEMPTION

ATTACHMENT B – Basis that the notice is inappropriate

B-1 Evidence that like or directly competitive goods are not offered for sale in Australia to all purchasers on equal terms under like conditions having regard to the custom and usage of trade

1. In the last 12 months, has an enterprise produced and sold, in Australia, goods that are identical in all respects to the goods described in section A-4 of this Application?

   ☐ YES, answer B-1.2 and B-1.3

   ☒ NO, answer B-1.5

2. Name the enterprise that has produced in Australia, goods that are identical in all respects to the goods described in section A-4 of this Application?

3. Are these products available to all purchasers on equal terms under like conditions?

   ☐ YES, the conditions for the making of a ministerial exemption have not been satisfied under paragraphs 8(7)(a) and 10(8)(a) of the *Dumping Duty Act*

   ☐ NO, answer B-1.4

4. Provide evidence and explain why you consider that these products are not available to all purchasers on equal terms under like conditions.

Evidence can be in the form of sales invoices, sales contracts, sales reports or advertisements and brochures.

5. In the last 12 months, has an enterprise produced and sold, in Australia, goods that are like or directly competitive to the goods described in section A-4 of this Application?

   ☐ YES, answer B-1.6 and B-1.7

   ☒ NO, answer B-1.9

6. Name the enterprise that has produced in Australia, goods that are like or directly competitive to the goods described in section A-4 of this Application?

7. Are these products available to all purchasers on equal terms under like conditions?

☐ YES, the conditions for the making of a ministerial exemption have not been satisfied under paragraphs 8(7)(a) and 10(8)(a) of the *Dumping Duty Act*

☐ NO, answer B-1.8

8. Provide evidence and explain why you consider that these products are not available to all purchasers on equal terms under like conditions.

Evidence can be in the form of sales invoices, sales contracts, sales reports or advertisements and brochures.

9. Provide evidence and explain why you consider that these products are not like or directly competitive to the goods described in section A-4 of this Application?

Refer **CONFIDENTIAL ATTACHMENT B-1.9**

B-2 Evidence that a Tariff Concession Order under Part XVA of the Customs Act 1901 in respect of the exempt goods is in force pursuant to paragraphs 8(7)(b) and 10(8)(aa) of the *Dumping Duty Act*

1. Does a Tariff Concession Order under Part XVA of the *Customs Act 1901* is in force in respect of the goods described in section A-4 of this Application?

☐ YES, answer section B-2.2 and B-2.3

☒ NO, the conditions for the making of a ministerial exemption have not been satisfied under paragraphs 8(7)(b) and 10(8)(aa) of the *Dumping Duty Act*

2. Provide details of the Tariff Concession Order (**TCO**) Number, Operative Date and Declared Date

TCO Number	***Operative Date***	***Declared Date***

3. Provide extracts of relevant notices made pursuant to section 269R(1) of the *Customs Act 1901*.

Not applicable.

APPENDIX A3

Authority to Deal with Representative

I, *Kevin Prater, General Manager, Kasia Nominees Pty Ltd (T/A DE Engineers)*

An applicant for Ministerial exemption from dumping and/or countervailing duties in respect of

Certain Hollow Structural Sections exported from The People's Republic of China, the Republic of Korea, Malaysia and Taiwan

have engaged a representative

Arthur Vlahonasios, International Trade Remedies Advisor, The Australian Industry Group

for the purpose of this application.

I agree that the Anti-Dumping Commission may liaise directly with my representative, including for the release of confidential information.

Signed

09/12/2013

Dated:

SUBMISSION IN SUPPORT OF THE EXEMPTION APPLICATION

IN THE APPLICATION FOR MINISTERIAL EXEMPTION FROM INTERIM DUMPING AND COUNTERVAILING DUTIES

KASIA NOMINEES PTY LTD (T/A DE ENGINEERS

APPLICANT

SUBMISSION IN SUPPORT OF APPLICATION

From: Arthur Vlahonasios
Sent: Thursday, 23 January 2014 10:31 AM
To: FLOR Timothy (Timothy.Flor@adcommission.gov.au)
Cc: 'Kevin Prater'
Subject: Application - Ministerial Exemption - Hot Dipped Galvanised - Kasia Nominees Pty Ltd (t/a DE Engineers)

Dear Tim,

Following our telephone discussion yesterday, my client met with Orrcon who confirmed that they do not produce hot dipped galvanised pipe (see quotation attached, p. 2, [**CONFIDENTIAL ATTACHMENT 1**] and email from Orrcon, below [**CONFIDENTIAL ATTACHMENT 2**]).

Orrcon does produce a product known as AllGal that is made to a AS 4750-2003 Electrogalvanised Zinc coating. 50 grams/m2 on each side.

Hot Dipped Galvanised pipe uses a different production process, meets different standards (AS1163 C250), has different physical features (300g/m3) and is put to different end uses (highly oxidising environments).

Therefore, to answer the questions, specifically asked in your 19 December 2013 email:

1. The Commission notes that Kasia has provided information relating to supply from OneSteel, but not the other HSS industry members. In the last twelve months, have any Australian industry members produced and sold in Australia:

a. goods that are identical in all respects; or

No, there is no Australian industry producing hot dipped galvanised pipe (see quotation from Orrcon) [**CONFIDENTIAL ATTACHMENT 1**]

b. goods that are like or directly competitive

There is no Australian industry producing goods that are like or directly competitive to the imported hot dipped galvanised pipe (see quotation from Orrcon). [**CONFIDENTIAL ATTACHMENT 1**]

to the goods nominated by Kasia in its application for an exemption from anti-dumping measures?

Please provide evidence to support your answer.

2. From the applicant's knowledge of all products produced and sold in Australia, why are these Australian-made goods not like or directly competitive to the goods the subject of the exemption application?

AllGal (the electrogalvanised zinc coated product produced in Australia by Orrcon) competes with in-line galvanised finishes, but not got dipped galvanised finishes, the two finishes are designed to address different Australian Standards (AS 4750-2003 and AS 1163), different physical characteristics (HDG has greater zinc coated finishes), undergoes different production processes (electrogalvanising and hot dipped galvanising).

In responding to this question, please include information regarding:

a. the end use of the subject goods; and

The different standards and finishes of AllGal (in-line or pre-galvanised pipe) are ideal for terrain based applications, but are not suitable for use in highly oxidising environments, such as submerged or salt water based environments.

Attached is a product brochure of the AllGal (in-line or pre-galvanised range of Orrcon) [NON-CONFIDENTIAL ATTACHMENT 3], and the mill certificate issued by the applicant's exporter [CONFIDENTIAL ATTACHMENT 4].

b. the substitutability of other goods.

By reason of the different standards, and different end-uses, there are limitation to the degree to which the AllGal product may be substituted for the HDG product – this is conceded in the product categorisation of Orrcon (see attached) [NON-CONFIDENTIAL ATTACHMENT 5]

Hot Dipped Galvanised

Hot Dip Galvanised finished products are perfect for jobs that require longer lasting protection against all weather and all conditions. HDG is suitable for use in a wide range of pipe related applications.

Hot Dip Galvanised coating is applied to both the external and internal surfaces with a minimum coating weight of 300g/m^2, applied in accordance with AS1650.

The standard end finish is a plain end. A range of optional end treatment is available subject to enquiry. This includes including roll grooved, shouldered and screwed on or both ends.

The standard stock length available is 6.5m. Non-standard lengths up to 12m are available, subject to enquiry and minimum order quantities.

3. Is there further information on why the goods are no longer available in Australia from OneSteel?

The reasons for the withdrawal from production by the Australian industry are not known to the applicant

Accordingly, in light of this further information, the applicant does not propose to withdraw his application

Please do not hesitate to contact me with any further questions.

Kind regards,

Arthur

Arthur Vlahonasios
International Trade Remedies Advisor

Australian Industry Group
Telephone: 03 9867 0267
Mobile: 0400 585 049
Email: arthur.vlahonasios@aigroup.asn.au
www.aigroup.com.au/traderemedies

From: Arthur Vlahonasios
Sent: Friday, 24 January 2014 4:15 PM
To: 'FLOR Timothy'
Cc: kevin@deengineers.com.au
Subject: RE: Ministerial Exemption - Kasia Nominees Pty Ltd (t/a DE Engineers) [SEC=UNCLASSIFIED]

Thanks Tim,

The application relates specifically to certain hot dipped galvanised (HDG) steel tube, my instructions are that there are no Australian producers of HDG steel pipe.

The in-line or pre-galvanised steel pipe produced by Orrcon has been addressed in the additional information provided in my earlier email to you. Is there a suggestion that ITM in fact produces HDG steel pipe? If that is so, that is contrary to the best evidence my client has on the matter. Indeed, my review of the ITM website confirms that they produce a form of in-line or pre-galvanised pipe that is not the subject of the application, see below:

> ITM-GAL™ product builds on the extensive groundwork of our UltraBlack™ range and takes it to new heights – with galvanised results. Utilising a pre-galvanised source material eliminates any inconsistencies in applied coating and offers a superior level of protection against the natural elements.
> By utilising a 90g/m^2 Surface Coating Mass on both surfaces of the material, ITM-GAL™ tubular products come standard with excellent corrosion protection against white and red rust when compared to normal hot-dip galvanising processes.
> Taking on the same focus of strength & ductility, ITM-GAL™ products have a key market advantage: compliance to AS/NZS1163:2009 and Grade C450L0, while displaying the same industry-high Elongation % (24-30%) as our UltraBlack™ range of products.

Source: http://www.tubemills.com.au/itmgal/ (accessed 24/01/2014)

The issue of whether or not in-line/pre-galvanised HSS is "like or directly competitive" to the goods the subject of the exemption application (specifically HDG HSS), will be a matter for submissions by Orrcon and ITM in the context of the Commission's inquiries

I hope that this provides some clarity on my client's position.

I would happy to discuss this further with you.

Arthur Vlahonasios
International Trade Remedies Advisor

Australian Industry Group
Telephone: 03 9867 0267
Mobile: 0400 585 049
Email: arthur.vlahonasios@aigroup.asn.au
www.aigroup.com.au/traderemedies

An Australian Government Initiative

The International Trade Remedies Advisor is an independent but Australian Government funded position employed by the Australian Industry Group

ATTACHMENT TO SUBMISSION - NON-CONFIDENTIAL ATTACHMENT 3

Product Catalogue

Orrcon Steel

we'll see it through

A Leading Australian Manufacturer of Structural Steel Hollow Section

Orrcon's ALLGAL steel hollow sections offer fabricators, builders and manufacturers so many benefits that it is now one of the leading range of zinc coated tubulars available on the Australian market today.

Whether it be a shade structure, cattle yard, bus shelter, floor framing or fence post, ALLGAL is now specified and used in a myriad of applications across Australia and New Zealand.

ALLGAL combines the strength and durability of structural steel with the corrosive protection properties of our unique duplex coating system which comprises a uniform and consistent electrogalvanized zinc coating and Clear-Tec clear polymer protective coating.

What makes ALLGAL® a Better Alternative?

ALLGAL is an excellent alternative to other in-line galvanized and hot-dip galvanized steel sections because:

- ALLGAL provides sound corrosion protection in mildly corrosive environments
- ALLGAL is faster, safer and easier to weld
- ALLGAL is easier and faster to laser process
- ALLGAL provides for a superior paint and powdercoat finish
- ALLGAL's zinc coating is easy to repair
- ALLGAL is safer to handle
- ALLGAL is available in Minipak quantities
- ALLGAL is available in a larger size range than other in-line galvanized steel hollow sections

Sound Corrosion Protection

ALLGAL's zinc coating combined with its Clear-Tec polymer coating results in a steel hollow section product which possesses sound corrosion protection properties in mildly corrosive environments.

ALLGAL is suitable for use in moderate to severe environments when top-coated in accordance with the following standard - AS/NZS 2312:2002.

Because ALLGAL is manufactured from steel which is zinc coated with high purity zinc on both sides prior to being cold-formed into hollow section, all ALLGAL products are protected from corrosion on the inside and out.

Although white rust is evidence that the zinc coating is doing its job, ALLGAL's Clear-Tec polymer coating increases the time before white rust commences.

The combination of high purity zinc and Clear-Tec results in ALLGAL products offering corrosion protection properties comparable with other galvanized products containing a higher zinc coating weight.

Faster, Safer & Easier to Weld

The thickness of ALLGAL's protective zinc coating is uniform and consistent making it easy to weld and causes considerably less weld spatter than hot-dip galvanized products.

ALLGAL's Clear-Tec polymer coating makes welding easier and cleaner as it reduces the potential for weld spatter to adhere to the steel section's surface.

Unlike hot-dip galvanized coated steel products which emit abundant potentially harmful fumes during welding, ALLGAL's protective zinc coating is lead free making welding safer.

ALLGAL is faster to weld than most other in-line galvanized and hot-dip galvanized steel sections as it can be welded at the same speed and setting as standard primed steel hollow sections.

ALLGAL is also easier to weld than most other in-line galvanized and hot-dip galvanized steel sections because arc initiation is similar to that of primed sections.

Easier and Faster to Laser Process

ALLGAL's smooth and consistent zinc coating thickness results in ALLGAL being up to 20 percent faster in terms of laser cutting compared to in-line galvanised, hot-dip galvanized and painted steel hollow sections.

Superior Paint and Powdercoat Finish

ALLGAL's unique smooth and consistent zinc coated surface provides an ideal substrate for powder-coating compared to hot-dip galvanized steel products which can be prone to surface unevenness and flaking.

Safer to Handle

The smooth surface finish of ALLGAL products makes them safer to handle than traditional hot-dip galvanized products which often contain sharp protrusions caused by the galvanizing process.

Easy to Repair & Apply Additional Zinc-based Paint Coatings

There may be situations where the repair or (re)application of additional protective zinc-based paint coatings to ALLGAL products may be required.

Liquid ALLGAL has been developed by Orrcon to complete the ALLGAL system.

Liquid ALLGAL is Orrcon's high content and high purity zinc-based cold galvanized protective paint coating product specifically designed for use on Orrcon ALLGAL steel hollow sections. When used in accordance with the manufacturer's instructions, Liquid ALLGAL provides an effective method of repair and maintenance of ALLGAL's protective zinc coating and provides an excellent colour match. Liquid ALLGAL is available in 400 gram net aerosols and 20 litre drums.

Product Availability and Size Range

All ALLGAL products are available in MiniPak quantities (approximately half the quantity of full packs) which means customers can hold smaller stock quantities.

ALLGAL is available in a larger range of sizes compared to other in-line galvanized products.

CIRCULAR HOLLOW SECTION					
NB (mm)	OD (mm)	t (mm)		ALLGAL (Grade C350L0)	ALLGAL (Grade C250L0)
20	26.9	2.0	XL	✓	
20	26.9	2.3	L	✓	
20	26.9	2.6	M		✓
25	33.7	2.0	XL	✓	
25	33.7	2.6	L	✓	
25	33.7	3.2	M		✓
32	42.4	2.0	XL	✓	
32	42.4	2.6	L	✓	
32	42.4	3.2	M		✓
40	48.3	2.3	XL	✓	
40	48.3	2.9	L	✓	
40	48.3	3.2	M		✓
50	60.3	2.3	XL	✓	
50	60.3	2.9	L	✓	
50	60.3	3.6	M		✓
65	76.1	2.3	XL	✓	
65	76.1	3.2	L	✓	
65	76.1	3.6	M		✓
80	88.9	2.6	XL	✓	
80	88.9	3.2	L	✓	
80	88.9	4.0	M		✓
90	101.6	3.2	L	✓	
90	101.6	4.0	M	✓	✓
100	114.3	3.2	XL	✓	
100	114.3	3.6	L	✓	
100	114.3	4.5	M	✓	✓
125	139.7	3.0	XL	✓	
125	139.7	3.5	L	✓	
125	139.7	5.0	M	✓	✓
150	165.1	3.0	XL	✓	
150	165.1	3.5	L	✓	
150	165.1	5.0	M	✓	✓

Note: Available in standard lengths of 6.5 metres

SQUARE HOLLOW SECTION

Grade C350L0	
dxb (mm)	t (mm)
20x20	1.6
25x25	1.6
25x25	2.0
25x25	2.5
25x25	3.0
30x30	1.6
30x30	2.0
30x30	2.5
30x30	3.0
35x35	1.6
35x35	2.0
35x35	2.5
35x35	3.0
40x40	1.6
40x40	2.0
40x40	2.5
40x40	3.0
40x40	4.0
50x50	1.6
50x50	2.0
50x50	2.5
50x50	3.0
50x50	4.0
50x50	5.0
65x65	1.6
65x65	2.0
65x65	2.5
65x65	3.0
65x65	4.0
65x65	5.0
75x75	2.0
75x75	2.5
75x75	3.0
75x75	3.5
75x75	4.0
75x75	5.0
89x89	2.0
89x89	3.5
89x89	5.0
100x100	2.0
100x100	2.5
100x100	3.0
100x100	4.0
100x100	5.0
125x125	4.0
125x125	5.0

Note: 20x20 to 25x25mm available in standard lengths of 6.5 metres.
30x30mm and greater available in standard lengths of 8.0 metres.

RECTANGULAR HOLLOW SECTION

Grade C350L0	
dxb (mm)	t (mm)
38x25	1.6
38x25	2.0
50x25	1.6
50x25	2.0
50x25	2.5
50x25	3.0
65x35	1.6
65x35	2.0
65x35	2.5
65x35	3.0
75x25	1.6
75x25	2.0
75x25	2.5
75x50	1.6
75x50	2.0
75x50	2.5
75x50	3.0
75x50	4.0
75x50	5.0
76x38	1.6
100x50	1.6
100x50	2.0
100x50	2.5
100x50	3.0
100x50	3.5
100x50	4.0
100x50	5.0
125x75	2.0
125x75	3.0
125x75	4.0
125x75	5.0
150x50	2.0
150x50	2.5
150x50	3.0
150x50	4.0
150x50	5.0
150x100	4.0
150x100	5.0

Note: 38x25mm available in standard lengths of 6.5 metres.
50x25mm and greater available in standard lengths of 8.0 metres.

DESIGN RAIL (FLAT SIDED ROUND)

Grade C350L0	
dxb (mm)	t (mm)
62x50	2.0
62x50	2.5
62x50	4.0

YARD RAIL (FLAT SIDED OVAL)

Grade C350L0	
dxb (mm)	t (mm)
59x30	1.6
59x30	2.0
97x42	2.0
97x42	2.5
115x42	2.0
115x42	2.5

Note: Design Rail & Yard Rail are available in standard lengths of 6.1 metres.
They are also available in 8.0 metre lengths on request.
Note: MOQ may apply.

ALLGAL Specifications

ALLGAL is manufactured to the following Australian Standards:

AS 1163 – 1991 Structural Steel Hollow Sections.
AS 4750 – 2003 Electrogalvanized (zinc) coatings on ferrous hollow and open sections.

Orrcon's manufacturing process results in ALLGAL steel hollow sections containing an average zinc coating mass of 50 grams/m^2 on each side (total average coating mass of 100 grams/m^2). The external surface is sealed with a Clear-Tec polymer coating.

Applications

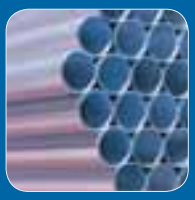
ALLGAL structural steel hollow sections are suitable for a multitude of applications including:

Agricultural / Manufacturing:

- Stock Yards
- Fence Posts & Rails
- Agricultural Implements
- Sheds and Silos
- Trailers
- Truck, Bus & Caravan Chassis
- Truck bodies
- Racking Systems
- Shelving Systems
- Conveyors
- Material Handling Equipment
- Rolling Garage Door Axles
- Roller Shutter Axles
- Sectional Garage Door Axles
- Machinery & Equipment
- Cattle Crushes
- Playground Equipment
- Pool & Garden Fencing
- Gates
- Bus Shelters
- Shade Structure Framework (including sails, blinds, awnings, gazebos, shade houses, umbrellas)

Construction:

- Architectural & Structural Columns
- Roof Framing
- Wall Framing
- Floor Framing
- Deck and Verandah Framing
- Pergola Framing
- Balustrade & Handrail
- Space Frames, Trusses



Notes:

General Information Regarding Installation, Storage & Handling of ALLGAL Products

ALLGAL steel hollow section products are only recommended for use in mildly corrosive environments and should not be used in environments exposing the product to soluble salts containing chlorides, nitrates and sulphates. When combined with moisture, these chemicals can attack the zinc coating and steel substrate causing accelerated corrosion.

Environments susceptible to acid rain, chemical spillage, animal waste, fertilisers and particularly those within one kilometre of coastal areas or other salt laden environments such as inland seas and lakes are considered harshly corrosive and are not suitable for ALLGAL unless further corrosion preventative measures are taken such as painting with an epoxy, polyurethane, oil-based topcoat or powder coating.

Where ALLGAL products must be used in corrosive environments, thicker high purity zinc coatings such as liquid ALLGAL should be applied prior to original installation and on an ongoing basis post installation. Where installed in salt-laden environments, ALLGAL products should be regularly washed down with clean water to remove salt deposits.

The life and performance of ALLGAL steel hollow sections will be prolonged where the products are applied, installed or used in an upright position or at such an angle which facilitates run-off of water and moisture due to gravity. Water or moisture which ponds on ALLGAL surfaces can cause white rust and may eventually lead to red rust. Where water and moisture does not run-off due to gravity or allowed to sufficiently dry, ALLGAL steel products must be inspected from time to time and wiped down to prevent the possibility of corrosion. Any indication of corrosion should be treated immediately by applying an appropriate corrosive protection product according to manufacturer's directions for use. Liquid ALLGAL is ideal in these cases. Note that whilst products such as Liquid ALLGAL assist in maintaining corrosive protection properties, they will not remedy any impact on the structural integrity of ALLGAL products caused by corrosion.

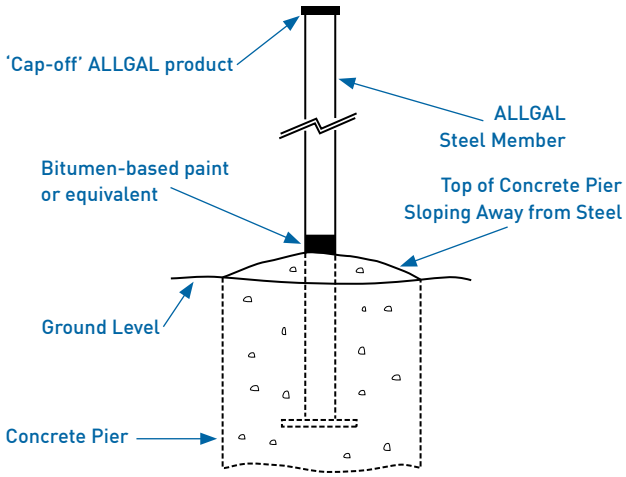
Cap ends of ALLGAL products where used in applications which can potentially allow water or moisture to enter the hollow area of the product.

Additional Precautions when Installing ALLGAL Products in the Ground

As with all galvanized products, the following precautions should be followed to obtain best results when installing ALLGAL in the ground:

- Prior to installation, coat section of steel in contact with concrete or earth with a bitumen-based paint product such as Ormonoid according to the manufacturer's directions for use. Bitumen paint should ideally coat 100mm of the steel above ground so as to ensure that moisture does not remain in contact with the steel.
- In addition, where ALLGAL products are installed into concrete piers, ensure the top of the concrete pier is above ground level providing a barrier between the earth and steel. Ensure the top of the concrete pier slopes away from the ALLGAL product to allow water and moisture to run away from the base of the steel.
- Under no circumstances should water or moisture be allowed to pond around the steel.

Installation of ALLGAL Steel Hollow Sections in Concrete Piers



Repair and Maintenance of ALLGAL's Protective Electrogalvanized Zinc Coating

Depending on the product's application, method of transportation, storage and handling, ALLGAL's protective zinc coating may encounter damage which can adversely affect the product's life. The coating should be repaired immediately with an appropriate product such as Liquid ALLGAL in accordance with the manufacturer's directions for use.

Exposed edges resulting from cutting, sawing or other work should be repaired immediately using an appropriate product such as Liquid ALLGAL according to the manufacturer's directions for use.

Storage Instructions

Avoid pack storage in external conditions or those susceptible to moisture. If storing ALLGAL in wet or moist conditions, separate individual lengths storing them off the ground so they can adequately dry. No galvanized steel products should remain in surface contact with each other under continually damp conditions as they will eventually develop white rust.

Powder-coating

Where users of ALLGAL are considering the application of powder-coating, some surface preparation of ALLGAL products may be required as powder-coating pre-treatment processes vary.

Contact Orrcon for more in-depth information regarding all technical aspects of ALLGAL accessible from www.orrcon.com.au

Product Catalogue

Orrcon ALLGAL® Product Catalogue
MRK-BRO-CRP-009 Jan 2013

Quality
ISO 9001

Orrcon Operations Pty Ltd ABN 92 094 103 090
Head Office: 121 Evans Road, Salisbury, QLD 4107
Telephone (07) 3274 0500 **Facsimile** (07) 3274 0517
For your nearest stockist: 1300 650 303
Orrcon Steel & Tube Direct: 1300 665 757
Email info@orrcon.com.au **Website** www.orrcon.com.au

Distributed by:

ATTACHMENT TO SUBMISSION - NON-CONFIDENTIAL ATTACHMENT 5

TUBE & PIPE
HOT ROLLED STRUCTURAL
BUILDING PRODUCTS
FENCING
PIPELINES
ORRFIRE FIREPIPE
NON-STANDARD PRODUCTS

Hot Dipped Galvanised

Hot Dip Galvanised finished products are perfect for jobs that require longer lasting protection against all weather and all conditions. HDG is suitable for use in a wide range of pipe related applications.
Â
Hot Dip Galvanised coating is applied to both the external and internal surfaces with a minimum coating weight of 300g/m^2, applied in accordance with AS1650.
Â
The standard end finish is a plain end. A range of optional end treatment is available subject to enquiry. This includes including roll grooved, shouldered and screwed on or both ends.
Â
The standard stock length available is 6.5m. Non-standard lengths up to 12m are available, subject to enquiry and minimum order quantities.
Â
Click here for all enquiries
Â

Australian Government
Anti-Dumping Commission

QUESTIONNAIRE - RESPONSE TO APPLICATION FOR EXEMPTION FROM DUTY UNDER *THE CUSTOMS TARIFF (ANTI-DUMPING) ACT 1975*

1 Introduction

The Anti-Dumping Commission (the Commission) has received an application from Kasia Nominees Pty Ltd (Kasia) for exemption from anti-dumping and countervailing measures under the *Customs Tariff (Anti-Dumping) Act 1975* (the Dumping Duty Act), in respect of certain hollow structural sections (HSS), for the sections exported to Australia from the People's Republic of China (China), the Republic of Korea (Korea), Malaysia and Taiwan.

Following receipt of this application, the Commissioner of the Anti-Dumping Commission has initiated an exemption inquiry.

Sections 8(7)(b) and 10(8)(a) of the Dumping Duty Act allow the relevant Minister (in this case the Parliamentary Secretary to the Minister for Industry (the Parliamentary Secretary), who has been delegated responsibility for anti-dumping matters) to exercise a discretion to exempt goods from anti-dumping measures, where he or she is satisfied that like or directly competitive goods are not offered for sale in Australia to all purchasers on equal terms under like conditions, having regard to the custom and usage of trade.

You have been identified from Australian Customs and Border Protection Service's (ACBPS) original investigation in respect of HSS (see below) as an Australian manufacturer of HSS. Consequently, the Commission seeks your assistance in this exemption inquiry by responding to the questions in this form. The Commission will use the information you provide in its assessment as to whether an exemption from dumping and countervailing duty should be recommended to the Parliamentary Secretary.

2 Current HSS Measures

In June 2012, ACBPS completed an investigation into the alleged dumping and subsidisation of HSS exported to Australia from China, Korea, Malaysia, Taiwan and the Kingdom of Thailand (Thailand).

The goods subject to this investigation (and later measures – see below) are

> *certain electric resistance welded pipe and tube made of carbon steel, comprising circular and non-circular hollow sections in galvanised and non-galvanised finishes. The goods are normally referred to as either CHS (circular hollow sections) or RHS (rectangular or square hollow sections). The goods are collectively referred to as HSS (hollow structural sections). Finish*

types for the goods include in-line galvanised (ILG), pre-galvanised, hot-dipped galvanised (HDG) and non-galvanised HSS.

The then Minister for Home Affairs accepted ACBPS' recommendations at the conclusion of this investigation that certain HSS from China, Korea, Malaysia and Taiwan had been dumped and/or subsidised and that dumping and subsidisation had caused material injury to the Australian industry.

A dumping duty notice and countervailing duty notice were published notifying of this decision on 3 July 2012. Australian Customs Dumping Duty Notice (ACDN) No. 2012/31 contains details of the measures, including a description of the goods subject to the measures.

The reasons for the Minister's decision in this case are contained in Trade Measures Report No.181 (REP 177).

3 The goods subject to the exemption application

The goods subject to this application for exemption are:

electric resistance welded pipe made of carbon steel, comprising circular and hollow sections normally referred to as CHS (circular hollow sections) having a hot-dipped galvanised (HDG) finish, and a nominal size (NB) of either 25, 32, 40 or 50 millimetres exported to Australia from China, Korea, Malaysia and Taiwan.

This forms a sub-set of the above goods subject to measures.

4 Exemption Provisions

The Dumping Duty Act allows the relevant Minister (or his delegate) to exercise his or her discretion to exempt goods from dumping and/or countervailing duties in certain circumstances, including the following.

Section 8

(7) The Minister may, by notice in writing, exempt goods from interim dumping duty and dumping duty if he or she is satisfied:

(a) that like or directly competitive goods are not offered for sale in Australia to all purchasers on equal terms under like conditions having regard to the custom and usage of trade;

Section 10

(8) The Minister may, by notice in writing, exempt goods from interim countervailing duty or countervailing duty if he or she is satisfied:

(a) that like or directly competitive goods are not offered for sale in Australia to all purchasers on equal terms under like conditions having regard to the custom and usage of trade;

It is noted at the outset that these exemption provisions are subject to the discretion of the Minister and are not automatically granted where the criteria set out in the provision appear to be met.

5 Claims made in the application

The following is a summary of the applicant's claims and information provided to the Commission.

Kasia provided quotations for HDG HSS (the exemption goods) from Australian manufacturers of HSS indicating that, while the goods could be supplied, they are not manufactured in Australia.

Two separate mill test certificates of the goods were provided that indicate that the goods are produced overseas and available for export to Australia.

Kasia provided publicly-available information as to types of galvanised HSS that are manufactured in Australia, and submitted that these products are not directly competitive to the goods the subject of the exemption application because of different Australian standards, different production processes, different finishes and different end-uses.

A non-confidential version of the exemption application is available on the Commission's Public Record.

6 Instructions on Completing this 'Response to the Exemption Application'

ACBPS' HSS investigation, completed in June 2012, identified you as an Australian producer of HSS.

Consequently, the Commission has forwarded you this 'Response to the Exemption Application' (the Response) to provide you with the opportunity to participate in this exemption inquiry.

The Commission will use the information provided by Australian manufacturers to determine:

- whether like or directly competitive goods are offered for sale in Australia, and
- whether offers for sale of the goods are available to all purchasers on equal terms under like conditions having regard to custom and usage of trade.

Due date for response

Australian manufacturers are requested to complete the Response and return it to the Commission by **5 March 2014**.

Responses may be lodged either by mail or by email to the following.

Director Operations 2
Anti-Dumping Commission
Customs House
5 Constitution Avenue
Canberra ACT 2601
Australia

Email: operations2@adcommission.gov.au
Fax: +61 2 6275 6990

Verification of the information that you supply

The Commission may seek to verify some or all of the information supplied in the response. The Commission may request evidence to support the claims such as quotations and offers of sale. An onsite visit by the Commission may be required in some cases. A report will be prepared of visits conducted and a non-confidential version will be made available to the applicant for comment.

There is no legislative timeframe for completion of an exemption inquiry, however a recommendation to the Parliamentary Secretary to the Minister for Industry will be made as soon as practicable after obtaining all the relevant information.

Outline of information required within the Response

Part A	Company contact information
Part B	Identical goods
Part C	Like or directly competitive goods
Part D	Capability to produce like or directly competitive goods
Part E	Additional comments
Part F	Your declaration

RESPONSE TO THE EXEMPTION APPLICATION

PART A – Company Information

A.1 Please provide the following company contact information

Name:	Matt Condon
Position in company:	Manager Trade Development
Address:	Level 6, 205 Pacific Highway St Leonards NSW 2065
Telephone:	02 8424 9880
Facsimile number:	02 8224 9885
E-mail address of contact person:	condonm@onesteel.com

PART B – Response to the Exemption Application

B.1

Does your company oppose the exemption application wholly or in part?

Yes, Australian Tube Mills opposes the exemption application wholly.

If your company does not oppose the application wholly or in part, you do not have to complete the remainder of this questionnaire.

If your company opposes or does not consent to the request for exemption wholly or in part, provide a description of that part of the request to which your company opposes or does not consent.

PART C – Identical Goods

C.1

Does your company produce, in Australia, goods that are identical in all respects to the goods described in Section 3 of this 'Response to Exemption Form'?

Yes, Australian Tube Mills does produce goods that are identical to the goods described in Section 3 of the "Response to Exemption Form".

If no, go to Part D - Like or directly competitive goods.

C.2

Please provide evidence that you have produced and sold in Australia, in the last 12 months, goods that are identical in all respects to the goods subject to this application for exemption.

> *Evidence can be in the form of production reports and sales invoices. To the extent that production reports or sales invoices do not refer to the goods in the same detail as set out in the description of the goods (Section 3), please provide additional information that indicates that identical goods have been produced or sold. The evidence should be attached to this form to ensure that it can be linked to this specific Response. Please also include any available product literature respecting the identical goods you have produced and sold.*

The evidence that Australian Tube Mills (ATM) submits includes invoices for Australian produced Hot Dipped Galvanised CHS in the size range that includes 25, 32, 40 and 50 NB. Refer to confidential attachment 1

These products are produced from black CHS that is manufactured at ATM's facilities, galvanised by a third party in Australia and then sold by ATM.

C.3

Provide evidence of the terms and conditions of sale of these identical goods. Are these products available to all purchasers on equal terms under like conditions? If so, provide evidence and explain why you consider that these products are available to all purchasers on equal terms under like conditions.

> *Evidence can be in the form of sales invoices, sales contracts, sales reports or advertisements and brochures.*

The evidence that Australian Tube Mills (ATM) submits includes invoices of Australian manufactured Hot Dipped galvanised CHS in sizes that includes 25, 32, 40 and 50 NB to a range of national and regional distributors on equal terms under like conditions.

In addition the availability of these products is listed in ATM's Product and Availability Guide dated August 2013.

PART D – Like or Directly Competitive Goods

D.1

If your company does not produce identical goods, does it produce and sell in Australia goods that are like or directly competitive to the goods subject to this application for exemption?

In addition to producing goods that are identical to the goods described, Australian Tube Mills also produces like and directly competitive goods marketed under the DuraGal brand. ATM is willing to provide evidence of this if it is required in addition to the material supplied in part C of the Questionnaire.

In determining whether the goods are like or directly competitive, the Commission will consider whether the goods have characteristics closely resembling each other and are substitutable.

The Commission may also consider;

- Whether physical characteristics of the goods are similar (including size, weight, shape, content, appearance, grade, standards, age, strength and purity);

- Whether the goods are commercially alike, this may include consideration of the following;
  - whether the goods directly compete in the same market sector;
  - the extent to which participants in the supply chain are willing to switch between the goods and the goods subject to the application for exemption;
  - how the price of the goods and goods subject to the application influences consumption;
  - whether the goods share similar distribution channels; and
  - whether the goods are similarly packaged.

- Functional likeness – whether the goods are suitable with regard to end use, this may include an assessment of;
  - the extent to which the goods are functionally substitutable;
  - the extent to which the goods are capable of performing the same or similar function;
  - whether the goods have the same or similar quality standards; and
  - consumer behavior in relation to the goods and goods subject to this application for exemption.

- Production likeness, this may include an assessment of;
  - the extent to which the goods are constructed of the same or similar materials;
  - the manufacturing process of the goods; and
  - whether any patented processes or inputs are involved in the production of the goods.

D.2

If you answered yes to question D.1, please provide a description of the goods produced by your company that you consider to be like or directly competitive to the goods subject to this application. Your description of the goods your company produces should refer to all aspects of the goods as set out in the description of the goods in Section 3.

Characteristics	Description

Please provide evidence that the goods you consider like or directly competitive to the goods subject to this application for exemption have recently been produced or sold in Australia by your company.

Evidence can be in the form of production reports and sales invoices. To the extent that production reports or sales invoices do not refer to the goods described in the above table, please provide additional information that indicates that the goods have been produced or sold. The evidence should be attached to this form to ensure that it can be linked to this specific Response. Please also include any available product literature concerning the like or directly competitive goods you produced and sold.

D.3

Provide evidence of the terms and conditions of sale of these like or directly competitive products. Are these products available to all purchasers on equal terms under like conditions? If so, provide evidence and explain why you consider that these products are available to all purchasers on equal terms under like conditions.

Evidence can be in the form of sales invoices, sales contracts, sales reports or advertisements and brochures.

PART E – Capability to Produce Identical or Like or Directly Products

E.1

If your company has not produced and sold in Australia products that are identical to, or like or directly competitive to the goods subject to this application for exemption, is your company capable of producing such goods?

E.2

If you answered yes to question E.1, indicate whether the product that you can produce is identical to, or like or directly competitive to the goods subject to this application for exemption.

E.3

If you are capable of producing identical, like or directly competitive goods, explain why you have not produced such goods.

> *Provide evidence of your production capability, including evidence of the production and sale of similar products, certification of the identical, like or directly competitive goods and at what cost they could be produced, as well as any plans for the imminent production of the goods or orders for the goods and any relevant information.*

E.4

If you are capable of producing identical, like or directly competitive goods, provide reasonable evidence of likely terms and conditions of sale for these goods.

PART F – Additional Comments

F.1

Provide any additional comments including any other information that will assist the Commissioner in reaching a recommendation to the Parliamentary Secretary regarding this application for exemption.

OneSteel submits that as the Australian industry produces identical and like goods that are directly competitive with the products described, and that these goods are offered for sale in Australia to all purchasers on equal terms under like conditions, there is no basis for the Commissioner to recommend that an exemption be granted by the Parliamentary Secretary.

PART G – Declaration

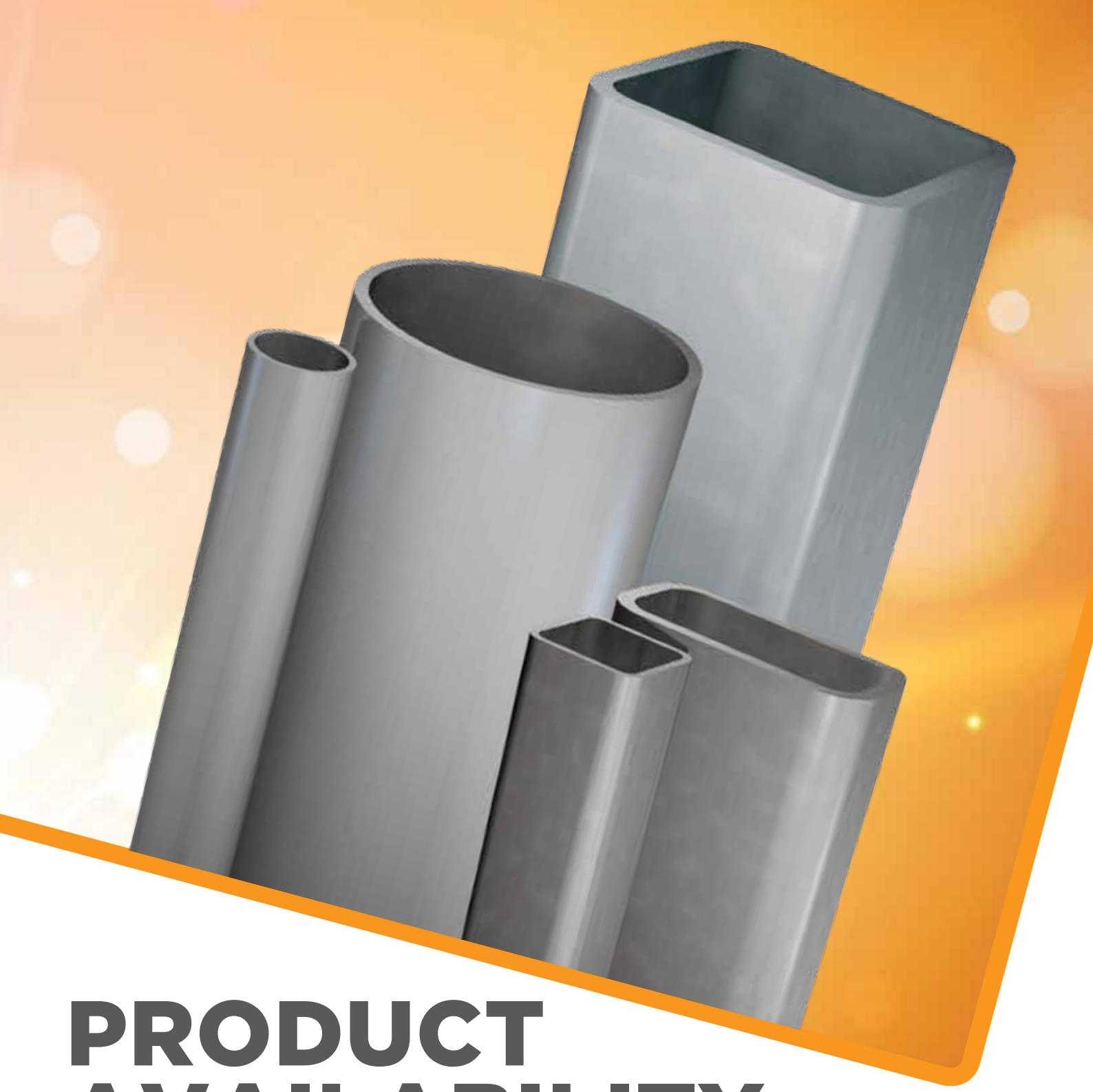
> I hereby declare that Australian Tube Mills (company) has completed the attached response to application for exemption and, having made due inquiry, certify that the information contained in this Response is complete and correct to the best of my knowledge and belief.

Name **Matt Condon**

Signature :.....

Position in Company : Manager Trade Development

Date **: 12th March 2014**



PRODUCT AVAILABILITY GUIDE

PIPE AND TUBE STRUCTURAL PRODUCTS

EFFECTIVE FROM: 26 AUGUST 2013

CANCELS PREVIOUS GUIDE DATED: 31 AUGUST 2013

APPLICABLE FOR AUSTRALIA & NEW ZEALAND

AustubeMills

SHAPING POSSIBILITIES

PRODUCT AVAILABILITY GUIDE

PIPE AND TUBE STRUCTURAL PRODUCTS

TABLE OF CONTENTS

PRODUCT AVAILABILITY GUIDE

MEDIUM — DURAPRIMED[RED]*
PLAIN ENDS, SCREWED ONE END AND SCREWED BOTH ENDS

Designation d_o t (mm)	Nominal Size DN	DuraPrimed PE Price Grp: PD	DuraPrimed SOE Price Grp: PD	DuraPrimed SBE Price Grp: PD	Pack Size	DuraPrimed PE, SOE & SBE
6.5 Metres					Lns	kg/m
33.7 x 3.2	25 M	✓	✓	R	91	2.41
42.4 x 3.2	32 M	✓	✓	✓	61	3.10
48.3 x 3.2	40 M	✓	✓	R	61	3.57
60.3 x 3.6	50 M	✓	✓	R	37	5.03
76.1 x 3.6	65 M	✓	-	R	37	6.43
88.9 x 4.0	80 M	✓	-	-	19	8.37
101.6 x 4.0	90 M	R	-	-	19	9.63
114.3 x 4.5	100 M	✓	-	R	19	12.2

✓	Cells are ex-stock items.
R	Cells are available ex-rolling only.
M	Cells are ex-rolling and require MOQ.

Specifications: Dual Specified - AS 1074 and AS/NZS 1163 C250L0.

For MOQ items the actual delivery quantity will be to the nearest pack or part pack (whichever is greater) as close to being within the +/-10% volume tolerance as possible.

* DuraPrimed replaces Painted

PRODUCT AVAILABILITY GUIDE

EXTRA LIGHT — CLEAR, OILED, HOT DIP GAL & DURAGAL$^{PLUS^{\wedge}}$ — PLAIN ENDS

Designation d_o t (mm)	Nominal Size DN	Clear Price Grp: PA	Oiled Price Grp: PA	Hot Dip Gal Price Grp: PB	DuraGal^{Plus} Price Grp: PC
6.5 Metres					
33.7 x 2.0	25 XL	R	-	-	✓
42.4 x 2.0	32 XL	M	-	-	M
48.3 x 2.3	40 XL	M	-	-	M
60.3 x 2.3	50 XL	R	-	-	M
76.1 x 2.3	65 XL	-	-	-	M
88.9 x 2.6	80 XL	M	-	M	M
101.6 x 2.6	90 XL	M	-	M	-
114.3 x 3.2	100 XL	M	-	M	-
139.7 x 3.0	125 XL	-	M	M	-
165.1 x 3.0	150 XL	-	M	M	-

Pack Size	Clear DuraGal^{Plus} Oiled	Hot Dip Gal
Lns	kg/m	
91	1.56	1.62
61	1.99	2.07
61	2.61	2.70
37	3.29	3.40
37	4.19	4.33
19	5.53	5.75
19	6.35	6.64
19	8.77	9.05
10	10.1	10.5
10	12.0	12.4

LIGHT — CLEAR, OILED & HOT DIP GAL — PLAIN ENDS

Designation d_o t (mm)	Nominal Size DN	Clear Price Grp: PA	Oiled Price Grp: PA	Hot Dip Gal Price Grp: PB
6.5 Metres				
33.7 x 2.6	25 L	R	-	-
42.4 x 2.6	32 L	✓	-	-
48.3 x 2.9	40 L	✓	-	-
60.3 x 2.9	50 L	✓	-	-
76.1 x 3.2	65 L	M	-	-
88.9 x 3.2	80 L	✓	-	M
101.6 x 3.2	90 L	M	-	M
114.3 x 3.6	100 L	✓	-	M
139.7 x 3.5	125 L	-	✓	M
165.1 x 3.5	150 L	-	M	M

Pack Size	Clear Oiled	Hot Dip Gal
Lns	kg/m	
91	1.99	2.05
61	2.55	2.63
61	3.25	3.33
37	4.11	4.21
37	5.75	5.89
19	6.76	6.92
19	7.77	8.02
19	9.83	10.0
10	11.8	12.1
10	13.9	14.4

✓	Cells are ex-stock items.
R	Cells are available ex-rolling only.
M	Cells are ex-rolling and require MOQ.

Specifications: AS/NZS 1163 C350L0.
Hot Dip Gal - Section 2 AS/NZS 4792 HDG 300.
DuraGal^{Plus} - Section 3 AS/NZS 4792 ZB 100/100.
DuraGal - Section 4 AS/NZS 4792 ILG 100.

For MOQ items the actual delivery quantity will be to the nearest pack or part pack (whichever is greater) as close to being within the +/-10% volume tolerance as possible.

^ DuraGal^{Plus} replace SupaGal

PRODUCT AVAILABILITY GUIDE

MEDIUM — CLEAR & OILED — PLAIN ENDS

Designation d_0 t (mm)	Nominal Size DN	Clear Price Grp: PA	Oiled Price Grp: PA	Pack Size Clear Oiled	
6.5 Metres				Lns	kg/m
33.7 x 3.2	25 M	✓	-	91	2.41
42.4 x 3.2	32 M	✓	-	61	3.10
48.3 x 3.2	40 M	✓	-	61	3.57
60.3 x 3.6	50 M	✓	-	37	5.03
76.1 x 3.6	65 M	✓	-	37	6.43
88.9 x 4.0	80 M	✓	-	19	8.37
101.6 x 4.0	90 M	✓	-	19	9.63
114.3 x 4.5	100 M	✓	-	19	12.2
139.7 x 5.0	125 M	-	✓	10	16.6
165.1 x 5.0	150 M	-	✓	10	19.7

MEDIUM — HOT DIP GAL — PLAIN ENDS

Designation d_0 t (mm)	Nominal Size DN	Hot Dip Gal Price Grp: PB	Pack Size Hot Dip Gal	
6.5 Metres			Lns	kg/m
60.3 x 3.6	50 M	M	37	5.14
76.1 x 3.6	65 M	M	37	6.56
88.9 x 4.0	80 M	M	19	8.53
101.6 x 4.0	90 M	M	19	9.81
114.3 x 4.5	100 M	M	19	12.4
139.7 x 5.0	125 M	M	10	16.9
165.1 x 5.0	150 M	M	10	20.0

✓	Cells are ex-stock items.
R	Cells are available ex-rolling only.
M	Cells are ex-rolling and require MOQ.

Specifications: Dual Specified - AS 1074 and AS/NZS 1163 C250L0.
Hot Dip Gal - AS/NZS 4792 HDG 300.

For MOQ items the actual delivery quantity will be to the nearest pack or part pack (whichever is greater) as close to being within the +/-10% volume tolerance as possible.

PRODUCT AVAILABILITY GUIDE

HEAVY — CLEAR & OILED — PLAIN ENDS

Designation d_o t (mm)	Nominal Size DN	Clear PE Price Grp: PA	Oiled Price Grp: PA	Pack Size	Clear
6.5 Metres				Lns	kg/m
33.7 x 4.0	25 H	✓	-	91	2.94
42.4 x 4.0	32 H	✓	-	61	3.80
48.3 x 4.0	40 H	✓	-	61	4.38
60.3 x 4.5	50 H	✓	-	37	6.19
76.1 x 4.5	65 H	✓	-	37	7.93
88.9 x 5.0	80 H	✓	-	19	10.3
101.6 x 5.0	90 H	✓	-	19	11.9
114.3 x 5.4	100 H	✓	-	19	14.5
139.7 x 5.4	125 H	-	✓	10	17.9
165.1 x 5.4	150 H	-	✓	10	21.3

HEAVY — HOT DIP GAL — PLAIN ENDS

Designation d_o t (mm)	Nominal Size DN	Hot Dip Gal PE Price Grp: PB	Pack Size	Hot Dip Gal
6.5 Metres			Lns	kg/m
42.4 x 4.0	32 H	M	61	3.87
48.3 x 4.0	40 H	M	61	4.46
60.3 x 4.5	50 H	M	37	6.30
76.1 x 4.5	65 H	M	37	8.07
88.9 x 5.0	80 H	M	19	10.5
101.6 x 5.0	90 H	M	19	12.1
114.3 x 5.4	100 H	M	19	14.7
139.7 x 5.4	125 H	M	10	18.1
165.1 x 5.4	150 H	M	10	21.6

EXTRA HEAVY — CLEAR — PLAIN ENDS

Designation d_o t (mm)	Nominal Size DN	Clear Price Grp: PA	Pack Size	Clear
6.5 Metres			Lns	kg/m
48.3 x 5.4	40 XH	✓	61	5.71
60.3 x 5.4	50 XH	✓	37	7.31
76.1 x 5.9	65 XH	✓	37	10.2
88.9 x 5.9	80 XH	✓	19	12.1

✓	Cells are ex-stock items.
R	Cells are available ex-rolling only.
M	Cells are ex-rolling and require MOQ.

Specifications: Dual Specified - AS 1074 and AS/NZS 1163 C250L0.
Hot Dip Gal - AS/NZS 4792 HDG 300.

For MOQ items the actual delivery quantity will be to the nearest pack or part pack (whichever is greater) as close to being within the +/-10% volume tolerance as possible.

PRODUCT AVAILABILITY GUIDE

SHS — DURAPRIMED*, DURAGAL$^{PLUS\hat{}}$ & DURAGAL

Designation *d b t* (mm)	DuraPrimed C350L0 Price Grp: RA	DuraGal^{Plus} C350L0 Price Grp: RC	DuraGal C450PLUS Price Grp: RC
25 x 25 x 1.6	R	R	-
2.0	R	R	-
2.5	✓	✓	-
3.0	✓	M	-
30 x 30 x 1.6	M	R	-
2.0	R	R	-
2.5	✓	M	-
3.0	M	M	-
35 x 35 x 1.6	M	M	-
2.0	✓	M	-
2.5	✓	✓	-
3.0	✓	M	-
40 x 40 x 1.6	R	R	-
2.0	R	R	-
2.5	✓	✓	-
3.0	✓	✓	-
4.0	✓	M	M
50 x 50 x 1.6	R	R	M
2.0	R	R	M
2.5	✓	✓	✓
3.0	✓	✓	M
4.0	✓	✓	✓
5.0	✓	✓	M
*6.0	✓	-	-

Pack Size (Lns)		All Listed Finishes
All Listed Finishes		
6.5m	8.0m	kg/m
100	-	1.12
100	-	1.36
100	-	1.64
100	-	1.89
-	100	1.38
-	100	1.68
-	100	2.03
-	64	2.36
-	100	1.63
-	100	1.99
-	64	2.42
-	64	2.83
-	81	1.88
-	81	2.31
-	64	2.82
-	64	3.30
-	49	4.09
-	64	2.38
-	64	2.93
-	49	3.60
-	49	4.25
-	36	5.35
-	30	6.39
-	25	7.32

✓	Cells are ex-stock items.
R	Cells are available ex-rolling only.
M	Cells are ex-rolling and require MOQ.

Specifications: AS/NZS 1163 - C350L0
AS/NZS 1163 - C450L0 supplied as C450PLUS
DuraGal^{Plus} - Section 3 AS/NZS 4792 ZB 100/100.
DuraGal - Section 4 AS/NZS 4792 ILG 100.

*50 x 50 x 6 is supplied as Oiled.

C450PLUS equivalent sections for DuraPrimed and DuraGal^{Plus} surface finish may be available ex rolling subject to mill limitations.

For MOQ items the actual delivery quantity will be to the nearest pack or part pack (whichever is greater) as close to being within the +/-10% volume tolerance as possible.

* DuraPrimed replaces Painted
^ DuraGal^{Plus} replace SupaGal

PRODUCT AVAILABILITY GUIDE

SHS — DURAPRIMED*, OILED, DURAGAL$^{PLUS\hat{}}$ & DURAGAL

Designation *d b t* (mm)	DuraPrimed C450PLUS Price Grp: RB	Oiled C450PLUS Price Grp: RB	DuraGal^{Plus} C450PLUS Price Grp: RD	DuraGal C450PLUS Price Grp: RD
65 x 65 x 1.6	R	-	R	M
2.0	R	-	R	M
2.5	✓	-	✓	✓
3.0	✓	-	✓	M
4.0	✓	-	M	M
5.0	✓	-	M	M
6.0	✓	-	-	M
75 x 75 x 2.0	R	-	R	✓
2.5	✓	-	✓	✓
3.0	✓	-	✓	✓
3.5	✓	-	✓	M
4.0	✓	-	✓	✓
5.0	✓	-	✓	✓
6.0	✓	-	-	✓
89 x 89 x 2.0	-	-	✓	-
3.5	✓	-	✓	✓
5.0	✓	-	✓	✓
6.0	✓	-	-	M
100 x 100 x 2.0	M	-	-	✓
2.5	-	-	M	M
3.0	✓	-	✓	✓
4.0	✓	-	✓	✓
5.0	✓	-	✓	✓
6.0	✓	-	-	✓
8.0	-	M	-	-
9.0	-	✓	-	-
10.0	-	M	-	-
125 x 125 x 4.0	✓	-	-	-
5.0	✓	-	-	-
6.0	✓	-	-	-
8.0	-	M	-	-
9.0	-	✓	-	-
10.0	-	M	-	-

Pack Size (Lns)		All Listed Finishes
All Listed Finishes		
8.0m	12.0m	kg/m
49	-	3.13
42	-	3.88
42	-	4.78
36	-	5.66
30	-	7.25
25	-	8.75
20	-	10.1
36	-	4.50
30	30	5.56
30	24	6.60
25	20	7.53
25	15	8.49
20	16	10.3
16	-	12.0
20	-	5.38
20	16	9.07
16	12	12.5
12	9	14.7
20	20	6.07
20	-	7.53
20	16	8.96
16	12	11.6
12	9	14.2
12	9	16.7
-	6	21.4
9	6	23.5
-	6	25.6
12	9	14.8
12	9	18.2
9	6	21.4
-	4	27.7
8	4	30.6
-	4	33.4

✓	Cells are ex-stock items.
R	Cells are available ex-rolling only.
M	Cells are ex-rolling and require MOQ.

Specifications: All sections to AS/NZS 1163 - C450L0 supplied as C450PLUS as marked.
DuraGal^{Plus} - Section 3 AS/NZS 4792 ZB 100/100.
DuraGal - Section 4 AS/NZS 4792 ILG 100.

For MOQ items the actual delivery quantity will be to the nearest pack or part pack (whichever is greater) as close to being within the +/-10% volume tolerance as possible.

* DuraPrimed replaces Painted
^ DuraGal^{Plus} replace SupaGal

PRODUCT AVAILABILITY GUIDE

SHS — DURAPRIMED* & OILED

Designation *d b t* (mm)	DuraPrimed C450PLUS Price Grp: RB	Oiled C450PLUS Price Grp: RB
150 x 150 x 5.0	✓	-
6.0	✓	-
8.0	-	M
9.0	-	✓
10.0	-	M

Pack Size (Lns)		All Listed Finishes
All Listed Finishes		
8.0m	12.0m	kg/m
9	6	22.1
6	6	26.2
-	4	33.9
6	4	37.7
-	2	41.3

Designation *d b t* (mm)	Oiled C450PLUS Price Grp: RF
200 x 200 x 5.0	✓
6.0	✓
8.0	M
9.0	✓
10.0	✓
12.5	✓
16.0	M
250 x 250 x 6.0	✓
8.0	M
9.0	✓
10.0	M
12.5	✓
16.0	M
300 x 300 x 8.0	✓
10.0	✓
12.5	✓
16.0	✓
350 x 350 x 8.0	M
10.0	✓
12.5	✓
16.0	✓
400 x 400 x 10.0	✓
12.5	✓
16.0	✓

Pack Size (Lns)		All Listed Finishes
All Listed Finishes		
8.0m	12.0m	kg/m
6	4	29.9
6	4	35.6
4	2	46.5
4	2	51.8
-	1	57.0
-	1	69.4
-	1	85.5
-	2	45.0
-	2	59.1
2	2	65.9
-	2	72.7
-	1	89.0
-	1	111
-	1	71.6
-	1	88.4
-	1	109
-	1	136
-	1	84.2
-	1	104
-	1	128
-	1	161
-	1	120
-	1	148
-	1	186

✓	Cells are ex-stock items.
R	Cells are available ex-rolling only.
M	Cells are ex-rolling and require MOQ.

Specifications: All sections to AS/NZS 1163 - C450L0 supplied as C450PLUS as marked.

For MOQ items the actual delivery quantity will be to the nearest pack or part pack (whichever is greater) as close to being within the +/-10% volume tolerance as possible.

* DuraPrimed replaces Painted

PRODUCT AVAILABILITY GUIDE

RHS — DURAPRIMED* & DURAGAL$^{PLUS\hat{}}$

Designation *d b t* (mm)	DuraPrimed C350L0 Price Grp: RA	DuraGal^{Plus} C350L0 Price Grp: RC
50 x 20 x 1.6	M	-
2.0	M	-
2.5	M	-
3.0	M	-
50 x 25 x 1.6	R	R
2.0	R	R
2.5	✓	✓
3.0	✓	✓
65 x 35 x 2.0	✓	M
2.5	✓	✓
3.0	✓	M
4.0	M	M
75 x 25 x 1.6	M	M
2.0	R	M
2.5	M	M

Pack Size (Lns) All Listed Finishes		All Listed Finishes
8.0m	12.0m	kg/m
96	-	1.63
96	-	1.99
72	-	2.42
72	-	2.83
96	-	1.75
96	-	2.15
72	-	2.62
60	-	3.07
54	-	2.93
54	-	3.60
45	-	4.25
35	-	5.35
65	-	2.38
65	-	2.93
48	-	3.60

✓	Cells are ex-stock items.
R	Cells are available ex-rolling only.
M	Cells are ex-rolling and require MOQ.

Specifications: AS/NZS 1163 - C350L0
AS/NZS 1163 - C450L0 supplied as C450PLUS as marked
DuraGal^{Plus} - Section 3 AS/NZS 4792 ZB 100/100.
DuraGal - Section 4 AS/NZS 4792 ILG 100.

Standard lengths are 8 metres.

C450PLUS equivalent sections for DuraPrimed and DuraGal^{Plus} surface finish may be available ex rolling subject to mill limitations.

For MOQ items the actual delivery quantity will be to the nearest pack or part pack (whichever is greater) as close to being within the +/-10% volume tolerance as possible.

* DuraPrimed replaces Painted
^ DuraGal^{Plus} replace SupaGal

PRODUCT AVAILABILITY GUIDE

RHS — DURAPRIMED*, OILED, DURAGAL$^{PLUS\hat{}}$ & DURAGAL

Designation *d b t* (mm)	DuraPrimed C450PLUS Price Grp: RB	Oiled C450PLUS Price Grp: RB	DuraGal^{Plus} C450PLUS Price Grp: RD	DuraGal C450PLUS Price Grp: RD	Pack Size (Lns) All Listed Finishes		All Listed Finishes
					8.0m	12.0m	kg/m
75 x 50 x 1.6	M	-	R	M	54	54	3.01
2.0	R	-	R	✓	42	42	3.72
2.5	✓	-	✓	✓	42	-	4.58
3.0	✓	-	✓	✓	35	24	5.42
4.0	✓	-	✓	✓	28	24	6.92
5.0	✓	-	M	M	24	-	8.35
6.0	✓	-	-	-	20	16	9.67
100 x 50 x 1.6	✓	-	M	✓	32	32	3.64
2.0	✓	-	✓	✓	32	32	4.50
2.5	✓	-	✓	✓	32	24	5.56
3.0	✓	-	✓	✓	32	24	6.60
3.5	✓	-	M	M	24	18	7.53
4.0	✓	-	✓	✓	24	18	8.49
5.0	✓	-	✓	✓	18	15	10.3
6.0	✓	-	-	M	15	12	12.0
102 x 76 x 3.5	✓	-	-	-	12	-	9.06
5.0	✓	-	-	-	9	-	12.5
6.0	✓	-	-	-	12	-	14.7
125 x 75 x 2.0	M	-	-	M	24	-	6.07
2.5	M	-	M	M	24	20	7.53
3.0	✓	-	✓	✓	20	15	8.96
4.0	✓	-	✓	✓	15	15	11.6
5.0	✓	-	✓	✓	15	12	14.2
6.0	✓	-	-	M	12	6	16.7
127 x 51 x 3.5	M	-	-	-	12	-	9.07
5.0	M	-	-	-	8	-	12.5
6.0	M	-	-	-	8	-	14.7
150 x 50 x 2.0	R	-	✓	✓	21	21	6.07
2.5	M	-	M	✓	24	-	7.53
3.0	✓	-	✓	✓	21	15	8.96
4.0	✓	-	✓	✓	15	15	11.6
5.0	✓	-	✓	✓	15	9	14.2
6.0	M	-	-	M	15	9	16.7
150 x 100 x 4.0	✓	-	-	-	12	9	14.8
5.0	✓	-	-	-	12	8	18.2
6.0	✓	-	-	-	9	6	21.4
8.0	-	M	-	-	-	4	27.7
9.0	-	✓	-	-	6	4	30.6
152 x 76 x 5.0	-	✓	-	-	6	6	16.5
6.0	-	✓	-	-	6	6	19.4

✓	Cells are ex-stock items.
R	Cells are available ex-rolling only.
M	Cells are ex-rolling and require MOQ.

Specifications: AS/NZS 1163 - C450L0 supplied as C450PLUS as marked.
DuraGal^{Plus} - Section 3 AS/NZS 4792 ZB 100/100.
DuraGal - Section 4 AS/NZS 4792 ILG 100.

For MOQ items the actual delivery quantity will be to the nearest pack or part pack (whichever is greater) as close to being within the +/-10% volume tolerance as possible.

* DuraPrimed replaces Painted
^ DuraGal^{Plus} replace SupaGal

PRODUCT AVAILABILITY GUIDE

RHS — DURAPRIMED* & OILED

Designation *d b t* (mm)	DuraPrimed C450PLUS Price Grp: RB	Oiled C450PLUS Price Grp: RB	Oiled C450PLUS Price Grp: RF	Pack Size (Lns) All Listed Finishes		All Listed Finishes
				8.0m	12.0m	kg/m
200 x 100 x 4.0	✓	-	-	8	6	17.9
5.0	✓	-	-	8	6	22.1
6.0	✓	-	-	8	4	26.2
8.0	-	M	-	-	4	33.9
9.0	-	✓	-	-	4	37.7
250 x 150 x 5.0	-	-	✓	6	4	29.9
6.0	-	-	✓	6	4	35.6
8.0	-	-	M	4	2	46.5
9.0	-	-	✓	4	2	51.8
10.0	-	-	M	-	2	57.0
12.5	-	-	✓	-	2	69.4
16.0	-	-	M	-	1	85.5
300 x 200 x 6.0	-	-	✓	-	1	45.0
8.0	-	-	✓	1	1	59.1
9.0	-	-	M	-	2	65.9
10.0	-	-	✓	1	1	72.7
12.5	-	-	✓	-	1	89.0
16.0	-	-	M	-	1	111
350 x 250 x 8.0	-	-	✓	-	2	71.6
10.0	-	-	M	-	1	88.4
12.5	-	-	M	-	1	109
16.0	-	-	M	-	1	136
400 x 200 x 8.0	-	-	M	-	2	71.6
10.0	-	-	✓	-	1	88.4
12.5	-	-	✓	-	1	109
16.0	-	-	M	-	1	136
400 x 300 x 8.0	-	-	M	-	1	84.2
10.0	-	-	M	-	1	104
12.5	-	-	M	-	1	128
16.0	-	-	✓	-	1	161

✓	Cells are ex-stock items.
R	Cells are available ex-rolling only.
M	Cells are ex-rolling and require MOQ.

Specifications: AS/NZS 1163 - C450L0 supplied as C450PLUS as marked.

For MOQ items the actual delivery quantity will be to the nearest pack or part pack (whichever is greater) as close to being within the +/-10% volume tolerance as possible.

* DuraPrimed replaces Painted

PRODUCT AVAILABILITY GUIDE

BUILDING PRODUCTS — DURAGAL$^{PLUS\hat{}}$ ZB135/135

Designation *d b t* (mm)	DuraGal^{Plus} ZB135/135 C450PLUS Price Grp: RE	Pack Size	DuraGal^{Plus} ZB135/135
8.0 Metres		Lns	kg/m
90 x 90 x 2.0	✓	20	5.45
2.5	M	20	6.74
100 x 50 x 1.6	✓	32	3.64
2.0	✓	32	4.50
150 x 50 x 2.0	✓	21	6.07
3.0	✓	21	8.96

Specifications: AS/NZS 1163 - C450L0 supplied as C450PLUS.
DuraGal^{Plus} - Section 3 AS/NZS 4792 ZB 135/135

For MOQ items the actual delivery quantity will be to the nearest pack or part pack (whichever is greater) as close to being within the +/-10% volume tolerance as possible.

^ DuraGal^{Plus} replace SupaGal

DURAGAL^{CLEAR†}

Designation *d b t* (mm)	DuraGal^{Clear} C450PLUS Price Grp: RE	Pack Size	DuraGal^{Clear}
8.0 Metres		Lns	kg/m
75 x 50 x 1.6	M	54	3.01
100 x 50 x 1.6	M	32	3.64
2.0	M	32	4.50
150 x 50 x 2.0	M	21	6.07
3.0	M	21	8.96
65 x 65 x 2.0	M	42	3.88
2.5	M	42	4.78
4.0	M	30	7.25
75 x 75 x 2.0	M	36	4.50
2.5	M	30	5.56
4.0	M	25	8.49
89 x 89 x 3.5	M	20	9.07
90 x 90 x 2.0	M	20	5.45
2.5	M	20	6.74
100 x 100 x 3.0	M	20	8.96
5.0	M	12	14.2

Specifications: AS/NZS 1163 - C450L0 supplied as C450PLUS.

DuraGal^{Clear} products are Hot Dip Gal to Section 3 AS/NZS 4792 ZB 100/100 with a minimum average zinc coating of 100g/m^2 on both internal and external surfaces.

DuraGal^{Clear} products are suitable for powder coating in accordance with AS 4506.

For MOQ items the actual delivery quantity will be to the nearest pack or part pack (whichever is greater) as close to being within the +/-10% volume tolerance as possible.

† DuraGal^{Clear} replaces OZTube Kleer

✓	Cells are ex-stock items.
R	Cells are available ex-rolling only.
M	Cells are ex-rolling and require MOQ.

PRODUCT AVAILABILITY GUIDE

SILO — DURAPRIMED* & DURAGAL

Designation *d b t* (mm)	DuraPrimed C450PLUS Price Grp: RX	DuraGal C450PLUS Price Grp: RX	Pack Size	DuraPrimed DuraGal
12.0 Metres			Lns	kg/m
75 x 64 x 2.3	M	M	36	4.43
2.5	M	-	36	4.75
3.0	M	✓	36	5.56
4.0	-	M	24	7.21

✓	Cells are ex-stock items.
R	Cells are available ex-rolling only.
M	Cells are ex-rolling and require MOQ.

Specifications: AS/NZS 1163 - C450L0 supplied as C450PLUS as marked.
DuraGal - Section 4 AS/NZS 4792 ILG 100

For non standard length, please calculate using the MOQ tonnes.

For MOQ items the actual delivery quantity will be to the nearest pack or part pack (whichever is greater) as close to being within the +/-10% volume tolerance as possible.

* DuraPrimed replaces Painted

PRODUCT AVAILABILITY GUIDE

NOTATIONS AND ABBREVIATIONS

Standard Surface Finishes	Description
DuraPrimed	DuraPrimed products are primer painted for protection during storage and handling.
DuraGal^{Plus}	DuraGal^{Plus} products are Hot Dip Gal to Section 3 AS/NZS 4792 ZB 100/100 with a minimum average zinc coating of 100g/m^2 on both the internal and external surfaces.
DuraGal^{Plus} ZB 135/135	DuraGal^{Plus} products are Hot Dip Gal to Section 3 AS/NZS 4792 ZB 135/135 with a minimum average zinc coating of 135g/m^2 on both the internal and external surfaces.
DuraGal	DuraGal products are Hot Dip Gal to Section 4 AS/NZS 4792 ILG 100 with a minimum average zinc coating of 100g/m^2 on the external surface.
DuraGal^{Clear}	DuraGal^{Clear} products are Hot Dip Gal to Section 3 AS/NZS 4792 ZB 100/100 with a minimum average zinc coating of 100g/m^2 on both internal and external surfaces. Ideal for powder coating.
Hot Dip Gal	Hot Dip Gal pipe has a minimum galvanized coating mass of 300g/m^2 both inside and out to AS/NZS 4792 HDG 300 Section 2.
Oiled	Oiled products have a light protective oil coating and comes standard on selected products.
Clear	Clear products are coated with a temporary rust preventative.

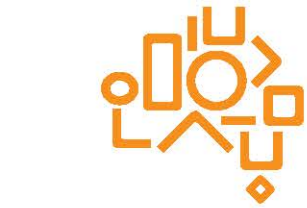
Non-Standard Surface Finishes	Description
NOPC	No oil or paint coating and no end code. Available on request ex-rolling only and may be subject to MOQ.
LiteOil	Available on selected sections on request and may be subject to MOQ.

Grades	Description
C250L0	Cold-formed Grade C250 hollow section to AS/NZS 1163 with L0 properties
C350L0	Cold-formed Grade C350 hollow section to AS/NZS 1163 with L0 properties
C450L0	Cold-formed Grade C450 hollow section to AS/NZS 1163 with L0 properties
C450PLUS	C450PLUS properties which satisfies AS/NZS 1163 Grades C350L0 and C450L0

Order Quantity	Description
Minimum Order Quantity (MOQ)	Minimum order quantity is subject to change. Refer to our Sales Representative for current applicable minimum order quantity.
Non-Standard Lengths	For non-standard lengths please refer to your Sales Representative for availability and minimum order requirements. The quantity supplied in non-standard mill lengths can vary from -10 to +10% and may include part packs.

Abbreviation	Description
b	Width of section
CHS	Circular Hollow Section
d	Depth of section
DN	Nominal Diameter
d_o	Outside Diameter of a Circular Hollow Section (CHS)
H	Heavy
L	Light
Lns	Lengths per pack
L0	Guaranteed impact performance at zero degrees celcius

Abbreviation	Description
M	Medium
PE	Plain Ends
RHS	Rectangular Hollow Section
SBE	Screwed Both Ends
SHS	Square Hollow Section
SOE	Screwed One End
t	Thickness of section
XH	Extra Heavy
XL	Extra Light



Address 146 Ingram Road, Acacia Ridge Qld 4110 | PO Box 246, Sunnybank Qld 4109 Australia
Phone +61 7 3909 6600 | Fax +61 7 3909 6660
Web austubemills.com

AUSTRALIAN MADE

RESPONSE TO THE EXEMPTION APPLICATION

PART A – Company Information

A.1 Please provide the following company contact information

Name:	John Egan
Position in company:	General Manager
Address:	2-14 Independent Way Ravenhall
Telephone:	8361 8366
Facsimile number:	8361 9108
E-mail address of contact person:	j.egan@tubemills.com.au

PART B – Response to the Exemption Application

B.1

Does your company oppose the exemption application wholly or in part? NO.

If your company does not oppose the application wholly or in part, you do not have to complete the remainder of this questionnaire.

If your company opposes or does not consent to the request for exemption wholly or in part, provide a description of that part of the request to which your company opposes or does not consent.

PART C – Identical Goods

C.1

Does your company produce, in Australia, goods that are identical in all respects to the goods described in Section 3 of this 'Response to Exemption Form'?

If no, go to Part D - Like or directly competitive goods.

C.2

Please provide evidence that you have produced and sold in Australia, in the last 12 months, goods that are identical in all respects to the goods subject to this application for exemption.

Evidence can be in the form of production reports and sales invoices. To the extent that production reports or sales invoices do not refer to the goods in

Australian Government
Anti-Dumping Commission

QUESTIONNAIRE - RESPONSE TO APPLICATION FOR EXEMPTION FROM DUTY UNDER *THE CUSTOMS TARIFF (ANTI-DUMPING) ACT 1975*

1 Introduction

The Anti-Dumping Commission (the Commission) has received an application from Kasia Nominees Pty Ltd (Kasia) for exemption from anti-dumping and countervailing measures under the *Customs Tariff (Anti-Dumping) Act 1975* (the Dumping Duty Act), in respect of certain hollow structural sections (HSS), for the sections exported to Australia from the People's Republic of China (China), the Republic of Korea (Korea), Malaysia and Taiwan.

Following receipt of this application, the Commissioner of the Anti-Dumping Commission has initiated an exemption inquiry .

Sections 8(7)(b) and 10(8)(a) of the Dumping Duty Act allow the relevant Minister (in this case the Parliamentary Secretary to the Minister for Industry (the Parliamentary Secretary), who has been delegated responsibility for anti-dumping matters) to exercise a discretion to exempt goods from anti-dumping measures, where he or she is satisfied that like or directly competitive goods are not offered for sale in Australia to all purchasers on equal terms under like conditions, having regard to the custom and usage of trade.

You have been identified from Australian Customs and Border Protection Service's (ACBPS) original investigation in respect of HSS (see below) as an Australian manufacturer of HSS. Consequently, the Commission seeks your assistance in this exemption inquiry by responding to the questions in this form. The Commission will use the information you provide in its assessment as to whether an exemption from dumping and countervailing duty should be recommended to the Parliamentary Secretary.

2 Current HSS Measures

In June 2012, ACBPS completed an investigation into the alleged dumping and subsidisation of HSS exported to Australia from China, Korea, Malaysia, Taiwan and the Kingdom of Thailand (Thailand).

The goods subject to this investigation (and later measures – see below) are

> *certain electric resistance welded pipe and tube made of carbon steel, comprising circular and non-circular hollow sections in galvanised and non-galvanised finishes. The goods are normally referred to as either CHS (circular hollow sections) or RHS (rectangular or square hollow sections). The goods are collectively referred to as HSS (hollow structural sections). Finish*

types for the goods include in-line galvanised (ILG), pre-galvanised, hot-dipped galvanised (HDG) and non-galvanised HSS.

The then Minister for Home Affairs accepted ACBPS' recommendations at the conclusion of this investigation that certain HSS from China, Korea, Malaysia and Taiwan had been dumped and/or subsidised and that dumping and subsidisation had caused material injury to the Australian industry.

A dumping duty notice and countervailing duty notice were published notifying of this decision on 3 July 2012. Australian Customs Dumping Duty Notice (ACDN) No. 2012/31 contains details of the measures, including a description of the goods subject to the measures.

The reasons for the Minister's decision in this case are contained in Trade Measures Report No.181 (REP 177).

3 The goods subject to the exemption application

The goods subject to this application for exemption are:

electric resistance welded pipe made of carbon steel, comprising circular and hollow sections normally referred to as CHS (circular hollow sections) having a hot-dipped galvanised (HDG) finish, and a nominal size (NB) of either 25, 32, 40 or 50 millimetres exported to Australia from China, Korea, Malaysia and Taiwan.

This forms a sub-set of the above goods subject to measures.

4 Exemption Provisions

The Dumping Duty Act allows the relevant Minister (or his delegate) to exercise his or her discretion to exempt goods from dumping and/or countervailing duties in certain circumstances, including the following.

Section 8

(7) The Minister may, by notice in writing, exempt goods from interim dumping duty and dumping duty if he or she is satisfied:

(a) that like or directly competitive goods are not offered for sale in Australia to all purchasers on equal terms under like conditions having regard to the custom and usage of trade;

Section 10

(8) The Minister may, by notice in writing, exempt goods from interim countervailing duty or countervailing duty if he or she is satisfied:

(a) that like or directly competitive goods are not offered for sale in Australia to all purchasers on equal terms under like conditions having regard to the custom and usage of trade;

It is noted at the outset that these exemption provisions are subject to the discretion of the Minister and are not automatically granted where the criteria set out in the provision appear to be met.

5 Claims made in the application

The following is a summary of the applicant's claims and information provided to the Commission.

Kasia provided quotations for HDG HSS (the exemption goods) from Australian manufacturers of HSS indicating that, while the goods could be supplied, they are not manufactured in Australia.

Two separate mill test certificates of the goods were provided that indicate that the goods are produced overseas and available for export to Australia.

Kasia provided publicly-available information as to types of galvanised HSS that are manufactured in Australia, and submitted that these products are not directly competitive to the goods the subject of the exemption application because of different Australian standards, different production processes, different finishes and different end-uses.

A non-confidential version of the exemption application is available on the Commission's Public Record.

6 Instructions on Completing this 'Response to the Exemption Application'

ACBPS' HSS investigation, completed in June 2012, identified you as an Australian producer of HSS.

Consequently, the Commission has forwarded you this 'Response to the Exemption Application' (the Response) to provide you with the opportunity to participate in this exemption inquiry.

The Commission will use the information provided by Australian manufacturers to determine:

- whether like or directly competitive goods are offered for sale in Australia, and
- whether offers for sale of the goods are available to all purchasers on equal terms under like conditions having regard to custom and usage of trade.

Due date for response

Australian manufacturers are requested to complete the Response and return it to the Commission by **5 March 2014**.

Responses may be lodged either by mail or by email to the following.

Director Operations 2
Anti-Dumping Commission
Customs House
5 Constitution Avenue
Canberra ACT 2601
Australia

Email: operations2@adcommission.gov.au
Fax: +61 2 6275 6990

Verification of the information that you supply

The Commission may seek to verify some or all of the information supplied in the response. The Commission may request evidence to support the claims such as quotations and offers of sale. An onsite visit by the Commission may be required in some cases. A report will be prepared of visits conducted and a non-confidential version will be made available to the applicant for comment.

There is no legislative timeframe for completion of an exemption inquiry, however a recommendation to the Parliamentary Secretary to the Minister for Industry will be made as soon as practicable after obtaining all the relevant information.

Outline of information required within the Response

Part A	Company contact information
Part B	Identical goods
Part C	Like or directly competitive goods
Part D	Capability to produce like or directly competitive goods
Part E	Additional comments
Part F	Your declaration

RESPONSE TO THE EXEMPTION APPLICATION

PART A – Company Information

A.1 Please provide the following company contact information

Name:	JEFF MCEVOY.
Position in company:	MANAGER INTERNATIONAL SUPPLY.
Address:	BUILDING 3 121 EVANS ROAD SALISBURY 4107
Telephone:	07 32740570
Facsimile number:	07 32740587
E-mail address of contact person:	J.MCEVOY @ ORRCON.COM.AU

PART B – Response to the Exemption Application

B.1

Does your company oppose the exemption application wholly or in part? NO

If your company does not oppose the application wholly or in part, you do not have to complete the remainder of this questionnaire.

If your company opposes or does not consent to the request for exemption wholly or in part, provide a description of that part of the request to which your company opposes or does not consent.

PART C – Identical Goods

C.1

Does your company produce, in Australia, goods that are identical in all respects to the goods described in Section 3 of this 'Response to Exemption Form'?

If no, go to Part D - Like or directly competitive goods.

C.2

Please provide evidence that you have produced and sold in Australia, in the last 12 months, goods that are identical in all respects to the goods subject to this application for exemption.

Evidence can be in the form of production reports and sales invoices. To the extent that production reports or sales invoices do not refer to the goods in the same detail as set out in the description of the goods (Section 3), please provide additional information that indicates that identical goods have been produced or sold. The evidence should be attached to this form to ensure that it can be linked to this specific Response. Please also include any available product literature respecting the identical goods you have produced and sold.

C.3

Provide evidence of the terms and conditions of sale of these identical goods. Are these products available to all purchasers on equal terms under like conditions? If so, provide evidence and explain why you consider that these products are available to all purchasers on equal terms under like conditions.

Evidence can be in the form of sales invoices, sales contracts, sales reports or advertisements and brochures.

PART D – Like or Directly Competitive Goods

D.1

If your company does not produce identical goods, does it produce and sell in Australia goods that are like or directly competitive to the goods subject to this application for exemption?

In determining whether the goods are like or directly competitive, the Commission will consider whether the goods have characteristics closely resembling each other and are substitutable.

The Commission may also consider;

- Whether physical characteristics of the goods are similar (including size, weight, shape, content, appearance, grade, standards, age, strength and purity);

- Whether the goods are commercially alike, this may include consideration of the following;
    - whether the goods directly compete in the same market sector;
    - the extent to which participants in the supply chain are willing to switch between the goods and the goods subject to the application for exemption;
    - how the price of the goods and goods subject to the application influences consumption;
    - whether the goods share similar distribution channels; and
    - whether the goods are similarly packaged.

- Functional likeness – whether the goods are suitable with regard to end use, this may include an assessment of;
    - the extent to which the goods are functionally substitutable;
    - the extent to which the goods are capable of performing the same or similar function;
    - whether the goods have the same or similar quality standards; and

- consumer behavior in relation to the goods and goods subject to this application for exemption.

- Production likeness, this may include an assessment of;
  - the extent to which the goods are constructed of the same or similar materials;
  - the manufacturing process of the goods; and
  - whether any patented processes or inputs are involved in the production of the goods.

D.2

If you answered yes to question D.1, please provide a description of the goods produced by your company that you consider to be like or directly competitive to the goods subject to this application. Your description of the goods your company produces should refer to all aspects of the goods as set out in the description of the goods in Section 3.

Characteristics	**Description**

Please provide evidence that the goods you consider like or directly competitive to the goods subject to this application for exemption have recently been produced or sold in Australia by your company.

Evidence can be in the form of production reports and sales invoices. To the extent that production reports or sales invoices do not refer to the goods described in the above table, please provide additional information that indicates that the goods have been produced or sold. The evidence should be attached to this form to ensure that it can be linked to this specific Response. Please also include any available product literature concerning the like or directly competitive goods you produced and sold.

D.3

Provide evidence of the terms and conditions of sale of these like or directly competitive products. Are these products available to all purchasers on equal terms under like conditions? If so, provide evidence and explain why you consider that these products are available to all purchasers on equal terms under like conditions.

Evidence can be in the form of sales invoices, sales contracts, sales reports or advertisements and brochures.

PART E – Capability to Produce Identical or Like or Directly Products

E.1

If your company has not produced and sold in Australia products that are identical to, or like or directly competitive to the goods subject to this application for exemption, is your company capable of producing such goods?

E.2

If you answered yes to question E.1, indicate whether the product that you can produce is identical to, or like or directly competitive to the goods subject to this application for exemption.

E.3

If you are capable of producing identical, like or directly competitive goods, explain why you have not produced such goods.

Provide evidence of your production capability, including evidence of the production and sale of similar products, certification of the identical, like or directly competitive goods and at what cost they could be produced, as well as any plans for the imminent production of the goods or orders for the goods and any relevant information.

E.4

If you are capable of producing identical, like or directly competitive goods, provide reasonable evidence of likely terms and conditions of sale for these goods.

PART F – Additional Comments

F.1

Provide any additional comments including any other information that will assist the Commissioner in reaching a recommendation to the Parliamentary Secretary regarding this application for exemption.

PART G – Declaration

I hereby declare that.....ORRCON STEEL.....(company) has completed the attached response to application for exemption and, having made due inquiry, certify that the information contained in this Response is complete and correct to the best of my knowledge and belief.

Name :.....JEFF McEVOY.....

Signature :.....

Position in Company : MANAGER INTERNATIONAL SUPPLY

Date : 26/2/14

PUBLIC RECORD

Australian Government
Anti-Dumping Commission

APPLICATION FOR EXEMPTION FROM DUTY UNDER *THE CUSTOMS TARIFF (ANTI-DUMPING) ACT 1975*

CERTAIN HOT-DIP GALVANISED (HDG) CIRCULAR HOLLOW SECTIONS (CHS)

RECORD OF MEETING WITH ONESTEEL AUSTRALIAN TUBE MILLS (ATM)

Note: the matters outlined in this document do not reflect the Anti-Dumping Commission's findings or opinion in relation to this inquiry, but rather reflect matters discussed at the concerned meeting.

Date: 15 April 2014

Location: Anti-Dumping Commission
1010 La Trobe St
Docklands
VIC

Attendees:

Anti-Dumping Commission	ATM
Kerry Taylor Director, operations 4	Matt Condon Manager Trade Development
Andrea Stone Manager, Operations 2	Arun Syam Tubular Development Manager
Bora Akdeniz Investigator, Operations 4	John O'Connor Director, John O'Connor and Associates

Discussed:

Galvanised CHS in general

- ATM classified the types of galvanised CHS into three categories:

1. Pre or in-line galvanised
   - o zinc coating mass of approximately 100g/m^2
   - o able to be manipulated (bent and shaped)
   - o able to be directly welded

2. Semi-automatic galvanised HDG CHS (air-blown as part of the galvanising process)
   - o zinc coating mass of approximately 300g/m^2
   - o able to be manipulated
   - o difficult to directly weld

3. Batch-galvanised HDG CHS
   - o zinc coating mass between 500 and 600 g/m^2 or possibly more (based on steel thickness)
   - o cannot be readily manipulated
   - o cannot be directly welded

- Pre or in-line galvanised CHS may not be suitable for coastal locations where there is a high level of steel corrosion – such as being exposed within 1 km of breaking surf, etc.

- Where the coating of zinc is too thick on CHS, it becomes difficult to manipulate (brittle coating) and unsuitable for certain applications.

ATM's galvanised CHS product offering

HDG CHS

- ATM currently supplies HDG CHS to the Australian market. This is Australian-manufactured (made from black pipe that is outsourced 'batch' galvanised by a local external provider). [redacted] [Confidential: previous source of sales]

- The Australian batch-galvanised product that is supplied by ATM is [redacted] [Confidential: product characteristics] as part of the galvanising process.

- The external galvaniser may be considered to be part of the Australian industry for HDG CHS.

- ATM used to fully produce HDG CHS itself (galvanising performed internally) at its Acacia Ridge and Newcastle facilities. The last galvanising plant was at Acacia Ridge and was initially 'mothballed', but has since been fully decommissioned. The HDG CHS produced at Acacia Ridge was air-blown.

Other galvanised finishes

- ATM also supplies the following other galvanised finishes of CHS (not HDG) that it manufactures:

    - DuraGal – the first generation of in-line galvanised product that is galvanised only on the outer surface – this is no longer supplied;
    - DuraGal^{Plus} - pre-galvanised product that is galvanised both internally and externally.

- While ATM could still supply the DuraGal product, it has moved towards the supply of DuraGal^{Plus}.

Imported HDG CHS

- ATM understands that a reasonable amount of imported HDG HSS from the countries subject to anti-dumping measures may be batch-galvanised and not air-blown.

Supply of like or directly competitive goods

- Australian made batch-galvanised HDG CHS is like to, and directly competitive with, imported HDG CHS.

- If requested by its customers (distributors of steel products), ATM is able to supply Australian-manufactured batch galvanised HDG CHS.

- Consequently, ATM submits that the Australian industry manufactures and supplies like or directly competitive goods to those subject to the exemption application, and an exemption from anti-dumping measures is not warranted.

- Additionally, DuraGal^{Plus} CHS is directly competitive with HDG CHS in numerous applications, specifically those that require the product to be manipulated. In addition, it is able to be easily welded, which HDG CHS is not.

- The Galvanizers Association of Australia (GAA) members advise they batch dip galvanise HDG CHS for customers other than OneSteel ATM.

Terms of supply

- ATM supplies CHS to its customers, which are at the distributor level. These customers then on-sell CHS to their own customers.

- Whether a distributor offers imported or Australian-produced HDG CHS to its customers will be a purchasing decision by the distributor, taking into account numerous factors.

- HDG CHS is listed in ATM's product availability guide as part of its standard product offering. Currently only Australian-made CHS is offered by ATM.

- All of ATM's customers (steel distributors) are able to access Australian-made HDG CHS, subject to minimum order requirements and customer-specific established terms of trade (e.g. credit terms, delivery terms, etc.).

Other matters

Orrcon Steel product

- Orrcon Steel has recently released its new Australian-manufactured MAXI-TUBE® range of galvanised pipe and tube (including CHS).

- This is a pre-galvanised product, and its coating consists of zinc, magnesium and aluminium.

- Orrcon Steel is marketing MAXI-TUBE® as a direct competitor to batch-galvanised HDG CHS, suitable for numerous end uses, including coastal applications.

Issues with batch galvanising

- The Commission raised previous submissions to previous investigations that stated that Australian batch galvanised HDG CHS supplied by ATM is inferior to imports as it has not been hydrostatically tested and may be insufficiently straight.

- ATM explained that hydrostatic testing is only necessary for pressure pipe, which is generally larger in size than that covered by the anti-dumping measures.

- ATM advised that batch-galvanising of products may result in some straightness issues, but this is more common in asymmetrical goods (such as some structural beams and angles) than in pipe which is multi-symmetrical. Australian hot-dip galvanising contractors also report minimal straightness issues as the dipped CHS are restrained in jigs.

Australian Government
Anti-Dumping Commission

APPLICATION FOR EXEMPTION FROM DUTY UNDER *THE CUSTOMS TARIFF (ANTI-DUMPING) ACT 1975* LODGED BY KASIA NOMINEES PTY LTD

SUPPLEMENTARY AUSTRALIAN INDUSTRY QUESTIONNAIRE

ONESTEEL AUSTRALIAN TUBE MILLS PTY LTD

BACKGROUND

The Anti-Dumping Commission (the Commission) received an application from Kasia Nominees Pty Ltd (Kasia) for exemption from dumping and countervailing duties under the *Customs Tariff (Anti-Dumping) Act 1975* (the Dumping Duty Act), in respect of certain hollow structural sections (HSS) exported to Australia from the People's Republic of China (China), the Republic of Korea (Korea), Malaysia and Taiwan.

In its application, Kasia requested an exemption from anti-dumping measures under Sections 8(10) and 10(8) of the Dumping Duty Act, on the grounds that like or directly competitive goods to those that are the subject of the application for exemption are not offered for sale in Australia to all purchasers on equal terms under like conditions having regard to the custom and usage of trade.

The goods subject to the application for exemption are:

electric resistance welded pipe made of carbon steel, comprising circular and hollow sections normally referred to as CHS (circular hollow sections) having a hot-dipped galvanised (HDG) finish, and a nominal size (NB) of either 25, 32, 40 or 50 millimetres exported to Australia from China, Korea, Malaysia and Taiwan.

Throughout this questionnaire, goods that meet this description will be referred to as 'HDG HSS'.

On 19 February 2014, an exemption inquiry was initiated into the claims raised by Kasia in its application.

As a known Australian manufacturer of HSS, OneSteel Australian Tube Mills Pty Ltd (OneSteel ATM) was contacted by the Commission shortly after the initiation of the exemption inquiry, and offered the opportunity to respond to Kasia's application, by completing an Australian Industry Questionnaire.

OneSteel ATM provided its response to that questionnaire on 13 March 2014. In that response, OneSteel ATM opposed Kasia's application in its entirety, and submitted that OneSteel ATM produces goods that are identical to those subject to Kasia's application.

OneSteel ATM submitted that this identical HDG HSS is

…produced from black CHS that is manufactured at ATM's facilities, galvanised by a third party in Australia and then sold by ATM.

The purpose of this Supplementary Australian Industry Questionnaire is to clarify certain matters, and request further evidence from OneSteel ATM in relation to its original questionnaire response, to assist the Commission in determining whether the grounds for the exemption requested by Kasia are met.

INSTRUCTIONS ON COMPLETING THIS 'RESPONSE TO THE EXEMPTION APPLICATION'

The Commission will use the information provided by OneSteel ATM to determine:

- whether like or directly competitive goods are offered for sale in Australia, and
- whether offers for sale of the goods are available to all purchasers on equal terms under like conditions having regard to custom and usage of trade.

Due date for response

OneSteel ATM is requested to complete this questionnaire and return it to the Commission by **29th April 2014**.

Responses may be lodged either by mail or by email to the following.

Director Operations 2
Anti-Dumping Commission
Customs House
5 Constitution Avenue
Canberra ACT 2601
Australia

Email: operations2@adcommission.gov.au
Fax: +61 2 6275 6990

Verification of the information that you supply

The Commission may seek to verify some or all of the information supplied in the response. The Commission may request evidence to support the claims such as quotations and offers of sale. An onsite visit by the Commission may be required in some cases. A report will be prepared of visits conducted and a non-confidential version will be made available to the applicant for comment.

There is no legislative timeframe for completion of an exemption inquiry, however a recommendation to the Parliamentary Secretary to the Minister for Industry will be made as soon as practicable after obtaining all the relevant information.

Public Record

In responding to this questionnaire, you are required to lodge one confidential version (for official use only) and one non-confidential version (for public record) of your submission by the due date.

Please ensure that each page of information you provide is clearly marked either "FOR OFFICIAL USE ONLY" or "PUBLIC RECORD".

All information provided to the Commission in confidence will be treated accordingly. The non-confidential version of your submission will be placed on the public record.

Please note, Australia's anti-dumping and countervailing legislation requires that to the extent that information given to the Commission is claimed to be confidential or whose publication would adversely affect a business or commercial interest, the person giving the information must ensure that a summary of that information contains sufficient detail to allow a reasonable understanding of the substance of the information, but does not breach confidentiality nor adversely affect those interests.

The legislation allows that a person is not required to provide a summary for the public record if the Commission can be satisfied that no such summary can be given that would allow a reasonable understanding of the substance of the information. However, such a summary would add considerably to an interested party's understanding of information contained in a document.

As provided for in Australia's anti-dumping and countervailing legislation, all submissions are required to have a bracketed explanation of deleted or blacked out information for the non-confidential version of the submission. Note that if such an explanation is not provided, the Commission may disregard the information in the submission. An example of a statement to accompany deleted/blacked out text is:

[explanation of cost allocation through the divisions].

If, for some reason, you cannot produce a non-confidential summary, please contact the investigation Case Manager.

PART A – SUPPLY OF IMPORTS

A.1 Has OneSteel ATM and/or any of its affiliates (e.g. OneSteel Metalcentre) imported and/or supplied HDG HSS during the period 1 January 2013 – 31 March 2014?

If 'No', continue to Part B. If 'Yes', please complete the remainder of Part A.

OneSteel ATM (ATM):

ATM has not imported any HDG HSS during the period 1 January 2013 -31st March 2014.

[confidential reference to historical imports]

ATM supplied Australian manufactured HDG HSS. It has done this by manufacturing black (uncoated) HSS which was then galvanized by an external contractor. The finished HDG HSS product was then on-sold by ATM to its distribution network.

OneSteel [Affiliate name]

[Affiliate name] has imported and supplied imported HDG HSS during the period 1 January 2013 -31st March 2014.

[Affiliate name] has also supplied Australian manufactured HDG HSS during the period 1 January 2013 -31st March 2014.

A.2 Outline (separately for each entity):

- the full range of imported HDG HSS supplied by OneSteel ATM and/or its affiliates;
- the source of imported HDG HSS supplied by OneSteel ATM and/or its affiliates; and
- the supply chain of imported HDG HSS supplied by OneSteel ATM and/or its affiliates.

[confidential reference to historical imports]

The supply chain of imported HDG HSS followed the typical import process:

- Manufacturer to Port for shipping
- Transhipped from to Australia
- Arrival Australian Ports
- Clearance, de-stuffing from container
- Transport to site

[Affiliate name]

[redacted] has imported and supplied imported HDG HSS in a range of [redacted] NB to [redacted] NB pipe (see Appendix A for full range of sizes). This product has been imported from [country].

The supply chain of imported HDG HSS followed the typical import process:

- Manufacturer to Port for shipping
- Transhipped from to Australia.
- Arrival Australian Ports
- Clearance, destuffing from container
- Transport to [redacted] site

A.3 In what circumstances would a customer of OneSteel ATM or its affiliates that wished to purchase HDG HSS be supplied imported product as opposed to product that OneSteel ATM claims is manufactured in Australia?

OneSteel ATM (ATM)

Currently, ATM does not supply imported HDG HSS products [redacted]

[Affiliate name]

Affiliate name may supply either Australian produced or imported HDG products depending on a range of factors that include: customer preference, stock availability and lead time.

A.4 Can OneSteel ATM's customers specify that they would prefer imported or Australian-produced HDG HSS when purchasing HDG HSS from OneSteel ATM?

OneSteel ATM will only supply Australian-produced HDG HSS.

A.5 Of OneSteel ATM's total sales of HDG HSS during the period 1 January 2013 – 31 December 2013, what percentage (based on sales volume) is represented by:

- black HSS that is outsourced galvanised in Australia;
- imported goods?

Of OneSteel ATM's total sales of HDG HSS during the period 1 January 2013 – 31 December 2013, the following percentages (based on sales volume) are represented by:

- black HSS that is outsourced galvanised in Australia ~ [redacted]%
- imported goods ~ [redacted]%

See B.5 for further information on this situation.

A.6 Are there any differences in:

- quality;
- standard;
- end use;
- physical characteristics;
- production process; or
- commercial characteristics

between OneSteel ATM's Australian-produced HDG HSS, and the imported HDG HSS supplied by OneSteel [redacted]? Explain these fully.

It is understood that the thickness of zinc galvanising on HDG HSS is particularly important to its end use, please address this specifically in your answer to the above.

OneSteel ATM no longer supplies imported HDG HSS. When comparing Australian manufactured HDG HSS to OneSteel ATM's previously supplied imported HDG HSS (last purchased in [redacted]) the following comments are made:

Quality: The product quality of the imported HDG HSS was [redacted]
[redacted] [Confidential assessment of quality] [redacted]

- Standard: No the imported product was ordered to meet the same standard.

- End use: The only difference in end use would be the required zinc thickness for a particular corrosion environment. The ATM produced HDG HSS would be applicable in more applications than the [redacted] imported HDG HSS as it has a thicker zinc coating whereas the latter has an air-blown reduced thickness coating. Thickness of zinc galvanizing is typically related to the corrosion rate of zinc/steel in a particular environment. Such macro (i.e. climatic) environments can range from severe (industrial pollution, wind-blown chlorine salts from marine environments, etc), to mild (somewhat inland away from severe coastal) to benign-low (way inland, arid, dry rural areas and also inside air-conditioned buildings, etc). Micro environment effects can also dictate corrosivity rates and may sometimes change a particular situation from low to an aggressive environment (e.g. poor moisture runoff leaving metal surfaces damp for extended periods, etc). Consequently, the use of a particular galvanized coating is dependent on the nature of the corrosive environment and the standard that the galvanized coating is produced to – i.e. there is no ready answer unless these parameters are spelt out. However, as a rule of thumb, the higher the corrosion rate the thicker the zinc coating required.

- Physical characteristics: Physically imported and Australian produced HDG HSS are [redacted]. The size, shape, weight and grades are all similar.

- Commercial characteristics: The commercial characteristics between the imported and Australian produced HDG HSS are very alike. The goods are directly competitive in the same market sectors and the distribution channels are the same.

A.7 Are there any minimum order quantities that relate to imported HDG HSS? What are these?

When imported HDG HSS was sold by [redacted] the minimum order quantity was one [redacted] the same as for Australian produced HSS. [redacted]

PART B – AUSTRALIAN PRODUCTION

B.1 Are all OneSteel ATM's customers able to purchase Australian-produced HDG HSS, or is this limited to certain customers?

All ATM's distributor customers can access the Australian-produced HDG HSS.

B.2 Describe the production process of the Australian-produced HDG HSS (including the outsourced galvanisation process).

ATM manufactures black CHS (Circular Hollow Sections) on the rolling mills at the Acacia Ridge (QLD) site from steel strip. In this process, a slit steel coil is unwound and fed into an accumulator. The accumulator permits the mill to be run at full speed whilst another coil is butt welded and fed into the process. After the accumulator the coil is passed through a series of rollers that changes its shape. For tube forming, the rollers shape the initially flat coil into a "C", then "U" and finally into an "O" shape when it is then welded using electric resistance welding (ERW) techniques. Thereafter the shape is then finished to the tolerances required by the specified Standard. Mill speeds can vary from 30 metres per minute for very large and thick sections to 140 metres per minute for small bore thin tube. After tube finishing, a flying saw is used to cut the tube to the specified length whereupon it is bundled and strapped into pack form and subsequently despatched to the warehouse/customer. The whole process is undertaken in the "cold" condition which provides significant advantages such as strength increases.

For application of the HDG coating, the black CHS is batch galvanized off-site by a third party and returned to ATM for future sale. This process relies on the immersion of the CHS into molten zinc which is typically at 450-480 degrees Celsius. Prior to immersion, the black CHS is degreased where rust and other surface contaminants are removed by immersion in tanks of hot caustic, then acid pickling (typically sulphuric or hydrochloric acids) followed by rinsing. Following the surface cleaning process, the CHS is immersed in a heated flux solution which removes the oxide film that forms on the steel surface after acid cleaning, and prevents further oxidation before galvanizing. The CHS is then galvanized by immersion in molten zinc. On immersion in the galvanizing bath the steel surface is completely covered by the molten zinc, which reacts with the steel to form a series of zinc-iron alloy layers, producing a uniform coating. The CHS is then withdrawn at a controlled rate and carries with it an outer layer of molten zinc which solidifies to form the relatively pure outer zinc coating. Upon extraction from the galvanizing bath the item is then quenched to cool.

B.3 Identify the enitiy(ies) that OneSteel uses to galvanise black CHS into HDG HSS.

[confidential suppliers]

B.4 The Commission understands that OneSteel ATM previously galvanised black CHS into HDG HSS in-house.

Explain why OneSteel ATM uses the outsourced galvanising method, as opposed to galvanising in-house.

Does OneSteel ATM still have the facilities to galvanise CHS into HDG HSS in-house? What would be required to re-commence galvanising in-house by OneSteel ATM?

1. OneSteel ATM previously manufactured HDG HSS in-house using continuous galvanising process at both the Acacia Ridge and Newcastle facilities but these plants were mothballed and eventually decommissioned. The displacement of Australian-produced HDG pipe by dumped imports reduced manufacturing volumes to a level that made continuous galvanising uneconomical. This combined with the ability to substitute a large proportion of the product applications with newer technology pre-galvanised products .

2. ATM has chosen to outsource the galvanising process as described for applications where substitution of pre-galvanised products is not feasible due to end user requirements or for compliance with Australian Standards. Outsourcing of Hot Dipped Galvanising is a more effective and scalable solution for our customers who required a HDG finish from Australian manufactured product.

3. ATM has the capability to in-house manufacture pre-galvanised product that substitute for a large proportion of the product applications. In terms of continuous HDG galvanising facilities (air blown), ATM has completely decommissioned and removed the Acacia Ridge facility. ATM's Newcastle continuous HDG Galvanised facility equipment is still in place in a decommissioned state. This facility

B.5 As an attachment to the response to the Australian Industry Questionnaire, OneSteel ATM submitted a listing of sales invoices that are claimed to be of Australian-produced HDG HSS.

Can OneSteel ATM provide evidence that the following sales of HDG HSS were produced in Australia?

785685
779282
797714
777877

With respect to the attachment to the Australian Industry Questionnaire, [redacted]
[redacted] [Confidential comments on evidence] [redacted]

[redacted] See Appendix B for evidence that product sales for this invoice number relate to HDG HSS manufactured in Australia.

If required, OneSteel ATM can provide further evidence on sales of HDG HSS produced in Australia as noted in the attached revised spreadsheet.

B.6 Are there any minimum order quantities that relate to Australian-produced HDG HSS? What are these?

Yes. There is a minimum order quantity of [redacted]

PART C – ACCESS TO HDG HSS

C.1 It is understood (from previous investigations into HSS) that OneSteel ATM limits direct access to purchases from it to entities that have an established 'distributorship' arrangement with OneSteel ATM, while other entities can purchase OneSteel ATM product via the distribution network.

a) Please confirm if this remains the case.
b) Outline the criteria that must be met in order to be granted a 'distributorship' with OneSteel ATM
c) Do all entities with OneSteel ATM distributorships have equal access to HDG HSS manufactured by OneSteel ATM? If not, please outline the differences.

a) The distribution network model continues to be adopted by OneSteel ATM. OneSteel ATM would assume that most if not all major steel manufacturing businesses would use a defined distribution model to sell their products. Non distributors can purchase OneSteel ATM product via the distribution network.

b) Applicants for OneSteel ATM distributorships are examined on a case by case basis to determine if they would offer a net benefit to the OneSteel business. Some of the key criteria considered in an assessment of an application for a distributorship include: [redacted]
[redacted] [Confidential criteria for distributorship] [redacted]

c) OneSteel ATM offers Australian manufactured HDG HSS to all existing distributors as per the published Product Availability Guide.

C.2 Are there any differences in:

- price;
- terms of trade (including credit and/or delivery terms);
- range;
- product characteristics of Australian-made HDG HSS offered and/or sold to OneSteel ATM's customers?

- price
  Yes there are some variations in pricing due to factors such as [redacted]

- terms of trade (including credit and/or delivery terms)
  Yes there are variations in [redacted] Delivery lead times are based on customer location as per the OneSteel ATM Guide to Purchasing. (See attached document).

- range
  There are no differences in the range of HDG HSS offered and/or sold to OneSteel ATM's customers.

- product characteristics
  There are no differences in the product characteristics of HDG HSS offered and/or sold to OneSteel ATM's customers.

C.3 OneSteel ATM's *Pricing and Availability Guide* includes HDG HSS as part of OneSteel ATM's product offering.

a) Is the product in the availability guide generally imported or Australian-made HDG HSS?
b) Do OneSteel ATM's customers have to specify that they would like to purchase Australian-made HDG HSS when ordering from the availability guide?
c) If no specification is made, will OneSteel ATM's customers be supplied imported or Australian-made HDG HSS?
d) Do OneSteel ATM's customers generally know whether the HDG HSS they purchase from OneSteel ATM is Australian-produced or imported?

For the size range noted in the Exemption Application:

a) Australian made.
b) No, as ATM now only sells Australian made HDG HSS
c) Australian made.
d) It is our understanding that customers will know it is Australian made.

C.4 The Commission has received a submission from an Australian company (MAS) that claims to have approached a OneSteel distribution business (Midalia) with a request to purchase HDG HSS, and was advised that the product on offer is imported and not Australian-manufactured.

This submission is available on the Public Record, accessible at www.adcommission.gov.au (case number EX0015).

Please respond to/explain the circumstances of MAS' submission.

OneSteel ATM's distributors are not compelled to only source product supplied by OneSteel ATM. OneSteel's distributors may source and sell both Australian produced and imported product.

The product offered by any of OneSteel's distributor locations at any particular point in time will be influenced by a combination of their customer's requirements, stock availability, product lead time, quality, price, minimum order quantity and the individual sales person understanding of all of the above.

SUPPLEMENTARY QUESTIONS FOR ONESTEEL AUSTRALIAN TUBE MILLS (ATM) FOLLOWING MEETING OF 15 APRIL 2014

In addition to the questions contained in the *Supplementary Australian Industry Questionnaire* forwarded to ATM in relation to the above exemption inquiry, please answer the following.

1) ATM advised during its meeting with the Anti-Dumping Commission that imports of HDG CHS by ATM's competitors are likely to be batch-galvanised (and not air-blown). Is ATM aware of imports of air-blown HDG CHS from the countries subject to anti-dumping measures? If so, please identify any known source(s) (country and supplier).

   There are numerous such suppliers. One known to us is:

   - [redacted] – [redacted].

2) Is the HDG CHS imported by ATM air-blown or batch-galvanised? Where imports are sourced from more than one supplier, please answer this question separately for each supplier.

   OneSteel ATM does not currently import HDG HSS [redacted]

3) What thickness is the zinc coating (e.g. 500g/m^2) of the HDG CHS imported by ATM (specify separately for each source of supply)?

   OneSteel ATM does not currently import HDG HSS [redacted]

4) Outline the full range of black CHS manufactured by ATM in Australia.

   [redacted] NB. Please note that this list includes black, primer-painted and clear HSS which all could be galvanized by external contractors.

5) Is any HDG CHS that is outsource-galvanised by ATM made from imported CHS (as opposed to ATM's own production)? Provide details of the imported goods if this is the case (e.g. origin, sizes, etc).

   No, not in the size range nominated in the Exemption Application.

[redacted] NB & [redacted] NB pipe are imported by OneSteel ATM from [redacted] which can be galvanized by external contractors.

6) Clarify when ATM's Acacia Ridge hot-dip galvanising plant was decommissioned (i.e. converted from a 'mothballed' state).

The Acacia Ridge plant was mothballed in [redacted] and decommissioned in [redacted]

7) Does ATM make its customers aware of the existence of Australian-produced HDG CHS? How is this communicated to customers?

ATM promotes themselves as an Australian manufacturer for the sizes within the range of our rolling mill capabilities. The product in question falls within that range.

8) When ATM's customers place an order for HDG CHS, are they routinely supplied imported HDG CHS or Australian-made batch galvanised HDG CHS?

Currently, Australian-made batch galvanized HDG CHS is exclusively supplied for the size range noted in the Exemption Classification.

9) Outline the rationale for adopting ATM's current supply of HDG CHS, that is:

a. decommissioning of ATM's own HDG facilities;
b. sourcing imported HDG CHS; and
c. supplying some Australian-made batch-galvanised HDG CHS.

Include in your answer the reason why ATM continues to supply Australian batch-galvanised HDG CHS, instead of opting for a wholly import-based product offering.

a. As outlined in question B4 the displacement of Australian-produced HDG pipe by dumped imports reduced manufacturing volumes [redacted]

b. [redacted] [confidential reference to historical imports] [redacted]

c. As outlined in question B4. Outsourcing of Hot Dipped Galvanising is a more cost effective and scalable solution for our customers who required a HDG finish from Australian manufactured product.

10) What level of inventory (if any) does ATM keep of:

a. imported HDG CHS;
b. Australian-produced batch galvanised HDG CHS?

a. No inventory held. [redacted]

b. No inventory held. Orders are fulfilled at time of rolling and subject to a minimum order quantity.

11) Clarify if there are any applications that either ATM-produced batch galvanised HDG CHS and pre-galvanised CHS are not suitable for?

If there are any such applications, does ATM supply any CHS that is suitable for this end use? Is this CHS manufactured in Australia or imported?

There are some applications where a batch dipped HDG galvanised product is not suitable due to bending or welding requirements and pre galvanised CHS doesn't have a thick enough zinc coating for the corrosive environment. In these instances suitable Australian produced product is supplied in the form of black CHS which is galvanised after a fabricator has shaped or welded the black CHS.

PART D - DECLARATION

I hereby declare that OneSteel ATM has completed the attached response to application for exemption and, having made due inquiry, certify that the information contained in this Response is complete and correct to the best of my knowledge and belief.

Name :……..Arun Syam

Signature 

Position in Company National Product Development Manager

Date 29 April 2014

Fact Sheet

AustubeMills
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Given the diverse climate and geography of the Australian landscape, only a DuraGalPlus coating can give you the peace of mind that you have the protection you need for the job at hand.

DuraGalPlus can be used in a variety of residential construction applications such as roof trusses, fencing, verandahs, elevated flooring solutions and shade structures. It is also commonly applied across a variety of other sectors including mining, commercial, engineering, manufacturing, agriculture and transport.

All Austube Mills products are third-party certified (ACRS) to meet the highest AUS/NZ Standards, ensuring you receive the safest and highest quality structural steel pipe and tube every time.

DuraGalPlus steel products have a smooth, even galvanized surface finish which produces significantly less weld spatter and fumes compared to traditional hot-dip galvanized coatings, making it safer and easier to weld. DuraGalPlus is manufactured to a minimum average coating mass of 100g/m^2 on the internal and external surface, resulting in superior corrosion protection. It is manufactured to the following AUS/NZ Standards:

> AS/NZS 1163:2009 – Cold-formed Structural Steel Hollow Sections.

> AS/NZS 4792:2006 – Hot-dip galvanized (zinc) coatings on ferrous hollow sections, applied by a continuous or specialised process.

DuraGalPlus products are part of the DuraGal® range of coatings and are available via the Austube Mills' network of more than 200 distribution partners across Australia and New Zealand.

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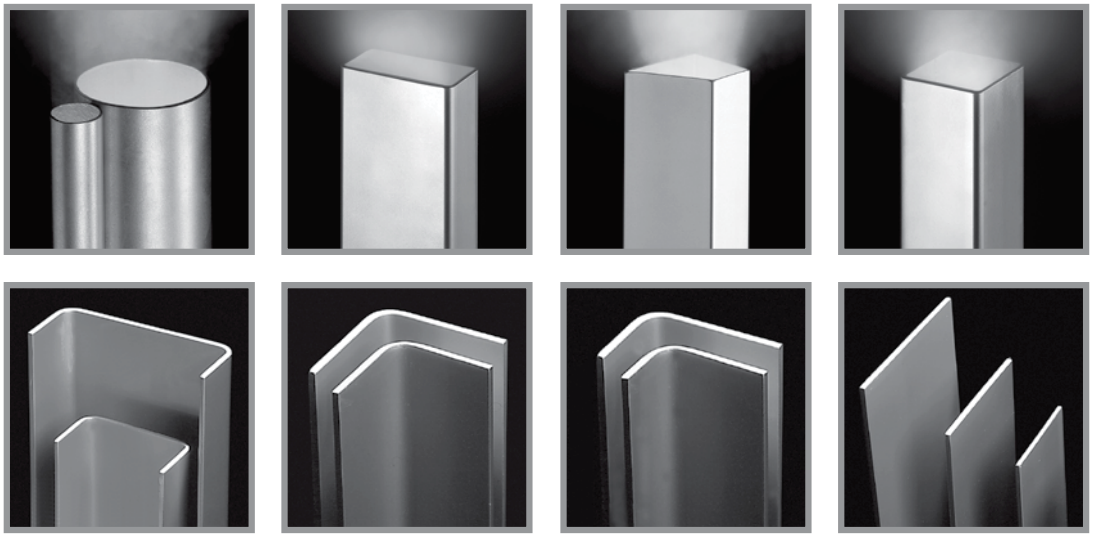
SHAPING POSSIBILITIES

PRODUCT MANUAL

PIPE & TUBE + PROFILES



Build with Standards

Product Manual – Contents

Notes:

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Product availability & other information – As the section, grade and finish of all products are subject to continuous improvement, reference should be made to the ATM *PRODUCT AVAILABILITY GUIDE* (PAG) for information on the availability of listed sections and associated finishes. The PAG is found at www.austubemills.com.

Australian Tube Mills A.B.N. 21 123 666 679. PO Box 246 Sunnybank, Queensland 4109 Australia **Telephone** +61 7 3909 6600 **Facsimile** +61 7 3909 6660 **E-mail** info@austubemills.com **Internet** www.austubemills.com

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Part 1 – General Information – Contents

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Phone: 07 4131 4200
Fax: 07 4131 4211

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Address: 163 Spence Street Cairns QLD 4870
Phone: 07 4048 9400
Fax: 07 4048 9419

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Fax: 07 4979 6794

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Fax: 07 3622 9333

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Fax: 07 4614 2044

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Fax: 07 4091 3140

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Fax: 07 4153 1415

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Fax: 07 4776 3572

Metaland – Currumbin
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Phone: 07 5534 6333
Fax: 07 5534 6337

Metaland – Dalby
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Fax: 07 4669 8144

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Address: 10 Hicks Street Emerald QLD 4720
Phone: 07 4982 2488
Fax: 07 4982 3257

Metaland – Gold Coast
Address: 2 Distribution Avenue Molendinar QLD 4214
Phone: 07 5597 6822
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Metaland – Hervey Bay
Address: 28-30 Boat Harbour Drive Hervey Bay QLD 4655
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Metaland – High Country Ent. Metaland
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Metaland – IBS Engineering Metaland
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Address: 103 Ingram Road Acacia Ridge QLD 4110
Phone: 07 3452 3888
Fax: 07 3452 3899

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Address: 21 Charlie Triggs Crescent Bundaberg QLD 4670
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Fax: 07 4035 4438

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Fax: 02 9670 9978

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Address: 24 Spit Island Close Steel River Industrial Estate Mayfield West NSW 2304
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Fax: 02 4967 9800

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Fax: 02 6021 6746

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Fax: 02 6331 2979

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Phone: 02 6492 2777
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Address: 932 Pacific Highway Lisarow NSW 2250
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Fax: 02 4329 2888

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Address: 4 O'hart Close Charmhaven NSW 2263
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Fax: 02 4392 4699

Metaland – Cooma Steel Metaland
Address: Snowy Mtns Highway Cooma NSW 2630
Phone: 02 6452 1934
Fax: 02 6452 1347

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Address: Lot 2 Wakool Road Deniliquin NSW 2710
Phone: 03 5881 7600
Fax: 03 5881 7601

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Address: Cnr. Farrer & Mullaley Road Gunnedah NSW 2380
Phone: 02 6742 2449
Fax: 02 6742 2418

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Fax: 02 6722 5265

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Fax: 02 4954 0566

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Phone: 02 6953 2833
Fax: 02 6953 3487

Metaland – Lismore
Address: 39-41 Habib Drive Lismore NSW 2480
Phone: 02 6621 8722
Fax: 02 6621 8497

Metaland – Moree
Address: 41-45 Greenbah Road Moree NSW 2400
Phone: 02 6752 2627
Fax: 02 6752 4624

Metaland – Orange
Address: Stephen Place Orange NSW 2800
Phone: 02 6362 4211
Fax: 02 6361 4602

Metaland – Parkes
Address: 1a East Street Parkes NSW 2870
Phone: 02 6862 3011
Fax: 02 6862 3048

Metaland – Penrith
Address: 50-58 Jack Williams Drive Penrith NSW 2750
Phone: 02 4729 1797
Fax: 02 4729 1798

Metaland – Richards Metaland
Address: Morath Street Narrabri NSW 2390
Phone: 02 6792 1429
Fax: 02 6792 4233

Metaland – Sable Engineering & Metaland
Address: 23 Yarrawonga Street Macksville NSW 2447
Phone: 02 6568 2014
Fax: 02 6568 2742

Metaland – Silverwater
Address: 62-70 Silverwater Road Silverwater NSW 2128
Phone: 02 9748 2487
Fax: 02 9748 2866

Metaland – Smeaton Grange
Address: 85 Hartley Road Smeaton Grange NSW 2567
Phone: 02 4647 8211
Fax: 02 4647 7288

Metaland – St Leonards
Address: 2/205 Pacific Highway St Leonards NSW 2065
Phone: 02 8436 4382
Fax: 02 9439 6824

Metaland – Tamarang Engineering Metaland
Address: Cnr. Station & Nowland Street Quirindi NSW 2343
Phone: 02 6746 1266
Fax: 02 6746 2488

Metaland – Tamworth
Address: 12 Denison Street Tamworth NSW 2340
Phone: 02 6762 1823
Fax: 02 6762 8823

Metaland – Taree
Address: 8 Elizabeth Avenue Taree NSW 2430
Phone: 02 6552 4899
Fax: 02 6552 7235

Metaland – Tumut Metaland
Address: 84 Adelong Street Tumut NSW 2720
Phone: 02 6947 3620
Fax: 02 6947 3854

Metaland – Wagga Wagga
Address: 11 Saxon Street Wagga Wagga NSW 2650
Phone: 02 6925 1109
Fax: 02 6925 1401

Metalcorp Steel – Albury
Address: Cnr. Catherine Crescent & Wagga Road Albury NSW 2640
Phone: 02 6025 7211
Fax: 02 6058 5477

Metalcorp Steel – Armidale
Address: 284 Mann Street Armidale NSW 2350
Phone: 02 6774 8610
Fax: 02 6774 8611

Metalcorp Steel – Auburn
Address: Manchester Road West Auburn NSW 2144
Phone: 02 9714 8092
Fax: 02 9714 8036

Metalcorp Steel – Bathurst
Address: 16 Kirkcaldy Street Bathurst NSW 2795
Phone: 02 6330 9333
Fax: 02 6330 9334

Metalcorp Steel – Coffs Harbour
Address: 2 Isles Drive Coffs Harbour NSW 2450
Phone: 02 6648 7111
Fax: 02 6648 7117

Metalcorp Steel – Dubbo
Address: Mitchell Highway Dubbo NSW 2830
Phone: 02 6841 2155
Fax: 02 6841 2166

Metalcorp Steel – Gosford
Address: 322 Manns Road West Gosford NSW 2250
Phone: 02 4328 7455

Metalcorp Steel – Lismore
Address: 25 Krauss Avenue South Lismore NSW 2480
Phone: 02 6626 4166
Fax: 02 6626 4160

Metalcorp Steel – Mildura
Address: Grace Crescent Buronga NSW 2739
Phone: 03 5051 6381
Fax: 03 5051 6397

Distributors List

New South Wales Distributors

Metalcorp Steel – Motto Farm
Address: 329 Pacific Highway Heatherbrae NSW 2322
Phone: 02 4980 7411
Fax: 02 4980 7422

Metalcorp Steel – Orange
Address: 23 Leewood Drive Orange NSW 2800
Phone: 02 6392 8566
Fax: 02 6392 8577

Metalcorp Steel – Penrith
Address: 19-23 Leland Street Penrith NSW 2750
Phone: 02 4723 7810
Fax: 02 4723 7822

Metalcorp Steel – Port Macquarie
Address: 8 - 12 Acacia Avenue Port Macquarie NSW 2444
Phone: 02 6589 4900
Fax: 02 6581 0760

Metalcorp Steel – St Marys
Address: 107 Dunheved Circuit St Marys NSW 2760
Phone: 02 8808 2555
Fax: 02 8808 2599

Metalcorp Steel – Tamworth
Address: 32 Hume Street Tamworth NSW 2340
Phone: 02 6755 3222
Fax: 02 6755 3201

Metalcorp Steel – Wagga Wagga
Address: 55 Dobney Avenue Wagga Wagga NSW 2650
Phone: 02 6932 3500
Fax: 02 6932 3501

Metalcorp Steel – West Gosford
Address: 322 Manns Road West Gosford NSW 2250
Phone: 02 4328 7455
Fax: 02 4328 7466

OneSteel Metalcentre – Coffs Harbour
Address: Cnr. Isles Drive & Elswick Street Coffs Harbour NSW 2450
Phone: 02 6652 3744
Fax: 02 6652 4226

OneSteel Metalcentre – Dubbo
Address: 30 Cobborah Road Dubbo NSW 2830
Phone: 02 6882 6655
Fax: 02 6884 1759

OneSteel Metalcentre – Tamworth
Address: 26-30 Goonan Street Tamworth NSW 2340
Phone: 02 6765 4044
Fax: 02 6765 2552

OneSteel Steel & Tube – Newcastle
Address: Industrial Drive Mayfield NSW 2304
Phone: 02 4967 0900

OneSteel Steel & Tube – Sydney
Address: 372-374 Victoria Street Wetherill Park NSW 2164
Phone: 02 9203 2222

OneSteel Steel & Tube – Wollongong
Address: Five Islands Road Unanderra NSW 2526
Phone: 02 4271 1788

Southern Steel Supplies – Dubbo
Address: 3 Richard Ryan Place Dubbo NSW 2830
Phone: 02 6882 1500
Fax: 02 6882 1502

Southern Steel Supplies – Newcastle
Address: 127 Glenwood Drive Thornton NSW 2322
Phone: 02 4966 8000
Fax: 02 4966 8888

Southern Steel Supplies – Sydney
Address: Bullecourt & Horsley Roads Milperra NSW 2214
Phone: 02 9792 2433
Fax: 02 9792 2973

Southern Steel Supplies – Tamworth
Address: 6A Wirraway St Tamworth NSW 2340
Phone: 02 6765 2288
Fax: 02 6765 4222

Southern Steel Supplies – Wollongong
Address: 499 Princes Highway Fairymeadow NSW 2519
Phone: 02 4284 4733
Fax: 02 4283 5017

Distributors List

Victorian Distributors

Bluescope Distribution – Albury
Address: Cnr. Catherine Crescent & Hume Highway Lavington VIC 2641
Phone: 02 6058 5488
Fax: 02 6058 5499

Bluescope Distribution – Ballarat
Address: Creswick Road Ballarat VIC 3353
Phone: 03 5320 7855
Fax: 03 5320 7866

Bluescope Distribution – Bendigo
Address: 15 – 35 Fairview Road Kangaroo Flat VIC 3555
Phone: 03 5448 3811
Fax: 03 5434 9844

Bluescope Distribution – Geelong
Address: Cnr. Point Henry & Portarlington Road Moolap VIC 3221
Phone: 03 5277 1559
Fax: 03 5277 1520

Bluescope Distribution – Horsham
Address: 140 Stawell Road Horsham VIC 3400
Phone: 03 5362 5333
Fax: 03 5362 5322

Bluescope Distribution – Mildura
Address: Grace Crescent Buronga VIC 2739
Phone: 03 5051 6388
Fax: 03 5051 6399

Bluescope Distribution – Morwell
Address: Lot 4 Jones Road Morwell VIC 3840
Phone: 03 5134 6266
Fax: 03 5128 5833

Bluescope Distribution – Portland
Address: 24 Portland – Nelson Road Portland VIC 3305
Phone: 03 5522 4255
Fax: 03 5527 1003

Bluescope Distribution – Shepparton
Address: 56-60 Florence Street Shepparton VIC 3630
Phone: 03 5821 1688
Fax: 03 5833 4455

Bluescope Distribution – Westall
Address: 16-24 Westall Road Westall VIC 3169
Phone: 03 9549 2666
Fax: 03 9547 5776

G.A.M. Steel – Derrimut
Address: 557 Mt Derrimut Road Derrimut VIC 3030
Phone: 03 8368 1555
Fax: 03 8368 1500

Metaland – Bendigo
Address: Craig Street Long Gully VIC 3550
Phone: 03 5442 2288
Fax: 03 5441 4062

Metaland – Breakwater Metaland
Address: 44-46 Leather Street Breakwater VIC 3219
Phone: 03 5248 6384
Fax: 03 5248 8015

Metaland – Camerons Metaland
Address: Cnr. Doveton & Eyre Streets Ballarat VIC 3350
Phone: 03 53374424
Fax: 03 5333 4934

Metaland – Donald Steel Metaland
Address: Racecourse Road Donald VIC 3480
Phone: 03 5497 1738
Fax: 03 5497 1862

Metaland – Echuca Metaland
Address: 16-18 Hovell Street Echuca VIC 3564
Phone: 03 5482 1505
Fax: 03 5482 6541

Metaland – Horsham
Address: 68 Hamilton Road Horsham VIC 3400
Phone: 03 5382 4411
Fax: 03 5382 0613

Metaland – Mildura
Address: 436-444 Benetook Avenue Mildura VIC 3502
Phone: 03 5023 5944
Fax: 03 5022 1442

Metaland – Morwell
Address: Lot 26 Kirwin Road Morwell VIC 3840
Phone: 03 5134 5111
Fax: 03 5133 9688

Metaland – Piera Metaland
Address: 17-23 Darcy Street Colac VIC 3249
Phone: 03 5231 3882
Fax: 03 5232 1865

Metaland – Shepparton
Address: 74-80 Florence Street Shepparton VIC 3630
Phone: 03 5821 7300
Fax: 03 5821 8975

Metaland – Swan Hill Metaland
Address: 223-225 Sea Lake Road Swan Hill VIC 3585
Phone: 03 5032 3203
Fax: 03 5032 3583

Metaland – Walkers Metaland
Address: Cnr. Coleraine & Cavendish Roads Hamilton VIC 3300
Phone: 03 5551 2788
Fax: 03 5571 2943

Metaland – Warrnambool
Address: 8-12 Strong Street Warrnambool VIC 3280
Phone: 03 5561 1622
Fax: 03 5561 1661

Metalcorp Steel – Ballarat
Address: Creswick Road Ballarat VIC 3350
Phone: 03 5320 7833
Fax: 03 5320 7866

Metalcorp Steel – Bendigo
Address: 117 Hattam Street Golden Square VIC 3555
Phone: 03 5434 9860
Fax: 03 5434 9854

Metalcorp Steel – Dandenong
Address: 503 Hammond Road Dandenong VIC 3175
Phone: 03 9768 1200
Fax: 03 9768 1210

Metalcorp Steel – Geelong
Address: 51 Cowie Street North Geelong VIC 3215
Phone: 03 5247 4100
Fax: 03 5272 2330

Metalcorp Steel – Horsham
Address: 140 Stawell Road Horsham VIC 3400
Phone: 03 5362 5333
Fax: 03 5362 5322

Metalcorp Steel – Portland
Address: 24 Portland Nelson Road Portland VIC 3305
Phone: 03 5522 4254
Fax: 03 5523 6818

Metalcorp Steel – Shepparton
Address: 56-60 Florence Street Shepparton VIC 3630
Phone: 03 5821 1688
Fax: 03 5822 2983

Metalcorp Steel – Warrnambool
Address: Cnr. Dickson & Watson Streets Warrnambool VIC 3280
Phone: 03 5562 7211
Fax: 03 5559 4277

Metalcorp Steel – Westall
Address: 16-24 Westall Road Clayton South VIC 3169
Phone: 03 8543 3678
Fax: 03 9547 5422

Metalcorp Steel – Wodonga
Address: 3 Kane Road Wodonga VIC 3690
Phone: 02 6022 9588
Fax: 02 6024 7967

OneSteel Steel & Tube – Geelong
Address: Cnr. Broderick & Heales Roads Corio VIC 3214
Phone: 03 5274 1414
Fax: 03 5275 0321

OneSteel Steel & Tube – Melbourne
Address: 1257-1259 Ferntree Gully Road Scoresby VIC 3179
Phone: 03 9212 7800
Fax: 03 9764 1456

Surdex Steel – Albury
Address: 25 Phoenix Place Albury NSW 2640
Phone: 02 6041 9400
Fax: 02 6041 3865

Surdex Steel – Bendigo
Address: 3 Craig Street Long Gully VIC 3550
Phone: 03 5442 6226
Fax: 03 5442 6227

Surdex Steel – Brunswick
Address: 26 Edward Street Brunswick VIC 3056
Phone: 03 9387 8000
Fax: 03 9387 0601

Surdex Steel – Campbellfield
Address: 204 Barry Road Campbellfield VIC 3061
Phone: 03 9357 8000
Fax: 03 9357 9441

Surdex Steel – Dandenong
Address: 46 Brooks Drive Dandenong South VIC 3175
Phone: 03 9213 5100
Fax: 03 9706 9020

Surdex Steel – Geelong
Address: 56 Weddell Road North Geelong VIC 3215
Phone: 03 5277 1555
Fax: 03 5277 1558

Surdex Steel – Keysborough
Address: 581 Chandler Road Keysborough VIC 3173
Phone: 03 9798 1177
Fax: 03 9706 3083

Surdex Steel – Morwell
Address: 8 Surdex Drive Morwell VIC 3840
Phone: 03 5135 3500
Fax: 03 5135 3544

Surdex Steel – Shepparton
Address: 27 Hawkins Road Shepparton VIC 3630
Phone: 03 5831 2700
Fax: 03 5831 4944

Surdex Steel – Warrnambool
Address: 8 Braithwaite Street Warrnambool VIC 3280
Phone: 03 5561 7888
Fax: 03 5561 7822

Distributors List

Western Australian Distributors

Bluescope Distribution – Albany
Address: 62 Chester Pass Road Albany WA 6330
Phone: 08 9841 9700
Fax: 08 9841 9711

Bluescope Distribution – Bunbury
Address: 69 Craigie Street Bunbury WA 6230
Phone: 08 9724 5220
Fax: 08 9724 5266

Bluescope Distribution – Esperance
Address: 26 Woods Street Esperance WA 6450
Phone: 08 9072 3100
Fax: 08 9072 3175

Bluescope Distribution – Geraldton
Address: 9 Beaver Street Geraldton WA 6530
Phone: 08 9921 9300
Fax: 08 9921 9310

Bluescope Distribution – Kalgoorlie
Address: 45 Great Eastern Highway Kalgoorlie WA 6430
Phone: 08 9024 1388
Fax: 08 9024 1399

Bluescope Distribution – Kewdale
Address: 9 Bradford Street Kewdale WA 6105
Phone: 08 6250 1000
Fax: 08 6250 1111

CMC Coil Steels
CMC Coil Steels Plate and Long Products Perth
1270 Abernethy Road Hazelmere WA 6055
Phone: +618 9359 8900
Fax: +618 9359 8999

Metalcorp Steel - Balcatta
Address: 184 Balcatta Road Balcatta WA
Phone: 08 9229 4460
Fax: 08 9229 4499
Email:david.larchet@bluescopesteel.com

Metalcorp Steel - Kewdale
Address: 497 Abernethy Road Kewdale WA 6105
Phone: 08 9251 2500
Fax: 08 9251 2511
Email:gunther.werner@bluescopesteel.com

Metaland – Frank Weston & Co Metaland
Address: Sales Street Narrogin WA 6312
Phone: 08 9881 1075
Fax: 08 9881 3181

Midalia Steel – Bibra Lake
Address: 20 Port Kembla Bibra Lake WA 6163
Phone: 08 9459 9466
Fax: 08 9459 9866

Midalia Steel – Albany
Address: 115 Chester Pass Road Albany WA 6330
Phone: 08 9841 1799
Fax: 08 9842 1482

Midalia Steel – Broome
Address: 3 Archer Street Heavy Industrial Area Broome WA 6725
Phone: 08 9192 5888
Fax: 08 9192 5777

Midalia Steel – Bunbury
Address: 5 Zaknic Place Bunbury WA 6230
Phone: 08 9791 3944
Fax: 08 9791 3844

Midalia Steel – Busselton
Address: 104 Strelly Street Busselton WA 6280
Phone: 08 9752 4900
Fax: 08 9752 4933

Midalia Steel – Esperance
Address: 5 Scanlon Street Esperance WA 6450
Phone: 08 9071 5326
Fax: 08 9071 2666

Midalia Steel – Karratha
Address: Cnr. Cowle & Coolawanyah Roads Karratha WA 6714
Phone: 08 9144 1944
Fax: 08 9144 1966

Midalia Steel – Maddington
Address: 9 Malcolm Road Maddington WA 6109
Phone: 08 9459 9466
Fax: 08 9459 9866

Midalia Steel – Mandurah
Address: 30-32 Panton Road Mandurah WA 6210
Phone: 08 9581 9811
Fax: 08 9581 9822

Midalia Steel – Merredin
Address: Barrack Street East Merredin WA 6415
Phone: 08 9041 3300
Fax: 08 9041 3322

Midalia Steel – Midvale
Address: 34 Farrall Road Midvale WA 6056
Phone: 08 9250 2005
Fax: 08 9250 2525

Midalia Steel – Moora
Address: 153 Gardiner Street Moora WA 6510
Phone: 08 9651 1610
Fax: 08 9651 1623

Midalia Steel – Northam
Address: Cnr. Great Eastern Highway & Old York Road Northam WA 6401
Phone: 08 9622 2211
Fax: 08 9622 2288

Midalia Steel – Wagin
Address: Lot 430 Tudhoe Street Wagin WA 6315
Phone: 08 9861 1317
Fax: 08 9861 1361

Midalia Steel – Welshpool
Address: 49 Pilbara Street Welshpool WA 6106
Phone: 08 9333 4444
Fax: 08 9458 8076

Midalia Steel – Lansdale
Address: 10 Rogers Way Lansdale WA 6065
Phone: 08 9409 7788
Fax: 08 9309 3221

OneSteel Metalcentre – Bunbury
Address: 7 Richter Road Bunbury WA 6230
Phone: 08 9725 4199
Fax: 08 9725 4086

OneSteel Metalcentre – Geraldton
Address: 89 Flores Road Geraldton WA 6530
Phone: 08 9921 4533
Fax: 08 9921 7133

OneSteel Metalcentre – Kalgoorlie
Address: Cnr. Great Eastern Highway & Atbara Street Kalgoorlie WA 6430
Phone: 08 9021 4488
Fax: 08 9021 7602

OneSteel Metalcentre – Karratha
Address: Cnr. Cowle & Coolawanyah Roads Karratha WA 6714
Phone: 08 9144 0111
Fax: 08 9185 3663

OneSteel Metalcentre – Port Hedland
Address: Lot 5271 Munda Way Port Hedland WA 6721
Phone: 08 9140 2822
Fax: 08 9172 1004

OneSteel Steel & Tube – Perth
Address: Lot 302 Spearwood Avenue Bibra Lake WA 6163
Phone: 08 9418 9877

Southern Steel (WA)
Address: Lot 1039 1&2 Hoyle Road (cnr Armstrong Rd) Hope Valley WA 6165
Phone: 08 9419 5386
Fax: 08 9419 3907

Distributors List

South Australian Distributors

Bluescope Distribution – Ottoway
Address: 301 Grand Junction Road Ottoway SA 5013
Phone: 08 830 13801
Fax: 08 8301 3888

Brice Metals – Adelaide
Address: 522 Cross Keys Road Cavan SA 5094
Phone: 08 8405 7111
Fax: 08 8347 1883

CMC Coil Steels Adelaide
Address: 13 - 21 Martin Ave Gillman SA 5013
Phone: 08 8240 0900
Fax: 08 8240 0955

Metaland – Nuriootpa
Address: 121 Greenock Road Nuriootpa SA 5355
Phone: 08 8562 4100
Fax: 08 8562 3472

Metaland – Minlaton Engineering Metaland
Address: 39 Maitland Road Minlaton SA 5575
Phone: 08 8853 2226
Fax: 08 8853 2265

Metaland – Mount Gambier
Address: Jubilee Highway West Mt Gambier SA 5290
Phone: 08 8725 7500
Fax: 08 8725 0259

Metaland – Port Adelaide
Address: 13 Webb Street Port Adelaide SA 5015
Phone: 08 8300 3444
Fax: 08 8300 3445

Metaland – Port Lincoln
Address: 6 - 8 Verran Terrace Port Lincoln SA 5606
Phone: 08 8682 3377
Fax: 08 8682 5316

Metaland – Riverland Steel Metaland
Address: Old Sturt Highway Berri SA 5343
Phone: 08 8582 2144
Fax: 08 8582 3242

Metaland – Sharman Engineering Metaland
Address: Powerline Road Long Plains SA 5501
Phone: 08 8527 2218
Fax: 08 8527 2405

Metaland – Whyalla
Address: 172 Lacey Street Whyalla SA 5600
Phone: 08 8645 0633
Fax: 08 8645 7280

Metalcorp Steel – Elizabeth
Address: Cnr. Wiley Street & Phillip Highway Elizabeth SA 5112
Phone: 08 8307 4311
Fax: 08 8307 4322

Metalcorp Steel – Ottoway
Address: 285 Grand Junction Road Ottoway SA 5013
Phone: 08 8301 3777
Fax: 08 8301 3888

OneSteel Steel & Tube – Adelaide
Address: 13 Webb Street Port Adelaide SA 5015
Phone: 08 8300 3333
Fax: 08 8300 3366

Tasmanian Distributors

Bluescope Distribution – Burnie
159A Bass Highway Cooee TAS 7321
Phone: 03 6434 4253
Fax: 03 6434 4266

Bluescope Distribution – Hobart
Address: 68 Mornington Road Mornington TAS 7018
Phone: 03 6211 4330
Fax: 03 6244 7013

Bluescope Distribution – Launceston
Address: Lot 5 Murphy Street Launceston TAS 7250
Phone: 03 6324 1250
Fax: 03 6334 2961

Metaland – Burnie
Address: Bass Highway Somerset TAS 7322
Phone: 03 6435 1500
Fax: 03 6435 1468

Metaland – Derwent Park
Address: 61 Sunderland Street Moonah TAS 7009
Phone: 03 6272 2877
Fax: 03 6272 0977

Metaland – Kings Meadow
Address: 345 Hobart Road Launceston TAS 7249
Phone: 03 6344 9714
Fax: 03 6344 9402

OneSteel Metalcentre – Hobart
Address: 67 Lampton Avenue Moonah TAS 7009
Phone: 03 6272 6931
Fax: 03 6273 1027

OneSteel Metalcentre – Kings Meadow
Address: 345 Hobart Road Launceston TAS 7249
Phone: 03 6344 5311
Fax: 03 6344 9402

Northern Territory Distributors

Bluescope Distribution – Darwin
Address: 50 O'Sullivan Circuit East Arm NT 0822
Phone: 08 8984 2600
Fax: 08 8984 2699

CMC Coil Steels – Darwin
Address: Lot 1036 Berrimah Road Berrimah NT 0828
Phone: 08 8947 2444
Fax: 08 8947 5158

Metaland – Hohns Sheet Metal Metaland
Address: 32 Crawford Street Katherine NT 0850
Phone: 08 8972 2633
Fax: 08 8972 3454

OneSteel Steel & Tube – Darwin
Address: Lot 889 Stuart Highway Berrimah NT 0828
Phone: 08 8935 0350
Fax: 08 8935 0380

Southern Steel – Darwin
Address: 3847 Marjorie Street Pinelands NT 0828
Phone: 08 8932 7135
Fax: 08 8931 4180

Aust. Capital Territory Distributors

Bluescope Distribution – Fyshwick
Address: 29 Tennant St Fyshwick ACT 2609

Metalcorp Steel – Fyshwick
Address: 29 Tennant St Fyshwick ACT 2609

OneSteel Metalcentre – Canberra
Address: John's Place Hume ACT 2620
Phone: 02 6260 1249
Fax: 02 6260 1317

Distributors List

New Zealand Distributors

Asmuss South Island (Christchurch)
Address: 67 Vickerys Road Sockburn Christchurch
Phone: +64 3 348 3417
Fax: +64 3 348 0503

Asmuss South Island (Dunedin)
Address: 3 White Street Dunedin
Phone: +64 3 477 2323
Fax: +64 3 477 2321

Asmuss South Island (Nelson)
Address: 8 Saxton Road West Stoke Nelson
Phone: +64 3 538 0351
Fax: +64 3 538 0349

Fletcher EasySteel (Auckland)
Address: 575 Great South Road Penrose Auckland
Phone: +64 9 525 9400
Fax: +64 9 525 9401

Fletcher EasySteel (Christchurch)
Address: 55 Lunns Road, Middleton Christchurch
Phone: +64 3 348 8479
Fax: +64 3 343 0320

Fletcher EasySteel (Dunedin)
Address: 26 Orari Street
Phone: +64 3 456 1750
Fax: +64 3 455 6538

Fletcher EasySteel (Hamilton)
Address: Ellis Street, Frankton Hamilton
Phone: +64 7 847 8189
Fax: +64 7 847 8445

Fletcher EasySteel (Invercargill)
Address: 54 Tweed Street Invercargill
Phone: +64 3 218 2986
Fax: +64 3 218 2318

Fletcher EasySteel (Hawkes Bay)
Address: Corner Omahu & Wilson Roads Hawkes Bay
Phone: +64 6 873 9036
Fax: +64 6 879 6880

Fletcher EasySteel (Nelson)
Address: 42 Beach Road Richmond Nelson
Phone: +64 3 544 3117
Fax: +64 3 544 3118

Fletcher EasySteel (New Plymouth)
Address: 50 Corbett Rd, Bell Block New Plymout
Phone: +64 6 755 0946
Fax: +64 6 755 2099

Fletcher EasySteel (Palmerston North)
Address: 120 Kaimanawa Street Kelvin Grove Palmerston North
Phone: +64 6 354 2622
Fax: +64 6 354 2623

Fletcher EasySteel (Rotorua)
Address: Tallyho Street
Phone: +64 7 348 3039
Fax: +64 7 347 7353

Fletcher EasySteel (Tauranga)
Address: 99 Aviation Avenue Mt Maunganui Tauranga
Phone: +64 7 572 9700
Fax: +64 7 572 9707

Fletcher EasySteel (Wellington)
Address: Burnham Street Petone
Phone: +64 4 568 4189
Fax: +64 4 570 8473

Fletcher EasySteel (Whangarei)
Address: 33 Rewarewa Road Whangarei
Phone: +64 9 438 4819
Fax: +64 9 438 4589

HJ Asmuss (Auckland)
Address: 6 Gabador Place Mt Wellington Auckland
Phone: +64 9 573 0099 / Freephone: 0800 276 877
Fax: +64 9 573 5590

HJ Asmuss (Mt Maunganui)
Address: 40 Portside Drive Mt Maunganui
Phone: +64 7 574 6774
Fax: +64 7 574 6775

Steel & Tube Distribution – Whangarei
Address: Cnr Hewlett Street & Fraser Crescent, Whangarei
Phone: +64 9 438 3999
Fax: +64 9 438 3990

Steel & Tube Distribution – North Harbour
Address: 5 Ride Way, North Harbour Industrial Estate, Albany
Phone: +64 9 415 3490
Fax:+64-9 415 3405

Steel & Tube Distribution – Auckland
Address: 68 Stonedon Drive, East Tamaki
Phone: +64 9 273 7610
Fax: +64 9 273 1470

Steel & Tube Distribution – Hamilton
Address: 40 Northway Street, Te Rapa.
Phone: +64 7 850 7640
Fax: +64 7 849 7407

Steel & Tube Distribution – Mt Maunganui
Address: 28c Jean Batten Drive, Mt Maunganui.
Phone: +64 7 572 7065
Fax: +64 7 571 2172

Steel & Tube Distribution – Rotorua
Address: Cnr View Road & 24 Hyland Crescent, Rotorua.
Phone: +64 7 348 0449
Fax: +64 7 348 0442

Steel & Tube Distribution – New Plymouth
Address: Centennial Drive, New Plymouth.
Phone: +64 6 751 0340
Fax: +64 6 751 1762

Steel & Tube Distribution – Napier
Address: 15 Ford Street, Onekawa.
Phone: +64 6 843 9196
Fax: +64 6 843 2224

Steel & Tube Distribution – Palmerston North
Address: Malden Street, Palmerston North.
Phone: +64 6 356 5252
Fax: +64 6 356 5247

Steel & Tube Distribution – Wellington
Address: Hautonga Street, Petone.
Phone: +64 4 568 5109
Fax: +64 4 568 8308

Steel & Tube Distribution – Nelson
Address: Cnr Carkeek & Graham Streets, Nelson.
Phone: +64 3 548 2209
Fax: +64 3 548 0626

Steel & Tube Distribution – Christchurch
Address: 375 Blenheim Road, Christchurch.
Phone: +64 3 343 7999
Fax: +64 3 348 4167

Steel & Tube Distribution – Timaru
Address: 9 Meadows Road, Washdyke.
Phone: +64 3 688 2085
Fax: +64 3 688 2084

Steel & Tube Distribution – Dunedin
Address: Cnr Willis & Tewsley Streets, Dunedin.
Phone: +64 3 477 9655
Fax: +64 3 477 9646

Steel & Tube Distribution – Invercargill
Address: Bond Street, Invercargill.
Phone: +64 3 218 2803
Fax: +64 3 218 9131

Steel & Tube Piping Systems – Auckland
Address: 124 Hugo Johnston Drive, Penrose, Auckland.
Phone: +64 9 276 2770
Fax: +64 9 276 2775

Steel & Tube Piping Systems – New Plymouth
Address: De Havilland Drive, Bell Block, New Plymouth.
Phone: +64 6 755 0055
Fax: +64 6 755 1628

Steel & Tube Piping Systems – Wellington
Address: 17 Hautonga Street, Petone.
Phone: +64 4 576 8990
Fax: +64 4 576 8993

Distributors List

New Zealand Distributors

Steel & Tube Piping Systems – Christchurch
Address: 65 Treffers Road, Christchurch.
Phone: +64 3 348 7631
Fax +64 3 348 6075

Steel Traders (Lower Hutt) A division of H.J. Asmuss & Co. Ltd
Address: 11-13 Gough Street Seaview Wellington
Phone: +64 9 939 6699 / Freephone: 0800 893 337
Fax: +64 9 939 6600

Stewart Steel
Address: 85 Falsgrave Street, Christchurch.
Tel: +64 3 365 0079
Fax: +64 3 365 7576

Vulcan Steel Ltd (Tauranga)
Address: 5 c Jean Batten Dve Mt Maunganui
Phone: +64 7 572 7028
Fax: +64 7 572 7029

Vulcan Steel Ltd (Whangarei)
Address: 110 Lower Port Road, Whangarei
Phone: +64 9 438 8526
Fax: +64 9 438 8523

Vulcan Steel Ltd (Invercargill)
Address: 77 Bond St Invercargill
Phone: +64 3 211 0375
Fax: +64 3 211 0374

Vulcan Steel Ltd (Nelson)
Address: 23 Low St Port Nelson
Phone: +64 3 545 8852
Fax: +64 3 545 8853

Vulcan Steel Ltd (Auckland)
Address: 29 Neales Rd East Tamaki
Phone: +64 9 273 7214
Fax: +64 9 273 7219

Vulcan Steel Ltd (Palmerston North)
Address: 52-60 Makomako Rd Palmerston North
Tel: +64 6 354 7763
Fax: +64 6 354 7764

Vulcan Steel Ltd (Christchurch)
Address: 15 Kilronan Pl Sockburn Christchurch
Phone: +64 3 343 3960
Fax: +64 3 343 3961

Vulcan Steel Ltd (Dunedin)
Address: 7 Birch St Dunedin
Phone: +64 3 471 8852
Fax: +64 3 471 8853

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References, Specifications & Standards

Australian Standards	
AS 1074	Steel tubes and tubulars for ordinary service
AS 3990*	Mechanical equipment – Steelwork
AS 4041	Pressure piping
AS 4100	Steel structures
AS 4100–Supplement 1*	Steel structures – Commentary
AS 4118.2.1	Fire sprinkler systems – Part 2.1: Piping – General

Joint Australian & New Zealand Standards	
AS/NZS 1163	Cold-formed structural steel hollow sections
AS/NZS 1554.1	Structural steel welding, Part 1: Welding of steel structures
AS/NZS 1554.5	Structural steel welding, Part 5: Welding of steel structures subject to high levels of fatigue loading
AS/NZS 2312	Guide to the Protection of structural steel against atmospheric corrosion by the use of protective coatings
AS/NZS 4496	Recommended practice for the colour coding of steel products
AS/NZS 4600	Cold-formed steel structures
AS/NZS 4791	Hot-dip galvanized (zinc) coatings on ferrous open sections, applied by an in-line process
AS/NZS 4792	Hot-dip galvanized (zinc) coatings on ferrous hollow sections, applied by a continuous or a specialised process

New Zealand Standards	
NZS 3404*	Steel structures standard
Joint Australian and International Organisation for Standardisation (ISO)	
AS ISO 7.1	Pipe threads where pressure-tight joints are made on the threads, Part 1: Dimensions, tolerances, and designation
AS ISO 7.2	Pipe threads where pressure-tight joints are made on the threads, Part 2: Verification by means of limit gauges.

Notes:

1. * For information only – not specifically referred to in this publication.

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End Colour Coding Chart *as per AS/NZS 4496*

Structural CHS Grade C250L0

M	Blue
H	Red
XH	No Colour

Structural CHS Grade C350L0*

XL	Green
L	Yellow

Pipe Grade C250L0

M	Blue
H	Red

Structural RHS/SHS C450PLUS®

1.6	Purple
1.8	Brown
2.0	Yellow
2.5	Pink
3.0	Blue
3.5	Grey
4.0	Green
5.0	Orange
6.0	Cream
8.0	Red
9.0	Purple
10.0	Yellow
12.5	Blue
16.0	Grey

Silo Section C450PLUS®

2.5	Pink
3.0	Blue

Notes:

1. As per AS/NZS 4496:1997 Recommended practice for colour coding of steel products.
2. * Refers to Structural CHS Grade C350L0 up to and including 165.1 mm OD only. Otherwise no end colour coding.

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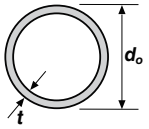
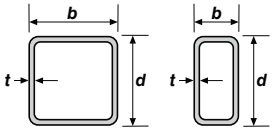
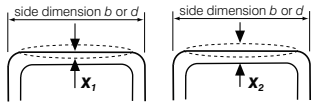
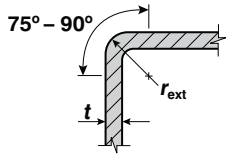
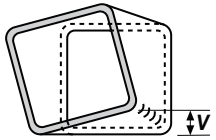
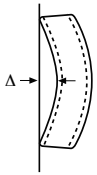
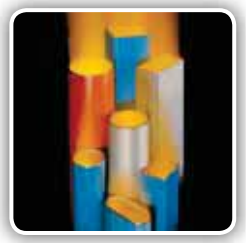
Dimensional Tolerances *compliant with AS/NZS 1163: 2009 Cold-formed structural steel hollow sections*

Dimension/Parameter	Tolerance
Cross-section – Variation in CHS outside diameter 	± 1%, with a minimum of ±0.5 mm and a maximum of ±10 mm
Cross-section – Variation in RHS/SHS outside dimensions 	± 1%, with a minimum of ±0.5 mm
Cross-section – Thickness (t)	• CHS – ◦ For $d_o \leq 406.4$ mm: ±10% ◦ For $d_o > 406.4$ mm: ±10% with a max of ±2 mm • RHS/SHS: ± 10%
Out-of-roundness (o)	o= 2% for hollow sections having a diameter to thickness ratio not exceeding 100, and where $o = \frac{d_{o_{max}} - d_{o_{min}}}{d_o} \times 100$
Concavity (x_1) or Convexity (x_2) 	(x_1) *or* (x_2) ≤ greater of 0.8% of side dimension and 0.5mm
Squareness of sides	90°±1°

Dimension/Parameter	Tolerance
Cross-section – RHS/SHS corner radius 	(a) Maximum outside radius (r_{ext}) = 3t (b) Minimum outside radius (r_{ext}) = 1.5t *(for RHS/SHS with equivalent perimeter equal to 50 x 50 or less)* = 1.8t *(for RHS/SHS with equivalent perimeter greater than 50 x 50)* where t is the section thickness in mm.
Member – Twist (RHS/SHS) 	Maximum value of V (see diagram) = 2 mm + 0.5 mm per metre length
Member – Straightness 	Maximum value of Δ (see diagram) = 0.20% of total length for CHS = 0.15% of total length for RHS and SHS The straightness tolerance applies to straightness in any one plane.
Member – Mass of Hollow Section Length	Not less than 0.96 times the nominal mass
Member – Length	+ 25 mm – 0 mm] Acacia Ridge Mills + 50 mm – 0 mm] Newcastle & Somerton Mills



Notes:

1. If tighter tolerances are required, they must be specified at the time of order (conditions apply).
2. Where AS/NZS 1163 tolerance provisions do not affect the size range supplied by ATM, they have not been included in the table.
3. All external dimensions are to be measured at a distance of at least d_o, b or d or 100mm from the end of the hollow section.
4. See Clause 8 of AS/NZS 1163 for methods of measuring manufacturing tolerances.

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Notations & Abbreviations

Abbreviation	Description
A_e	effective area of cross-section
A_g	gross area of a cross-section
b	width of section
C	torsional modulus for a cross-section; or Compact section (in bending)
C250L0	cold-formed Grade C250 hollow section to AS/NZS 1163 with L0 properties
C350L0	cold-formed Grade C350 hollow section to AS/NZS 1163 with L0 properties
C450L0	cold-formed Grade C450 hollow section to AS/NZS 1163 with L0 properties
C450L0PLUS®	cold-formed hollow section which satisfies AS/NZS 1163 Grades C350L0 and C450L0
CHS	Circular Hollow Section(s)
d	depth of section
d_o	outside diameter of a Circular Hollow Section (CHS)
DN	nominal size (as noted in AS 1074)
ERW	Electric Resistance Welding
f_u	tensile strength used in design, as defined in AS 4100
f_y	yield stress used in design, as defined in AS 4100
I	second moment of area of a cross-section
I_u	I about the cross-section u-axis (Silo section)
I_v	I about the cross-section v-axis (Silo section)
I_w	warping constant for a cross-section (~0 for hollow sections)
I_x	I about the cross-section major principal x-axis
I_y	I about the cross-section minor principal y-axis
J	torsion constant for a cross-section

Abbreviation	Description
k_f	form factor for members subject to axial compression
L0	Impact properties (as required by AS/NZS 1163 at 0 degrees Celcius)
N	Non-compact section (in bending)
n	axis through the opposite corners of a SHS
RHS	Rectangular Hollow Section(s)
r	radius of gyration
r_x	radius of gyration about the major principal x-axis
r_y	radius of gyration about the minor principal y-axis
S	plastic section modulus; or Slender section (in bending)
S_x	(plastic) S about the cross-section major principal x-axis
S_y	(plastic) S about the cross-section minor principal y-axis
SHS	Square Hollow Section(s)
t	wall thickness
u	rectangular (abscissa) axis value for u-v co-ordinate system for SiloTube section
v	rectangular (ordinate) axis value for u-v co-ordinate system for SiloTube section
x	major principal axis value
y	minor principal axis value
Z	elastic section modulus
Z_e	effective section modulus
Z_{ex}	Z_e about the cross-section major principal x-axis
Z_{ey}	Z_e about the cross-section minor principal y-axis
Z_n	Z about the n-axis through the opposite corners of a SHS
Z_x	Z about the cross-section major principal x-axis
Z_y	Z about the cross-section minor principal y-axis
λ_e	plate element slenderness

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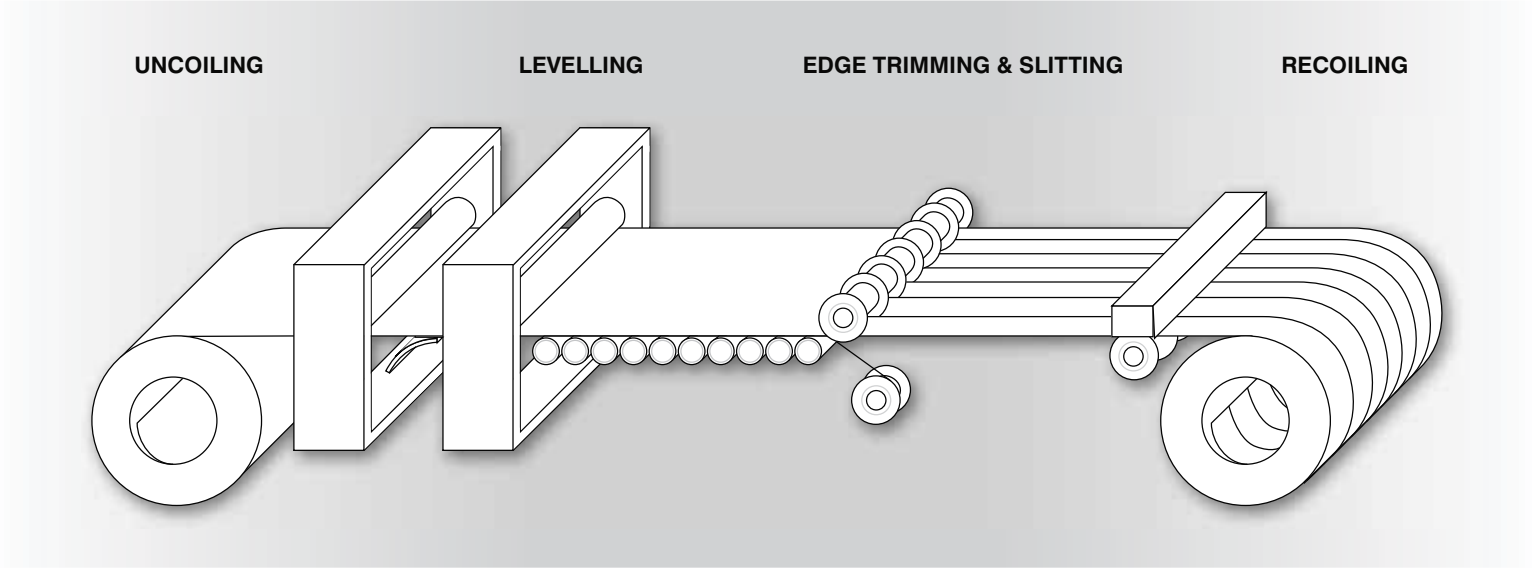
Manufacturing Process – Hollow Sections – ERW Process Step 1



Raw Material Handling

1.0 – 1.5 metre wide rolls of steel coil are processed to make welded steel tube. Each coil weighs anywhere from 18 to 27 tonnes. After careful inspection and measurement to ensure the material is correct, the coils are placed in a storage area.

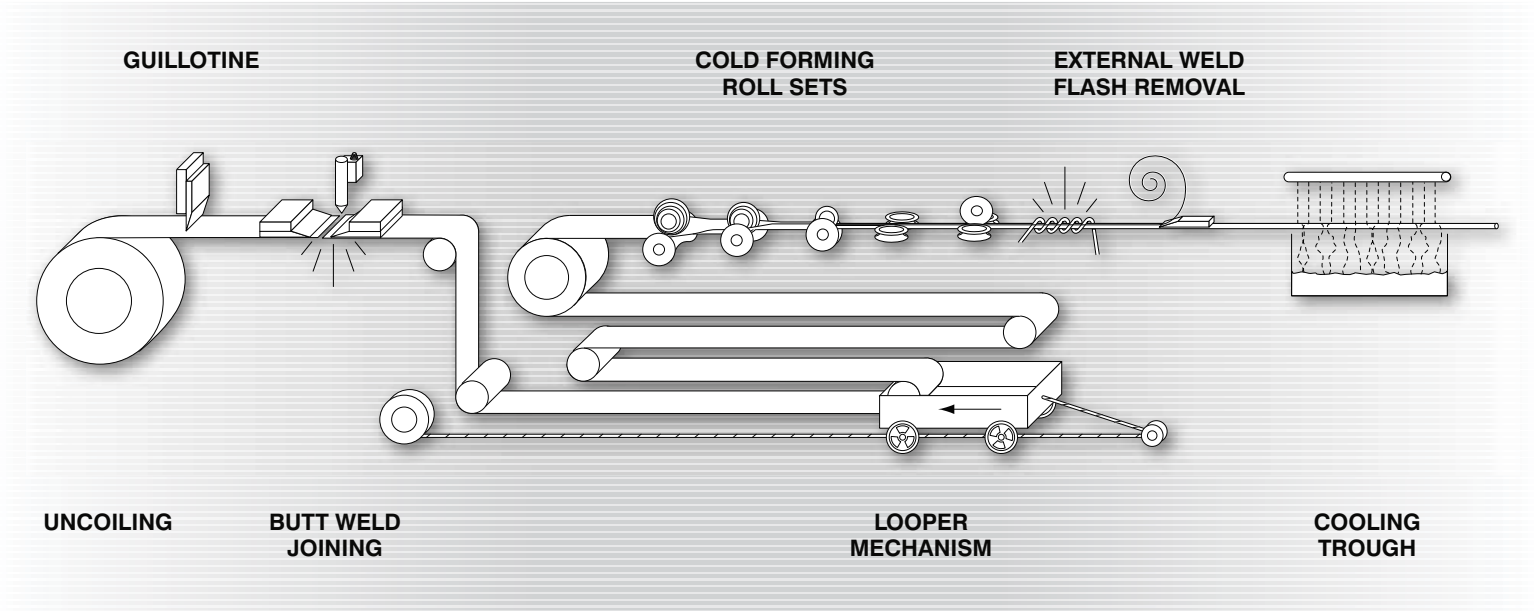
The coil ends are prepared for the start of the milling process by uncoiling and levelling. The edges are trimmed and the flat steel is then slit into the required widths to suit different products.

They are then recoiled and the trimmed edges plus offcuts are collected for recycling as scrap metal.

Pre-mill Preparation

A fully computerised production log schedule selects which coils will be processed through the mill. At this stage, information on the coils and mults (i.e. slit sub-multiples of the coil) is entered into a computer system so that the end product can be traced for quality control purposes.

Manufacturing Process – Hollow Sections – ERW Process Step 2



Mill Entry

Selected mults are taken from storage to meet production demands. Lengths are joined by a combination guillotine/ welding process. This does not halt production because a looper (or accumulator) allows a loop of steel strip to feed the mill while the joining operation takes place.

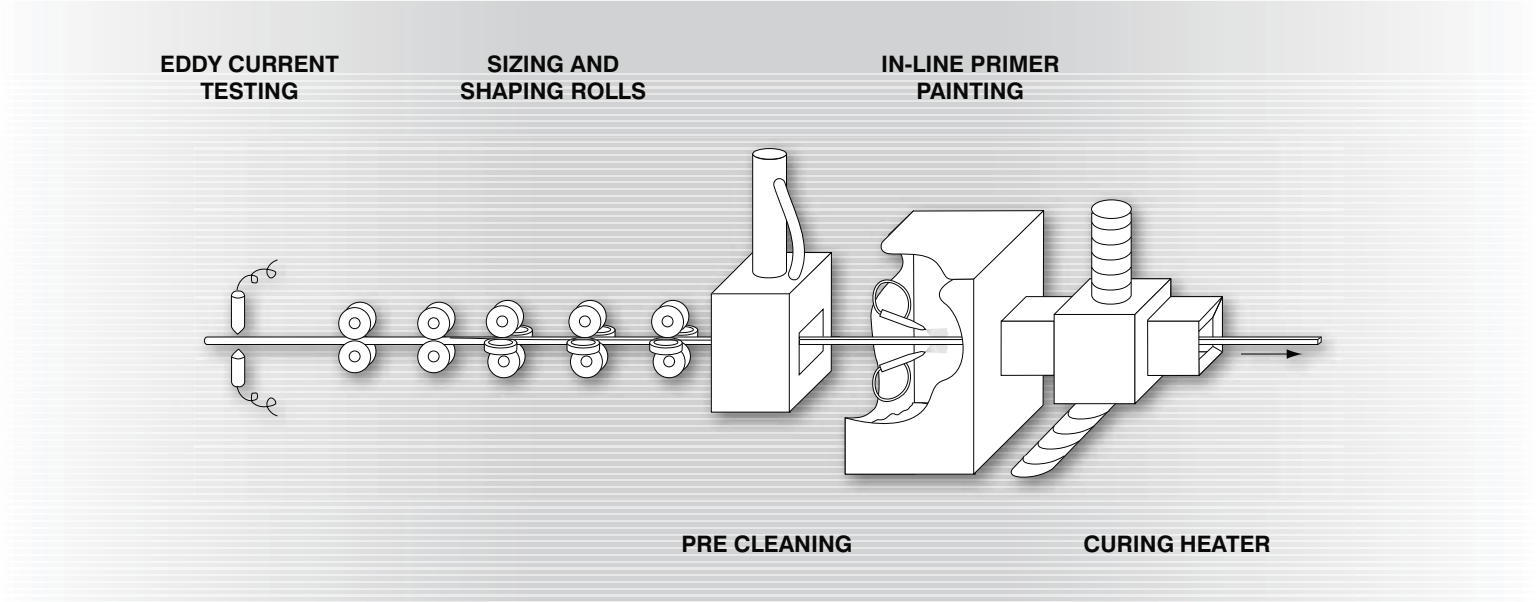
Cold Forming and Welding

A long series of forming rolls forms the flat steel into tube. The steel is not heated and this gradual cold forming process enhances the strength of the steel and allows for very tight dimensional tolerances.

When the edges of the tube are pushed together by squeeze rolls, they are welded using Electric Resistance Welding (ERW).

The external weld flash is removed by special scarfing tools and the pipe is cooled uniformly in a cooling trough.

Manufacturing Process – Hollow Sections – ERW Process Step 3



Eddy Current Testing

Weld quality is absolutely vital to the quality of the end products, its integrity is checked continuously (by our eddy current testing system) and any tube that does not conform is marked and rejected.

Sizing and Shaping

The tube then enters the sizing and shaping mill where rolls turn it into products such as square and rectangular hollow sections or other Australian Tube Mills' products such as StockRail.

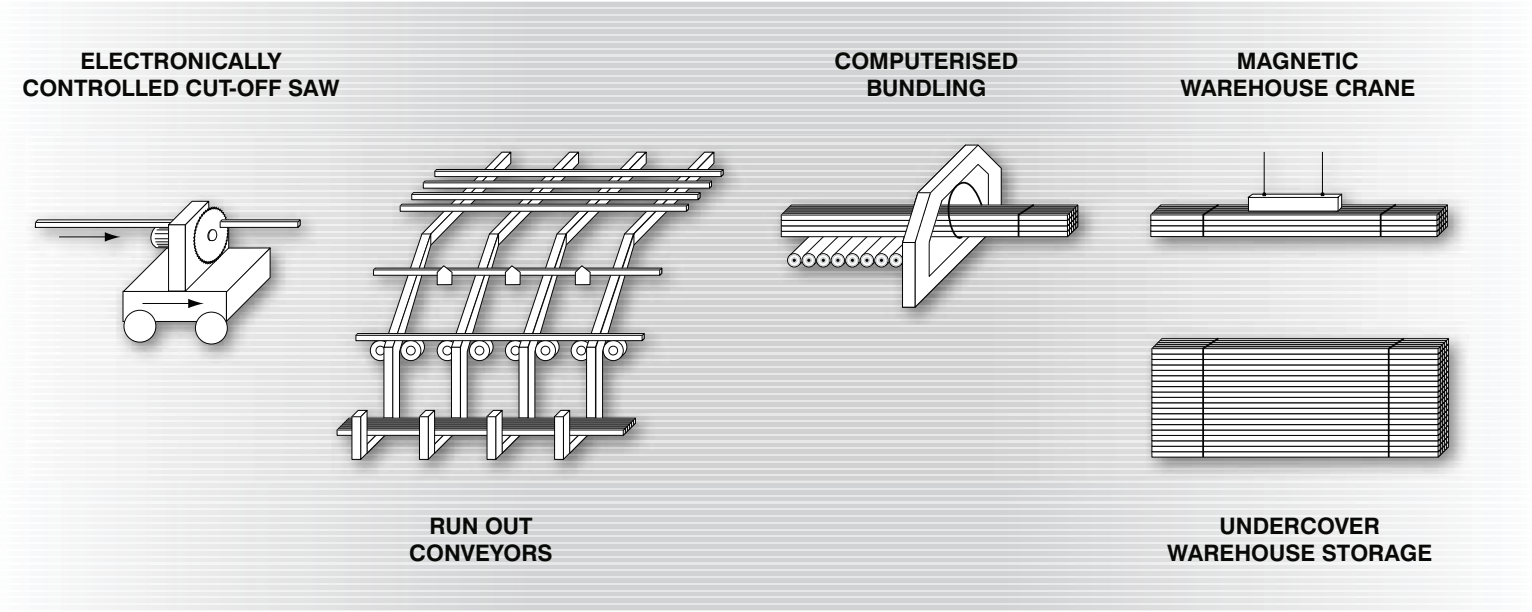
Painstaking measurement takes place throughout the process to make sure the product conforms with specifications.

Protective Painting

These sections are then cleaned and degreased before entering the in-line painting process.

When required, this patented in-line Primer painting process took over 20 years to fully develop and offers excellent protection for steel products during transport, handling and fabrication. The various colours also make for easy identification of the products.

Manufacturing Process – Hollow Sections – ERW Process Step 4



Cut-off and Bundling

After paint finishing, the product passes through an electronically controlled cut-off machine. Cut to specified lengths, the products then change direction and go through a run-out process en route to the bundler.

After a rigorous visual and dimensional inspection, most lengths of product go to the next step, those that have been ear-marked for rejection pass to one side. Tube products are then end faced to remove any jagged edges left by the cut off machine.

The bundler is a very complex process that sorts the product into pre-specified packs, wraps them with steel strap for transport and then removes them to the warehouse area.

The ends of the products are colour coded to identify wall thickness. Barcoded identification tags are also attached at this point.

Despatch

After weighing, they are put in the warehouse or are taken away for other operations, such as galvanizing.

Packs are lifted onto semi-trailer transporters for despatch to our distribution network throughout Australia, New Zealand, the Pacific Rim and South-East Asia.

Part 2 – Pipe & Tube Products – Contents

Notes:

Disclaimer – Whilst every care has been taken in the preparation of this information, Australian Tube Mills, and its agents accept no liability for the accuracy of the information supplied. The company expressly disclaims all and any liability to any person whether a purchaser of any product, or otherwise in respect of anything done or omitted to be done and the consequences of anything done or omitted to be done, by any such person in reliance, whether in whole or in part upon the whole or any part of this publication.

Product availability & other information – As the section, grade and finish of all products are subject to continuous improvement, reference should be made to the ATM *PRODUCT AVAILABILITY GUIDE* (PAG) for information on the availability of listed sections and associated finishes. The PAG is found at: www.austubemills.com.

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CHS/Pipe to AS/NZS 1163 – C250L0 – Specifications

Technical Specifications

Australian Standards

CHS/Pipe to Grade C250L0 is manufactured and tested to comply with the requirements of the following specifications:

- AS 1074 – Steel tubes and tubulars for ordinary service.
- AS/NZS 1163 – Cold-formed structural steel hollow sections (Grade C250L0).
- AS/NZS 4792 – Hot-dip galvanized (zinc) coatings on ferrous hollow sections, applied by a continuous or a specialised process (Section 2).

Mechanical Properties

CHS/Pipe to Grade C250L0 has the following mechanical properties:

- Minimum Yield Strength _____ 250 MPa
- Minimum Tensile Strength _____ 320 MPa
- Minimum Elongation in $5.65\sqrt{S_o}$

$d_o/t \leq 15$	$15 < d_o/t \leq 30$	$d_o/t > 30$
18%	20%	22%

- L0 guaranteed impact properties at 0°C to AS/NZS 1163

Tolerances

Tolerances for CHS/Pipe to Grade C250L0 are compliant with AS/NZS 1163. See Dimensional Tolerances in Part 1 for more information.

Supply Conditions

DuraPrimed (DP) Finish

CHS/Pipe to Grade C250L0 with a DuraPrimed finish is supplied in the following surface colours:

- DuraPrimed^{Red}
- Clear

This DuraPrimed finish is applied in-line using a patented process and is supplied in the following coating thicknesses:

- DuraPrimed^{Red} & Clear _____ Target 12 microns with average at 8-10 microns

Note: Non-standard finishes, such as NOPC and LiteOil, are available if ordered prior to rollings. Conditions apply and subject to mill acceptance.

See the ATM Product Availability Guide for further information on availability.

HotDipGal Finish

- Galvanized (Hot-dip)

CHS/Pipe to Grade C250L0 with HotDipGal finish is galvanized and tested to meet the requirements of Section 2 of AS/NZS 4792.

- Minimum coating mass _____ 300 g/m^2 each side

The coating adherence of the galvanizing is satisfactory for the pipe to be bent to a radius 6 times the diameter of the pipe up to 60.3mm OD in accordance with AS/NZS 4792.

See the ATM Product Availability Guide for further information on availability.

End Finish (Mill Processing)

- Plain and Threaded Ends with/without Sockets.

Refer to Mill Processing (Part 7) of this product manual for end finish details.

See the ATM Product Availability Guide for further information on availability.

Standard Lengths

Standard length for CHS/Pipe to Grade C250L0:

- (DN 20 – DN 150 CHS) _____ 6.5 m

Grade C250L0 Extra Heavy Pipe is also available on request.

May exclude some wall thicknesses and finishes. Contact your Australian Tube Mills representative or refer to the ATM Product Availability Guide for further details.

Non-Standard Lengths

Special orders of non-standard pack lengths of CHS/Pipe to Grade C250L0 are available (conditions apply). Check with your distributor for details.

Minimum Length:

- (DN 20 – DN 100, excl. DN 90) DP _____ 4.2 m
- (DN 90, DN 125 – DN 150) DP _____ 5.3 m
- (DN 20 – DN 100, excl. DN 90) HotDipGal _____ 5.0 m
- (DN 90, DN 125 – DN 150) HotDipGal _____ 5.3 m

Maximum Length:

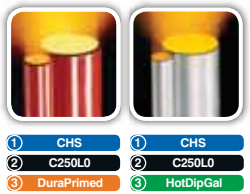
- (DN 20 – DN 40) DP _____ 8.0 m
- (DN 50 – DN 100) DP _____ 12.0 m
- (DN 90, DN 125 – DN 150) DP _____ 12.2 m
- (DN 20 – DN 100) HotDipGal _____ 7.2 m
- (DN 125 – DN 150) HotDipGal _____ 12.0 m

Note: Contact your Australian Tube Mills representative for lengths outside this range.

Thickness

CHS/Pipe to Grade C250L0 are available in medium (M), heavy (H) and extra heavy (XH) wall thickness. These thicknesses are identified by the following end colour codes:

- Medium (M) _____ Blue
- Heavy (H) _____ Red
- Extra Heavy (XH) _____ No Colour



General Description

Manufacturing Process

CHS/Pipe to Grade C250L0, for general mechanical and low pressure reticulation and structural applications, is manufactured by cold-forming and high frequency Electric Resistance Welding (ERW) of steel strip. The cold-forming process enhances the strength, hardness and surface finish of the pipe and produces tube to tight dimensional tolerances.

Further Information

For further information refer to the Australian Tube Mills:

- Product Availability Guide (PAG), (www.austubemills.com)

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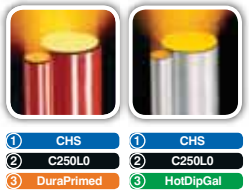
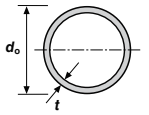
CHS/Pipe to AS/NZS 1163 – C250L0 – Section Properties *calculated in accordance with AS/NZS 1163 & AS 4100*

Dimensions and Ratios									Properties								Properties for Design to AS 4100		
Designation			Nominal Size	Mass per m	External Surface Area		$\frac{d_o}{t}$		Gross Section Area	About any axis				Torsion Constant	Torsion Modulus		Form Factor	About any axis	
d_o		t			per m	per t			A_g	I	Z	S	r	J	C		k_f	Compactness	Z_e
mm		mm	DN	kg/m	m^2/m	m^2/t			mm^2	10^6mm^4	10^3mm^3	10^3mm^3	mm	10^6mm^4	10^3mm^3			(C,N,S)	10^3mm^3
165.1	x	5.4 CHS	150 H	21.3	0.519	24.4	30.6		2710	8.65	105	138	56.5	17.3	209		1.00	C	138
		5.0 CHS	150 M	19.7	0.519	26.3	33.0		2510	8.07	97.7	128	56.6	16.1	195		1.00	C	128
139.7	x	5.4 CHS	125 H	17.9	0.439	24.5	25.9		2280	5.14	73.7	97.4	47.5	10.3	147		1.00	C	97.4
		5.0 CHS	125 M	16.6	0.439	26.4	27.9		2120	4.81	68.8	90.8	47.7	9.61	138		1.00	C	90.8
114.3	x	5.4 CHS	100 H	14.5	0.359	24.8	21.2		1850	2.75	48.0	64.1	38.5	5.49	96.1		1.00	C	64.1
		4.5 CHS	100 M	12.2	0.359	29.5	25.4		1550	2.34	41.0	54.3	38.9	4.69	82.0		1.00	C	54.3
101.6	x	5.0 CHS	90 H	11.9	0.319	26.8	20.3		1520	1.77	34.9	46.7	34.2	3.55	69.9		1.00	C	46.7
		4.0 CHS	90 M	9.63	0.319	33.2	25.4		1230	1.46	28.8	38.1	34.5	2.93	57.6		1.00	C	38.1
88.9	x	5.9 CHS	80 XH	12.1	0.279	23.1	15.1		1540	1.33	30.0	40.7	29.4	2.66	59.9		1.00	C	40.7
		5.0 CHS	80 H	10.3	0.279	27.0	17.8		1320	1.16	26.2	35.2	29.7	2.33	52.4		1.00	C	35.2
		4.0 CHS	80 M	8.38	0.279	33.3	22.2		1070	0.963	21.7	28.9	30.0	1.93	43.3		1.00	C	28.9
76.1	x	5.9 CHS	65 XH	10.2	0.239	23.4	12.9		1300	0.807	21.2	29.1	24.9	1.61	42.4		1.00	C	29.1
		4.5 CHS	65 H	7.95	0.239	30.1	16.9		1010	0.651	17.1	23.1	25.4	1.30	34.2		1.00	C	23.1
		3.6 CHS	65 M	6.44	0.239	37.1	21.1		820	0.540	14.2	18.9	25.7	1.08	28.4		1.00	C	18.9
60.3	x	5.4 CHS	50 XH	7.31	0.189	25.9	11.2		931	0.354	11.8	16.3	19.5	0.709	23.5		1.00	C	16.3
		4.5 CHS	50 H	6.19	0.189	30.6	13.4		789	0.309	10.2	14.0	19.8	0.618	20.5		1.00	C	14.0
		3.6 CHS	50 M	5.03	0.189	37.6	16.8		641	0.259	8.58	11.6	20.1	0.517	17.2		1.00	C	11.6
48.3	x	4.0 CHS	40 H	4.37	0.152	34.7	12.1		557	0.138	5.70	7.87	15.7	0.275	11.4		1.00	C	7.87
		3.2 CHS	40 M	3.56	0.152	42.6	15.1		453	0.116	4.80	6.52	16.0	0.232	9.59		1.00	C	6.52
42.4	x	4.0 CHS	32 H	3.79	0.133	35.2	10.6		483	0.0899	4.24	5.92	13.6	0.180	8.48		1.00	C	5.92
		3.2 CHS	32 M	3.09	0.133	43.1	13.3		394	0.0762	3.59	4.93	13.9	0.152	7.19		1.00	C	4.93
33.7	x	4.0 CHS	25 H	2.93	0.106	36.1	8.43		373	0.0419	2.49	3.55	10.6	0.0838	4.97		1.00	C	3.55
		3.2 CHS	25 M	2.41	0.106	44.0	10.5		307	0.0360	2.14	2.99	10.8	0.0721	4.28		1.00	C	2.99
26.9	x	4.0 CHS	20 XH	2.26	0.0845	37.4	6.73		288	0.0194	1.45	2.12	8.22	0.0389	2.89		1.00	C	2.12
		3.2 CHS	20 H	1.87	0.0845	45.2	8.41		238	0.0170	1.27	1.81	8.46	0.0341	2.53		1.00	C	1.81
		2.6 CHS	20 M	1.56	0.0845	54.2	10.3		198	0.0148	1.10	1.54	8.64	0.0296	2.20		1.00	C	1.54



Notes:

1. For Grade C250L0: f_y = 250 MPa and f_u = 320 MPa; f_y = yield stress used in design; f_u = tensile strength used in design; as defined in AS 4100.
2. C = Compact Section; N = Non-Compact Section; S = Slender Section (as defined in AS 4100).
3. Grade C250L0 to AS/NZS 1163 is cold-formed and is therefore allocated the CF residual stresses classification in AS 4100.
4. Grade C250L0: M = Medium; H = Heavy; XH = Extra Heavy.
5. LiteOil and NOPC are available in all sections on request and subject to confirmation.
6. Information on standard lengths for these products are listed in the following Mass & Bundling tables.
7. Refer to the Australian Tube Mills Product Availability Guide (PAG) for information on the availability of these products and associated grades, finishes, and standard lengths. The PAG can be found at www.austubemills.com.



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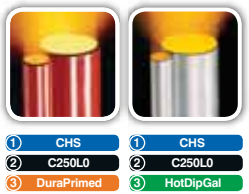
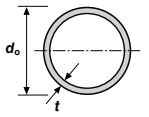
CHS/Pipe to AS/NZS 1163 – C250L0 – Mass & Bundling *calculated in accordance with AS/NZS 1163*

Dimensions				Bundling													Mass											
Designation			Nominal Size	Bundle Dimensions (mm)				Lengths Per Bundle				Metres Per Bundle				DuraPrimed						HotDipGal						
																Nominal Mass		Mass Per Bundle tonnes				Nominal Mass		Mass Per Bundle tonnes				
d_o	t			6.5	8.0	9.0	12.0																					
mm	mm		DN	W x H	W x H	W x H	W x H	6.5	8.0	9.0	12.0	6.5	8.0	9.0	12.0	kg/m	m/t	6.5	8.0	9.0	12.0	kg/m	m/t	6.5	8.0	9.0	12.0
26.9 x	2.6	CHS	20 M	350 306	-	-	-	127	-	-	-	825.5	-	-	-	1.56	642	1.29	-	-	-	1.60	624	1.32	-	-	-
	3.2	CHS	20 H	350 306	-	-	-	127	-	-	-	825.5	-	-	-	1.87	535	1.54	-	-	-	1.92	522	1.58	-	-	-
	4.0	CHS	20 XH	350 306	-	-	-	127	-	-	-	825.5	-	-	-	2.26	443	1.86	-	-	-	2.30	434	1.90	-	-	-
33.7 x	3.2	CHS	25 M	371 326	-	-	-	91	-	-	-	591.5	-	-	-	2.41	415	1.42	-	-	-	2.46	406	1.46	-	-	-
	4.0	CHS	25 H	371 326	-	-	-	91	-	-	-	591.5	-	-	-	2.93	341	1.73	-	-	-	2.99	335	1.77	-	-	-
42.4 x	3.2	CHS	32 M	382 336	-	-	-	61	-	-	-	396.5	-	-	-	3.09	323	1.23	-	-	-	3.17	316	1.26	-	-	-
	4.0	CHS	32 H	382 336	-	-	-	61	-	-	-	396.5	-	-	-	3.79	264	1.50	-	-	-	3.86	259	1.53	-	-	-
48.3 x	3.2	CHS	40 M	435 383	-	-	-	61	-	-	-	396.5	-	-	-	3.56	281	1.41	-	-	-	3.64	274	1.45	-	-	-
	4.0	CHS	40 H	435 383	-	-	-	61	-	-	-	396.5	-	-	-	4.37	229	1.73	-	-	-	4.45	225	1.77	-	-	-
60.3 x	3.6	CHS	50 M	422 374	-	-	-	37	-	-	-	240.5	-	-	-	5.03	199	1.21	-	-	-	5.14	195	1.24	-	-	-
	4.5	CHS	50 H	422 374	-	-	-	37	-	-	-	240.5	-	-	-	6.19	161	1.49	-	-	-	6.30	159	1.51	-	-	-
	5.4	CHS	50 XH	422 374	-	-	-	37	-	-	-	240.5	-	-	-	7.31	137	1.76	-	-	-	7.41	135	1.78	-	-	-
76.1 x	3.6	CHS	65 M	533 472	-	-	-	37	-	-	-	240.5	-	-	-	6.44	155	1.55	-	-	-	6.57	152	1.58	-	-	-
	4.5	CHS	65 H	533 472	-	-	-	37	-	-	-	240.5	-	-	-	7.95	126	1.91	-	-	-	8.08	124	1.94	-	-	-
	5.9	CHS	65 XH	533 472	-	-	-	37	-	-	-	240.5	-	-	-	10.2	97.9	2.46	-	-	-	10.3	96.7	2.49	-	-	-
88.9 x	4.0	CHS	80 M	445 397	-	-	-	19	-	-	-	123.5	-	-	-	8.38	119	1.03	-	-	-	8.54	117	1.05	-	-	-
	5.0	CHS	80 H	445 397	-	-	-	19	-	-	-	123.5	-	-	-	10.3	96.7	1.28	-	-	-	10.5	95.2	1.30	-	-	-
	5.9	CHS	80 XH	445 397	-	-	-	19	-	-	-	123.5	-	-	-	12.1	82.8	1.49	-	-	-	12.2	81.7	1.51	-	-	-
101.6 x	4.0	CHS	90 M	508 454	-	-	-	19	-	-	-	123.5	-	-	-	9.63	104	1.19	-	-	-	9.81	102	1.21	-	-	-
	5.0	CHS	90 H	508 454	-	-	-	19	-	-	-	123.5	-	-	-	11.9	84.0	1.47	-	-	-	12.1	82.7	1.49	-	-	-
114.3 x	4.5	CHS	100 M	572 510	-	-	-	19	-	-	-	123.5	-	-	-	12.2	82.1	1.50	-	-	-	12.4	80.7	1.53	-	-	-
	5.4	CHS	100 H	572 510	-	-	-	19	-	-	-	123.5	-	-	-	14.5	69.0	1.79	-	-	-	14.7	68.0	1.82	-	-	-
139.7 x	5.0	CHS	125 M	699 382	-	-	-	13	-	-	-	84.5	-	-	-	16.6	60.2	1.40	-	-	-	16.9	59.3	1.43	-	-	-
	5.4	CHS	125 H	699 382	-	-	-	13	-	-	-	84.5	-	-	-	17.9	55.9	1.51	-	-	-	18.1	55.1	1.53	-	-	-
165.1 x	5.0	CHS	150 M	660 451	-	-	-	10	-	-	-	65	-	-	-	19.7	50.7	1.28	-	-	-	20.0	49.9	1.30	-	-	-
	5.4	CHS	150 H	660 451	-	-	-	10	-	-	-	65	-	-	-	21.3	47.0	1.38	-	-	-	21.6	46.4	1.40	-	-	-



Notes:

1. Grade C250L0: M = Medium; H = Heavy; XH = Extra Heavy.
2. See also notes for Section Properties for this product



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CHS to AS/NZS 1163 – C350L0 – Specifications

Technical Specifications

Australian Standards

CHS to Grade C350L0 is manufactured and tested to comply with the requirements of the following specifications:

- AS/NZ 1163 – Cold formed structural steel hollow sections (Grade C350L0).
- AS/NZS 4792 – Hot-dip galvanized (zinc) coatings on ferrous hollow sections, applied by a continuous or a specialized process (Section 2 or 3 or 4).

Mechanical Properties

CHS to Grade C350L0 has the following mechanical properties:

- Minimum Yield Strength _____ 350 MPa
- Minimum Tensile Strength _____ 430 MPa
- Minimum Elongation in $5.65\sqrt{S_o}$

$d_o/t \leq 15$	$15 < d_o/t \leq 30$	$d_o/t > 30$
16%	18%	20%

- L0 guaranteed impact properties at 0°C to AS/NZ 1163.

Tolerances

Tolerances for CHS to Grade C350L0 are compliant with AS/NZS 1163. See Dimensional Tolerances in Part 1 for more information.

Supply Conditions

DuraPrimed (DP) Finish

CHS to Grade C350L0 with a DuraPrimed finish is supplied in the following surface colour:

- Clear

This DuraPrimed finish is applied in-line using a patented process and is supplied in the following coating thicknesses:

- Clear _____ Target 12 microns with 8 - 10 microns average

Note: Non-standard finishes, such as NOPC and LiteOil, are available if ordered prior to rollings. Conditions apply and subject to mill acceptance.
See the ATM Product Availability Guide for further information on availability.

DuraGal® Finish

CHS to Grade C350L0 with DuraGal® finish is manufactured from in-line galvanizing hollow sections that has the following external coating thickness:

- Minimum coating mass _____ 100 g/m²
- Designated as _____ AS/NZS 4792 ILG 100

See the ATM Product Availability Guide for further information on availability.

DuraGal[Plus] Finish

CHS to Grade C350L0 with DuraGal[Plus] finish is manufactured using steel strip that has the following coating thickness:

- Minimum coating mass _____ 100 g/m² each side
- Designated as _____ AS/NZS 4792 ZB 100/100

See the ATM Product Availability Guide for further information on availability.

HotDipGal Finish

- Galvanized (Hot-dip)

CHS to Grade C350L0 with HotDipGal finish is manufactured and tested to meet the requirements of Section 2 of AS/NZS 4792.

- Minimum coating mass _____ 300 g/m² each side
- Designated as _____ AS/NZS 4792 HDG 300

The coating adherence of the galvanizing is satisfactory for the CHS to be bent to a radius 6 times the diameter of the CHS up to 60.3 mm OD in accordance with AS/NZS 4792.
See the ATM Product Availability Guide for further information on availability.

End Finish (Mill Processing)

- Plain Ends as standard.
- Swaged Ends available for 20-50 NB in Extra Light and Light (excl. 20L).

Refer to Mill Processing (Part 7) of this Product Manual for end finish details.
See the ATM Product Availability Guide for further information on availability.

Standard Lengths

Standard length for CHS to Grade C350L0:

- See following Mass & Bundling Tables

Contact your Australian Tube Mills representative or refer to the ATM Product Availability Guide for further details.

Non-Standard Lengths

Special orders of non-standard pack lengths of CHS to Grade C350L0 are available (conditions apply). Check with your distributor for details.

Minimum Length:

- (26.9 OD – 114.3 OD, excl 101.6 OD) DP _____ 4.2 m
- (101.6 OD, 139.7 OD – 165.1 OD) DP _____ 5.3 m
- (26.9 OD – 114.3 OD, excl. 101.6 OD) DuraGal[Plus] 4.2 m
- (26.9 OD – 114.3 OD, excl. 101.6 OD) HotDipGal _ 5.0 m
- (101.6 OD, 139.7 OD – 165.1 OD) HotDipGal __ 5.3 m

Maximum Length:

- (26.9 OD – 48.3 OD) DP _____ 8.0 m
- (60.3 OD – 114.3 OD, excl. 101.6 OD) DP____ 12.0 m
- (88.9 OD – 165.1 OD) DP _____ 12.2 m
- (26.9 OD – 48.3 OD) DuraGal[Plus] _____ 8.0 m
- (60.3 OD – 114.3 OD) DuraGal[Plus] _____ 12.0 m
- (26.9 OD – 114.3 OD) HotDipGal _____ 7.2 m
- (139.7 OD – 165.1 OD) HotDipGal _____ 12.2 m

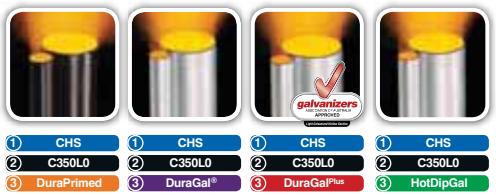
Note: Contact your Australian Tube Mills representative for lengths outside this range.

Thickness

CHS to Grade C350L0 are available in 2.0 mm to 12.7 mm wall thickness. Sections with 165.1 mm OD and less are identified by the following end colour codes:

- Extra Light _____ Green
- Light _____ Yellow

Otherwise no end colour coding applies.



General Description

Manufacturing Process

CHS to Grade C350L0, for general structural and mechanical applications, is manufactured by cold-forming and high frequency Electric Resistance Welding (ERW) of high strength steel strip. The cold-forming process enhances the strength, hardness and surface finish of the pipe and produces tube to tight dimensional tolerances.

Further Information

For further information refer to the Australian Tube Mills:

- Product Availability Guide (PAG) (www.austubemills.com)

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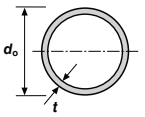
CHS to AS/NZS 1163 – C350L0 – Section Properties *calculated in accordance with AS/NZS 1163 & AS 4100*

Dimensions and Ratios								Properties								Properties for Design to AS 4100		
Designation			Nominal Size	Mass per m	External Surface Area		$\frac{d_o}{t}$	Gross Section Area	About any axis				Torsion Constant	Torsion Modulus	Form Factor	About any axis	
d_o	t				per m	per t		A_g	I	Z	S	r	J	C	k_f	Compactness	Z_e
mm	mm		DN	kg/m	m^2/m	m^2/t		mm^2	10^6mm^4	10^3mm^3	10^3mm^3	mm	10^6mm^4	10^3mm^3		(C,N,S)	10^3mm^3
508.0 x	12.7	CHS		155	1.60	10.3	40.0	19800	606	2390	3120	175	1210	4770	1.00	N	3060
	9.5	CHS		117	1.60	13.7	53.5	14900	462	1820	2360	176	925	3640	1.00	N	2170
	6.4	CHS		79.2	1.60	20.2	79.4	10100	317	1250	1610	177	634	2500	0.857	N	1300
457.0 x	12.7	CHS		139	1.44	10.3	36.0	17700	438	1920	2510	157	876	3830	1.00	N	2510
	9.5	CHS		105	1.44	13.7	48.1	13400	334	1460	1900	158	669	2930	1.00	N	1790
	6.4	CHS		71.1	1.44	20.2	71.4	9060	230	1010	1300	159	460	2010	0.904	N	1090
406.4 x	12.7	CHS		123	1.28	10.4	32.0	15700	305	1500	1970	139	609	3000	1.00	C	1970
	9.5	CHS		93.0	1.28	13.7	42.8	11800	233	1150	1500	140	467	2300	1.00	N	1450
	6.4	CHS		63.1	1.28	20.2	63.5	8040	161	792	1020	141	322	1580	0.960	N	893
355.6 x	12.7	CHS		107	1.12	10.4	28.0	13700	201	1130	1490	121	403	2260	1.00	C	1490
	9.5	CHS		81.1	1.12	13.8	37.4	10300	155	871	1140	122	310	1740	1.00	N	1130
	6.4	CHS		55.1	1.12	20.3	55.6	7020	107	602	781	123	214	1200	1.00	N	710
323.9 x	12.7	CHS		97.5	1.02	10.4	25.5	12400	151	930	1230	110	301	1860	1.00	C	1230
	9.5	CHS		73.7	1.02	13.8	34.1	9380	116	717	939	111	232	1430	1.00	C	939
	6.4	CHS		50.1	1.02	20.3	50.6	6380	80.5	497	645	112	161	994	1.00	N	601
273.1 x	12.7	CHS		81.6	0.858	10.5	21.5	10400	88.3	646	862	92.2	177	1290	1.00	C	862
	9.3	CHS		60.5	0.858	14.2	29.4	7710	67.1	492	647	93.3	134	983	1.00	C	647
	6.4	CHS		42.1	0.858	20.4	42.7	5360	47.7	349	455	94.3	95.4	699	1.00	N	441
	4.8	CHS		31.8	0.858	27.0	56.9	4050	36.4	267	346	94.9	72.8	533	1.00	N	312
219.1 x	8.2	CHS		42.6	0.688	16.1	26.7	5430	30.3	276	365	74.6	60.5	552	1.00	C	365
	6.4	CHS		33.6	0.688	20.5	34.2	4280	24.2	221	290	75.2	48.4	442	1.00	C	290
	4.8	CHS		25.4	0.688	27.1	45.6	3230	18.6	169	220	75.8	37.1	339	1.00	N	210
168.3 x	7.1	CHS		28.2	0.529	18.7	23.7	3600	11.7	139	185	57.0	23.4	278	1.00	C	185
	6.4	CHS		25.6	0.529	20.7	26.3	3260	10.7	127	168	57.3	21.4	254	1.00	C	168
	4.8	CHS		19.4	0.529	27.3	35.1	2470	8.25	98.0	128	57.8	16.5	196	1.00	C	128

1. CHS
2. C350L0
3. DuraPrimed

Notes:

1. For Grade C350L0: f_y = 350 MPa and f_u = 430 MPa; f_y = yield stress used in design; f_u = tensile strength used in design; as defined in AS 4100.
2. C = Compact Section; N = Non-Compact Section; S = Slender Section (as defined in AS 4100).
3. Grade C350L0 to AS/NZS 1163 is cold-formed and is therefore allocated the CF residual stresses classification in AS 4100.
4. Grade C350L0: XL = Extra Light; L = Light.
5. LiteOil and NOPC are available in all sections on request and subject to confirmation.
6. Information on standard lengths for these products are listed in the following Mass & Bundling tables.
7. Refer to the Australian Tube Mills Product Availability Guide (PAG) for information on the availability of these products and associated, grades, finishes, and standard lengths. The PAG can be found at www.austubemills.com.

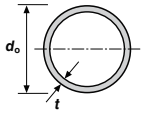


CHS to AS/NZS 1163 – C350L0 – Section Properties *calculated in accordance with AS/NZS 1163 & AS 4100*

Dimensions and Ratios									Properties							Properties for Design to AS 4100		
Designation d_o		t		Nominal Size	Mass per m	External Surface Area per m	per t	$\frac{d_o}{t}$	Gross Section Area A_g	About any axis I	Z	S	r	Torsion Constant J	Torsion Modulus C	Form Factor k_f	About any axis Compactness	Z_e
mm		mm		DN	kg/m	m^2/m	m^2/t		mm^2	10^6mm^4	10^3mm^3	10^3mm^3	mm	10^6mm^4	10^3mm^3		(C,N,S)	10^3mm^3
165.1	x	3.5	CHS	150 L	13.9	0.519	37.2	47.2	1780	5.80	70.3	91.4	57.1	11.6	141	1.00	N	86.6
		3.0	CHS	150 XL	12.0	0.519	43.2	55.0	1530	5.02	60.8	78.8	57.3	10.0	122	1.00	N	71.9
139.7	x	3.5	CHS	125 L	11.8	0.439	37.3	39.9	1500	3.47	49.7	64.9	48.2	6.95	99.5	1.00	N	63.7
		3.0	CHS	125 XL	10.1	0.439	43.4	46.6	1290	3.01	43.1	56.1	48.3	6.02	86.2	1.00	N	53.3
114.3	x	3.6	CHS	100 L	9.83	0.359	36.5	31.8	1250	1.92	33.6	44.1	39.2	3.84	67.2	1.00	C	44.1
		3.2	CHS	100 XL	8.77	0.359	41.0	35.7	1120	1.72	30.2	39.5	39.3	3.45	60.4	1.00	N	39.5
101.6	x	3.2	CHS	90 L	7.77	0.319	41.1	31.8	989	1.20	23.6	31.0	34.8	2.40	47.2	1.00	C	31.0
		2.6	CHS	90 XL	6.35	0.319	50.3	39.1	809	0.991	19.5	25.5	35.0	1.98	39.0	1.00	N	25.1
88.9	x	3.2	CHS	80 L	6.76	0.279	41.3	27.8	862	0.792	17.8	23.5	30.3	1.58	35.6	1.00	C	23.5
		2.6	CHS	80 XL	5.53	0.279	50.5	34.2	705	0.657	14.8	19.4	30.5	1.31	29.6	1.00	C	19.4
76.1	x	3.2	CHS	65 L	5.75	0.239	41.6	23.8	733	0.488	12.8	17.0	25.8	0.976	25.6	1.00	C	17.0
		2.3	CHS	65 XL	4.19	0.239	57.1	33.1	533	0.363	9.55	12.5	26.1	0.727	19.1	1.00	C	12.5
60.3	x	2.9	CHS	50 L	4.11	0.189	46.1	20.8	523	0.216	7.16	9.56	20.3	0.432	14.3	1.00	C	9.56
		2.3	CHS	50 XL	3.29	0.189	57.6	26.2	419	0.177	5.85	7.74	20.5	0.353	11.7	1.00	C	7.74
48.3	x	2.9	CHS	40 L	3.25	0.152	46.7	16.7	414	0.107	4.43	5.99	16.1	0.214	8.86	1.00	C	5.99
		2.3	CHS	40 XL	2.61	0.152	58.2	21.0	332	0.0881	3.65	4.87	16.3	0.176	7.30	1.00	C	4.87
42.4	x	2.6	CHS	32 L	2.55	0.133	52.2	16.3	325	0.0646	3.05	4.12	14.1	0.129	6.10	1.00	C	4.12
		2.0	CHS	32 XL	1.99	0.133	66.8	21.2	254	0.0519	2.45	3.27	14.3	0.104	4.90	1.00	C	3.27
33.7	x	2.6	CHS	25 L	1.99	0.106	53.1	13.0	254	0.0309	1.84	2.52	11.0	0.0619	3.67	1.00	C	2.52
		2.0	CHS	25 XL	1.56	0.106	67.7	16.9	199	0.0251	1.49	2.01	11.2	0.0502	2.98	1.00	C	2.01
26.9	x	2.3	CHS	20 L	1.40	0.0845	60.6	11.7	178	0.0136	1.01	1.40	8.74	0.0271	2.02	1.00	C	1.40
		2.0	CHS	20 XL	1.23	0.0845	68.8	13.5	156	0.0122	0.907	1.24	8.83	0.0244	1.81	1.00	C	1.24

Notes:

1. For Grade C350L0: f_y = 350 MPa and f_u = 430 MPa; f_y = yield stress used in design; f_u = tensile strength used in design; as defined in AS 4100.
2. C = Compact Section; N = Non-Compact Section; S = Slender Section (as defined in AS 4100).
3. Grade C350L0 to AS/NZS 1163 is cold-formed and is therefore allocated the CF residual stresses classification in AS 4100.
4. Grade C350L0: XL = Extra Light; L = Light.
5. LiteOil and NOPC are available in all sections on request and subject to confirmation.
6. Information on standard lengths for these products are listed in the following Mass & Bundling tables.
7. Refer to the Australian Tube Mills Product Availability Guide (PAG) for information on the availability of these products and associated, grades, finishes, and standard lengths. The PAG can be found at www.austubemills.com.



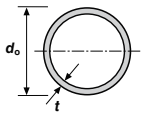
Australian Tube Mills A.B.N. 21 123 666 679. PO Box 246 Sunnybank, Queensland 4109 Australia **Telephone** +61 7 3909 6600 **Facsimile** +61 7 3909 6660 **E-mail** info@austubemills.com **Internet** www.austubemills.com

CHS to AS/NZS 1163 – C350L0 – Mass & Bundling *calculated in accordance with AS/NZS 1163*

Dimensions				Bundling												Mass											
Designation			Nominal Size	Bundle Dimensions (mm)				Lengths Per Bundle				Metres Per Bundle				DuraPrimed/DuraGal®/DuraGal^{Plus}/						HotDipGal					
																Nominal Mass		Mass Per Bundle tonnes				Nominal Mass		Mass Per Bundle tonnes			
d_o	t			6.5	8.0	9.0	12.0																				
mm	mm		DN	W x H	W x H	W x H	W x H	6.5	8.0	9.0	12.0	6.5	8.0	9.0	12.0	kg/m	m/t	6.5	8.0	9.0	12.0	kg/m	m/t	6.5	8.0	9.0	12.0
26.9 x	2.0	CHS	20 XL	350 306	-	-	-	127	-	-	-	825.5	-	-	-	1.23	814	1.01	-	-	-	1.28	784	1.05	-	-	-
	2.3	CHS	20 L	350 306	-	-	-	127	-	-	-	825.5	-	-	-	1.40	717	1.15	-	-	-	1.44	694	1.19	-	-	-
33.7 x	2.0	CHS	25 XL	371 326	-	-	-	91	-	-	-	591.5	-	-	-	1.56	640	0.925	-	-	-	1.62	616	0.960	-	-	-
	2.6	CHS	25 L	371 326	-	-	-	91	-	-	-	591.5	-	-	-	1.99	501	1.18	-	-	-	2.05	487	1.21	-	-	-
42.4 x	2.0	CHS	32 XL	382 336	-	-	-	61	-	-	-	396.5	-	-	-	1.99	502	0.790	-	-	-	2.07	483	0.820	-	-	-
	2.6	CHS	32 L	382 336	-	-	-	61	-	-	-	396.5	-	-	-	2.55	392	1.01	-	-	-	2.63	381	1.04	-	-	-
48.3 x	2.3	CHS	40 XL	435 383	-	-	-	61	-	-	-	396.5	-	-	-	2.61	383	1.03	-	-	-	2.70	371	1.07	-	-	-
	2.9	CHS	40 L	435 383	-	-	-	61	-	-	-	396.5	-	-	-	3.25	308	1.29	-	-	-	3.33	300	1.32	-	-	-
60.3 x	2.3	CHS	50 XL	422 374	-	-	-	37	-	-	-	240.5	-	-	-	3.29	304	0.791	-	-	-	3.40	294	0.818	-	-	-
	2.9	CHS	50 L	422 374	-	-	-	37	-	-	-	240.5	-	-	-	4.11	244	0.987	-	-	-	4.21	237	1.01	-	-	-
76.1 x	2.3	CHS	65 XL	533 472	-	-	-	37	-	-	-	240.5	-	-	-	4.19	239	1.01	-	-	-	4.33	231	1.04	-	-	-
	3.2	CHS	65 L	533 472	-	-	-	37	-	-	-	240.5	-	-	-	5.75	174	1.38	-	-	-	5.89	170	1.42	-	-	-
88.9 x	2.6	CHS	80 XL	445 397	-	-	-	19	-	-	-	123.5	-	-	-	5.53	181	0.683	-	-	-	5.70	176	0.703	-	-	-
	3.2	CHS	80 L	445 397	-	-	-	19	-	-	-	123.5	-	-	-	6.76	148	0.835	-	-	-	6.92	144	0.855	-	-	-
101.6 x	2.6	CHS	90 XL	508 454	-	-	-	19	-	-	-	123.5	-	-	-	6.35	158	0.784	-	-	-	6.53	153	0.807	-	-	-
	3.2	CHS	90 L	508 454	-	-	-	19	-	-	-	123.5	-	-	-	7.77	129	0.959	-	-	-	7.95	126	0.982	-	-	-
114.3 x	3.2	CHS	100 XL	572 510	-	-	-	19	-	-	-	123.5	-	-	-	8.77	114	1.08	-	-	-	8.98	111	1.11	-	-	-
	3.6	CHS	100 L	572 510	-	-	-	19	-	-	-	123.5	-	-	-	9.83	102	1.21	-	-	-	10.0	99.6	1.24	-	-	-
139.7 x	3.0	CHS	125 XL	699 382	-	-	-	13	-	-	-	84.5	-	-	-	10.1	98.9	0.855	-	-	-	10.4	96.4	0.876	-	-	-
	3.5	CHS	125 L	699 382	-	-	-	13	-	-	-	84.5	-	-	-	11.8	85.1	0.993	-	-	-	12.0	83.2	1.02	-	-	-
165.1 x	3.0	CHS	150 XL	660 451	-	-	-	10	-	-	-	65	-	-	-	12.0	83.4	0.780	-	-	-	12.3	81.3	0.799	-	-	-
	3.5	CHS	150 L	660 451	-	-	-	10	-	-	-	65	-	-	-	13.9	71.7	0.907	-	-	-	14.3	70.2	0.926	-	-	-

Notes:

1. Grade C350L0: XL = Extra Light; L = Light.
2. See also Notes for Section Properties for this product.

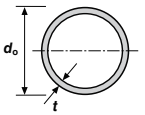


CHS to AS/NZS 1163 – C350L0 – Mass & Bundling *calculated in accordance with AS/NZS 1163*

Dimensions				Bundling												Mass											
Designation			Nominal Size	Bundle Dimensions (mm)				Lengths Per Bundle				Metres Per Bundle				DuraPrimed						HotDipGal					
																Nominal Mass		Mass Per Bundle tonnes				Nominal Mass		Mass Per Bundle tonnes			
d_o	t			6.5	8.0	9.0	12.0																				
mm	mm		DN	W x H	W x H	W x H	W x H	6.5	8.0	9.0	12.0	6.5	8.0	9.0	12.0	kg/m	m/t	6.5	8.0	9.0	12.0	kg/m	m/t	6.5	8.0	9.0	12.0
168.3 x	4.8	CHS					168 168				1				12	19.4	51.7				0.232						
	6.4	CHS					168 168				1				12	25.6	39.1				0.307						
	7.1	CHS					168 168				1				12	28.2	35.4				0.339						
219.1 x	4.8	CHS					219 219				1				12	25.4	39.4				0.304						
	6.4	CHS					219 219				1				12	33.6	29.8				0.403						
	8.2	CHS					219 219				1				12	42.6	23.4				0.512						
273.1 x	4.8	CHS					273 273				1				12	31.8	31.5				0.381						
	6.4	CHS					273 273				1				12	42.1	23.8				0.505						
	9.3	CHS					273 273				1				12	60.5	16.5				0.726						
	12.7	CHS					273 273				1				12	81.6	12.3				0.979						
323.9 x	6.4	CHS					324 324				1				12	50.1	20.0				0.601						
	9.5	CHS					324 324				1				12	73.7	13.6				0.884						
	12.7	CHS					324 324				1				12	97.5	10.3				1.17						
355.6 x	6.4	CHS					356 356				1				12	55.1	18.1				0.661						
	9.5	CHS					356 356				1				12	81.1	12.3				0.973						
	12.7	CHS					356 356				1				12	107	9.31				1.29						
406.4 x	6.4	CHS					406 406				1				12	63.1	15.8				0.758						
	9.5	CHS					406 406				1				12	93.0	10.8				1.12						
	12.7	CHS					406 406				1				12	123	8.11				1.48						
457.0 x	6.4	CHS					457 457				1				12	71.1	14.1				0.853						
	9.5	CHS					457 457				1				12	105	9.54				1.26						
	12.7	CHS					457 457				1				12	139	7.19				1.67						
508.0 x	6.4	CHS					508 508				1				12	79.2	12.6				0.950						
	9.5	CHS					508 508				1				12	117	8.56				1.40						
	12.7	CHS					508 508				1				12	155	6.45				1.86						

Notes:

1. Grade C350L0: XL = Extra Light; L = Light.
2. See also Notes for Section Properties for this product.



RHS to AS/NZS 1163 – C350L0 – Specifications

Technical Specifications

Australian Standards

RHS to Grade C350L0 is manufactured and tested to comply with the requirements of the following specifications:

- AS/NZS 1163 – Cold-formed structural steel hollow sections (Grade C350L0).
- AS/NZS 4792 – Hot-dip galvanized (zinc) coatings on ferrous hollow sections, applied by a continuous or a specialized process (Section 3 or 4).

Mechanical Properties

RHS to Grade C350L0 has the following mechanical properties:

- Minimum Yield Strength _____ 350 MPa
- Minimum Tensile Strength _____ 430 MPa
- Minimum Elongation in $5.65\sqrt{S_o}$

$(b_{/t}, d_{/t}) \leq 15$	$15 < (b_{/t}, d_{/t}) \leq 30$	$(b_{/t}, d_{/t}) > 30$
12%	14%	16%

- L0 guaranteed impact properties at 0°C to AS/NZS 1163

Tolerances

Tolerances for RHS to Grade C350L0 are compliant with AS/NZS 1163. See Dimensional Tolerances in Part 1 for more information.

Supply Conditions

DuraPrimed (DP) Finish

RHS to Grade C350L0 with DuraPrimed finish is supplied in the following surface colours:

- DuraPrimed[Blue]

This DuraPrimed finish is applied in-line using a patented process and is supplied in the following coating thicknesses:

- DuraPrimed[Blue] _____ Target 12 microns with average at 8-10 microns

Note: Non-standard finishes, such as NOPC and LiteOil, are available if ordered prior to rollings. Conditions apply and subject to mill acceptance.

See the ATM Product Availability Guide for further information on availability.

DuraGal® Finish

RHS to Grade C350L0 with DuraGal® finish is manufactured from in-line galvanising hollow sections that has the following external coating thickness:

- Minimum coating mass _____ 100 g/m^2
- Designated as _____ AS/NZS 4792 ILG 100

See the ATM Product Availability Guide for further information on availability.

DuraGal[Plus] Finish

RHS to Grade C350L0 with DuraGal[Plus] finish is manufactured using steel strip that has the following coating thickness:

- Minimum coating mass _____ 100 g/m^2 each side
- Designated as _____ AS/NZS 4792 ZB 100/100

See the ATM Product Availability Guide for further information on availability.

Oiled Finish

Oiled tubular products use a robust oil coating which is adequate for seaborne transport.

See the ATM Product Availability Guide for further information on availability.

End Finish (Mill Processing)

- Plain Ends only.

Standard Lengths

Standard lengths for RHS to Grade C350L0:

- See following Mass & Bundling Tables.

Contact your Australian Tube Mills representative or refer to the ATM Product Availability Guide for further details.

Non-Standard Lengths

Special orders of non-standard pack lengths of RHS to Grade C350L0 are available (conditions apply). Check with your distributor for details.

Minimum Length:

- (50x20 RHS) DuraGal[Plus]/DP _____ 4.5 m
- (50x25 – 75x25 RHS) DuraGal[Plus]/DP _____ 4.2 m
- (65x35 – 75x25 RHS) DuraGal[Plus]/DP _____ 4.5 m

Maximum Length:

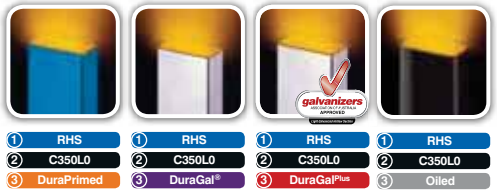
- (50x20 RHS) DuraGal[Plus]/DP _____ 9.0 m
- (50x25 RHS) DuraGal[Plus]/DP _____ 8.0 m
- (65x35 – 75x25 RHS) DuraGal[Plus]/DP _____ 12.2 m

Note: Contact your Australian Tube Mills representative for lengths outside this range.

Thickness

RHS to Grade C350L0 is available in 1.6 mm to 4.0 mm wall thicknesses. These thicknesses are identified by the following end colour codes:

- 1.6 mm _____ Purple
- 2.0 mm _____ Yellow
- 2.5 mm _____ Pink
- 3.0 mm _____ Blue
- 4.0 mm _____ Green
- 5.0 mm _____ Orange



General Description

Manufacturing Process

RHS to Grade C350L0, for manufacturing, general fabrication and lighter structural applications, is manufactured by cold-forming and high frequency Electric Resistance Welding (ERW) of higher strength steel strip. The cold-forming process enhances the strength, hardness and surface finish of the tube and produces RHS to tight dimensional tolerances.

Further Information

For further information refer to the Australian Tube Mills:

- Product Availability Guide (PAG) (www.austubemills.com.au)

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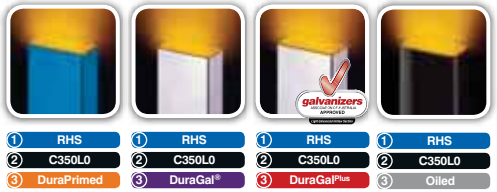
RHS to AS/NZS 1163 – C350L0 – Section Properties *calculated in accordance with AS/NZS 1163 & AS 4100*

Dimensions and Ratios									Properties											Properties for Design to AS 4100							
Designation				Mass per m	External Surface Area		b-2t / t	d-2t / t	Gross Section Area	About x-axis				About y-axis				Torsion Constant	Torsion Modulus	Form Factor	About x-axis			About y-axis		
d	b	t			per m	per t			A_g	I_x	Z_x	S_x	r_x	I_y	Z_y	S_y	r_y	J	C	k_f	λ_e	Compact-ness	Z_{ex}	λ_e	Compact-ness	Z_{ey}
mm	mm	mm		kg/m	m^2/m	m^2/t			mm^2	10^6mm^4	10^3mm^3	10^3mm^3	mm	10^6mm^4	10^3mm^3	10^3mm^3	mm	10^6mm^4	10^3mm^3			(C,N,S)	10^3mm^3		(C,N,S)	10^3mm^3
75 x 25 x	2.5	RHS	3.60	0.191	53.1	8.00	28.0	459	0.285	7.60	10.1	24.9	0.0487	3.89	4.53	10.3	0.144	7.14	1.00	9.47	C	10.1	33.1	N	4.33
	2.0	RHS	2.93	0.193	65.8	10.5	35.5	374	0.238	6.36	8.31	25.3	0.0414	3.31	3.77	10.5	0.120	6.04	0.964	12.4	C	8.31	42.0	S	3.18
	1.6	RHS	2.38	0.195	81.7	13.6	44.9	303	0.197	5.26	6.81	25.5	0.0347	2.78	3.11	10.7	0.0993	5.05	0.813	16.1	C	6.81	53.1	S	2.22
65 x 35 x	4.0	RHS	5.35	0.183	34.2	6.75	14.3	681	0.328	10.1	13.3	22.0	0.123	7.03	8.58	13.4	0.320	12.5	1.00	7.99	C	13.3	16.9	C	8.58
	3.0	RHS	4.25	0.190	44.7	9.67	19.7	541	0.281	8.65	11.0	22.8	0.106	6.04	7.11	14.0	0.259	10.4	1.00	11.4	C	11.0	23.3	C	7.11
	2.5	RHS	3.60	0.191	53.1	12.0	24.0	459	0.244	7.52	9.45	23.1	0.0926	5.29	6.13	14.2	0.223	9.10	1.00	14.2	C	9.45	28.4	C	6.13
	2.0	RHS	2.93	0.193	65.8	15.5	30.5	374	0.204	6.28	7.80	23.4	0.0778	4.44	5.07	14.4	0.184	7.62	1.00	18.3	C	7.80	36.1	N	4.69
50 x 25 x	3.0	RHS	3.07	0.140	45.5	6.33	14.7	391	0.112	4.47	5.86	16.9	0.0367	2.93	3.56	9.69	0.0964	5.18	1.00	7.49	C	5.86	17.4	C	3.56
	2.5	RHS	2.62	0.141	54.0	8.00	18.0	334	0.0989	3.95	5.11	17.2	0.0328	2.62	3.12	9.91	0.0843	4.60	1.00	9.47	C	5.11	21.3	C	3.12
	2.0	RHS	2.15	0.143	66.6	10.5	23.0	274	0.0838	3.35	4.26	17.5	0.0281	2.25	2.62	10.1	0.0706	3.92	1.00	12.4	C	4.26	27.2	C	2.62
	1.6	RHS	1.75	0.145	82.5	13.6	29.3	223	0.0702	2.81	3.53	17.7	0.0237	1.90	2.17	10.3	0.0585	3.29	1.00	16.1	C	3.53	34.6	N	2.05
50 x 20 x	3.0	RHS	2.83	0.130	45.8	4.67	14.7	361	0.0951	3.81	5.16	16.2	0.0212	2.12	2.63	7.67	0.0620	3.88	1.00	5.52	C	5.16	17.4	C	2.63
	2.5	RHS	2.42	0.131	54.2	6.00	18.0	309	0.0848	3.39	4.51	16.6	0.0192	1.92	2.32	7.89	0.0550	3.49	1.00	7.10	C	4.51	21.3	C	2.32
	2.0	RHS	1.99	0.133	66.8	8.00	23.0	254	0.0723	2.89	3.78	16.9	0.0167	1.67	1.96	8.11	0.0466	3.00	1.00	9.47	C	3.78	27.2	C	1.96
	1.6	RHS	1.63	0.135	82.7	10.5	29.3	207	0.0608	2.43	3.14	17.1	0.0142	1.42	1.63	8.29	0.0389	2.55	1.00	12.4	C	3.14	34.6	N	1.54



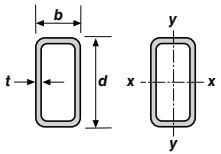
Notes:

1. For Grade C350L0: f_y = 350 MPa and f_u = 430 MPa; f_y = yield stress used in design; f_u = tensile strength used in design; as defined in AS 4100.
2. C = Compact Section; N = Non-Compact Section; S = Slender Section (as defined in AS 4100).
3. Grade C350L0 to AS/NZS 1163 is cold-formed, and is therefore allocated the CF residual stresses classification in AS 4100.
4. LiteOil and NOPC are available in all sections on request and subject to confirmation.
5. Information on standard lengths for these products are listed in the following Mass & Bundling tables.
6. Refer to the Australian Tube Mills Product Availability Guide (PAG) for information on the availability of these products and associated grades, finishes, and standard lengths. The PAG can be found at www.austubemills.com

ADDITIONAL NOTES:

(A) <u>THE ABOVE IS THE STANDARD GRADE FOR THE LISTED PRODUCTS</u>. SEE THE FOLLOWING TABLE FOR THESE SECTIONS LISTED IN NON-STANDARD C450PLUS.

(B) SEE THE FOLLOWING TABLE FOR OTHER SIZES IN ATM'S LARGER RANGE OF C450PLUS PRODUCTS.



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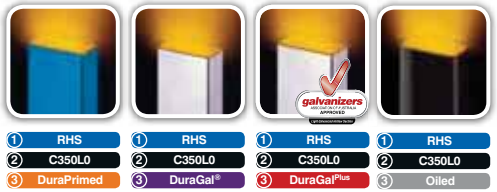
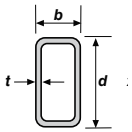
RHS to AS/NZS 1163 – C350L0 – Mass & Bundling *calculated in accordance with AS/NZS 1163*

Dimensions				Bundling																Mass					
Designation				Bundle Configuration (mm)				Bundle Dimensions (mm)				Lengths Per Bundle				Metres Per Bundle				Nominal Mass		Mass Per Bundle tonnes			
d	b	t		6.5	8.0	9.0	12.0	6.5	8.0	9.0	12.0														
mm	mm	mm		W x H	W x H	W x H	W x H	W x H	W x H	W x H	W x H	6.5	8.0	9.0	12.0	6.5	8.0	9.0	12.0	kg/m	m/t	6.5	8.0	9.0	12.0
50	20	1.6	RHS		8 12				400 240				96				768			1.63	615		1.25		
		2.0	RHS		8 12				400 240				96				768			1.99	502		1.53		
		2.5	RHS		6 12				300 240				72				576			2.42	412		1.40		
		3.0	RHS		6 12				300 240				72				576			2.83	353		1.63		
50	25	1.6	RHS		8 12				400 300				96				768			1.75	571		1.35		
		2.0	RHS		8 12				400 300				96				768			2.15	465		1.65		
		2.5	RHS		6 12				300 300				72				576			2.62	382		1.51		
		3.0	RHS		6 10				300 250				60				480			3.07	326		1.47		
65	35	2.0	RHS		6 9				390 315				54				432			2.93	341		1.27		
		2.5	RHS		6 9				390 315				54				432			3.60	278		1.56		
		3.0	RHS		5 9				325 315				45				360			4.25	236		1.53		
		4.0	RHS		5 7				325 245				35				280			5.35	187		1.50		
75	25	1.6	RHS		5 13				375 325				65				520			2.38	420		1.24		
		2.0	RHS		5 13				375 325				65				520			2.93	341		1.53		
		2.5	RHS		4 12				300 300				48				384			3.60	278		1.38		



Notes:

1. See also Notes for Section Properties for this product.



ADDITIONAL NOTES:

(A) <u>THE ABOVE IS THE STANDARD GRADE FOR THE LISTED PRODUCTS</u>. SEE THE FOLLOWING TABLE FOR THESE SECTIONS LISTED IN NON-STANDARD C450PLUS.

(B) SEE THE FOLLOWING TABLE FOR OTHER SIZES IN ATM'S LARGER RANGE OF C450PLUS PRODUCTS.

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RHS to AS/NZS 1163 – C450PLUS® – Specifications

Technical Specifications

Australian Standards

RHS to Grade C450PLUS is manufactured and tested to comply with the requirements of the following specifications:

- AS/NZS 1163 – Cold-formed structural steel hollow sections (Grades C350L0 and Grade C450L0).
- AS/NZS 4792 – Hot-dip galvanized (zinc) coatings on ferrous hollow sections, applied by a continuous or a specialized process (Section 3 or 4).

Mechanical Properties

RHS to Grade C450PLUS has the following mechanical properties:

- Minimum Yield Strength _____ 450 MPa
- Minimum Tensile Strength _____ 500 MPa
- Minimum Elongation in $5.65\sqrt{S_o}$

$(b_{/t}, d_{/t}) \leq 15$	$15 < (b_{/t}, d_{/t}) \leq 30$	$(b_{/t}, d_{/t}) > 30$
12%	14%	16%

- L0 guaranteed impact properties at 0°C to AS/NZS 1163.

Tolerances

Tolerances for RHS to Grade C450PLUS are compliant with AS/NZS 1163. See Dimensional Tolerances in Part 1 for more information.

Supply Conditions

DuraPrimed (DP) Finish

RHS to Grade C450PLUS with DuraPrimed finish is supplied in the following surface colours:

- DuraPrimed^{Blue}

This DuraPrimed finish is applied in-line using a patented process and is supplied in the following coating thicknesses:

- DuraPrimed^{Blue} _____ Target 12 microns with average at 8-10 microns

Note: Non-standard finishes, such as NOPC and LiteOil, are available if ordered prior to rollings. Conditions apply and subject to mill acceptance.

See the ATM Product Availability Guide for further information on availability.

DuraGal® Finish

RHS to Grade C450PLUS with DuraGal® finish is manufactured from in-line galvanising hollow sections that has the following external coating thickness:

- Minimum coating mass _____ 100 g/m^2
- Designated as _____ AS/NZS 4792 ILG 100

See the ATM Product Availability Guide for further information on availability.

DuraGal^{Plus} Finish

RHS to Grade C450PLUS with DuraGal^{Plus} finish is manufactured using steel strip that has the following coating thickness:

- Minimum coating mass _____ 100 g/m^2 each side
- Designated as _____ AS/NZS 4792 ZB 100/100

See the ATM Product Availability Guide for further information on availability.

Oiled Finish

Oiled tubular products use a robust oil coating which is adequate for seaborne transport.

See the ATM Product Availability Guide for further information on availability.

End Finish (Mill Processing)

- Plain Ends only.

Standard Lengths

Standard lengths for RHS to Grade C450PLUS:

- See following Mass & Bundling Tables

Contact your Australian Tube Mills representative or refer to the ATM Product Availability Guide for further details.

Non-Standard Lengths

Special orders of non-standard pack lengths of RHS to Grade C450PLUS are available (conditions apply). Check with your distributor for details.

Minimum Length:

- (50x20 RHS) DP _____ 4.5 m
- (50x25 RHS) DP _____ 4.2 m
- (65x35, 75x25 – 150x50 RHS) DP _____ 4.5 m

Maximum Length:

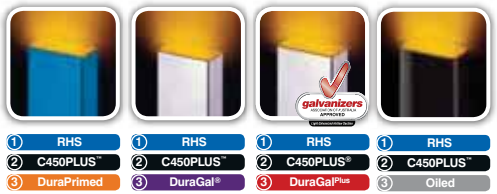
- (50x20 RHS) DP _____ 9.0 m
- (50x25 RHS) DP _____ 8.0 m
- (65x35 – 150x50 RHS) DP _____ 12.2 m

Note: Contact your Australian Tube Mills representative for lengths outside this range.

Thickness

RHS to Grade C450PLUS is available in 1.6 mm to 16.0mm wall thicknesses. These thicknesses are identified by the following end colour codes:

- 1.6 mm _____ Purple
- 1.8 mm _____ Brown
- 2.0 mm _____ Yellow
- 2.5 mm _____ Pink
- 3.0 mm _____ Blue
- 3.5 mm _____ Grey
- 4.0 mm _____ Green
- 5.0 mm _____ Orange
- 6.0 mm _____ Cream
- 8.0 mm _____ Red
- 9.0 mm _____ Purple
- 10.0 mm _____ Yellow
- 12.5 mm _____ Blue
- 16.0 mm _____ Grey



General Description

Manufacturing Process

RHS to Grade C450PLUS, for general fabrication and structural applications, is manufactured by cold-forming and high frequency Electric Resistance Welding (ERW) of higher strength steel strip. The cold-forming process enhances the strength, hardness and surface finish of the tube and produces RHS to tight dimensional tolerances.

Further Information

For further information refer to the Australian Tube Mills:

- Product Availability Guide (PAG) (www.austubemills.com.au)

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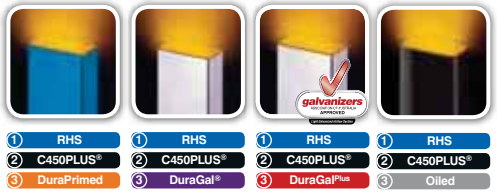
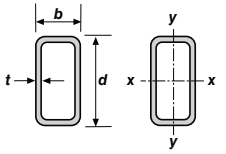
RHS to AS/NZS 1163 – C450PLUS® – Section Properties *calculated in accordance with AS/NZS 1163 & AS 4100*

Dimensions and Ratios																															
Designation				Mass per m	External Surface Area		b-2t	d-2t	Gross Section Area	Properties													Properties for Design to AS 4100								
										About x-axis					About y-axis					Torsion Constant	Torsion Modulus	Form Factor	About x-axis			About y-axis			
d	b	t			per m	per t	t	t	A_g	I_x	Z_x	S_x	r_x		I_y	Z_y	S_y	r_y		J	C	k_f	λ_e	Compactness	Z_{ex}	λ_e	Compactness	Z_{ey}			
mm	mm	mm		kg/m	m^2/m	m^2/t			mm^2	$10^6 mm^4$	$10^3 mm^3$	$10^3 mm^3$	mm		$10^6 mm^4$	$10^3 mm^3$	$10^3 mm^3$	mm		$10^6 mm^4$	$10^3 mm^3$			(C,N,S)	$10^3 mm^3$		(C,N,S)	$10^3 mm^3$			
400 x 300 x	16.0	RHS		161	1.33	8.27	16.8	23.0	20500	453	2260	2750	149		290	1940	2260	119		586	3170	1.00	22.5	C	2750	30.9	N	2230			
	12.5	RHS		128	1.35	10.5	22.0	30.0	16300	370	1850	2230	151		238	1590	1830	121		471	2590	0.996	29.5	C	2230	40.2	S	1580			
	10.0	RHS		104	1.36	13.0	28.0	38.0	13300	306	1530	1820	152		197	1320	1500	122		384	2130	0.877	37.6	N	1600	51.0	S	1120			
	8.0	RHS		84.2	1.37	16.2	35.5	48.0	10700	251	1260	1490	153		162	1080	1220	123		312	1750	0.715	47.6	S	1140	64.4	S	800			
400 x 200 x	16.0	RHS		136	1.13	8.33	10.5	23.0	17300	335	1670	2140	139		113	1130	1320	80.8		290	2000	1.00	14.1	C	2140	30.9	N	1300			
	12.5	RHS		109	1.15	10.6	14.0	30.0	13800	277	1380	1740	141		94.0	940	1080	82.4		236	1650	0.996	18.8	C	1740	40.2	S	936			
	10.0	RHS		88.4	1.16	13.1	18.0	38.0	11300	230	1150	1430	143		78.6	786	888	83.6		194	1370	0.855	24.1	C	1430	51.0	S	658			
	8.0	RHS		71.6	1.17	16.3	23.0	48.0	9120	190	949	1170	144		65.2	652	728	84.5		158	1130	0.745	30.9	N	1150	64.4	S	464			
350 x 250 x	16.0	RHS		136	1.13	8.33	13.6	19.9	17300	283	1620	1990	128		168	1340	1580	98.5		355	2230	1.00	18.3	C	1990	26.7	C	1580			
	12.5	RHS		109	1.15	10.6	18.0	26.0	13800	233	1330	1620	130		139	1110	1290	100		287	1840	1.00	24.1	C	1620	34.9	N	1200			
	10.0	RHS		88.4	1.16	13.1	23.0	33.0	11300	194	1110	1330	131		116	927	1060	101		235	1520	0.943	30.9	N	1320	44.3	S	865			
	8.0	RHS		71.6	1.17	16.3	29.3	41.8	9120	160	914	1090	132		95.7	766	869	102		191	1250	0.833	39.2	N	928	56.0	S	614			
300 x 200 x	16.0	RHS		111	0.931	8.42	10.5	16.8	14100	161	1080	1350	107		85.7	857	1020	78.0		193	1450	1.00	14.1	C	1350	22.5	C	1020			
	12.5	RHS		89.0	0.946	10.6	14.0	22.0	11300	135	899	1110	109		72.0	720	842	79.7		158	1210	1.00	18.8	C	1110	29.5	C	842			
	10.0	RHS		72.7	0.957	13.2	18.0	28.0	9260	113	754	921	111		60.6	606	698	80.9		130	1010	1.00	24.1	C	921	37.6	N	628			
	8.0	RHS		59.1	0.966	16.3	23.0	35.5	7520	93.9	626	757	112		50.4	504	574	81.9		106	838	0.903	30.9	N	746	47.6	S	447			
	6.0	RHS		45.0	0.974	21.7	31.3	48.0	5730	73.0	487	583	113		39.3	393	443	82.8		81.4	651	0.753	42.0	S	474	64.4	S	288			
250 x 150 x	16.0	RHS		85.5	0.731	8.55	7.38	13.6	10900	80.2	641	834	85.8		35.8	478	583	57.3		88.2	836	1.00	9.89	C	834	18.3	C	583			
	12.5	RHS		69.4	0.746	10.8	10.0	18.0	8840	68.5	548	695	88.0		30.8	411	488	59.0		73.4	710	1.00	13.4	C	695	24.1	C	488			
	10.0	RHS		57.0	0.757	13.3	13.0	23.0	7260	58.3	466	582	89.6		26.3	351	409	60.2		61.2	602	1.00	17.4	C	582	30.9	N	404			
	9.0	RHS		51.8	0.761	14.7	14.7	25.8	6600	53.7	430	533	90.2		24.3	324	375	60.7		56.0	554	1.00	19.7	C	533	34.6	N	352			
	8.0	RHS		46.5	0.766	16.5	16.8	29.3	5920	48.9	391	482	90.8		22.2	296	340	61.2		50.5	504	1.00	22.5	C	482	39.2	N	299			
	6.0	RHS		35.6	0.774	21.8	23.0	39.7	4530	38.4	307	374	92.0		17.5	233	264	62.2		39.0	395	0.843	30.9	N	368	53.2	S	191			
	5.0	RHS		29.9	0.779	26.0	28.0	48.0	3810	32.7	262	317	92.6		15.0	199	224	62.6		33.0	337	0.762	37.6	N	275	64.4	S	144			



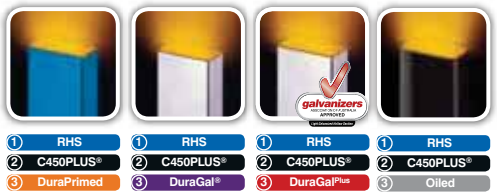
Notes:

1. For C450PLUS: f_y = 450 MPa and f_u = 500 MPa; f_y = yield stress used in design; f_u = tensile strength used in design; as defined in AS 4100 – see Steel Grades (Part 5) of this Product Manual for a definition of C450PLUS .
2. C = Compact Section; N = Non-Compact Section; S = Slender Section (as defined in AS 4100).
3. C450PLUS designed as Grade C450L0 to AS/NZS 1163 is cold-formed, and is therefore allocated the CF residual stresses classification in AS 4100.
4. LiteOil and NOPC are available in all sections on request and subject to confirmation.
5. Information on standard lengths for these products are listed in the following Mass & Bundling tables.
6. Refer to the Australian Tube Mills Product Availability Guide (PAG) for information on the availability of these products and associated grades, finishes, and standard lengths. The PAG can be found at www.austubemills.com



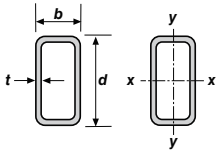
RHS to AS/NZS 1163 – C450PLUS® – Section Properties *calculated in accordance with AS/NZS 1163 & AS 4100*

Dimensions and Ratios									Properties												Properties for Design to AS 4100								
Designation				Mass per m	External Surface Area		b-2t	d-2t	Gross Section Area	About x-axis				About y-axis				Torsion Constant	Torsion Modulus	Form Factor	About x-axis				About y-axis			
																						Compactness				Compactness		
d	b	t			per m	per t	t	t	A_g	I_x	Z_x	S_x	r_x	I_y	Z_y	S_y	r_y	J	C	k_f	λ_e		Z_{ex}	λ_e		Z_{ey}
mm	mm	mm		kg/m	m^2/m	m^2/t			mm^2	10^6mm^4	10^3mm^3	10^3mm^3	mm	10^6mm^4	10^3mm^3	10^3mm^3	mm	10^6mm^4	10^3mm^3			(C,N,S)	10^3mm^3		(C,N,S)	10^3mm^3
200 x	100 x	10.0	RHS	41.3	0.557	13.5	8.00	18.0	5260	24.4	244	318	68.2	8.18	164	195	39.4	21.5	292	1.00	10.7	C	318	24.1	C	195
		9.0	RHS	37.7	0.561	14.9	9.11	20.2	4800	22.8	228	293	68.9	7.64	153	180	39.9	19.9	272	1.00	12.2	C	293	27.1	C	180
		8.0	RHS	33.9	0.566	16.7	10.5	23.0	4320	20.9	209	267	69.5	7.05	141	165	40.4	18.1	250	1.00	14.1	C	267	30.9	N	163
		6.0	RHS	26.2	0.574	22.0	14.7	31.3	3330	16.7	167	210	70.8	5.69	114	130	41.3	14.2	200	0.967	19.7	C	210	42.0	S	110
		5.0	RHS	22.1	0.579	26.2	18.0	38.0	2810	14.4	144	179	71.5	4.92	98.3	111	41.8	12.1	172	0.855	24.1	C	179	51.0	S	82.2
		4.0	RHS	17.9	0.583	32.5	23.0	48.0	2280	11.9	119	147	72.1	4.07	81.5	91.0	42.3	9.89	142	0.745	30.9	N	144	64.4	S	58.0
152 x	76 x	6.0	RHS	19.4	0.430	22.2	10.7	23.3	2470	6.91	90.9	116	52.9	2.33	61.4	71.5	30.7	5.98	108	1.00	14.3	C	116	31.3	N	70.2
		5.0	RHS	16.4	0.435	26.4	13.2	28.4	2090	6.01	79.0	99.8	53.6	2.04	53.7	61.6	31.2	5.13	94.3	1.00	17.7	C	99.8	38.1	N	55.2
150 x	100 x	10.0	RHS	33.4	0.457	13.7	8.00	13.0	4260	11.6	155	199	52.2	6.14	123	150	38.0	14.3	211	1.00	10.7	C	199	17.4	C	150
		9.0	RHS	30.6	0.461	15.1	9.11	14.7	3900	10.9	145	185	52.9	5.77	115	140	38.5	13.2	197	1.00	12.2	C	185	19.7	C	140
		8.0	RHS	27.7	0.466	16.8	10.5	16.8	3520	10.1	134	169	53.5	5.36	107	128	39.0	12.1	182	1.00	14.1	C	169	22.5	C	128
		6.0	RHS	21.4	0.474	22.1	14.7	23.0	2730	8.17	109	134	54.7	4.36	87.3	102	40.0	9.51	147	1.00	19.7	C	134	30.9	N	101
		5.0	RHS	18.2	0.479	26.3	18.0	28.0	2310	7.07	94.3	115	55.3	3.79	75.7	87.3	40.4	8.12	127	1.00	24.1	C	115	37.6	N	78.5
		4.0	RHS	14.8	0.483	32.7	23.0	35.5	1880	5.87	78.2	94.6	55.9	3.15	63.0	71.8	40.9	6.64	105	0.903	30.9	N	93.2	47.6	S	55.9
150 x	50 x	6.0	RHS	16.7	0.374	22.4	6.33	23.0	2130	5.06	67.5	91.2	48.7	0.860	34.4	40.9	20.1	2.63	64.3	1.00	8.50	C	91.2	30.9	N	40.4
		5.0	RHS	14.2	0.379	26.6	8.00	28.0	1810	4.44	59.2	78.9	49.5	0.765	30.6	35.7	20.5	2.30	56.8	1.00	10.7	C	78.9	37.6	N	31.8
		4.0	RHS	11.6	0.383	32.9	10.5	35.5	1480	3.74	49.8	65.4	50.2	0.653	26.1	29.8	21.0	1.93	48.2	0.877	14.1	C	65.4	47.6	S	22.7
		3.0	RHS	8.96	0.390	43.5	14.7	48.0	1140	2.99	39.8	51.4	51.2	0.526	21.1	23.5	21.5	1.50	38.3	0.713	19.7	C	51.4	64.4	S	14.5
		2.5	RHS	7.53	0.391	52.0	18.0	58.0	959	2.54	33.9	43.5	51.5	0.452	18.1	19.9	21.7	1.28	32.8	0.633	24.1	C	43.5	77.8	S	10.9
		2.0	RHS	6.07	0.393	64.7	23.0	73.0	774	2.08	27.7	35.3	51.8	0.372	14.9	16.3	21.9	1.04	26.9	0.553	30.9	N	31.6	97.9	S	7.64
127 x	51 x	6.0	RHS	14.7	0.330	22.5	6.50	19.2	1870	3.28	51.6	68.9	41.9	0.761	29.8	35.8	20.2	2.20	54.9	1.00	8.72	C	68.9	25.7	C	35.8
		5.0	RHS	12.5	0.335	26.7	8.20	23.4	1590	2.89	45.6	59.9	42.6	0.679	26.6	31.3	20.6	1.93	48.6	1.00	11.0	C	59.9	31.4	N	30.6
		3.5	RHS	9.07	0.341	37.6	12.6	34.3	1150	2.20	34.7	44.6	43.7	0.526	20.6	23.4	21.3	1.44	37.2	0.905	16.9	C	44.6	46.0	S	18.5
125 x	75 x	6.0	RHS	16.7	0.374	22.4	10.5	18.8	2130	4.16	66.6	84.2	44.2	1.87	50.0	59.1	29.6	4.44	86.2	1.00	14.1	C	84.2	25.3	C	59.1
		5.0	RHS	14.2	0.379	26.6	13.0	23.0	1810	3.64	58.3	72.7	44.8	1.65	43.9	51.1	30.1	3.83	75.3	1.00	17.4	C	72.7	30.9	N	50.5
		4.0	RHS	11.6	0.383	32.9	16.8	29.3	1480	3.05	48.9	60.3	45.4	1.39	37.0	42.4	30.6	3.16	63.0	1.00	22.5	C	60.3	39.2	N	37.4
		3.0	RHS	8.96	0.390	43.5	23.0	39.7	1140	2.43	38.9	47.3	46.1	1.11	29.5	33.3	31.1	2.43	49.5	0.845	30.9	N	46.5	53.2	S	24.2
		2.5	RHS	7.53	0.391	52.0	28.0	48.0	959	2.07	33.0	40.0	46.4	0.942	25.1	28.2	31.4	2.05	42.1	0.763	37.6	N	34.7	64.4	S	18.2
		2.0	RHS	6.07	0.393	64.7	35.5	60.5	774	1.69	27.0	32.5	46.7	0.771	20.6	22.9	31.6	1.67	34.4	0.624	47.6	S	24.8	81.2	S	13.0
102 x	76 x	6.0	RHS	14.7	0.330	22.5	10.7	15.0	1870	2.52	49.4	61.9	36.7	1.59	42.0	50.5	29.2	3.38	69.8	1.00	14.3	C	61.9	20.1	C	50.5
		5.0	RHS	12.5	0.335	26.7	13.2	18.4	1590	2.22	43.5	53.7	37.3	1.41	37.0	43.9	29.7	2.91	61.2	1.00	17.7	C	53.7	24.7	C	43.9
		3.5	RHS	9.07	0.341	37.6	19.7	27.1	1150	1.68	33.0	39.9	38.2	1.07	28.2	32.6	30.5	2.14	46.1	1.00	26.4	C	39.9	36.4	N	29.8



Notes:

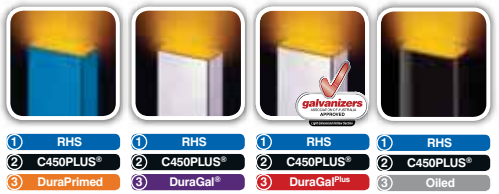
1. For C450PLUS: f_y = 450 MPa and f_u = 500 MPa; f_y = yield stress used in design; f_u = tensile strength used in design; as defined in AS 4100 – see Steel Grades (Part 5) of this Product Manual for a definition of C450PLUS.
2. C = Compact Section; N = Non-Compact Section; S = Slender Section (as defined in AS 4100).
3. C450PLUS designed as Grade C450L0 to AS/NZS 1163 is cold-formed, and is therefore allocated the CF residual stresses classification in AS 4100.
4. LiteOil and NOPC are available in all sections on request and subject to confirmation.
5. Information on standard lengths for these products are listed in the following Mass & Bundling tables.
6. Refer to the Australian Tube Mills Product Availability Guide (PAG) for information on the availability of these products and associated grades, finishes, and standard lengths. The PAG can be found at www.austubemills.com



Australian Tube Mills A.B.N. 21 123 666 679. PO Box 246 Sunnybank, Queensland 4109 Australia **Telephone** +61 7 3909 6600 **Facsimile** +61 7 3909 6660 **E-mail** info@austubemills.com **Internet** www.austubemills.com

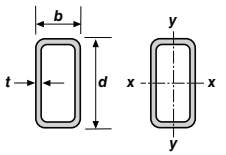
RHS to AS/NZS 1163 – C450PLUS® – Section Properties *calculated in accordance with AS/NZS 1163 & AS 4100*

Dimensions and Ratios										Properties												Properties for Design to AS 4100								
Designation				Mass per m	External Surface Area		b-2t	d-2t		Gross Section Area	About x-axis				About y-axis				Torsion Constant	Torsion Modulus		Form Factor	About x-axis				About y-axis			
																								Compactness				Compactness		
d	b	t			per m	per t	t	t		A_g	I_x	Z_x	S_x	r_x	I_y	Z_y	S_y	r_y	J	C	k_f	λ_e		Z_{ex}	λ_e		Z_{ey}
mm	mm	mm		kg/m	m^2/m	m^2/t				mm^2	10^6mm^4	10^3mm^3	10^3mm^3	mm	10^6mm^4	10^3mm^3	10^3mm^3	mm	10^6mm^4	10^3mm^3			(C,N,S)	10^3mm^3		(C,N,S)	10^3mm^3
100 x 50 x	6.0	RHS		12.0	0.274	22.8	6.33	14.7		1530	1.71	34.2	45.3	33.4	0.567	22.7	27.7	19.2	1.53	40.9	1.00	8.50	C	45.3	19.7	C	27.7
	5.0	RHS		10.3	0.279	27.0	8.00	18.0		1310	1.53	30.6	39.8	34.1	0.511	20.4	24.4	19.7	1.35	36.5	1.00	10.7	C	39.8	24.1	C	24.4
	4.0	RHS		8.49	0.283	33.3	10.5	23.0		1080	1.31	26.1	33.4	34.8	0.441	17.6	20.6	20.2	1.13	31.2	1.00	14.1	C	33.4	30.9	N	20.3
	3.5	RHS		7.53	0.285	37.9	12.3	26.6		959	1.18	23.6	29.9	35.1	0.400	16.0	18.5	20.4	1.01	28.2	1.00	16.5	C	29.9	35.6	N	17.1
	3.0	RHS		6.60	0.290	43.9	14.7	31.3		841	1.06	21.3	26.7	35.6	0.361	14.4	16.4	20.7	0.886	25.0	0.967	19.7	C	26.7	42.0	S	13.9
	2.5	RHS		5.56	0.291	52.4	18.0	38.0		709	0.912	18.2	22.7	35.9	0.311	12.4	14.0	20.9	0.754	21.5	0.856	24.1	C	22.7	51.0	S	10.4
	2.0	RHS		4.50	0.293	65.1	23.0	48.0		574	0.750	15.0	18.5	36.2	0.257	10.3	11.5	21.2	0.616	17.7	0.746	30.9	N	18.2	64.4	S	7.33
	1.6	RHS		3.64	0.295	81.0	29.3	60.5		463	0.613	12.3	15.0	36.4	0.211	8.43	9.33	21.3	0.501	14.5	0.661	39.2	N	12.5	81.2	S	5.19
76 x 38 x	4.0	RHS		6.23	0.211	33.9	7.50	17.0		793	0.527	13.9	18.1	25.8	0.176	9.26	11.1	14.9	0.466	16.6	1.00	10.1	C	18.1	22.8	C	11.1
	3.0	RHS		4.90	0.218	44.4	10.7	23.3		625	0.443	11.7	14.8	26.6	0.149	7.82	9.09	15.4	0.373	13.6	1.00	14.3	C	14.8	31.3	N	8.92
	2.5	RHS		4.15	0.219	52.8	13.2	28.4		529	0.383	10.1	12.7	26.9	0.129	6.81	7.81	15.6	0.320	11.8	1.00	17.7	C	12.7	38.1	N	7.00
75 x 50 x	6.0	RHS		9.67	0.224	23.2	6.33	10.5		1230	0.800	21.3	28.1	25.5	0.421	16.9	21.1	18.5	1.01	29.3	1.00	8.50	C	28.1	14.1	C	21.1
	5.0	RHS		8.35	0.229	27.4	8.00	13.0		1060	0.726	19.4	24.9	26.1	0.384	15.4	18.8	19.0	0.891	26.4	1.00	10.7	C	24.9	17.4	C	18.8
	4.0	RHS		6.92	0.233	33.7	10.5	16.8		881	0.630	16.8	21.1	26.7	0.335	13.4	16.0	19.5	0.754	22.7	1.00	14.1	C	21.1	22.5	C	16.0
	3.0	RHS		5.42	0.240	44.2	14.7	23.0		691	0.522	13.9	17.1	27.5	0.278	11.1	12.9	20.0	0.593	18.4	1.00	19.7	C	17.1	30.9	N	12.8
	2.5	RHS		4.58	0.241	52.7	18.0	28.0		584	0.450	12.0	14.6	27.7	0.240	9.60	11.0	20.3	0.505	15.9	1.00	24.1	C	14.6	37.6	N	9.95
	2.0	RHS		3.72	0.243	65.4	23.0	35.5		474	0.372	9.91	12.0	28.0	0.199	7.96	9.06	20.5	0.414	13.1	0.904	30.9	N	11.8	47.6	S	7.07
	1.6	RHS		3.01	0.245	81.3	29.3	44.9		383	0.305	8.14	9.75	28.2	0.164	6.56	7.40	20.7	0.337	10.8	0.799	39.2	N	8.26	60.2	S	5.01
75 x 25 x	2.5	RHS		3.60	0.191	53.1	8.00	28.0		459	0.285	7.60	10.1	24.9	0.0487	3.89	4.53	10.3	0.144	7.14	1.00	10.7	C	10.1	37.6	N	4.05
	2.0	RHS		2.93	0.193	65.8	10.5	35.5		374	0.238	6.36	8.31	25.3	0.0414	3.31	3.77	10.5	0.120	6.04	0.878	14.1	C	8.31	47.6	S	2.88
	1.6	RHS		2.38	0.195	81.7	13.6	44.9		303	0.197	5.26	6.81	25.5	0.0347	2.78	3.11	10.7	0.0993	5.05	0.746	18.3	C	6.81	60.2	S	2.02
65 x 35 x	4.0	RHS		5.35	0.183	34.2	6.75	14.3		681	0.328	10.1	13.3	22.0	0.123	7.03	8.58	13.4	0.320	12.5	1.00	9.06	C	13.3	19.1	C	8.58
	3.0	RHS		4.25	0.190	44.7	9.67	19.7		541	0.281	8.65	11.0	22.8	0.106	6.04	7.11	14.0	0.259	10.4	1.00	13.0	C	11.0	26.4	C	7.11
	2.5	RHS		3.60	0.191	53.1	12.0	24.0		459	0.244	7.52	9.45	23.1	0.0926	5.29	6.13	14.2	0.223	9.10	1.00	16.1	C	9.45	32.2	N	5.95
	2.0	RHS		2.93	0.193	65.8	15.5	30.5		374	0.204	6.28	7.80	23.4	0.0778	4.44	5.07	14.4	0.184	7.62	0.985	20.8	C	7.80	40.9	S	4.37
50 x 25 x	3.0	RHS		3.07	0.140	45.5	6.33	14.7		391	0.112	4.47	5.86	16.9	0.0367	2.93	3.56	9.69	0.0964	5.18	1.00	8.50	C	5.86	19.7	C	3.56
	2.5	RHS		2.62	0.141	54.0	8.00	18.0		334	0.0989	3.95	5.11	17.2	0.0328	2.62	3.12	9.91	0.0843	4.60	1.00	10.7	C	5.11	24.1	C	3.12
	2.0	RHS		2.15	0.143	66.6	10.5	23.0		274	0.0838	3.35	4.26	17.5	0.0281	2.25	2.62	10.1	0.0706	3.92	1.00	14.1	C	4.26	30.9	N	2.58
	1.6	RHS		1.75	0.145	82.5	13.6	29.3		223	0.0702	2.81	3.53	17.7	0.0237	1.90	2.17	10.3	0.0585	3.29	1.00	18.3	C	3.53	39.2	N	1.92
50 x 20 x	3.0	RHS		2.83	0.130	45.8	4.67	14.7		361	0.0951	3.81	5.16	16.2	0.0212	2.12	2.63	7.67	0.0620	3.88	1.00	6.26	C	5.16	19.7	C	2.63
	2.5	RHS		2.42	0.131	54.2	6.00	18.0		309	0.0848	3.39	4.51	16.6	0.0192	1.92	2.32	7.89	0.0550	3.49	1.00	8.05	C	4.51	24.1	C	2.32
	2.0	RHS		1.99	0.133	66.8	8.00	23.0		254	0.0723	2.89	3.78	16.9	0.0167	1.67	1.96	8.11	0.0466	3.00	1.00	10.7	C	3.78	30.9	N	1.93
	1.6	RHS		1.63	0.135	82.7	10.5	29.3		207	0.0608	2.43	3.14	17.1	0.0142	1.42	1.63	8.29	0.0389	2.55	1.00	14.1	C	3.14	39.2	N	1.44



Notes:

1. For C450PLUS: f_y = 450 MPa and f_u = 500 MPa; f_y = yield stress used in design; f_u = tensile strength used in design; as defined in AS 4100 – see Steel Grades (Part 5) of this Product Manual for a definition of C450PLUS.
2. C = Compact Section; N = Non-Compact Section; S = Slender Section (as defined in AS 4100).
3. C450PLUS designed as Grade C450L0 to AS/NZS 1163 is cold-formed, and is therefore allocated the CF residual stresses classification in AS 4100.
4. LiteOil and NOPC are available in all sections on request and subject to confirmation.
5. Information on standard lengths for these products are listed in the following Mass & Bundling tables.
6. Refer to the Australian Tube Mills Product Availability Guide (PAG) for information on the availability of these products and associated grades, finishes, and standard lengths. The PAG can be found at www.austubemills.com
7. **NOTE: Grey shaded listings are for C450L0 which is a non-standard grade – availability is subject to minimum order criteria. The standard grade for shaded listings is AS/NZS 1163 – C350L0. Please refer to earlier tables for design values associated with this as a standard grade. See the ATM PAG for further information on grades and availability.**



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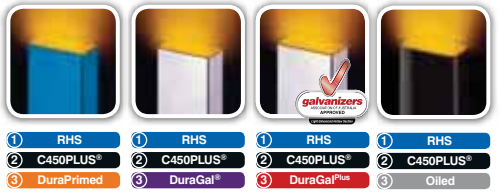
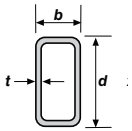
RHS to AS/NZS 1163 – C450PLUS® – Mass & Bundling *calculated in accordance with AS/NZS 1163*

Dimensions				Bundling																Mass					
Designation				Bundle Configuration (mm)				Bundle Dimensions (mm)				Lengths Per Bundle				Metres Per Bundle				Nominal Mass		Mass Per Bundle tonnes			
d	b	t		6.5	8.0	9.0	12.0	6.5	8.0	9.0	12.0														
mm	mm	mm		W x H	W x H	W x H	W x H	W x H	W x H	W x H	W x H	6.5	8.0	9.0	12.0	6.5	8.0	9.0	12.0	kg/m	m/t	6.5	8.0	9.0	12.0
50	20	1.6	RHS		8 12				400 240				96				768			1.63	615		1.25		
		2.0	RHS		8 12				400 240				96				768			1.99	502		1.53		
		2.5	RHS		6 12				300 240				72				576			2.42	412		1.40		
		3.0	RHS		6 12				300 240				72				576			2.83	353		1.63		
50	25	1.6	RHS		8 12				400 300				96				768			1.75	571		1.35		
		2.0	RHS		8 12				400 300				96				768			2.15	465		1.65		
		2.5	RHS		6 12				300 300				72				576			2.62	382		1.51		
		3.0	RHS		6 10				300 250				60				480			3.07	326		1.47		
65	35	2.0	RHS		6 9				390 315				54				432			2.93	341		1.27		
		2.5	RHS		6 9				390 315				54				432			3.60	278		1.56		
		3.0	RHS		5 9				325 315				45				360			4.25	236		1.53		
		4.0	RHS		5 7				325 245				35				280			5.35	187		1.50		
75	25	1.6	RHS		5 13				375 325				65				520			2.38	420		1.24		
		2.0	RHS		5 13				375 325				65				520			2.93	341		1.53		
		2.5	RHS		4 12				300 300				48				384			3.60	278		1.38		
75	50	1.6	RHS		6 9		6 9		450 450		450 450		54		54		432		648	3.01	332		1.30		1.95
		2.0	RHS		6 7		6 7		450 350		450 350		42		42		336		504	3.72	269		1.25		1.87
		2.5	RHS		6 7				450 350				42				336			4.58	218		1.54		
		3.0	RHS		5 7		4 6		375 350		300 300		35		24		280		288	5.42	184		1.52		1.56
		4.0	RHS		4 7		4 6		300 350		300 300		28		24		224		288	6.92	145		1.55		1.99
		5.0	RHS		4 6				300 300				24				192			8.35	120		1.60		
		6.0	RHS		4 5				300 250				20				160			9.67	103		1.55		
76	38	2.5	RHS		4 5				304 190				20				160			4.15	241		0.664		
		3.0	RHS		4 5				304 190				20				160			4.90	204		0.785		
		4.0	RHS		4 4				304 152				16				128			6.23	161		0.797		
100	50	1.6	RHS		4 8		4 8		400 400		400 400		32		32		256		384	3.64	275		0.931		1.40
		2.0	RHS		4 8		4 8		400 400		400 400		32		32		256		384	4.50	222		1.15		1.73
		2.5	RHS		4 8		4 6		400 400		400 300		32		24		256		288	5.56	180		1.42		1.60
		3.0	RHS		4 8		4 6		400 400		400 300		32		24		256		288	6.60	152		1.69		1.90
		3.5	RHS		4 6		3 6		400 300		300 300		24		18		192		216	7.53	133		1.45		1.63
		4.0	RHS		4 6		3 6		400 300		300 300		24		18		192		216	8.49	118		1.63		1.83
		5.0	RHS		3 6		3 5		300 300		300 250		18		15		144		180	10.3	96.9		1.49		1.86
		6.0	RHS		3 5		3 4		300 250		300 200		15		12		120		144	12.0	83.1		1.44		1.73



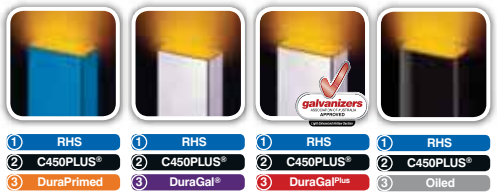
Notes:

1. See also Notes for Section Properties for this product
2. **NOTE: Grey shaded listings are for C450L0 which is a non-standard grade – availability is subject to minimum order criteria. The standard grade for the shaded listings is AS/NZS 1163 – C350L0. Please refer to earlier tables for design values associated with this as a standard grade. See the ATM PAG for further information on grades and availability.**



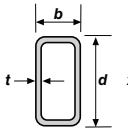
RHS to AS/NZS 1163 – C450PLUS® – Mass & Bundling *calculated in accordance with AS/NZS 1163*

Dimensions				Bundling																Mass					
Designation				Bundle Configuration (mm)				Bundle Dimensions (mm)				Lengths Per Bundle				Metres Per Bundle				Nominal Mass		Mass Per Bundle tonnes			
d	b	t		6.5	8.0	9.0	12.0	6.5	8.0	9.0	12.0														
mm	mm	mm		W x H	W x H	W x H	W x H	W x H	W x H	W x H	W x H	6.5	8.0	9.0	12.0	6.5	8.0	9.0	12.0	kg/m	m/t	6.5	8.0	9.0	12.0
102	76	3.5	RHS		3 4				306 304				12				96			9.07	110		0.870		
		5.0	RHS		3 3				306 228				9				72			12.5	79.9		0.901		
		6.0	RHS		3 2				306 152				6				48			14.7	68.2		0.704		
125	75	2.0	RHS		4 6				500 450				24				192			6.07	165		1.17		
		2.5	RHS		4 6		4 5		500 450		500 375		24		20		192		240	7.53	133		1.45		1.81
		3.0	RHS		4 5		4 5		500 375		500 375		20		20		160		240	8.96	112		1.43		2.15
		4.0	RHS		3 5		3 5		375 375		375 375		15		15		120		180	11.6	86.0		1.40		2.09
		5.0	RHS		3 5		3 3		375 375		375 225		15		9		120		108	14.2	70.2		1.71		1.54
		6.0	RHS		3 4		3 2		375 300		375 150		12		6		96		72	16.7	59.7		1.61		1.21
127	51	3.5	RHS		3 4				381 204				12				96			9.07	110		0.870		
		5.0	RHS		2 4				254 204				8				64			12.5	79.9		0.801		
		6.0	RHS		2 4				254 204				8				64			14.7	68.2		0.939		
150	50	2.0	RHS		3 7		3 7		450 350		450 350		21		21		168		252	6.07	165		1.02		1.53
		2.5	RHS		3 8				450 400				24				192			7.53	133		1.45		
		3.0	RHS		3 7		3 5		450 350		450 250		21		15		168		180	8.89	112		1.49		1.60
		4.0	RHS		3 5		3 5		450 250		450 250		15		15		120		180	11.6	86.0		1.40		2.09
		5.0	RHS		3 5		3 3		450 250		450 150		15		9		120		108	14.2	70.2		1.71		1.54
		6.0	RHS		3 5		3 3		450 250		450 150		15		9		120		108	16.7	59.7		2.01		1.81
150	100	4.0	RHS		3 4		3 3		450 400		450 300		12		9		96		108	14.8	67.7		1.42		1.59
		5.0	RHS		3 4		2 4		450 400		300 400		12		8		96		96	18.2	55.0		1.74		1.74
		6.0	RHS		3 3		2 3		450 300		300 300		9		6		72		72	21.4	46.6		1.54		1.54
		8.0	RHS		2 3		2 2		300 300		300 200		6		4		48		48	27.7	36.1		1.33		1.33
		9.0	RHS		2 3		2 2		300 300		300 200		6		4		48		48	30.6	32.7		1.47		1.47
		10.0	RHS				2 2				300 200				4				48	33.4	29.9				1.60
152	76	5.0	RHS		2 3		2 3		304 228		304 228		6		6		48		72	16.4	60.8		0.789		1.18
		6.0	RHS		2 3		2 3		304 228		304 228		6		6		48		72	19.4	51.6		0.930		1.40
200	100	4.0	RHS		2 4		2 3		400 400		400 300		8		6		64		72	17.9	55.8		1.15		1.29
		5.0	RHS		2 4		2 3		400 400		400 300		8		6		64		72	22.1	45.3		1.41		1.59
		6.0	RHS		2 4		2 2		400 400		400 200		8		4		64		48	26.2	38.2		1.67		1.26
		8.0	RHS		2 3		2 2		400 300		400 200		6		4		48		48	33.9	29.5		1.63		1.63
		9.0	RHS		2 3		2 2		400 300		400 200		6		4		48		48	37.7	26.6		1.81		1.81
		10.0	RHS				1 2				200 200				2				24	41.3	24.2				0.990



Notes:

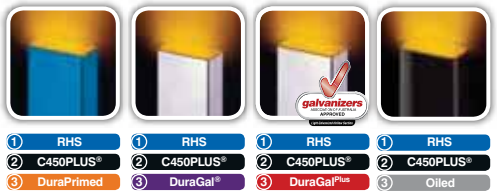
1. See also Notes for Section Properties for this product.



Australian Tube Mills A.B.N. 21 123 666 679. PO Box 246 Sunnybank, Queensland 4109 Australia **Telephone** +61 7 3909 6600 **Facsimile** +61 7 3909 6660 **E-mail** info@austubemills.com **Internet** www.austubemills.com

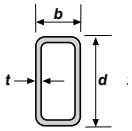
RHS to AS/NZS 1163 – C450PLUS® – Mass & Bundling *calculated in accordance with AS/NZS 1163*

Dimensions				Bundling																Mass					
Designation				Bundle Configuration (mm)				Bundle Dimensions (mm)				Lengths Per Bundle				Metres Per Bundle				Nominal Mass		Mass Per Bundle tonnes			
d	b	t		6.5	8.0	9.0	12.0	6.5	8.0	9.0	12.0														
mm	mm	mm		W x H	W x H	W x H	W x H	W x H	W x H	W x H	W x H	6.5	8.0	9.0	12.0	6.5	8.0	9.0	12.0	kg/m	m/t	6.5	8.0	9.0	12.0
250	150	5.0	RHS		2 3		2 2		500 450		500 300		6		4		48		48	29.9	33.4		1.44		1.44
		6.0	RHS		2 2		2 2		500 300		500 300		4		4		32		48	35.6	28.1		1.14		1.71
		8.0	RHS		2 2		1 2		500 300		250 300		4		2		32		24	46.5	21.5		1.49		1.12
		9.0	RHS		2 2		1 2		500 300		250 300		4		2		32		24	51.8	19.3		1.66		1.24
		10.0	RHS				1 2				250 300				2				24	57.0	17.6				1.37
		12.5	RHS				1 2				250 300				2				24	69.4	14.4				1.67
		16.0	RHS				1 1				250 150				1				12	85.5	11.7				1.03
300	200	6.0	RHS				2 1				600 200				2				24	45.0	22.2				1.08
		8.0	RHS				2 1				600 200				2				24	59.1	16.9				1.42
		10.0	RHS				2 1				600 200				2				24	72.7	13.8				1.74
		12.5	RHS				1 1				300 200				1				12	89.0	11.2				1.07
		16.0	RHS				1 1				300 200				1				12	111	9.04				1.33
350	250	8.0	RHS				2 1				700 250				2				24	71.6	14.0				1.72
		10.0	RHS				1 1				350 250				1				12	88.4	11.3				1.06
		12.5	RHS				1 1				350 250				1				12	109	9.21				1.30
		16.0	RHS				1 1				350 250				1				12	136	7.36				1.63
400	200	8.0	RHS				1 2				400 400				2				24	71.6	14.0				1.72
		10.0	RHS				1 1				400 200				1				12	88.4	11.3				1.06
		12.5	RHS				1 1				400 200				1				12	109	9.21				1.30
		16.0	RHS				1 1				400 200				1				12	136	7.36				1.63
400	300	8.0	RHS				1 1				400 300				1				12	84.2	11.9				1.01
		10.0	RHS				1 1				400 300				1				12	104	9.61				1.25
		12.5	RHS				1 1				400 300				1				12	128	7.80				1.54
		16.0	RHS				1 1				400 300				1				12	161	6.21				1.93



Notes:

1. See also Notes for Section Properties for this product.



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SHS to AS/NZS 1163 – C350L0 – Specifications

Technical Specifications

Australian Standards

SHS to Grade C350L0 is manufactured and tested to comply with the requirements of the following specifications:

- AS/NZS 1163 – Cold-formed structural steel hollow sections (Grade C350L0)
- AS/NZS 4792 – Hot-dip galvanized (zinc) coatings on ferrous hollow sections, applied by a continuous or a specialized process (Section 3 or 4).

Mechanical Properties

SHS to Grade C350L0 has the following mechanical properties:

- Minimum Yield Strength _____ 350 MPa
- Minimum Tensile Strength _____ 430 MPa
- Minimum Elongation in $5.65\sqrt{S_o}$

$(b_{ft}, d_{ft}) \leq 15$	$15 < (b_{ft}, d_{ft}) \leq 30$	$(b_{ft}, d_{ft}) > 30$
12%	14%	16%

- L0 guaranteed impact properties at 0°C to AS/NZS 1163

Tolerances

Tolerances for SHS to Grade C350L0 are compliant with AS/NZS 1163. See Dimensional Tolerances in Part 1 for more information.

Supply Conditions

DuraPrimed (DP) Finish

SHS to Grade C350L0 with DuraPrimed finish is supplied in the following surface colours:

- DuraPrimed^{Blue}

This DuraPrimed finish is applied in-line using a patented process and is supplied in the following coating thicknesses:

- DuraPrimed^{Blue} _____ Target 12 microns with average at 8-10 microns

Note: Non-standard finishes, such as NOPC and LiteOil, are available if ordered prior to rollings. Conditions apply and subject to mill acceptance.

See the ATM Product Availability Guide for further information on availability.

DuraGal® Finish

SHS to Grade C350L0 with DuraGal® finish is manufactured from in-line galvanizing hollow sections that have the following external coating thickness:

- Minimum coating mass _____ 100 g/m^2 each side
- Designated as _____ AS/NZS 4792 ILG 100

See the ATM Product Availability Guide for further information on availability.

DuraGal^{Plus} Finish

SHS to Grade C350L0 with DuraGal^{Plus} finish is manufactured using steel strip that has the following coating thickness:

- Minimum coating mass _____ 100 g/m^2 each side
- Designated as _____ AS/NZS 4792 ZB 100/100

See the ATM Product Availability Guide for further information on availability.

Oiled Finish

Oiled tubular products use a robust oil coating which is adequate for seaborne transport.

See the ATM Product Availability Guide for further information on availability.

End Finish (Mill Processing)

- Plain Ends only.

Standard Lengths

Standard lengths for SHS to Grade C350L0:

- See the folllowing Mass & Bundling Tables

Contact your Australian Tube Mills representative or refer to the ATM Product Availability Guide for further details.

Non-Standard Lengths

Special orders of non-standard pack lengths of SHS to Grade C350L0 are available (conditions apply). Check with your distributor for details.

Minimum Length:

- (20x20 – 40x40 SHS) DuraGal^{Plus}/DP _____ 4.2 m
- (50x50 SHS) DuraGal^{Plus}/DP _____ 4.5 m

Maximum Length:

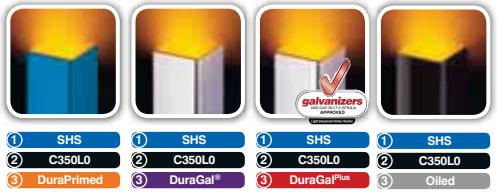
- (20x20 – 50x50 SHS) DuraGal^{Plus}/DP _____ 8.0 m
- (50x50 SHS) DuraGal^{Plus}/DP _____ 12.2m

Note: Contact your Australian Tube Mills representative for lengths outside this range.

Thickness

SHS to Grade C350L0 is available in 1.6 mm to 5.0 mm wall thicknesses. These thicknesses are identified by the following end colour codes:

- 1.6 mm _____ Purple
- 1.8 mm _____ Brown
- 2.0 mm _____ Yellow
- 2.5 mm _____ Pink
- 3.0 mm _____ Blue
- 4.0 mm _____ Green
- 5.0 mm _____ Orange



General Description

Manufacturing Process

SHS to Grade C350L0, for manufacturing, general fabrication and lighter structural applications, is manufactured by cold-forming and high frequency Electric Resistance Welding (ERW) of higher strength steel strip. The cold-forming process enhances the strength, hardness and surface finish of the tube and produces SHS to tight dimensional tolerances.

Further Information

For further information refer to the Australian Tube Mills:

- Product Availability Guide (PAG) (www.austubemills.com)

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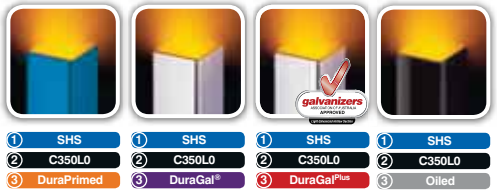
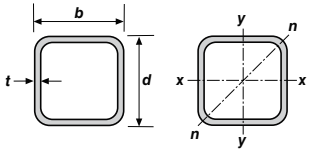
SHS to AS/NZS 1163 – C350L0 – Section Properties *calculated in accordance with AS/NZS 1163 & AS 4100*

Dimensions and Ratios										Section Properties								Properties for Design to AS 4100			
Designation				Mass per m	External Surface Area		b-2t / t	Gross Section Area	About x-, y- and n-axis					Torsion Constant	Torsion Modulus	Form Factor	About x and y-axis		
d	b	t			per m	per t		A_g	I_x	Z_x	Z_n	S_x	r_x	J	C	k_f	λ_e	Compact-ness	Z_{ex}
mm	mm	mm		kg/m	m^2/m	m^2/t		mm^2	10^6mm^4	10^3mm^3	10^3mm^3	10^3mm^3	mm	10^6mm^4	10^3mm^3			(C,N,S)	10^3mm^3
50 x 50 x	6.0	SHS	7.32	0.174	23.8	6.33	932	0.275	11.0	9.45	14.5	17.2	0.518	17.7	1.00	7.49	C	14.5
	5.0	SHS	6.39	0.179	27.9	8.00	814	0.257	10.3	8.51	13.2	17.8	0.469	16.3	1.00	9.47	C	13.2
	4.0	SHS	5.35	0.183	34.2	10.5	681	0.229	9.15	7.33	11.4	18.3	0.403	14.3	1.00	12.4	C	11.4
	3.0	SHS	4.25	0.190	44.7	14.7	541	0.195	7.79	5.92	9.39	19.0	0.321	11.8	1.00	17.4	C	9.39
	2.5	SHS	3.60	0.191	53.1	18.0	459	0.169	6.78	5.09	8.07	19.2	0.275	10.2	1.00	21.3	C	8.07
	2.0	SHS	2.93	0.193	65.8	23.0	374	0.141	5.66	4.20	6.66	19.5	0.226	8.51	1.00	27.2	C	6.66
	1.6	SHS	2.38	0.195	81.7	29.3	303	0.117	4.68	3.44	5.46	19.6	0.185	7.03	1.00	34.6	N	5.10
40 x 40 x	4.0	SHS	4.09	0.143	34.9	8.00	521	0.105	5.26	4.36	6.74	14.2	0.192	8.33	1.00	9.47	C	6.74
	3.0	SHS	3.30	0.150	45.3	11.3	421	0.0932	4.66	3.61	5.72	14.9	0.158	7.07	1.00	13.4	C	5.72
	2.5	SHS	2.82	0.151	53.7	14.0	359	0.0822	4.11	3.13	4.97	15.1	0.136	6.21	1.00	16.6	C	4.97
	2.0	SHS	2.31	0.153	66.4	18.0	294	0.0694	3.47	2.61	4.13	15.4	0.113	5.23	1.00	21.3	C	4.13
	1.6	SHS	1.88	0.155	82.3	23.0	239	0.0579	2.90	2.15	3.41	15.6	0.0927	4.36	1.00	27.2	C	3.41
35 x 35 x	3.0	SHS	2.83	0.130	45.8	9.67	361	0.0595	3.40	2.67	4.23	12.8	0.102	5.18	1.00	11.4	C	4.23
	2.5	SHS	2.42	0.131	54.2	12.0	309	0.0529	3.02	2.33	3.69	13.1	0.0889	4.58	1.00	14.2	C	3.69
	2.0	SHS	1.99	0.133	66.8	15.5	254	0.0451	2.58	1.95	3.09	13.3	0.0741	3.89	1.00	18.3	C	3.09
	1.6	SHS	1.63	0.135	82.7	19.9	207	0.0379	2.16	1.62	2.57	13.5	0.0611	3.26	1.00	23.5	C	2.57
30 x 30 x	3.0	SHS	2.36	0.110	46.5	8.00	301	0.0350	2.34	1.87	2.96	10.8	0.0615	3.58	1.00	9.47	C	2.96
	2.5	SHS	2.03	0.111	54.8	10.0	259	0.0316	2.10	1.65	2.61	11.0	0.0540	3.20	1.00	11.8	C	2.61
	2.0	SHS	1.68	0.113	67.4	13.0	214	0.0272	1.81	1.39	2.21	11.3	0.0454	2.75	1.00	15.4	C	2.21
	1.6	SHS	1.38	0.115	83.3	16.8	175	0.0231	1.54	1.16	1.84	11.5	0.0377	2.32	1.00	19.8	C	1.84
25 x 25 x	3.0	SHS	1.89	0.0897	47.4	6.33	241	0.0184	1.47	1.21	1.91	8.74	0.0333	2.27	1.00	7.49	C	1.91
	2.5	SHS	1.64	0.0914	55.7	8.00	209	0.0169	1.35	1.08	1.71	8.99	0.0297	2.07	1.00	9.47	C	1.71
	2.0	SHS	1.36	0.0931	68.3	10.5	174	0.0148	1.19	0.926	1.47	9.24	0.0253	1.80	1.00	12.4	C	1.47
	1.6	SHS	1.12	0.0945	84.1	13.6	143	0.0128	1.02	0.780	1.24	9.44	0.0212	1.54	1.00	16.1	C	1.24
20 x 20 x	2.0	SHS	1.05	0.0731	69.7	8.00	134	0.00692	0.692	0.554	0.877	7.20	0.0121	1.06	1.00	9.47	C	0.877
	1.6	SHS	0.873	0.0745	85.4	10.5	111	0.00608	0.608	0.474	0.751	7.39	0.0103	0.924	1.00	12.4	C	0.751



Notes:

1. For Grade C350L0: f_y = 350 MPa and f_u = 430 MPa; f_y = yield stress used in design; f_u = tensile strength used in design; as defined in AS 4100.
2. C = Compact Section; N = Non-Compact Section; S = Slender Section (as defined in AS 4100).
3. Grade C350L0 to AS/NZS 1163 is cold-formed, and is therefore allocated the CF residual stresses classification in AS 4100.
4. LiteOil and NOPC are available in all sections on request and subject to confirmation.
5. Information on standard lengths for these products are listed in the following Mass & Bundling tables.
6. Refer to the Australian Tube Mills Product Availability Guide (PAG) for information on the availability of these products and associated grades, finishes, and standard lengths. The PAG can be found at www.austubemills.com



ADDITIONAL NOTES:

(A) <u>THE ABOVE IS THE STANDARD GRADE FOR THE LISTED PRODUCTS</u>.
SEE THE FOLLOWING TABLE FOR THESE SECTIONS LISTED IN NON-STANDARD C450PLUS.

(B) SEE THE FOLLOWING TABLE FOR OTHER SIZES IN ATM'S LARGER RANGE OF C450PLUS PRODUCTS.

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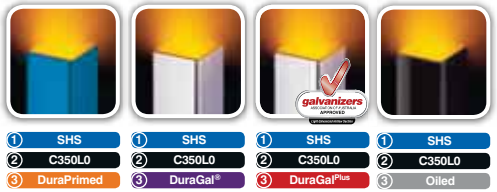
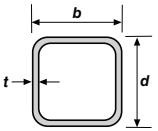
SHS to AS/NZS 1163 – C350L0 – Mass & Bundling *calculated in accordance with AS/NZS 1163*

Dimensions				Bundling																Mass					
Designation				Bundle Configuration (mm)				Bundle Dimensions (mm)				Lengths Per Bundle				Metres Per Bundle				Nominal Mass		Mass Per Bundle tonnes			
d	b	t		6.5	8.0	9.0	12.0	6.5	8.0	9.0	12.0														
mm	mm	mm		W x H	W x H	W x H	W x H	W x H	W x H	W x H	W x H	6.5	8.0	9.0	12.0	6.5	8.0	9.0	12.0	kg/m	m/t	6.5	8.0	9.0	12.0
20	x 20	x 1.6	SHS	12 8				240 160				96				624				0.873	1150	0.545			
		2.0	SHS	12 8				240 160				96				624				1.05	953	0.655			
25	x 25	x 1.6	SHS	10 10				250 250				100				650				1.12	890	0.731			
		2.0	SHS	10 10				250 250				100				650				1.36	733	0.886			
		2.5	SHS	10 10				250 250				100				650				1.64	610	1.07			
		3.0	SHS	10 10				250 250				100				650				1.89	529	1.23			
30	x 30	x 1.6	SHS		10 10				300 300				100				800			1.38	727		1.10		
		2.0	SHS		10 10				300 300				100				800			1.68	596		1.34		
		2.5	SHS		10 10				300 300				100				800			2.03	492		1.63		
		3.0	SHS		8 8				240 240				64				512			2.36	423		1.21		
35	x 35	x 1.6	SHS		10 10				350 350				100				800			1.63	615		1.30		
		2.0	SHS		10 10				350 350				100				800			1.99	502		1.59		
		2.5	SHS		8 8				280 280				64				512			2.42	412		1.24		
		3.0	SHS		8 8				280 280				64				512			2.83	353		1.45		
40	x 40	x 1.6	SHS		9 9				360 360				81				648			1.88	533		1.22		
		2.0	SHS		9 9				360 360				81				648			2.31	434		1.49		
		2.5	SHS		8 8				320 320				64				512			2.82	355		1.44		
		3.0	SHS		8 8				320 320				64				512			3.30	303		1.69		
		4.0	SHS		7 7				280 280				49				392			4.09	244		1.60		
50	x 50	x 1.6	SHS		8 8				400 400				64				512			2.38	420		1.22		
		2.0	SHS		8 8				400 400				64				512			2.93	341		1.50		
		2.5	SHS		7 7				350 350				49				392			3.60	278		1.41		
		3.0	SHS		7 7				350 350				49				392			4.25	236		1.66		
		4.0	SHS		6 6				300 300				36				288			5.35	187		1.54		
		5.0	SHS		6 5				300 250				30				240			6.39	156		1.53		
		6.0	SHS		5 5				250 250				25				200			7.32	137		1.46		



Notes:

1. See also Notes for Section Properties for this product.



ADDITIONAL NOTES:

(A) <u>THE ABOVE IS THE STANDARD GRADE FOR THE LISTED PRODUCTS</u>.
SEE THE FOLLOWING TABLE FOR THESE SECTIONS LISTED IN NON-STANDARD C450PLUS.

(B) SEE THE FOLLOWING TABLE FOR OTHER SIZES IN ATM'S LARGER RANGE OF C450PLUS PRODUCTS.

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SHS to AS/NZS 1163 – C450PLUS® – Specifications

Technical Specifications

Australian Standards

SHS to C450PLUS is manufactured and tested to comply with the requirements of the following specifications:

- AS/NZS 1163 – Cold-formed structural steel hollow sections (Grades C350L0 and Grade C450L0).
- AS/NZS 4792 – Hot-dip galvanized (zinc) coatings on ferrous hollow sections, applied by a continuous or a specialised process (Section 3 or 4).

Mechanical Properties

SHS to Grade C450PLUS has the following mechanical properties:

- Minimum Yield Strength _____ 450 MPa
- Minimum Tensile Strength _____ 500 MPa
- Minimum Elongation in $5.65\sqrt{S_o}$

$(b_{/t}, d_{/t}) \leq 15$	$15 < (b_{/t}, d_{/t}) \leq 30$	$(b_{/t}, d_{/t}) > 30$
12%	14%	16%

- L0 guaranteed impact properties at 0°C to AS/NZS 1163.

Tolerances

Tolerances for SHS to Grade C450PLUS are compliant with AS/NZS 1163. See Dimensional Tolerances in Part 1 for more information.

Supply Conditions

DuraPrimed (DP) Finish

SHS to Grade C450PLUS with DuraPrimed finish is supplied in the following surface colours:

- DuraPrimed^{Blue}

This DuraPrimed finish is applied in-line using a patented process and is supplied in the following coating thicknesses:

- DuraPrimed^{Blue} _____ Target 12 microns with average at 8-10 microns

Note: Non-standard finishes, such as NOPC and LiteOil, are available if ordered prior to rollings. Conditions apply and subject to mill acceptance.

See the ATM Product Availability Guide for further information on availability.

DuraGal® Finish

SHS to Grade C450PLUS with DuraGal® finish is manufactured from in-line galvanising hollow sections that has the following external coating thickness:

- Minimum coating mass _____ 100 g/m^2
- Designated as _____ AS/NZS 4792 ZB 100/100

See the ATM Product Availability Guide for further information on availability.

DuraGal^{Plus} Finish

SHS to Grade C450PLUS with DuraGal^{Plus} finish is manufactured using steel strip that has the following coating thickness:

- Minimum coating mass _____ 100 g/m^2 each side
- Designated as _____ AS/NZS 4792 ZB 100/100

See the ATM Product Availability Guide for further information on availability.

Oiled Finish

Oiled tubular products use a robust oil coating which is adequate for seaborne transport.

See the ATM Product Availability Guide for further information on availability.

End Finish (Mill Processing)

- Plain Ends only.

Standard Lengths

Standard lengths for SHS to Grade C450PLUS:

- See following Mass & Bundling Tables

Contact your Australian Tube Mills representative or refer to the ATM Product Availability Guide for further details.

Non-Standard Lengths

Special orders of non-standard pack lengths of SHS to Grade C450PLUS are available (conditions apply). Check with your distributor for details.

Minimum Length:

- (20x20 – 40x40 SHS) DuraGal^{Plus}/DP _____ 4.2 m
- (50x50 – 100x100 SHS) DuraGal^{Plus}/DP _____ 4.5 m
- (125x125 – 200x200 SHS) DuraGal^{Plus}/DP _____ 5.3 m

Maximum Length:

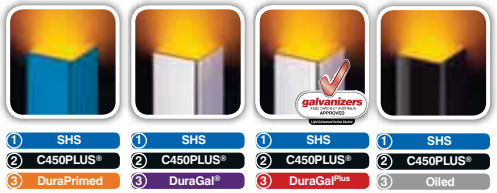
- (20x20 – 40x40 SHS) DuraGal^{Plus}/DP _____ 8.0 m
- (50x50 – 200x200 SHS) DuraGal^{Plus}/DP _____ 12.2 m

Note: Contact your Australian Tube Mills representative for lengths outside this range.

Thickness

SHS to Grade C450PLUS is available in 1.6 mm to 16.0mm wall thicknesses. These thicknesses are identified by the following end colour codes:

- 1.6 mm _____ Purple
- 1.8 mm _____ Brown
- 2.0 mm _____ Yellow
- 2.5 mm _____ Pink
- 3.0 mm _____ Blue
- 3.5 mm _____ Grey
- 4.0 mm _____ Green
- 5.0 mm _____ Orange
- 6.0 mm _____ Cream
- 8.0 mm _____ Red
- 9.0 mm _____ Purple
- 10.0 mm _____ Yellow
- 12.5 mm _____ Blue
- 16.0 mm _____ Grey



General Description

Manufacturing Process

SHS to Grade C450PLUS, for general fabrication and structural applications, is manufactured by cold-forming and high frequency Electric Resistance Welding (ERW) of higher strength steel strip. The cold-forming process enhances the strength, hardness and surface finish of the tube and produces SHS to tight dimensional tolerances.

Further Information

For further information refer to the Australian Tube Mills:

- Product Availability Guide (PAG) (www.austubemills.com.au)

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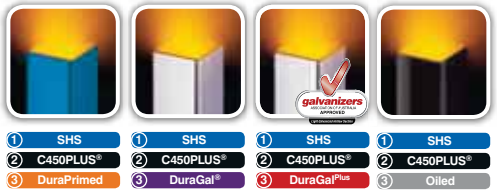
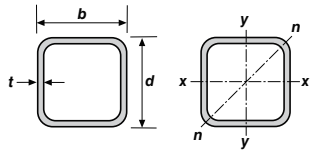
SHS to AS/NZS 1163 – C450PLUS® – Section Properties *calculated in accordance with AS/NZS 1163 & AS 4100*

Dimensions and Ratios								Properties								Properties for Design to AS 4100			
Designation				Mass per m	External Surface Area		b-2t	Gross Section Area	About x, y and n-axis					Torsion Constant	Torsion Modulus	Form Factor	About x-and y-axis		
d	b	t			per m	per t	t	A_g	I_x	Z_x	Z_n	S_x	r_x	J	C	k_f	λ_e	Compactness	Z_{ey}
mm	mm	mm		kg/m	m^2/m	m^2/t		mm^2	10^6mm^4	10^3mm^3	10^3mm^3	10^3mm^3	mm	10^6mm^4	10^3mm^3			(C,N,S)	10^3mm^3
400 x 400 x	16.0	SHS		186	1.53	8.23	23.0	23700	571	2850	2140	3370	155	930	4350	1.00	30.9	N	3320
	12.5	SHS		148	1.55	10.5	30.0	18800	464	2320	1720	2710	157	744	3520	0.994	40.2	S	2310
	10.0	SHS		120	1.56	13.0	38.0	15300	382	1910	1400	2210	158	604	2890	0.785	51.0	S	1650
350 x 350 x	16.0	SHS		161	1.33	8.27	19.9	20500	372	2130	1610	2530	135	614	3250	1.00	26.7	C	2530
	12.5	SHS		128	1.35	10.5	26.0	16300	305	1740	1300	2040	137	493	2650	1.00	34.9	N	1900
	10.0	SHS		104	1.36	13.0	33.0	13300	252	1440	1060	1670	138	401	2180	0.904	44.3	S	1350
	8.0	SHS		84.2	1.37	16.2	41.8	10700	207	1180	865	1370	139	326	1790	0.715	56.0	S	971
300 x 300 x	16.0	SHS		136	1.13	8.33	16.8	17300	226	1510	1160	1810	114	378	2310	1.00	22.5	C	1810
	12.5	SHS		109	1.15	10.6	22.0	13800	187	1240	937	1470	116	305	1900	1.00	29.5	C	1470
	10.0	SHS		88.4	1.16	13.1	28.0	11300	155	1030	769	1210	117	250	1570	1.00	37.6	N	1080
	8.0	SHS		71.6	1.17	16.3	35.5	9120	128	853	628	991	118	203	1290	0.840	47.6	S	768
250 x 250 x	16.0	SHS		111	0.931	8.42	13.6	14100	124	992	774	1210	93.8	212	1530	1.00	18.3	C	1210
	12.5	SHS		89.0	0.946	10.6	18.0	11300	104	830	634	992	95.7	173	1270	1.00	24.1	C	992
	10.0	SHS		72.7	0.957	13.2	23.0	9260	87.1	697	523	822	97.0	142	1060	1.00	30.9	N	811
	9.0	SHS		65.9	0.961	14.6	25.8	8400	79.8	639	477	750	97.5	129	972	1.00	34.6	N	699
	8.0	SHS		59.1	0.966	16.3	29.3	7520	72.3	578	429	676	98.0	116	878	1.00	39.2	N	586
	6.0	SHS		45.0	0.974	21.7	39.7	5730	56.2	450	330	521	99.0	88.7	681	0.753	53.2	S	380
200 x 200 x	16.0	SHS		85.5	0.731	8.55	10.5	10900	58.6	586	469	728	73.3	103	914	1.00	14.1	C	728
	12.5	SHS		69.4	0.746	10.8	14.0	8840	50.0	500	389	607	75.2	85.2	772	1.00	18.8	C	607
	10.0	SHS		57.0	0.757	13.3	18.0	7260	42.5	425	324	508	76.5	70.7	651	1.00	24.1	C	508
	9.0	SHS		51.8	0.761	14.7	20.2	6600	39.2	392	297	465	77.1	64.5	599	1.00	27.1	C	465
	8.0	SHS		46.5	0.766	16.5	23.0	5920	35.7	357	268	421	77.6	58.2	544	1.00	30.9	N	415
	6.0	SHS		35.6	0.774	21.8	31.3	4530	28.0	280	207	327	78.6	44.8	425	0.952	42.0	S	272
	5.0	SHS		29.9	0.779	26.0	38.0	3810	23.9	239	175	277	79.1	37.8	362	0.785	51.0	S	207
150 x 150 x	10.0	SHS		41.3	0.557	13.5	13.0	5260	16.5	220	173	269	56.1	28.4	341	1.00	17.4	C	269
	9.0	SHS		37.7	0.561	14.9	14.7	4800	15.4	205	159	248	56.6	26.1	316	1.00	19.7	C	248
	8.0	SHS		33.9	0.566	16.7	16.8	4320	14.1	188	144	226	57.1	23.6	289	1.00	22.5	C	226
	6.0	SHS		26.2	0.574	22.0	23.0	3330	11.3	150	113	178	58.2	18.4	229	1.00	30.9	N	175
	5.0	SHS		22.1	0.579	26.2	28.0	2810	9.70	129	96.2	151	58.7	15.6	197	1.00	37.6	N	135



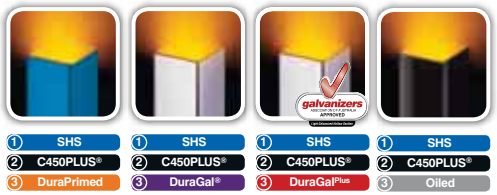
Notes:

1. For C450PLUS: f_y = 450 MPa and f_u = 500 MPa; f_y = yield stress used in design; f_u = tensile strength used in design; as defined in AS 4100. See Steel Grades (Part 5) of this Product Manual for a definition of C450PLUS.
2. C = Compact Section; N = Non-Compact Section; S = Slender Section (as defined in AS 4100).
3. C450PLUS designed as Grade C450L0 to AS/NZS 1163 is cold-formed, and is therefore allocated the CF residual stresses classification in AS 4100.
4. LiteOil and NOPC are available in all sections on request and subject to confirmation.
5. Information on standard lengths for these products are listed in the following Mass & Bundling tables.
6. Refer to the Australian Tube Mills Product Availability Guide (PAG) for information on the availability of these products and associated grades, finishes, and standard lengths. The PAG can be found at www.austubemills.com



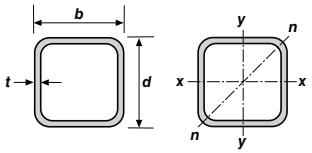
SHS to AS/NZS 1163 – C450PLUS® – Section Properties *calculated in accordance with AS/NZS 1163 & AS 4100*

Dimensions and Ratios								Properties									Properties for Design to AS 4100			
Designation				Mass per m	External Surface Area		b-2t	Gross Section Area	About x, y and n-axis					Torsion Constant	Torsion Modulus	Form Factor	About x-and y-axis			
d	b	t			per m	per t	t	A_g	I_x	Z_x	Z_n	S_x	r_x	J	C	k_f	λ_e	Compactness		Z_e
mm	mm	mm		kg/m	m^2/m	m^2/t		mm^2	10^6mm^4	10^3mm^3	10^3mm^3	10^3mm^3	mm	10^6mm^4	10^3mm^3				(C,N,S)	10^3mm^3
125 x 125 x	10.0	SHS		33.4	0.457	13.7	10.5	4260	8.93	143	114	178	45.8	15.7	223	1.00	14.1		C	178
	9.0	SHS		30.6	0.461	15.1	11.9	3900	8.38	134	106	165	46.4	14.5	208	1.00	16.0		C	165
	8.0	SHS		27.7	0.466	16.8	13.6	3520	7.75	124	96.8	151	46.9	13.3	192	1.00	18.3		C	151
	6.0	SHS		21.4	0.474	22.1	18.8	2730	6.29	101	76.5	120	48.0	10.4	154	1.00	25.3		C	120
	5.0	SHS		18.2	0.479	26.3	23.0	2310	5.44	87.1	65.4	103	48.5	8.87	133	1.00	30.9		N	101
	4.0	SHS		14.8	0.483	32.7	29.3	1880	4.52	72.3	53.6	84.5	49.0	7.25	110	1.00	39.2		N	73.2
100 x 100 x	10.0	SHS		25.6	0.357	14.0	8.00	3260	4.11	82.2	68.1	105	35.5	7.50	130	1.00	10.7		C	105
	9.0	SHS		23.5	0.361	15.4	9.11	3000	3.91	78.1	63.6	98.6	36.1	7.00	123	1.00	12.2		C	98.6
	8.0	SHS		21.4	0.366	17.1	10.5	2720	3.66	73.2	58.6	91.1	36.7	6.45	114	1.00	14.1		C	91.1
	6.0	SHS		16.7	0.374	22.4	14.7	2130	3.04	60.7	47.1	73.5	37.7	5.15	93.6	1.00	19.7		C	73.5
	5.0	SHS		14.2	0.379	26.6	18.0	1810	2.66	53.1	40.5	63.5	38.3	4.42	81.4	1.00	24.1		C	63.5
	4.0	SHS		11.6	0.383	32.9	23.0	1480	2.23	44.6	33.5	52.6	38.8	3.63	68.0	1.00	30.9		N	51.9
	3.0	SHS		8.96	0.390	43.5	31.3	1140	1.77	35.4	26.0	41.2	39.4	2.79	53.2	0.952	42.0		S	34.4
	2.5	SHS		7.53	0.391	52.0	38.0	959	1.51	30.1	21.9	34.9	39.6	2.35	45.2	0.787	51.0		S	26.1
	2.0	SHS		6.07	0.393	64.7	48.0	774	1.23	24.6	17.8	28.3	39.9	1.91	36.9	0.624	64.4		S	18.8
90 x 90 x	2.5	SHS		6.74	0.351	52.1	34.0	859	1.09	24.1	17.6	28.0	35.6	1.70	36.2	0.878	45.6		S	22.3
	2.0	SHS		5.45	0.353	64.8	43.0	694	0.889	19.7	14.3	22.8	35.8	1.38	29.6	0.696	57.7		S	16.0
89 x 89 x	6.0	SHS		14.7	0.330	22.5	12.8	1870	2.06	46.4	36.4	56.7	33.2	3.55	71.8	1.00	17.2		C	56.7
	5.0	SHS		12.5	0.335	26.7	15.8	1590	1.82	40.8	31.5	49.2	33.8	3.06	62.8	1.00	21.2		C	49.2
	3.5	SHS		9.07	0.341	37.6	23.4	1150	1.38	31.0	23.3	36.5	34.6	2.25	47.2	1.00	31.4		N	35.8
	2.0	SHS		5.38	0.349	64.9	42.5	686	0.858	19.3	14.0	22.3	35.4	1.33	29.0	0.704	57.0		S	15.7
75 x 75 x	6.0	SHS		12.0	0.274	22.8	10.5	1530	1.16	30.9	24.7	38.4	27.5	2.04	48.2	1.00	14.1		C	38.4
	5.0	SHS		10.3	0.279	27.0	13.0	1310	1.03	27.5	21.6	33.6	28.0	1.77	42.6	1.00	17.4		C	33.6
	4.0	SHS		8.49	0.283	33.3	16.8	1080	0.882	23.5	18.1	28.2	28.6	1.48	36.1	1.00	22.5		C	28.2
	3.5	SHS		7.53	0.285	37.9	19.4	959	0.797	21.3	16.1	25.3	28.8	1.32	32.5	1.00	26.1		C	25.3
	3.0	SHS		6.60	0.290	43.9	23.0	841	0.716	19.1	14.2	22.5	29.2	1.15	28.7	1.00	30.9		N	22.2
	2.5	SHS		5.56	0.291	52.4	28.0	709	0.614	16.4	12.0	19.1	29.4	0.971	24.6	1.00	37.6		N	17.0
	2.0	SHS		4.50	0.293	65.1	35.5	574	0.505	13.5	9.83	15.6	29.7	0.790	20.2	0.841	47.6		S	12.1
65 x 65 x	6.0	SHS		10.1	0.234	23.1	8.83	1290	0.706	21.7	17.8	27.5	23.4	1.27	34.2	1.00	11.9		C	27.5
	5.0	SHS		8.75	0.239	27.3	11.0	1110	0.638	19.6	15.6	24.3	23.9	1.12	30.6	1.00	14.8		C	24.3
	4.0	SHS		7.23	0.243	33.6	14.3	921	0.552	17.0	13.2	20.6	24.5	0.939	26.2	1.00	19.1		C	20.6
	3.0	SHS		5.66	0.250	44.1	19.7	721	0.454	14.0	10.4	16.6	25.1	0.733	21.0	1.00	26.4		C	16.6
	2.5	SHS		4.78	0.251	52.6	24.0	609	0.391	12.0	8.91	14.1	25.3	0.624	18.1	1.00	32.2		N	13.7
	2.0	SHS		3.88	0.253	65.3	30.5	494	0.323	9.94	7.29	11.6	25.6	0.509	14.9	0.978	40.9		S	9.80
	1.6	SHS		3.13	0.255	81.2	38.6	399	0.265	8.16	5.94	9.44	25.8	0.414	12.2	0.774	51.8		S	7.01



Notes:

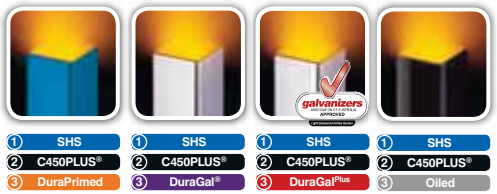
1. For C450PLUS: f_y = 450 MPa and f_u = 500 MPa; f_y = yield stress used in design; f_u = tensile strength used in design; as defined in AS 4100. See Steel Grades (Part 5) of this Product Manual for a definition of C450PLUS.
2. C = Compact Section; N = Non-Compact Section; S = Slender Section (as defined in AS 4100).
3. C450PLUS designed as Grade C450L0 to AS/NZS 1163 is cold-formed, and is therefore allocated the CF residual stresses classification in AS 4100.
4. LiteOil and NOPC are available in all sections on request and subject to confirmation.
5. Information on standard lengths for these products are listed in the following Mass & Bundling tables.
6. Refer to the Australian Tube Mills Product Availability Guide (PAG) for information on the availability of these products and associated grades, finishes, and standard lengths. The PAG can be found at www.austubemills.com



Australian Tube Mills A.B.N. 21 123 666 679. PO Box 246 Sunnybank, Queensland 4109 Australia **Telephone** +61 7 3909 6600 **Facsimile** +61 7 3909 6660 **E-mail** info@austubemills.com **Internet** www.austubemills.com

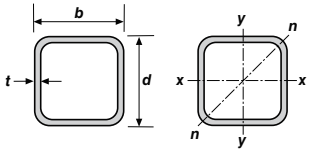
SHS to AS/NZS 1163 – C450PLUS® – Section Properties *calculated in accordance with AS/NZS 1163 & AS 4100*

Dimensions and Ratios								Properties									Properties for Design to AS 4100			
Designation				Mass per m	External Surface Area		b-2t	Gross Section Area	About x, y and n-axis					Torsion Constant	Torsion Modulus	Form Factor	About x-and y-axis			
d	b	t			per m	per t	t	A_g	I_x	Z_x	Z_n	S_x	r_x	J	C	k_f	λ_e	Compactness	Z_e	
mm	mm	mm		kg/m	m^2/m	m^2/t		mm^2	10^6mm^4	10^3mm^3	10^3mm^3	10^3mm^3	mm	10^6mm^4	10^3mm^3			(C,N,S)	10^3mm^3	
50	50	6.0	SHS	7.32	0.174	23.8	6.33	932	0.275	11.0	9.45	14.5	17.2	0.518	17.7	1.00	8.50	C	14.5	
		5.0	SHS	6.39	0.179	27.9	8.00	814	0.257	10.3	8.51	13.2	17.8	0.469	16.3	1.00	10.7	C	13.2	
		4.0	SHS	5.35	0.183	34.2	10.5	681	0.229	9.15	7.33	11.4	18.3	0.403	14.3	1.00	14.1	C	11.4	
		3.0	SHS	4.25	0.190	44.7	14.7	541	0.195	7.79	5.92	9.39	19.0	0.321	11.8	1.00	19.7	C	9.39	
		2.5	SHS	3.60	0.191	53.1	18.0	459	0.169	6.78	5.09	8.07	19.2	0.275	10.2	1.00	24.1	C	8.07	
		2.0	SHS	2.93	0.193	65.8	23.0	374	0.141	5.66	4.20	6.66	19.5	0.226	8.51	1.00	30.9	N	6.58	
		1.6	SHS	2.38	0.195	81.7	29.3	303	0.117	4.68	3.44	5.46	19.6	0.185	7.03	1.00	39.2	N	4.74	
40	40	4.0	SHS	4.09	0.143	34.9	8.00	521	0.105	5.26	4.36	6.74	14.2	0.192	8.33	1.00	10.7	C	6.74	
		3.0	SHS	3.30	0.150	45.3	11.3	421	0.0932	4.66	3.61	5.72	14.9	0.158	7.07	1.00	15.2	C	5.72	
		2.5	SHS	2.82	0.151	53.7	14.0	359	0.0822	4.11	3.13	4.97	15.1	0.136	6.21	1.00	18.8	C	4.97	
		2.0	SHS	2.31	0.153	66.4	18.0	294	0.0694	3.47	2.61	4.13	15.4	0.113	5.23	1.00	24.1	C	4.13	
		1.6	SHS	1.88	0.155	82.3	23.0	239	0.0579	2.90	2.15	3.41	15.6	0.0927	4.36	1.00	30.9	N	3.37	
35	35	3.0	SHS	2.83	0.130	45.8	9.67	361	0.0595	3.40	2.67	4.23	12.8	0.102	5.18	1.00	13.0	C	4.23	
		2.5	SHS	2.42	0.131	54.2	12.0	309	0.0529	3.02	2.33	3.69	13.1	0.0889	4.58	1.00	16.1	C	3.69	
		2.0	SHS	1.99	0.133	66.8	15.5	254	0.0451	2.58	1.95	3.09	13.3	0.0741	3.89	1.00	20.8	C	3.09	
		1.6	SHS	1.63	0.135	82.7	19.9	207	0.0379	2.16	1.62	2.57	13.5	0.0611	3.26	1.00	26.7	C	2.57	
30	30	3.0	SHS	2.36	0.110	46.5	8.00	301	0.0350	2.34	1.87	2.96	10.8	0.0615	3.58	1.00	10.7	C	2.96	
		2.5	SHS	2.03	0.111	54.8	10.0	259	0.0316	2.10	1.65	2.61	11.0	0.0540	3.20	1.00	13.4	C	2.61	
		2.0	SHS	1.68	0.113	67.4	13.0	214	0.0272	1.81	1.39	2.21	11.3	0.0454	2.75	1.00	17.4	C	2.21	
		1.6	SHS	1.38	0.115	83.3	16.8	175	0.0231	1.54	1.16	1.84	11.5	0.0377	2.32	1.00	22.5	C	1.84	
25	25	3.0	SHS	1.89	0.0897	47.4	6.33	241	0.0184	1.47	1.21	1.91	8.74	0.0333	2.27	1.00	8.50	C	1.91	
		2.5	SHS	1.64	0.0914	55.7	8.00	209	0.0169	1.35	1.08	1.71	8.99	0.0297	2.07	1.00	10.7	C	1.71	
		2.0	SHS	1.36	0.0931	68.3	10.5	174	0.0148	1.19	0.926	1.47	9.24	0.0253	1.80	1.00	14.1	C	1.47	
		1.6	SHS	1.12	0.0945	84.1	13.6	143	0.0128	1.02	0.780	1.24	9.44	0.0212	1.54	1.00	18.3	C	1.24	
20	20	2.0	SHS	1.05	0.0731	69.7	8.00	134	0.00692	0.692	0.554	0.877	7.20	0.0121	1.06	1.00	10.7	C	0.877	
		1.6	SHS	0.873	0.0745	85.4	10.5	111	0.00608	0.608	0.474	0.751	7.39	0.0103	0.924	1.00	14.1	C	0.751	



Notes:

1. For C450PLUS: f_y = 450 MPa and f_u = 500 MPa; f_y = yield stress used in design; f_u = tensile strength used in design; as defined in AS 4100. See Steel Grades (Part 5) of this Product Manual for a definition of C450PLUS.
2. C = Compact Section; N = Non-Compact Section; S = Slender Section (as defined in AS 4100).
3. C450PLUS designed as Grade C450L0 to AS/NZS 1163 is cold-formed, and is therefore allocated the CF residual stresses classification in AS 4100.
4. LiteOil and NOPC are available in all sections on request and subject to confirmation.
5. Information on standard lengths for these products are listed in the following Mass & Bundling tables.
6. Refer to the Australian Tube Mills Product Availability Guide (PAG) for information on the availability of these products and associated grades, finishes, and standard lengths. The PAG can be found at www.austubemills.com
7. **NOTE: Grey shaded listings are for C450L0 which is a non-standard grade – availability is subject to minimum order criteria. The standard grade for the shaded listings is AS/NZS 1163 – C350L0. Please refer to earlier tables for design values associated with this as a standard grade. See the ATM PAG for further information on grades and availability.**



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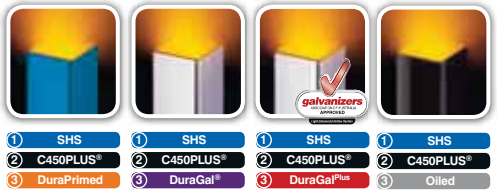
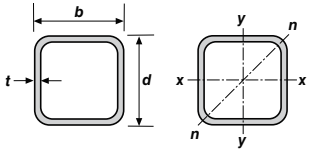
SHS to AS/NZS 1163 – C450PLUS® – Mass & Bundling *calculated in accordance with AS/NZS 1163*

Dimensions				Bundling																Mass					
Designation				Bundle Configuration (mm)				Bundle Dimensions (mm)				Lengths Per Bundle				Metres Per Bundle				Nominal Mass		Mass Per Bundle tonnes			
d	b	t		6.5	8.0	9.0	12.0	6.5	8.0	9.0	12.0														
mm	mm	mm		W x H	W x H	W x H	W x H	W x H	W x H	W x H	W x H	6.5	8.0	9.0	12.0	6.5	8.0	9.0	12.0	kg/m	m/t	6.5	8.0	9.0	12.0
20	20	1.6	SHS	12 8				240 160				96				624				0.873	1150	0.545			
		2.0	SHS	12 8				240 160				96				624				1.05	953	0.655			
25	25	1.6	SHS	10 10				250 250				100				650				1.12	890	0.731			
		2.0	SHS	10 10				250 250				100				650				1.36	733	0.886			
		2.5	SHS	10 10				250 250				100				650				1.64	610	1.07			
		3.0	SHS	10 10				250 250				100				650				1.89	529	1.23			
30	30	1.6	SHS		10 10				300 300				100				800			1.38	727		1.10		
		2.0	SHS		10 10				300 300				100				800			1.68	596		1.34		
		2.5	SHS		10 10				300 300				100				800			2.03	492		1.63		
		3.0	SHS		8 8				240 240				64				512			2.36	423		1.21		
35	35	1.6	SHS		10 10				350 350				100				800			1.63	615		1.30		
		2.0	SHS		10 10				350 350				100				800			1.99	502		1.59		
		2.5	SHS		8 8				280 280				64				512			2.42	412		1.24		
		3.0	SHS		8 8				280 280				64				512			2.83	353		1.45		
40	40	1.6	SHS		9 9				360 360				81				648			1.88	533		1.22		
		2.0	SHS		9 9				360 360				81				648			2.31	434		1.49		
		2.5	SHS		8 8				320 320				64				512			2.82	355		1.44		
		3.0	SHS		8 8				320 320				64				512			3.30	303		1.69		
		4.0	SHS		7 7				280 280				49				392			4.09	244		1.60		
50	50	1.6	SHS		8 8				400 400				64				512			2.38	420		1.22		
		2.0	SHS		8 8				400 400				64				512			2.93	341		1.50		
		2.5	SHS		7 7				350 350				49				392			3.60	278		1.41		
		3.0	SHS		7 7				350 350				49				392			4.25	236		1.66		
		4.0	SHS		6 6				300 300				36				288			5.35	187		1.54		
		5.0	SHS		6 5				300 250				30				240			6.39	156		1.53		
		6.0	SHS		5 5				250 250				25				200			7.32	137		1.46		



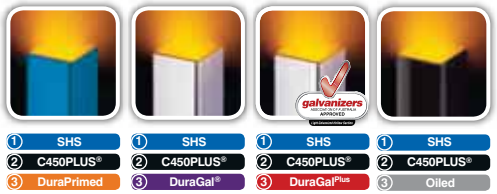
Notes:

1. See also Notes for Section Properties for this product
2. **NOTE: Grey shaded listings are for C450L0 which is a non-standard grade – availability is subject to minimum order criteria. The standard grade for the shaded listings is AS/NZS 1163 – C350L0. Please refer to earlier tables for design values associated with this as a standard grade. See the ATM PAG for further information on grades and availability.**



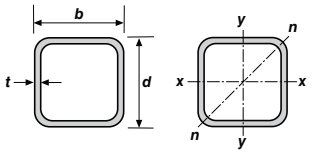
SHS to AS/NZS 1163 – C450PLUS® – Mass & Bundling *calculated in accordance with AS/NZS 1163*

Dimensions				Bundling																Mass					
Designation				Bundle Configuration (mm)				Bundle Dimensions (mm)				Lengths Per Bundle				Metres Per Bundle				Nominal Mass		Mass Per Bundle tonnes			
d	b	t		6.5	8.0	9.0	12.0	6.5	8.0	9.0	12.0														
mm	mm	mm		W x H	W x H	W x H	W x H	W x H	W x H	W x H	W x H	6.5	8.0	9.0	12.0	6.5	8.0	9.0	12.0	kg/m	m/t	6.5	8.0	9.0	12.0
65	65	1.6	SHS		7 7				455 455				49				392			3.13	319		1.23		
		2.0	SHS		7 6				455 390				42				336			3.88	258		1.30		
		2.5	SHS		7 6				455 390				42				336			4.78	209		1.61		
		3.0	SHS		6 6				390 390				36				288			5.66	177		1.63		
		4.0	SHS		6 5				390 325				30				240			7.23	138		1.74		
		5.0	SHS		5 5				325 325				25				200			8.75	114		1.75		
		6.0	SHS		5 4				325 260				20				160			10.1	98.6		1.62		
75	75	2.0	SHS		6 6				450 450				36				288			4.50	222		1.30		
		2.5	SHS		6 5		6 5		450 375		450 375		30		30		240		360	5.56	180		1.34		2.00
		3.0	SHS		6 5		5 5		450 375		375 375		30		25		240		300	6.60	152		1.58		1.98
		3.5	SHS		5 5		5 4		375 375		375 300		25		20		200		240	7.53	133		1.51		1.81
		4.0	SHS		5 5		5 3		375 375		375 225		25		15		200		180	8.49	118		1.70		1.53
		5.0	SHS		5 4		5 3		375 300		375 225		20		15		160		180	10.3	96.9		1.65		1.86
		6.0	SHS		4 4				300 300				16				128			12.0	83.1		1.54		
89	89	2.0	SHS		5 4				445 356				20				160			5.38	186		0.861		
		3.5	SHS		5 4		4 4		445 356		356 356		20		16		160		192	9.07	110		1.45		1.74
		5.0	SHS		4 4		4 3		356 356		356 267		16		12		128		144	12.5	79.9		1.60		1.80
		6.0	SHS		4 3		3 3		356 267		267 267		12		9		96		108	14.7	68.2		1.41		1.58
90	90	2.0	SHS		5 4				450 360				20				160			5.45	184		0.871		
		2.5	SHS		5 4				450 360				20				160			6.74	148		1.08		
100	100	2.0	SHS		5 4		5 4		500 400		500 400		20		20		160		240	6.07	165		0.972		1.46
		2.5	SHS		5 4				500 400				20				160			7.53	133		1.20		
		3.0	SHS		5 4		4 4		500 400		400 400		20		16		160		192	8.89	112		1.42		1.71
		4.0	SHS		4 4		4 3		400 400		400 300		16		12		128		144	11.6	86.0		1.49		1.67
		5.0	SHS		4 3		3 3		400 300		300 300		12		9		96		108	14.2	70.2		1.37		1.54
		6.0	SHS		4 3		3 3		400 300		300 300		12		9		96		108	16.7	59.7		1.61		1.81
		8.0	SHS				3 2				300 200				6				72	21.4	46.8				1.54
		9.0	SHS		3 3		3 2		300 300		300 200		9		6		72		72	23.5	42.5		1.69		1.69
		10.0	SHS				3 2				300 200				6				72	25.6	39.1				1.84
125	125	4.0	SHS		4 3		3 3		500 375		375 375		12		9		96		108	14.8	67.7		1.42		1.59
		5.0	SHS		4 3		3 3		500 375		375 375		12		9		96		108	18.2	55.0		1.74		1.96
		6.0	SHS		3 3		3 2		375 375		375 250		9		6		72		72	21.4	46.6		1.54		1.54
		8.0	SHS				2 2				250 250				4				48	27.7	36.1				1.33
		9.0	SHS		4 2		2 2		500 250		250 250		8		4		64		48	30.6	32.7		1.96		1.47
		10.0	SHS				2 2				250 250				4				48	33.4	29.9				1.60



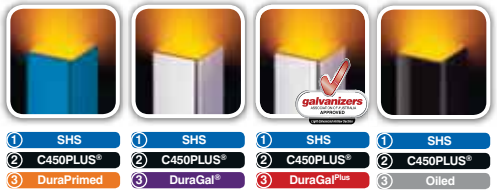
Notes:

1. See also Notes for Section Properties for this product.



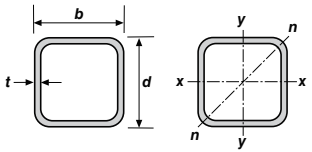
SHS to AS/NZS 1163 – C450PLUS® – Mass & Bundling *calculated in accordance with AS/NZS 1163*

Dimensions				Bundling																Mass					
Designation				Bundle Configuration (mm)				Bundle Dimensions (mm)				Lengths Per Bundle				Metres Per Bundle				Nominal Mass		Mass Per Bundle tonnes			
d	b	t		6.5	8.0	9.0	12.0	6.5	8.0	9.0	12.0														
mm	mm	mm		W x H	W x H	W x H	W x H	W x H	W x H	W x H	W x H	6.5	8.0	9.0	12.0	6.5	8.0	9.0	12.0	kg/m	m/t	6.5	8.0	9.0	12.0
150	x 150	x 5.0	SHS		3 3		3 2		450 450		450 300		9		6		72		72	22.1	45.3		1.59		1.59
		6.0	SHS		3 2		3 2		450 300		450 300		6		6		48		72	26.2	38.2		1.26		1.88
		8.0	SHS				2 2				300 300				4				48	33.9	29.5				1.63
		9.0	SHS		3 2		2 2		450 300		300 300		6		4		48		48	37.7	26.6		1.81		1.81
		10.0	SHS				2 1				300 150				2				24	41.3	24.2				0.990
200	x 200	x 5.0	SHS		3 2		2 2		600 400		400 400		6		4		48		48	29.9	33.4		1.44		1.44
		6.0	SHS		2 2		2 2		400 400		400 400		4		4		32		48	35.6	28.1		1.14		1.71
		8.0	SHS				2 1				400 200				2				24	46.5	21.5				1.12
		9.0	SHS		2 2		2 1		400 400		400 200		4		2		32		24	51.8	19.3		1.66		1.24
		10.0	SHS				2 1				400 200				2				24	57.0	17.6				1.37
		12.5	SHS				2 1				400 200				2				24	69.4	14.4				1.67
		16.0	SHS				1 1				200 200				1				12	85.5	11.7				1.03
250	x 250	x 6.0	SHS		2 2		2 1		500 500		500 250		4		2		32		24	45.0	22.2		1.44		1.08
		8.0	SHS		2 2		2 1		500 500		500 250		4		2		32		24	59.1	16.9		1.89		1.42
		9.0	SHS		2 1		2 1		500 250		500 250		2		2		16		24	65.9	15.2		1.05		1.58
		10.0	SHS				2 1				500 250				2				24	72.7	13.8				1.74
		12.5	SHS				1 1				250 250				1				12	89.0	11.2				1.07
		16.0	SHS				1 1				250 250				1				12	111	9.04				1.33
300	x 300	x 8.0	SHS				1 1				300 300				1				12	71.6	14.0				0.860
		10.0	SHS				1 1				300 300				1				12	88.4	11.3				1.06
		12.5	SHS				1 1				300 300				1				12	109	9.21				1.30
		16.0	SHS				1 1				300 300				1				12	136	7.36				1.63
350	x 350	x 8.0	SHS				1 1				350 350				1				12	84.2	11.9				1.01
		10.0	SHS				1 1				350 350				1				12	104	9.61				1.25
		12.5	SHS				1 1				350 350				1				12	128	7.80				1.54
		16.0	SHS				1 1				350 350				1				12	161	6.21				1.93
400	x 400	x 10.0	SHS				1 1				400 400				1				12	120	8.35				1.44
		12.5	SHS				1 1				400 400				1				12	148	6.76				1.77
		16.0	SHS				1 1				400 400				1				12	186	5.38				2.23



Notes:

1. See also Notes for Section Properties for this product.



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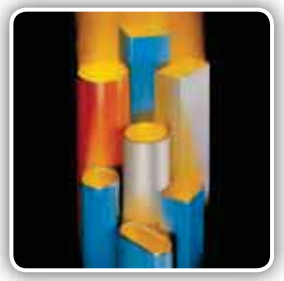
Part 3 – Other Tube Products – Contents



Notes:

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Product availability & other information – As the section, grade and finish of all products are subject to continuous improvement, reference should be made to the ATM *PRODUCT AVAILABILITY GUIDE* (PAG) for information on the availability of listed sections and associated finishes. The PAG is found at: www.austubemills.com.

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Silo Section to C450PLUS® – Specifications

Technical Specifications

Australian Standards

Silo Section to C450PLUS is manufactured and tested to comply with the requirements of the following specifications:

- AS/NZS 1163 – Cold-formed Structural Steel Hollow Sections (Grades C350L0 and Grade C450L0).
- AS/NZS 4792 – Hot-dip galvanized (zinc) coatings on ferrous hollow sections, applied by a continuous or a specialized process (Section 3 or 4).

Mechanical Properties

Silo Section to C450PLUS has the following mechanical properties:

- Minimum Yield Strength _____ 450 MPa
- Minimum Tensile Strength _____ 500 MPa
- Minimum Elongation in $5.65\sqrt{S_o}$ _____ 16%
- L0 guaranteed impact properties at 0°C to AS/NZS 1163

Tolerances

Tolerances for Silo Section to C450PLUS are compliant with AS/NZS 1163.

See Dimensional Tolerances in Part 1 for more information.

Supply Conditions

DuraPrimed (DP) Finish

Silo Section to C450PLUS with DuraPrimed finish is supplied in the following surface colour:

- DuraPrimed^{Blue}

This DuraPrimed finish is applied in-line using a patented process and is supplied in the following coating thicknesses:

- DuraPrimed^{Blue} _____ Target 12 microns with average at 8-10 microns

Note: Non-standard finishes, such as NOPC and LiteOil, are available if ordered prior to rollings. Conditions apply and subject to mill acceptance.

See the ATM Product Availability Guide for further information on availability.

DuraGal® Finish

Silo Section to C450PLUS with DuraGal® finish is manufactured from in-line galvanising hollow sections that have the following external coating thickness:

- Minimum coating mass _____ 100 g/m^2
- Designated as _____ AS/NZS 4792 ILG 100

See the ATM Product Availability Guide for further information on availability.

DuraGal^{Plus} Finish

Silo Section to C450PLUS with DuraGal^{Plus} finish is manufactured using steel strip that has the following coating thickness:

- Minimum coating mass _____ 100 g/m^2 each side
- Designated as _____ AS/NZS 4792 ZB 100/100

See the ATM Product Availability Guide for further information on availability.

End Finish (Mill Processing)

- Plain Ends only.

Standard Lengths

Standard length for Silo Section to C450PLUS:

- See the following Mass & Bundling Table

Contact your Australian Tube Mills representative or refer to the ATM Product Availability Guide for further details.

Non-Standard Lengths

Special orders of non-standard pack lengths of Silo Section to C450PLUS are available (conditions apply). Check with your distributor for details.

Minimum Length:

- (75x64) DuraGal^{Plus}/DP _____ 4.5 m

Maximum Length:

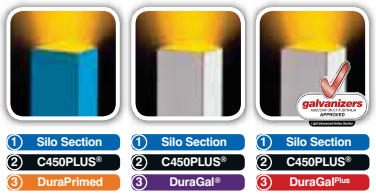
- (75x64) DuraGal^{Plus}/DP _____ 12.2 m

Note: Contact your Australian Tube Mills representative for lengths outside this range.

Thickness

Silo Section to C450PLUS is available in 2.5 and 3.0 mm wall thickness. These thicknesses are identified by the following end colour codes:

- 2.5 mm _____ Pink
- ☒ 3.0 mm _____ Blue



General Description

Manufacturing Process

Silo Section to C450PLUS is manufactured by cold-forming and high frequency Electric Resistance Welding (ERW) of higher strength steel strip.

The unique shape of Silo Section to C450PLUS follows the contour of typical grain silos and provides a practical and economical solution for silo base ring sections and support legs.

Silo Section to C450PLUS is also suitable for a wide range of mechanical and structural applications.

Further Information

For further information refer to the Australian Tube Mills:

- Product Availability Guide (PAG) (www.austubemills.com)

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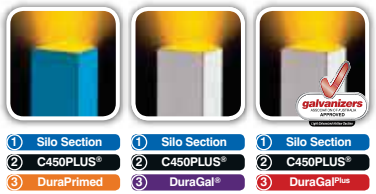
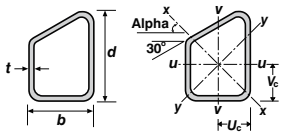
Silo Section to C450PLUS® – Section Properties *calculated in accordance with AS/NZS 1163 & AS 4100*

Dimensions and Ratios				Properties															Properties for Design to AS 4100				
Designation			Mass per m	Gross Section Area														Torsion Constant	Form Factor	About u-axis		About v-axis	
d	b	t		A_g	u_c	v_c	I_u	$Z_u$min	$Z_u$max	r_u	I_v	$Z_v$min	$Z_v$max	r_v	I_x	I_y	Alpha	J	k_f	Compact-ness	Z_{eu}	Compact-ness	Z_{ev}
mm	mm	mm	kg/m	mm^2	mm	mm	10^6mm^4	10^3mm^3	10^3mm^3	mm	10^6mm^4	10^3mm^3	10^3mm^3	mm	10^6mm^4	10^6mm^4	Deg.	10^6mm^4		(C,N,S)	10^3mm^3	(C,N,S)	10^3mm^3
75 x 64 x		3.0	5.55	707	27.8	31.9	0.440	10.2	13.8	24.9	0.401	11.1	14.4	23.8	0.530	0.310	39.9	0.573	1.00	N	14.7	N	15.0
		2.5	4.66	593	27.8	31.9	0.374	8.68	11.7	25.1	0.342	9.44	12.3	24.0	0.451	0.265	39.9	0.493	1.00	N	10.2	N	10.3



Notes:

1. For C450PLUS: f_y = 450 MPa and f_u = 500 MPa; f_y = yield stress used in design; f_u = tensile strength used in design; as defined in AS 4100 – see Steel Grades (Part 5) of this Product Manual for a definition of C450PLUS.
2. C = Compact Section; N = Non-Compact Section; S = Slender Section (as defined in AS 4100).
3. C450PLUS designed as Grade C450L0 to AS/NZS 1163 is cold-formed, and is therefore allocated the CF residual stresses classification in AS 4100.
4. LiteOil and NOPC are available in all sections on request and subject to confirmation.
5. Information on standard lengths for these products are listed in the following Mass & Bundling tables.
6. ***REFER* to the Australian Tube Mills *PRODUCT AVAILABILITY GUIDE* (PAG) for information on the availability of these products and associated grades, finishes, and standard lengths. The PAG can be found at www.austubemills.com**



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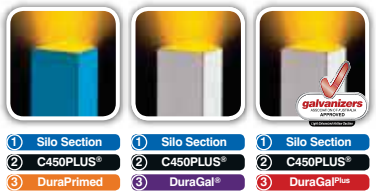
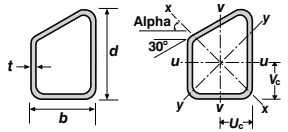
Silo Section to C450PLUS® – Mass & Bundling *calculated in accordance with AS/NZS 1163*

Dimensions				Bundling												Mass				
Designation				Bundle Configuration			Bundle Dimensions (mm)			Lengths Per Bundle			Metres Per Bundle			Nominal Mass		Mass Per Bundle tonnes		
d	b	t		6.5 m	8.0 m	12.0 m	6.5 m	8.0 m	12.0 m											
mm	mm	mm		W x H	W x H	W x H	W x H	W x H	W x H	6.5 m	8.0 m	12.0 m	6.5 m	8.0 m	12.0 m	kg/m	m/t	6.5 m	8.0 m	12.0 m
75	x 64 x	2.5		-	6 6	-	-	350 385	-	-	36	-	-	288	-	4.66	215	-	1.34	-
		3.0		-	6 6	-	-	350 385	-	-	36	-	-	288	-	5.55	180	-	1.60	-



Notes:

1. See also Notes for Section Properties for this product.



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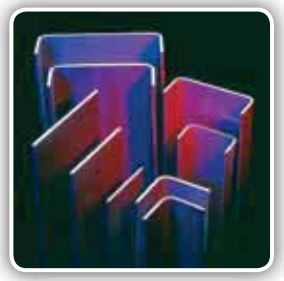
Part 4 – Profiles – Contents



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Product availability & other information – As the section, grade and finish of all products are subject to continuous improvement, reference should be made to the ATM *PRODUCT AVAILABILITY GUIDE* (PAG) for information on the availability of listed sections and associated finishes. The PAG is found at: www.austubemills.com.

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Profiles Angles – Equal Angles – Specifications

Technical Specifications

Australian Standards

Equal Angles are manufactured and tested to comply with the requirements of the following specifications:

- ATM Technical Specification TS100 DuraGal[Ultra] Profiles – Angles, Channels and Flats.
- AS/NZS 4791 – Hot-dipped (zinc) coatings on ferrous hollow sections, applied by an in-line process

and various other Australian and National Standards listed in TS100.

ATM Specification TS100 is available from www.austubemills.com

Mechanical Properties

Equal Angles have the following mechanical properties for section thickness (t):

- Minimum Yield Strength:

Actual Thickness (mm)	Grade	Minimum Yield Strength (MPa)
$t \leq 2.5$	C350L0	350
$2.5 < t \leq 6$	C450L0	450
$t > 6$	C400L0	400

- Minimum Tensile Strength:

Actual Thickness (mm)	Grade	Minimum Tensile Strength (MPa)
$t \leq 2.5$	C350L0	400
$2.5 < t \leq 6$	C450L0	500
$t > 6$	C400L0	450

- Minimum Elongation in $5.65\sqrt{S_o}$:

Actual Thickness (mm)	Grade	Minimum Elongation
$t \leq 2.5$	C350L0	20%
$2.5 < t \leq 6$	C450L0	16%
$t > 6$	C400L0	16%

- L0 indicates that Profiles have Charpy V-notch impact properties at 0° as specified in TS100. Table 10.4.1 of AS4100 Steel Structures permits L0 grades to have the following minimum permissible service temperature:

Actual Thickness (mm)	Lowest One Day Mean Ambient Temperature (°C)
$t \leq 6$	-30
$6 < t \leq 10$	-20

See TS100 for further details.

Tolerances

Tolerances for Equal Angles are compliant with ATM Technical Specification TS100.

Supply Conditions

DuraGal[Ultra]® Finish

Equal Angles are manufactured from in-line galvanizing cold-formed open sections that have the following coating thickness of zinc aluminium:

- Minimum (av) coating mass _____ 75 g/m²
- Designated as _____ AS/NZS 4791 ILG 75

End Finish (Mill Processing)

- Plain Ends only.

Standard Lengths

Standard lengths for Equal Angles:

- See following Mass & Bundling Tables

Contact your Australian Tube Mills representative or refer to the ATM Profiles Product Availability Guide for further details.

Non-Standard Lengths

Special orders of non-standard pack lengths of Equal Angles are available (conditions apply).

Minimum Length:

- All sizes _____ 5.0 m

Maximum Length:

- All sizes _____ 13.0 m

Notes:

1. Contact your Australian Tube Mills representative for lengths outside this range.
2. Lengths longer than the standard length may be restricted on some sizes and section shapes due to material handling issues in storage and transit. Check with your steel distributor(s) for more information.
3. Off-line cutting facilities are not available for Equal Angles.

Thickness

Equal Angles are available in 2.5 to 8.0 mm thickness. These thicknesses are identified by ends which are colour coded as specified in Table 8 of AS/NZS 4496.

General Description

Manufacturing Process

Equal Angles are produced by cold-forming low carbon steel strip and coated in-line applying a hot-dip zinc aluminium coating. This product is intended for general engineering and structural uses.

Further Information

For further information refer to the following publications available from www.austubemills.com:

- ATM Technical Specification TS100 DuraGal[Ultra]® Profiles – Angles, Channels, and Flats
- Profiles Product Availability Guide for further details.

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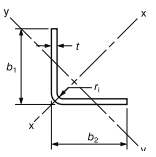
Profiles Angles – Equal Angles – Dimensions & *Full* Section Properties

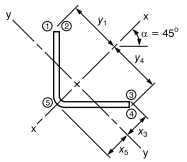
About principal x- and y-axes

Dimensions									Section Properties									
Designation			Mass per m	Actual Thickness	Inside Corner Radius	Co-ordinates of Centroid			Full Area of Section	About x-axis				About y-axis				
Leg b_1	Size b_2	Nominal Thickness		t	r_i	$y_1 = y_4$	$x_2 = x_3$	x_5	A_f	I_x	$Z_{x1} = Z_{x4}$	S_x	r_x	I_y	$Z_{y2} = Z_{y3}$	Z_{y5}	S_y	r_y
mm	mm	mm	kg/m	mm	mm	mm	mm	mm	mm^2	10^6mm^4	10^3mm^3	10^3mm^3	mm	10^6mm^4	10^3mm^3	10^3mm^3	10^3mm^3	mm
150 x	150 x	8.0 CA	18.0	8.0	8.0	106	53.5	51.6	2290	8.30	78.3	120	60.2	1.96	36.7	38.1	58.2	29.3
		6.0 CA	13.6	6.0	8.0	106	53.2	51.3	1740	6.36	59.9	91.6	60.5	1.51	28.3	29.4	44.3	29.5
		5.0 CA	10.8	4.7	4.0	106	53.4	52.4	1380	5.04	47.6	72.4	60.6	1.23	23.0	23.4	35.6	29.9
125 x	125 x	8.0 CA	14.9	8.0	8.0	88.4	44.6	42.8	1890	4.73	53.5	82.7	50.0	1.11	24.7	25.8	39.6	24.1
		5.0 CA	8.95	4.7	4.0	88.4	44.5	43.6	1140	2.89	32.7	50.0	50.4	0.699	15.7	16.0	24.4	24.8
		4.0 CA	7.27	3.8	4.0	88.4	44.4	43.4	926	2.36	26.7	40.7	50.5	0.572	12.9	13.2	19.9	24.9
100 x	100 x	8.0 CA	11.7	8.0	8.0	70.7	35.8	33.9	1490	2.36	33.4	52.0	39.8	0.542	15.1	16.0	24.7	19.0
		6.0 CA	8.92	6.0	8.0	70.7	35.5	33.6	1140	1.83	25.8	39.8	40.1	0.421	11.9	12.5	19.0	19.3
90 x	90 x	8.0 CA	10.5	8.0	8.0	63.6	32.3	30.4	1330	1.70	26.7	41.7	35.7	0.386	12.0	12.7	19.7	17.0
		5.0 CA	6.37	4.7	4.0	63.6	32.2	31.2	811	1.06	16.6	25.5	36.1	0.252	7.83	8.06	12.4	17.6
75 x	75 x	8.0 CA	8.59	8.0	8.0	53.0	26.9	25.1	1090	0.957	18.0	28.4	29.6	0.213	7.89	8.46	13.2	13.9
		6.0 CA	6.56	6.0	8.0	53.0	26.7	24.8	836	0.747	14.1	21.9	29.9	0.167	6.26	6.73	10.2	14.1
		5.0 CA	5.26	4.7	4.0	53.0	26.8	25.9	670	0.601	11.3	17.5	30.0	0.142	5.29	5.48	8.44	14.6
		4.0 CA	4.29	3.8	4.0	53.0	26.7	25.8	546	0.495	9.34	14.3	30.1	0.117	4.39	4.55	6.93	14.7
65 x	65 x	6.0 CA	5.62	6.0	8.0	46.0	23.1	21.3	716	0.477	10.4	16.2	25.8	0.104	4.52	4.91	7.50	12.1
		5.0 CA	4.52	4.7	4.0	46.0	23.3	22.4	576	0.386	8.39	13.0	25.9	0.0902	3.87	4.03	6.24	12.5
		4.0 CA	3.69	3.8	4.0	46.0	23.2	22.2	470	0.318	6.93	10.7	26.0	0.0747	3.22	3.36	5.13	12.6
50 x	50 x	6.0 CA	4.21	6.0	8.0	35.4	17.8	16.0	536	0.208	5.89	9.29	19.7	0.0434	2.44	2.71	4.18	9.00
		5.0 CA	3.42	4.7	4.0	35.4	18.0	17.1	435	0.170	4.80	7.53	19.8	0.0389	2.16	2.28	3.56	9.45
		4.0 CA	2.79	3.8	4.0	35.4	17.9	16.9	356	0.141	3.99	6.20	19.9	0.0324	1.81	1.91	2.94	9.54
		2.5 CA	1.81	2.4	2.5	35.4	17.8	17.2	230	0.0930	2.63	4.04	20.1	0.0221	1.24	1.28	1.95	9.79
45 x	45 x	4.0 CA	2.50	3.8	4.0	31.8	16.1	15.2	318	0.102	3.19	4.98	17.9	0.0231	1.43	1.52	2.35	8.52
		2.5 CA	1.62	2.4	2.5	31.8	16.0	15.4	206	0.0673	2.11	3.25	18.1	0.0159	0.990	1.03	1.57	8.77
40 x	40 x	4.0 CA	2.20	3.8	4.0	28.3	14.3	13.4	280	0.0702	2.48	3.89	15.8	0.0157	1.10	1.17	1.82	7.50
		2.5 CA	1.43	2.4	2.5	28.3	14.3	13.7	182	0.0468	1.65	2.55	16.0	0.0110	0.768	0.801	1.22	7.75
30 x	30 x	2.5 CA	1.06	2.4	2.5	21.2	10.7	10.2	134	0.0191	0.902	1.40	11.9	0.00438	0.408	0.431	0.664	5.71

Notes:

1. Based on nominal thickness (t), Equal Angles are supplied in the following steel grades (see Specifications of TS100 for further details):
   - C450L0 for 2.5mm $< t \leq$ 6.0mm
   - C400L0 for $t >$ 6.0 mm
   - C350L0 for $t \leq$ 2.5 mm
2. Full section properties are calculated in accordance with AS/NZS 4600.
3. For information on standard lengths for these products see following Mass & Bundling Tables.
4. Refer to either ATM Technical Specification TS100 and/or the Profiles Product Availability Guide for information on availability and further details.





Profiles Angles – Equal Angles – Dimensions & *Full* Section Properties

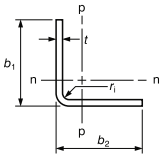
About non-principal n- and p-axes

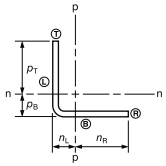
Dimensions							Section Properties						
Designation			Mass per m	Actual Thickness	Inside Corner Radius	Co-ordinates of Centroid		Full Area of Section	About non-principal n- and p-axes					Product of 2nd Moment of Area
Leg b_1	Size b_2	Nominal Thickness		t	r_i	$p_B = n_L$	$p_T = n_R$	A_f	$I_n = I_p$	$Z_{nB} = Z_{pL}$	$Z_{nT} = Z_{pR}$	$S_n = S_p$	$r_n = r_p$	I_{np}
mm	mm	mm	kg/m	mm	mm	mm	mm	mm^2	10^6mm^4	10^3mm^3	10^3mm^3	10^3mm^3	mm	10^6mm^4
150 x	150 x	8.0 CA	18.0	8.0	8.0	41.2	109	2290	5.13	125	47.2	85.2	47.3	- 3.17
		6.0 CA	13.6	6.0	8.0	40.4	110	1740	3.93	97.4	35.9	64.8	47.6	- 2.42
		5.0 CA	10.8	4.7	4.0	39.6	110	1380	3.14	79.1	28.4	51.2	47.7	- 1.91
125 x	125 x	8.0 CA	14.9	8.0	8.0	34.9	90.1	1890	2.92	83.5	32.4	58.5	39.2	- 1.81
		5.0 CA	8.95	4.7	4.0	33.4	91.6	1140	1.80	53.8	19.6	35.3	39.7	- 1.10
		4.0 CA	7.27	3.8	4.0	33.0	92.0	926	1.47	44.5	16.0	28.8	39.8	- 0.896
100 x	100 x	8.0 CA	11.7	8.0	8.0	28.7	71.3	1490	1.45	50.6	20.4	36.8	31.2	- 0.910
		6.0 CA	8.92	6.0	8.0	27.9	72.1	1140	1.12	40.3	15.6	28.2	31.5	- 0.703
90 x	90 x	8.0 CA	10.5	8.0	8.0	26.2	63.8	1330	1.04	39.8	16.3	29.5	27.9	- 0.657
		5.0 CA	6.37	4.7	4.0	24.6	65.4	811	0.654	26.6	10.0	18.0	28.4	- 0.402
75 x	75 x	8.0 CA	8.59	8.0	8.0	22.5	52.5	1090	0.585	26.0	11.1	20.1	23.1	- 0.372
		6.0 CA	6.56	6.0	8.0	21.7	53.3	836	0.457	21.1	8.57	15.5	23.4	- 0.290
		5.0 CA	5.26	4.7	4.0	20.9	54.1	670	0.372	17.8	6.86	12.4	23.5	- 0.230
		4.0 CA	4.29	3.8	4.0	20.5	54.5	546	0.306	14.9	5.62	10.1	23.7	- 0.189
65 x	65 x	6.0 CA	5.62	6.0	8.0	19.2	45.8	716	0.291	15.2	6.35	11.5	20.2	- 0.186
		5.0 CA	4.52	4.7	4.0	18.4	46.6	576	0.238	13.0	5.10	9.22	20.3	- 0.148
		4.0 CA	3.69	3.8	4.0	18.0	47.0	470	0.197	10.9	4.18	7.56	20.5	- 0.122
50 x	50 x	6.0 CA	4.21	6.0	8.0	15.4	34.6	536	0.126	8.15	3.64	6.59	15.3	- 0.0823
		5.0 CA	3.42	4.7	4.0	14.6	35.4	435	0.104	7.14	2.95	5.33	15.5	- 0.0655
		4.0 CA	2.79	3.8	4.0	14.3	35.7	356	0.0868	6.08	2.43	4.39	15.6	- 0.0544
		2.5 CA	1.81	2.4	2.5	13.6	36.4	230	0.0576	4.23	1.58	2.86	15.8	- 0.0355
45 x	45 x	4.0 CA	2.50	3.8	4.0	13.0	32.0	318	0.0623	4.79	1.95	3.52	14.0	- 0.0392
		2.5 CA	1.62	2.4	2.5	12.4	32.6	206	0.0416	3.36	1.27	2.30	14.2	- 0.0257
40 x	40 x	4.0 CA	2.20	3.8	4.0	11.8	28.2	280	0.0430	3.65	1.52	2.75	12.4	- 0.0272
		2.5 CA	1.43	2.4	2.5	11.1	28.9	182	0.0289	2.60	0.999	1.80	12.6	- 0.0179
30 x	30 x	2.5 CA	1.06	2.4	2.5	8.61	21.4	134	0.0118	1.37	0.550	0.994	9.35	-0.00738

① CA
② C350L0-C450L0
③ DuraGal[Ultra]®

Notes:

1. Based on nominal thickness (t), Equal Angles are supplied in the following steel grades (see Specifications of TS100 for further details):
   - C450L0 for 2.5mm < t ≤ 6.0mm
   - C400L0 for t > 6.0 mm
   - C350L0 for t ≤ 2.5 mm
2. Full section properties are calculated in accordance with AS/NZS 4600.
3. For information on standard lengths for these products see following Mass & Bundling Tables.
4. Refer to either ATM Technical Specification TS100 and/or the Profiles Product Availability Guide for information on availability and further details.





Profiles Angles – Equal Angles – Section Properties for Member Stability

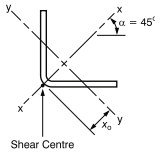
About principal x- and y-axes

Designation			Mass per m	Torsion Constant	Cooordinate of Shear Centre	Polar Radius of Gyration about the Shear Centre	Monosymmetry Section Constant
Leg b_1	Size b_2	Nominal Thickness		J	X_o	r_{o1}	β_y
mm	mm	mm	kg/m	$10^3 mm^4$	mm	mm	mm
150 x	150 x	8.0 CA	18.0	49.0	51.6	84.3	206
		6.0 CA	13.6	20.8	52.0	84.9	208
		5.0 CA	10.8	10.1	52.2	85.2	209
125 x	125 x	8.0 CA	14.9	40.4	42.8	69.9	171
		5.0 CA	8.95	8.39	43.4	70.8	173
		4.0 CA	7.27	4.46	43.5	71.1	174
100 x	100 x	8.0 CA	11.7	31.9	33.9	55.4	136
		6.0 CA	8.92	13.6	34.3	56.0	137
90 x	90 x	8.0 CA	10.5	28.5	30.4	49.7	122
		5.0 CA	6.37	5.97	31.0	50.6	124
75 x	75 x	8.0 CA	8.59	23.4	25.1	41.0	100
		6.0 CA	6.56	10.0	25.5	41.6	102
		5.0 CA	5.26	4.93	25.7	41.9	103
		4.0 CA	4.29	2.63	25.8	42.2	103
65 x	65 x	6.0 CA	5.62	8.59	21.9	35.8	87.7
		5.0 CA	4.52	4.24	22.2	36.2	88.6
		4.0 CA	3.69	2.26	22.3	36.4	89.2
50 x	50 x	6.0 CA	4.21	6.43	16.6	27.1	66.5
		5.0 CA	3.42	3.20	16.8	27.5	67.4
		4.0 CA	2.79	1.71	17.0	27.8	68.0
		2.5 CA	1.81	0.442	17.3	28.2	69.0
45 x	45 x	4.0 CA	2.50	1.53	15.2	24.9	61.0
		2.5 CA	1.62	0.396	15.5	25.3	61.9
40 x	40 x	4.0 CA	2.20	1.35	13.5	22.0	53.9
		2.5 CA	1.43	0.350	13.7	22.4	54.9
30 x	30 x	2.5 CA	1.06	0.258	10.2	16.6	40.7

Notes:

1. Based on nominal thickness (t), Equal Angles are supplied in the following steel grades (see Specifications of TS100 for further details):
   - C450L0 for 2.5 mm $< t \leq$ 6.0 mm
   - C400L0 for $t >$ 6.0 mm
   - C350L0 for $t \leq$ 2.5 mm
2. With the exception of J, properties are calculated assuming a simplified shape where the bends are eliminated and the section is represented by straight mid-lines in accordance with Clause 2.1.2.1 of AS/NZS 4600.
3. β is zero for equal angles.
4. I_w is equal to zero for angles.
5. The shear centre is assumed to be located at the intersection of the centre lines of the angle legs.

   Refer to either ATM Technical Specification TS100 and/or the Profiles Product Availability Guide for information on availability and further details.



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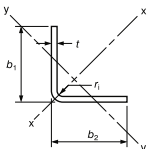
Profiles Angles – Equal Angles – Mass & Bundling

Nominal Size		Nominal Thickness	Mass per Metre	Metres per Tonnes	No. of lengths per pack	Arrangement of Pack	Overall Bundle Dimesions	Total Metres per pack	Total Weight per Pack
mm	mm	mm		kg/t	m/t	Cols x Rows	W x H (mm)	m	tonnes
6.0 Metre Standard Lengths									
30	30	2.5	1.06	948	80	4 x 20	170 x 85	480	0.507
40	40	2.5 4.0	1.43 2.20	698 455	60 39	3 x 20 3 x 13	170 x 92 170 x 92	360 234	0.516 0.514
45	45	2.5 4.0	1.62 2.50	617 401	54 36	3 x 18 3 x 12	191 x 89 191 x 90	324 216	0.525 0.539
9.0 Metre Standard Lengths									
50	50	2.5 4.0 5.0 6.0	1.81 2.79 3.42 4.21	553 358 298 238	33 27 24 21	3 x 11 3 x 9 3 x 8 3 x 7	212 x 69 212 x 78 212 x 82 212 x 85	297 243 216 189	0.537 0.679 0.738 0.795
65	65	4.0 5.0 6.0	3.69 4.52 5.62	271 221 178	22 22 18	2 x 11 2 x 11 2 x 9	184 x 99 184 x 112 184 x 112	198 198 162	0.730 0.895 0.910
75	75	4.0 5.0 6.0 8.0	4.29 5.26 6.56 8.59	233 190 152 116	22 22 18 18	2 x 11 2 x 11 2 x 9 2 x 9	212 x 106 212 x 119 212 x 119 212 x 143	198 198 162 162	0.849 1.04 1.06 1.39
90	90	5.0 8.0	6.37 10.50	157 95.4	22 18	2 x 11 2 x 9	255 x 130 255 x 153	198 162	1.26 1.70
12.0 Metre Standard Lengths									
100	100	6.0 8.0	8.92 11.7	112 85.2	16 14	2 x 8 2 x 7	283 x 129 283 x 138	192 168	1.71 1.97
125	125	4.0 5.0 8.0	7.27 8.95 14.9	138 112 67.2	20 18 12	2 x 10 2 x 9 2 x 6	354 x 136 354 x 141 354 x 144	240 216 144	1.74 1.93 2.14
150	150	5.0 6.0 8.0	10.8 13.6 18.0	92.6 73.4 55.5	18 18 12	2 x 9 2 x 9 2 x 6	424 x 159 424 x 172 424 x 162	216 216 144	2.33 2.94 2.59

1. CA
2. C350L0-C450L0
3. DuraGal Ultra®

Notes:

1. Refer to either ATM Technical Specification TS100 and/or the Profiles Product Availability Guide for information on availability and further details.



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Profiles Angles – Unequal Angles – Specifications

Technical Specifications

Australian Standards

Unequal Angles are manufactured and tested to comply with the requirements of the following specifications:

- ATM Technical Specification TS100 DuraGal[Ultra®] Profiles – Angles, Channels and Flats.
- AS/NZS 4791 – Hot-dipped (zinc) coatings on ferrous hollow sections, applied by an in-line process

and various other Australian and national Standards listed in TS100.

ATM Specification TS100 is available from www.austubemills.com

Mechanical Properties

Unequal Angles have the following mechanical properties for section thickness (t):

- Minimum Yield Strength (f_y):

Actual Thickness (mm)	Grade	Minimum Yield Strength (MPa)
$t \leq 2.5$	C350L0	350
$2.5 < t \leq 6$	C450L0	450
$t > 6$	C400L0	400

- Minimum Tensile Strength (f_u):

Actual Thickness (mm)	Grade	Minimum Tensile Strength (MPa)
$t \leq 2.5$	C350L0	400
$2.5 < t \leq 6$	C450L0	500
$t > 6$	C400L0	450

- Minimum Elongation in $5.65\sqrt{S_o}$:

Actual Thickness (mm)	Grade	Minimum Elongation
$t \leq 2.5$	C350L0	20%
$2.5 < t \leq 6$	C450L0	16%
$t > 6$	C400L0	16%

- L0 indicates that Profiles have Charpy V-notch impact properties at 0° as specified in TS100. Tables 10.4.1 of AS4100 Steel Structures permits L0 grades to have the following minimum permissible service temperatures:

Actual Thickness (mm)	Lowest One Day Mean Ambient Temperature (°C)
$t \leq 6$	-30
$6 < t \leq 10$	-20

See TS100 for further details.

Tolerances

Tolerances for Unequal Angles are compliant with ATM Technical Specification TS100.

Supply Conditions

DuraGal[Ultra®] Finish

Unequal Angles are manufactured from in-line galvanizing cold-formed open sections that have the following coating thickness of zinc aluminium:

- Minimum (av) coating mass _____ 75 g/m²
- Designated as _____ AS/NZS 4791 ILG 75

End Finish (Mill Processing)

- Plain Ends only.

Standard Lengths

Standard lengths for Unequal Angles:

- See following Mass & Bundling Tables

Contact your Australian Tube Mills representative or refer to the ATM Profiles Product Availability Guide for further details.

Non-Standard Lengths

Special orders of non-standard pack lengths of Unequal Angles are available (conditions apply).

Minimum Length:

- All sizes _____ 5.0 m

Maximum Length:

- All sizes _____ 13.0 m

Notes:

1. Contact your Australian Tube Mills representative for lengths outside this range.
2. Lengths longer than the standard length may be restricted on some sizes and section shapes due to material handling issues in storage and transit. Check with your steel distributor(s) for more information.
3. Off-line cutting facilities are not available for Unequal Angles.

Thickness

Unequal Angles are available in 4.0 to 8.0 mm thickness. These thicknesses are identified by ends which are colour coded as specified in Table 8 of AS/NZS 4496.

General Description

Manufacturing Process

Unequal Angles are produced by cold-forming low carbon steel strip and coated in-line applying a hot-dip zinc aluminium coating. This product is intended for general engineering and structural uses.

Further Information

For further information refer to the following publications available from www.austubemills.com:

- ATM Technical Specification TS100 DuraGal[Ultra®] Profiles – Angles, Channels, and Flats
- Profiles Product Availability Guide for further details.

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Profiles Angles – Unequal Angles – Dimensions & *Full* Section Properties

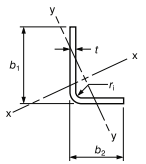
About principal x- and y-axes

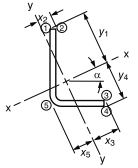
Dimensions										
Designation			Mass per m	Actual Thickness	Inside Corner Radius	Coordinates of Centroid				Tan
Leg b_1	Size b_2	Nominal Thickness		t	r_i	y_1	y_4	x_2	x_3	x_5	α
mm	mm	mm	kg/m	10^3mm^4	mm	mm	mm	mm	mm	mm	
150 x 100 x		8.0 CA	14.9	8.0	8.0	101	76.6	28.4	52.2	36.7	0.463
		6.0 CA	11.3	6.0	8.0	102	76.3	27.8	52.3	36.3	0.465
125 x 75 x		8.0 CA	11.7	8.0	8.0	82.6	61.0	20.6	40.9	27.2	0.386
		6.0 CA	8.92	6.0	8.0	83.1	60.6	19.9	41.2	26.8	0.388
100 x 75 x		8.0 CA	10.2	8.0	8.0	68.3	55.8	23.6	35.8	27.4	0.576
		6.0 CA	7.74	6.0	8.0	68.6	55.5	23.1	35.8	27.0	0.578
75 x 50 x		6.0 CA	5.38	6.0	8.0	50.0	39.2	14.9	25.3	17.8	0.472
		5.0 CA	4.34	4.7	4.0	50.6	38.4	14.4	26.1	18.5	0.462
		4.0 CA	3.54	3.8	4.0	50.8	38.3	14.1	26.1	18.3	0.464

Section Properties														
Designation			Mass per m	Full Area of Section	About x-axis					About y-axis					
Leg b_1	Size b_2	Nominal Thickness		A_t	I_x	Z_{x1}	Z_{x4}	S_x	r_x	I_y	Z_{y2}	Z_{y3}	Z_{y5}	S_y	r_x
mm	mm	mm	kg/m	mm^2	10^6mm^4	10^3mm^3	10^3mm^3	10^3mm^3	mm	10^6mm^4	10^3mm^3	10^3mm^3	10^3mm^3	10^3mm^3	mm
150 x 100 x		8.0 CA	14.9	1890	5.23	51.5	68.3	87.3	52.5	0.878	30.9	16.8	23.9	34.2	21.5
		6.0 CA	11.3	1440	4.02	39.4	52.7	66.6	52.9	0.679	24.4	13.0	18.7	26.2	21.7
125 x 75 x		8.0 CA	11.7	1490	2.74	33.1	44.8	56.2	42.8	0.381	18.5	9.30	14.0	19.8	16.0
		6.0 CA	8.92	1140	2.11	25.4	34.9	43.0	43.1	0.297	14.9	7.21	11.1	15.2	16.2
100 x 75 x		8.0 CA	10.2	1290	1.64	24.0	29.4	40.4	35.6	0.312	13.2	8.72	11.4	17.1	15.5
		6.0 CA	7.74	986	1.27	18.6	22.9	31.1	36.0	0.244	10.6	6.81	9.03	13.2	15.7
75 x 50 x		6.0 CA	5.38	686	0.464	9.29	11.9	15.7	26.0	0.0731	4.89	2.89	4.10	5.97	10.3
		5.0 CA	4.34	553	0.378	7.47	9.83	12.7	26.2	0.0631	4.38	2.42	3.42	4.96	10.7
		4.0 CA	3.54	451	0.312	6.15	8.15	10.4	26.3	0.0524	3.71	2.01	2.87	4.08	10.8

Notes:

1. Based on nominal thickness (t), Unequal Angles are supplied in the following steel grades (see Specifications of TS100 for further details):
   - C450L0 for 2.5 mm $< t \leq$ 6.0mm
   - C400L0 for $t >$ 6.0 mm
   - C350L0 for $t \leq$ 2.5 mm
2. Full section properties are calculated in accordance with AS/NZS 4600.
3. For information on standard lengths for these products see following Mass & Bundling Tables.
4. Refer to either ATM Technical Specification TS100 and/or the Profiles Product Availability Guide for information on availability and further details.





Profiles Angles – Unequal Angles – Dimensions & *Full* Section Properties

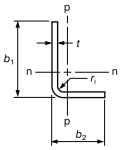
About non-principal n- and p-axes

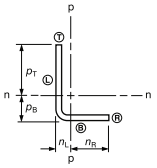
Dimensions								Section Properties										
Designation			Mass per metre	Coordinates of Centroid				Full Area of Section	About n-axis					About p-axis					Product of 2nd Moment of Area
Leg b_1	Size b_2	Nominal Thickness		p_B	p_t	n_L	n_R	A_f	I_n	z_{nB}	z_{nT}	S_n	r_n	I_p	z_{pL}	z_{pR}	S_p	r_p	I_{np}
mm	mm	mm	kg/m	mm	mm	mm	mm	mm²	10^6mm⁴	10^3mm³	10^3mm³	10^3mm³	mm	10^6mm⁴	10^3mm³	10^3mm³	10^3mm³	mm	10^6mm⁴
150 x 100 x		8.0 CA	14.9	49.0	101	23.5	76.5	1890	4.46	91.0	44.2	79.1	48.5	1.65	70.1	21.5	38.1	29.5	- 1.66
		6.0 CA	11.3	48.2	102	22.7	77.3	1440	3.42	71.1	33.6	60.3	48.8	1.27	56.1	16.4	28.9	29.8	- 1.28
125 x 75 x		8.0 CA	11.7	43.2	81.8	17.5	57.5	1490	2.43	56.2	29.7	52.4	40.3	0.687	39.2	11.9	21.4	21.4	- 0.791
		6.0 CA	8.92	42.3	82.7	16.7	58.3	1140	1.87	44.3	22.7	40.1	40.6	0.535	32.0	9.18	16.2	21.7	- 0.613
100 x 75 x		8.0 CA	10.2	32.5	67.5	19.6	55.4	1290	1.31	40.3	19.4	35.0	31.8	0.643	32.8	11.6	20.8	22.3	- 0.575
		6.0 CA	7.74	31.7	68.3	18.8	56.2	986	1.02	32.1	14.9	26.9	32.1	0.502	26.7	8.93	15.9	22.6	- 0.446
75 x 50 x		6.0 CA	5.38	25.7	49.3	12.7	37.3	686	0.393	15.3	7.98	14.2	23.9	0.144	11.4	3.87	6.97	14.5	- 0.151
		5.0 CA	4.34	24.8	50.2	12.0	38.0	553	0.323	13.0	6.43	11.5	24.2	0.119	9.86	3.12	5.56	14.6	- 0.120
		4.0 CA	3.54	24.4	50.6	11.7	38.3	451	0.266	10.9	5.26	9.43	24.3	0.0983	8.44	2.57	4.54	14.8	- 0.0991

① CA
② C350L0-C450L0
③ DuraGal[Ultra]®

Notes:

1. Based on nominal thickness (t), Unequal Angles are supplied in the following steel grades (see Specifications of TS100 for further details):
   - C450L0 for 2.5mm $< t \leq$ 6.0 mm
   - C400L0 for $t >$ 6.0 mm
   - C350L0 for $t \leq$ 2.5 mm
2. Full section properties are calculated in accordance with AS/NZS 4600.
3. For information on standard lengths for these products see following Mass & Bundling Tables.
4. Refer to either ATM Technical Specification TS100 and/or the Profiles Product Availability Guide for information on availability and further details.





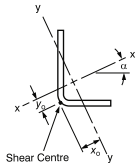
Profiles Angles – Unequal Angles – Section Properties for Member Stability

About principal x- and y-axes

Designation			Mass per m	Torsion Constant	Coordinate of Shear Centre		Polar Radius of Gyration about the Shear Centre	Monosymmetry Section Constant	
Leg b_1	Size b_2	Nominal Thickness		J	x_o	y_o	r_{o1}	β_y	β_y
mm	mm	mm	kg/m	$10^3 mm^4$	mm	mm	mm	mm	mm
150 x	100 x	8.0 CA	14.9	40.7	35.4	32.4	74.2	78.6	161
		5.0 CA	11.3	17.2	35.8	32.4	74.7	78.7	163
125 x	75 x	8.0 CA	11.7	31.9	25.5	31.2	60.8	74.7	126
		6.0 CA	8.92	13.6	25.9	31.3	61.3	74.9	127
100 x	75 x	8.0 CA	10.2	27.6	26.6	16.8	49.8	41.3	114
		6.0 CA	7.74	11.8	27.0	16.8	50.4	41.3	115
75 x	50 x	6.0 CA	5.38	8.23	17.3	16.2	36.6	39.2	79.2
		5.0 CA	4.34	4.07	17.6	16.2	36.9	39.2	80.2
		4.0 CA	3.54	2.17	17.7	16.2	37.2	39.3	80.8

Notes:

1. Based on nominal thickness (t), Unequal Angles are supplied in the following steel grades (see Specifications of TS100 for further details):
   - C450L0 for 2.5 mm $< t \leq$ 6.0 mm
   - C400L0 for $t >$ 6.0 mm
   - C350L0 for $t \leq$ 2.5 mm
2. With the exception of J, properties are calculated assuming a simplified shape where the bends are eliminated and the section is represented by straight mid-lines in accordance with Clause 2.1.2.1 of AS/NZS 4600.
3. I_w is equal to zero for angles.
4. The shear centre is assumed to be located at the intersection of the centre lines of the angle legs.
5. Refer to either ATM Technical Specification TS100 and/or the Profiles Product Availability Guide for information on availability and further details.



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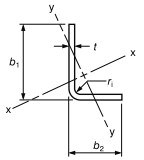
Profiles Angles – Unequal Angles – Mass & Bundling

Nominal Size		Nominal Thickness	Mass per Metre	Metres per Tonne	No. of lengths per pack	Arrangement of Pack	Overall Bundle Dimensions	Total Metres per pack	Total Weight per Pack
mm	mm	mm		kg/t	m/t	Cols x Rows	W x H (mm)	m	tonnes
9.0 Metre Standard Lengths									
75	50	4.0	3.54	282	22	2 x 11	197 x 94	198	0.701
		5.0	4.34	231	22	2 x 11	200 x 106	198	0.859
		6.0	5.38	186	18	2 x 9	199 x 106	162	0.872
12.0 Metre Standard Lengths									
100	75	6.0	7.74	129	16	2 x 8	261 x 117	192	1.49
		8.0	10.2	98.4	16	2 x 8	264 x 137	192	1.95
125	75	6.0	8.92	122	16	2 x 8	311 x 120	192	1.71
		8.0	11.7	85.2	14	2 x 7	312 x 129	168	1.97
150	100	6.0	11.3	88.7	16	2 x 8	376 x 140	192	2.16
		8.0	14.9	67.2	12	2 x 6	374 x 137	144	2.14

1. CA
2. C350L0-C450L0
3. DuraGal Ultra®

Notes:

1. Refer to either ATM Technical Specification TS100 and/or the Profiles Product Availability Guide for information on availability and further details.



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Profiles Channels – Specifications

Technical Specifications

Australian Standards

Channels are manufactured and tested to comply with the requirements of the following specifications:

- ATM Technical Specification TS100 DuraGal[Ultra®] Profiles – Angles, Channels and Flats.
- AS/NZS 4791 – Hot-dipped (zinc) coatings on ferrous hollow sections, applied by an in-line process

and various other Australian and national Standards listed in TS100.

ATM Specification TS100 is available from www.austubemills.com

Mechanical Properties

Channels have the following mechanical properties for section thickness (t):

- Minimum Yield Strength (f_y):

Actual Thickness (mm)	Grade	Minimum Yield Strength (MPa)
$t \leq 2.5$	C350L0	350
$2.5 < t \leq 6$	C450L0	450
$t > 6$	C400L0	400

- Minimum Tensile Strength (f_u):

Actual Thickness (mm)	Grade	Minimum Tensile Strength (MPa)
$t \leq 2.5$	C350L0	400
$2.5 < t \leq 6$	C450L0	500
$t > 6$	C400L0	450

- Minimum Elongation in $5.65\sqrt{S_o}$:

Actual Thickness (mm)	Grade	Minimum Elongation
$t \leq 2.5$	C350L0	20%
$2.5 < t \leq 6$	C450L0	16%
$t > 6$	C400L0	16%

- L0 indicates that Profiles have Charpy V-notch impact properties at 0° as specified in TS100. Tables 10.4.1 of AS4100 Steel Structures permits L0 grades to have the following minimum permissible service temperatures:

Actual Thickness (mm)	Lowest One Day Mean Ambient Temperature (°C)
$t \leq 6$	-30
$6 < t \leq 10$	-20

See TS100 for further details.

Tolerances

Tolerances for Channels are compliant with ATM Technical Specification TS100.

Supply Conditions

DuraGal[Ultra®] Finish

Channels manufactured from in-line galvanizing cold-formed open sections that have the following coating thickness of zinc aluminium:

- Minimum (av) coating mass _____ 75 g/m²
- Designated as _____ AS/NZS 4791 ILG 75

End Finish (Mill Processing)

- Plain Ends only.

Standard Lengths

Standard lengths for Channels:

- See following Mass & Bundling Tables

Contact your Australian Tube Mills representative or refer to the ATM Profiles Product Availability Guide for further details.

Non-Standard Lengths

Special orders of non-standard pack lengths of Channels are available (conditions apply).

Minimum Length:

- All sizes _____ 5.0 m

Maximum Length:

- All sizes _____ 13.0 m

Notes:

1. Contact your Australian Tube Mills representative for lengths outside this range.
2. Lengths longer than the standard length may be restricted on some sizes and section shapes due to material handling issues in storage and transit. Check with your steel distributor(s) for more information.
3. Off-line cutting facilities are not available for Channels.

Thickness

Channels are available in 4.0 to 8.0 mm thickness. These thicknesses are identified by ends which are colour coded as specified in Table 8 of AS/NZS 4496.

General Description

Manufacturing Process

Channels are produced by cold-forming low carbon steel strip and coated in-line applying a hot-dip zinc aluminium coating. This product is intended for general engineering and structural uses.

Further Information

For further information refer to the following publications available from www.austubemills.com:

- ATM Technical Specification TS100 DuraGal[Ultra®] Profiles – Angles, Channels, and Flats
- Profiles Product Availability Guide for further details.

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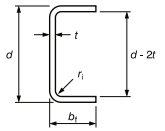
Profiles Channels – Dimensions & *Full* Section Properties

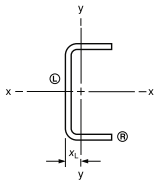
About principal x- and y-axes

Dimensions							Section Properties									
Designation			Mass per metre	Actual Thickness	Inside Corner Radius	Depth Between Flanges	Coord of Centroid	Full Area of Section	About x-axis				About y-axis				
d	b_f	Nominal Thickness		t	r_i	$d - 2t$	X_L	A_f	I_x	Z_x	S_x	r_x	I_y	Z_{yR}	Z_{yL}	S_y	r_y
mm	mm	mm	kg/m	mm	mm	mm	mm	mm^3	10^{6}mm^4	10^{3}mm^3	10^{3}mm^3	mm	10^{6}mm^4	10^{3}mm^3	10^{3}mm^3	10^{3}mm^3	mm
300 x 90 x		8.0 CC	28.5	8.0	8.0	284	20.3	3630	44.2	294	359	110	2.44	35.0	120	62.1	25.9
		6.0 CC	21.6	6.0	8.0	288	19.5	2750	34.0	227	275	111	1.89	26.8	96.6	47.1	26.2
250 x 90 x		6.0 CC	19.2	6.0	8.0	238	21.6	2450	21.9	176	210	94.6	1.79	26.2	83.3	46.4	27.1
230 x 75 x		6.0 CC	16.9	6.0	8.0	218	17.5	2150	15.7	137	166	85.5	1.05	18.2	59.8	32.2	22.0
200 x 75 x		6.0 CC	15.5	6.0	8.0	188	18.8	1970	11.2	112	135	75.5	1.00	17.9	53.4	31.8	22.6
		5.0 CC	12.4	4.7	4.0	191	18.1	1580	9.18	91.8	109	76.4	0.812	14.3	44.9	25.3	22.7
180 x 75 x		5.0 CC	11.6	4.7	4.0	171	19.1	1480	7.16	79.5	93.7	69.5	0.787	14.1	41.2	25.1	23.1
150 x 75 x		5.0 CC	10.5	4.7	4.0	141	20.9	1340	4.67	62.3	72.5	59.0	0.743	13.7	35.6	24.8	23.5
125 x 65 x		4.0 CC	7.23	3.8	4.0	117	18.3	921	2.25	36.1	41.8	49.5	0.388	8.32	21.2	15.1	20.5
100 x 50 x		4.0 CC	5.59	3.8	4.0	92.4	14.3	712	1.08	21.7	25.4	39.0	0.174	4.86	12.2	8.78	15.6
75 x 40 x		4.0 CC	4.25	3.8	4.0	67.4	12.1	541	0.457	12.2	14.4	29.1	0.0840	3.01	6.93	5.46	12.5

Notes:

1. Based on nominal thickness (t), Channels are supplied in the following steel grades (see Specifications of TS100 for further details):
   - C450L0 for 2.5 mm $< t \leq$ 6.0 mm
   - C400L0 for $t >$ 6.0 mm
   - C350L0 for $t \leq$ 2.5 mm
2. Full section properties are calculated in accordance with AS/NZS 4600.
3. For information on standard lengths for these products see following Mass & Bundling Tables.
4. Refer to either ATM Technical Specification TS100 and/or the Profiles Product Availability Guide for information on availability and further details.





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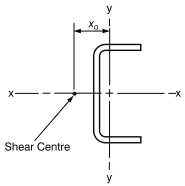
Profiles Channels – Section Properties for Member Stability

About principal x- and y-axes

Designation			Mass per m	Torsion Constant	Warping Constant	Coordinate of Shear Centre	Polar Radius of Gyration about the Shear Centre	Monosymmetry Section Constant
d	b_f	Nominal Thickness		*J*	I_w	x_o	r_{o1}	β_y
mm	mm	mm	kg/m	10^3mm^4	10^3mm^4	mm	mm	mm
300 x 90 x		8.0 CC	28.5	77.4	37.7	43.4	122	338
		6.0 CC	21.6	33.0	29.6	44.0	123	340
250 x 90 x		6.0 CC	19.2	29.4	19.2	47.8	110	273
230 x 75 x		6.0 CC	16.9	25.8	9.48	37.8	96.7	254
200 x 75 x		6.0 CC	15.5	223.7	6.78	40.2	89.0	217
		5.0 CC	12.4	11.6	5.52	40.6	89.7	218
180 x 75 x		5.0 CC	11.6	10.9	4.29	42.4	84.9	197
150 x 75 x		5.0 CC	10.5	9.87	2.77	45.4	78.3	171
125 x 65 x		4.0 CC	7.23	4.43	1.01	40.0	67.0	145
100 x 50 x		4.0 CC	5.59	3.43	0.285	30.1	51.8	113
75 x 40 x		4.0 CC	4.25	2.60	0.0760	24.4	40.1	85.9

Notes:

1. Based on nominal thickness (*t*), Channels are supplied in the following steel grades (see Specifications of TS100 for further details):
   - C450L0 for 2.5mm $< t \leq$ 6.0 mm
   - C400L0 for $t >$ 6.0 mm
   - C350L0 for $t \leq$ 2.5 mm
2. With the exception of *J*, properties are calculated assuming a simplified shape where the bends are eliminated and the section is represented by straight mid-lines in accordance with Clause 2.1.2.1 of AS/NZS 4600.
3. β_x is zero for channels.
4. Refer to either ATM Technical Specification TS100 and/or the Profiles Product Availability Guide for information on availability and further details.



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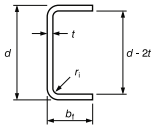
Profiles Channels – Mass & Bundling

Nominal Size		Nominal Thickness	Mass per Metre	Metres per Tonnes	No. of lengths per pack	Arrangement of Pack	Overall Bundle Dimensions	Total Metres per pack	Total Weight per Pack
mm	mm	mm	kg/m	m/t		Cols x Rows	W x H (mm)	m	tonnes
9.0 Metre Standard Lengths									
75	40	4.0	4.25	236	18	3 x 6	237 x 136	162	0.688
100	50	4.0	5.59	179	18	3 x 6	312 x 166	162	0.905
125	65	4.0	7.23	138	18	3 x 6	387 x 211	162	1.17
12.0 Metre Standard Lengths									
150	75	5.0	10.5	95.1	12	2 x 6	313 x 244	144	1.51
180	75	5.0	11.6	86.0	12	2 x 6	373 x 244	144	1.67
200	75	5.0	12.4	80.9	12	2 x 6	413 x 244	144	1.78
		6.0	15.5	64.6	12	2 x 6	420 x 247	144	2.23
230	75	6.0	16.9	59.2	12	2 x 6	480 x 247	144	2.43
250	90	6.0	19.2	52.0	8	2 x 4	520 x 194	96	1.85
300	90	6.0	21.6	46.3	6	1 x 6	314 x 292	72	1.56
		8.0	28.5	35.1	6	1 x 6	316 x 298	72	2.05

Notes:

1. Refer to either ATM Technical Specification TS100 and/or the Profiles Product Availability Guide for information on availability and further details.



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Profiles Flats – Specifications

Technical Specifications

Australian Standards

Flats are manufactured and tested to comply with the requirements of the following specifications:

- ATM Technical Specification TS100 DuraGal[Ultra®] Profiles – Angles, Channels and Flats.
- AS/NZS 4791 – Hot-dipped (zinc) coatings on ferrous hollow sections, applied by an in-line process

and various other Australian and national Standards listed in TS100.

ATM Specification TS100 is available from www.austubemills.com

Mechanical Properties

Flats have the following mechanical properties for section thickness (t):

- Minimum Yield Strength (f_y):

Actual Thickness (mm)	Grade	Minimum Yield Strength (MPa)
$t \leq 6$	C400L0	400
$t > 6$	C350L0	350

- Minimum Tensile Strength (f_u):

Actual Thickness (mm)	Grade	Minimum Tensile Strength (MPa)
$t \leq 6$	C400L0	450
$t > 6$	C350L0	400

- Minimum Elongation in $5.65\sqrt{S_o}$:

Actual Thickness (mm)	Grade	Minimum Elongation
$t \leq 6$	C400L0	20%
$t > 6$	C350L0	20%

- L0 indicates that Profiles have Charpy V-notch impact properties at 0° as specified in TS100. Tables 10.4.1 of AS4100 Steel Structures permits L0 grades to have the following minimum permissible service temperatures:

Actual Thickness (mm)	Lowest One Day Mean Ambient Temperature (°C)
$t \leq 6$	-30
$6 < t \leq 10$	-20

See TS100 for further details.

Tolerances

Tolerances for Flats are compliant with ATM Technical Specification TS100.

Supply Conditions

DuraGal[Ultra®] Finish

Flats are manufactured from in-line galvanizing cold-formed open sections that have the following coating thickness of zinc aluminium:

- Minimum (av) coating mass _____ 75 g/m²
- Designated as _____ AS/NZS 4791 ILG 75

End Finish (Mill Processing)

- Plain Ends only.

Standard Lengths

Standard lengths for Flats:

- See following Mass & Bundling Tables

Contact your Australian Tube Mills representative or refer to the ATM Profiles Product Availability Guide for further details.

Non-Standard Lengths

Special orders of non-standard pack lengths of Flats are available (conditions apply).

Minimum Length:

- All sizes _____ 5.8 m

Maximum Length:

- All sizes, 4 & 5 mm thick _____ 6.2 m
- All sizes, 6 & 8 mm thick _____ 6.5 m

Notes:

1. Contact your Australian Tube Mills representative for lengths outside this range.
2. Lengths longer than the standard length may be restricted on some sizes and section shapes due to material handling issues in storage and transit. Check with your steel distributor(s) for more information.
3. Off-line cutting facilities are not available for Flats.

Thickness

Flats are available in 4.0 to 8.0 mm thickness. These thicknesses are identified by ends which are colour coded as specified in Table 8 of AS/NZS 4496.

General Description

Manufacturing Process

Flats are produced by cold-forming low carbon steel strip and coated in-line applying a hot-dip zinc aluminium coating. This product is intended for general engineering and structural uses.

Further Information

For further information refer to the following publications available from www.austubemills.com:

- ATM Technical Specification TS100 Profiles – Angles, Channels, and Flats
- Profiles Product Availability Guide for further details.

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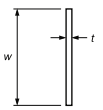
Profiles Flats – Dimensions & *Full* Section Properties

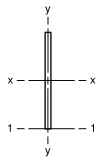
About principal x- and y-axes and baseline axis

Dimensions				Grade	Section Properties										
Designation		Mass per metre	Actual Thickness	Yield Stress	Full Area of Section	About 1-axis	About x-axis				About y-axis				Torsion Constant
Width w	Nominal Thickness		t	f_y	A_f	I_1	I_x	z_x	S_x	r_x	I_y	z_y	S_y	r_y	J
mm	mm	kg/m	mm	MPa	mm^2	10^6mm^4	10^6mm^4	10^3mm^3	10^3mm^3	10^6mm^4	10^3mm^3	10^3mm^3	10^3mm^3	mm	10^6mm^4
300 x	8.0 CF	18.8	8.0	350	2400	72.0	18.0	120	180	86.6	0.0128	3.20	4.80	2.31	51.2
	5.0 CF	11.1	4.7	400	1410	42.3	10.6	70.5	106	86.6	0.00260	1.10	1.66	1.36	10.4
250 x	8.0 CF	15.7	8.0	350	2000	41.7	10.4	83.3	125	72.2	0.0107	2.67	4.00	2.31	42.7
	5.0 CF	9.22	4.7	400	1180	24.5	6.12	49.0	73.4	72.2	0.00216	0.920	1.38	1.36	8.65
200 x	8.0 CF	12.6	8.0	350	1600	21.3	5.33	53.3	80.0	57.7	0.00853	2.13	3.20	2.31	34.1
	6.0 CF	9.42	6.0	400	1200	16.0	4.00	40.0	60.0	57.7	0.00360	1.20	1.80	1.73	14.4
	5.0 CF	7.38	4.7	400	940	12.5	3.13	31.3	47.0	57.7	0.00173	0.736	1.10	1.36	6.92
150 x	8.0 CF	9.42	8.0	350	1200	9.00	2.25	30.0	45.0	43.3	0.00640	1.60	2.40	2.31	25.6
	6.0 CF	7.07	6.0	400	900	6.75	1.69	22.5	33.8	43.3	0.00270	0.900	1.35	1.73	10.8
	5.0 CF	5.53	4.7	400	705	5.29	1.32	17.6	26.4	43.3	0.00130	0.552	0.828	1.36	5.19
130 x	5.0 CF	4.80	4.7	400	611	3.44	0.860	13.2	19.9	37.5	0.00112	0.479	0.718	1.36	4.50
100 x	8.0 CF	6.28	8.0	350	800	2.67	0.667	13.3	20.0	28.9	0.00427	1.07	1.60	2.31	17.1
	6.0 CF	4.71	6.0	400	600	2.00	0.500	10.0	15.0	28.9	0.00180	0.600	0.900	1.73	7.20
	5.0 CF	3.69	4.7	400	470	1.57	0.392	7.83	11.8	28.9	0.000865	0.368	0.552	1.36	3.46
	4.0 CF	2.98	3.8	400	380	1.27	0.317	6.33	9.50	28.9	0.000457	0.241	0.361	1.10	1.83
90 x	6.0 CF	4.24	6.0	400	540	1.46	0.365	8.10	12.2	26.0	0.00162	0.540	0.810	1.73	6.48
75 x	5.0 CF	2.77	4.7	400	353	0.661	0.165	4.41	6.61	21.7	0.000649	0.276	0.414	1.36	2.60
	4.0 CF	2.24	3.8	400	285	0.534	0.134	3.56	5.34	21.7	0.000343	0.181	0.271	1.10	1.37
65 x	5.0 CF	2.40	4.7	400	306	0.430	0.108	3.31	4.96	18.8	0.000562	0.239	0.359	1.36	2.25
	4.0 CF	1.94	3.8	400	247	0.348	0.0870	2.68	4.01	18.8	0.000297	0.156	0.235	1.10	1.19
50 x	5.0 CF	1.84	4.7	400	235	0.196	0.0490	1.96	2.94	14.4	0.000433	0.184	0.276	1.36	1.73
	4.0 CF	1.49	3.8	400	190	0.158	0.0396	1.58	2.38	14.4	0.000229	0.120	0.181	1.10	0.915

Notes:

1. Based on nominal thickness (t), Flats are supplied in the following steel grades (see Specifications of TS100 for further details):
   - C400L0 for $t \leq 6.0$ mm
   - C350L0 for $t > 6.0$ mm
2. Full section properties are calculated in accordance with AS/NZS 4600.
3. For information on standard lengths for these products see following Mass & Bundling Tables.
4. Refer to either ATM Technical Specification TS100 and/or the Profiles Product Availability Guide for information on availability and further details.





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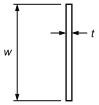
Profiles Flats – Mass & Bundling

Nominal Size mm	Nominal Thickness mm	Mass per Metre kg/m	Metres per Tonne m/t	No. of Lengths per Pack	Arrangement of Pack Cols x Rows	Overall Bundle Dimensions W x H (mm)	Total Metres per Pack m	Total Weight per Pack tonnes
6.0 Metre Standard Lengths								
50	4.0 5.0	1.49 1.84	670 542	57 45	3 x 19 3 x 15	150 x 76 150 x 75	342 270	0.510 0.498
65	4.0 5.0	1.94 2.40	516 417	44 36	2 x 22 2 x 18	130 x 88 130 x 90	264 216	0.512 0.518
75	4.0 5.0	2.24 2.77	447 361	38 32	2 x 19 2 x 16	150 x 76 150 x 80	228 192	0.510 0.530
90	6.0	4.24	236	26	2 x 13	180 x 78	156	0.661
100	4.0 5.0 6.0 8.0	2.98 3.69 4.71 6.28	335 271 212 159	28 28 26 22	2 x 14 2 x 14 2 x 13 2 x 11	200 x 56 200 x 70 200 x 78 200 x 88	168 168 156 132	0.501 0.620 0.735 0.829
130	5.0	4.80	208	28	2 x 14	260 x 70	168	0.806
150	5.0 6.0 8.0	5.53 7.07 9.42	181 142 106	28 24 22	2 x 14 2 x 12 2 x 11	300 x 70 300 x 72 300 x 88	168 144 132	0.930 1.02 1.24
200	5.0 6.0 8.0	7.38 9.42 12.6	136 106 79.6	32 28 22	2 x 16 2 x 14 2 x 11	400 x 80 400 x 84 400 x 88	192 168 132	1.42 1.58 1.66
250	5.0 8.0	9.22 15.7	108 63.7	23 16	1 x 23 1 x 16	250 x 115 250 x 128	138 96	1.27 1.51
300	5.0 8.0	11.1 18.8	90.3 53.1	19 12	1 x 19 1 x 12	300 x 95 300 x 96	114 72	1.26 1.36

Notes:

1. Refer to either ATM Technical Specification TS100 and/or the Profiles Product Availability Guide for information on availability and further details.



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Lintel – Lintels for Masonry Construction – Specifications

Technical Specifications

Australian Standards

Lintels – Lintels for Masonry Construction are manufactured and tested to comply with the requirements of the following specifications:

- ATM Technical Specification TS100 Profiles – Angles, Channels and Flats.
- AS/NZS 4791 – Hot-dipped (zinc) coatings on ferrous hollow sections, applied by an in-line process

and various other Australian and national Standards listed in TS100.

ATM Specification TS100 is available from www.austubemills.com

Mechanical Properties

Lintel products have the following mechanical properties for section thickness (t):

- Minimum Yield Strength (f_y):

Actual Thickness (mm)	Grade	Minimum Yield Strength (MPa)
$t = 6$	C450L0	450
$t = 8$	C400L0	400

- Minimum Tensile Strength (f_u):

Actual Thickness (mm)	Grade	Minimum Tensile Strength (MPa)
$t = 6$	C450L0	500
$t = 8$	C400L0	450

- Minimum Elongation in $5.65\sqrt{S_o}$:

Actual Thickness (mm)	Grade	Minimum Elongation
$t = 6$	C450L0	16%
$t = 8$	C400L0	16%

- L0 indicates that Profiles have Charpy V-notch impact properties at 0° as specified in TS100. Tables 10.4.1 of AS4100 Steel Structures permits L0 grades to have the following minimum permissible service temperatures:

Actual Thickness (mm)	Lowest One Day Mean Ambient Temperature (°C)
$t \leq 6$	-30
$6 < t \leq 10$	-20

See TS100 for further details.

Tolerances

Tolerances for Lintel products are compliant with ATM Technical Specification TS100.

Supply Conditions

DuraGal[Ultra®] Finish

Lintel products are manufactured from in-line galvanizing cold-formed open sections that have the following coating thickness of zinc aluminium:

- Minimum (av) coating mass _____ 250 g/m²
- Designated as _____ AS/NZS 4791 ILG 250

End Finish (Mill Processing)

- Plain Ends only.

Standard Lengths

Standard lengths for Lintel products:

- See following Mass & Bundling Tables

Contact your Australian Tube Mills representative or refer to the ATM Profiles Product Availability Guide for further details.

Non-Standard Lengths

Special orders of non-standard pack lengths of Lintel products are available (conditions apply).

Minimum Length:

- All sizes _____ 5.0 m

Maximum Length:

- All sizes _____ 13.0 m

Notes:

1. Contact your Australian Tube Mills representative for lengths outside this range.
2. Lengths longer than the standard length may be restricted on some sizes and section shapes due to material handling issues in storage and transit. Check with your steel distributor(s) for more information.
3. Off-line cutting facilities are not available for Lintel products.

Thickness

Lintel products are available in 6.0 and 8.0 mm thickness. These thicknesses are identified by ends which are colour coded as specified in Table 8 of AS/NZS 4496.

General Description

Manufacturing Process

Lintel products are produced by low carbon steel strip and coated in-line applying a hot-dip zinc aluminium coating. This product is intended for general engineering and structural uses as well as for lintels in masonry construction.

Further Information

For further information refer to the following publications available from www.austubemills.com:

- ATM Technical Specification TS100 Profiles – Angles, Channels, and Flats
- Profiles Product Availability Guide for further details.

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Lintel – Product Range

Lintel product designation			Base DuraGal[Ultra®] product
d	*b*	*t*	
mm			
100 x	100 x	6.0	See 100 x 100 x 6.0 CA for further information
		8.0	See 100 x 100 x 8.0 CA for further information
150 x	100 x	6.0	See 150 x 100 x 6.0 CA for further information
		8.0	See 150 x 100 x 8.0 CA for further information

For the above Lintel Products, further information on –

- **Dimensions & *Full* Section Properties**
- **Section Properties for Member Stability**
- **Mass & Bundling**

can be found in the Profiles, Angles part of the Product Manual

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Part 5 – Steel Grades – Contents

Notes:

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Product availability & other information – As the section, grade and finish of all products are subject to continuous improvement, reference should be made to the ATM *PRODUCT AVAILABILITY GUIDE* (PAG) for information on the availability of listed sections and associated finishes. The PAG is found at: www.austubemills.com.

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Grade C250L0

Australian Tube Mills (ATM) Grade C250L0 steels are fully compliant with AS/NZS 1163 and can be readily processed to Australian/New Zealand Standards and/or industry practice for:

- General, mechanical, piping and structural fabrication
- Rolling/bending member lengths
- Welding
- Galvanizing
- Surface preparation for top coats
- End Processing (Screwed, Roll Grooved, Swaged)

Due to the reduced level of cold-working, C250L0 steel grade is available in the following ATM circular tube products:

- CHS
- Pipe (also complies with AS 1074)
- Other sections based on enquiry.

ATM Grade C250L0 steel products are rated to meet AS/NZS 1163 steel quality and Charpy V-Notch impact test requirements at the test temperature of 0°C (i.e. L0). This property is important for use in lower temperatures and also critical for non-brittle behaviour of tubular products subject to dynamic loads – particularly for thicker sections and welded connections.

The "lower" strength properties (compared to our other available grades), higher ductility and ability to satisfy the above performance criteria of Grade C250L0 is achieved by the following material characteristics as required by AS/NZS 1163.

Specifications and Standards

Minimum Yield Strength:

- 250 MPa (a measure of how strong the tube is – see Table 1).

Standard designation:

- AS/NZS 1163 – C250L0.

Steelmaking process:

- Basic oxygen, Fully Killed, Continuously Cast, Fine Grained practice.

Steel Feed manufacturing process:

- Coil from Hot Strip Mill.

Product manufacture:

- Cold-forming and high frequency Electric Resistance Welding (ERW) of steel strip. The cold-forming process enhances the strength, hardness and surface finish of the manufactured product.

Chemical composition:

- See Table 2 which applies to steelmake cast analysis and finished product analysis.

Carbon Equivalence (CE):

- 0.25 – see Table 2 for details.

Welding Code Steel Type:

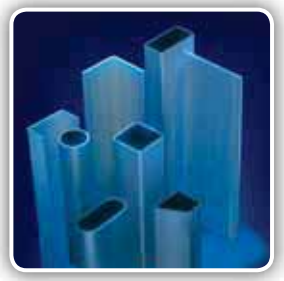
- Type 2 (from Table 4.6.1(B) of AS/NZS 1554.1 and AS/NZS 1554.5).

Mechanical properties:

- See Table 1 for tensile test and below for impact test requirements. For cold-flattening tests, AS/NZS 1163 requires deformation to 75% or less of initial tube depth.

Impact Properties:

- For nominal wall thickness (t) greater than or equal to 6 mm – satisfies Clause 10.6.2.1 of AS/NZS 1163 at the test temperature of 0°C (i.e L0) for L0 compliance.
- For nominal wall thickness (t) less than 6 mm – satisfies Clause 10.6.2.2(b) of AS/NZS 1163 for L0 compliance.



1 Section
2 C250L0
3 Finish

Table 1: C250L0 Tensile test requirements to AS/NZS 1163

Grade	Minimum yield strength	Minimum tensile strength	Minimum elongation as a proportion of the gauge length $5.65\sqrt{S_o}$ %					
			Circular Hollow Sections d_o/t (See Note 1)			Rectangular Hollow Sections b/t, d/t (See Note 2)		
	MPa	MPa	≤ 15	> 15 & ≤ 30	>30	≤ 15	> 15 & ≤ 30	>30
C250L0	250	320	18	20	22	14	16	18

Table 1 Notes:
(1) AS/NZS 1163 – Grade C250L0 is generally supplied as CHS
(2) These limits apply to the face from which the tensile test is taken.

Table 2: C250L0 Chemical composition requirements to AS/NZS 1163

Grade	Chemical composition % max. (see Note 1)										
	C	Si	Mn	P	S	Cr	Mo	Al	Ti	MAE	CE
C250L0	0.12	0.05	0.50	0.03	0.03	0.15	0.10	0.10 (see Note 2)	0.04	0.03 (See Note 3)	0.25 (See Note 4)

Table 2 Notes:
(1) The following elements may be present to the limits stated in the brackets: Cu (0.25%), Ni (0.25%)
(2) The limit specified are for soluble and total aluminium.
(3) MAE = Micro-alloying elements which applies to Nb and V only.
(4) $CE = C + \frac{Mn}{6} + \frac{Cr + Mo + V}{5} + \frac{Ni + Cu}{15}$

Notes:

1. For Grade C250L0 product availability refer to the ATM Product Availability Guide (PAG). The PAG can be found at www.austubemills.com.

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Grade C350L0

Australian Tube Mills (ATM) Grade C350L0 steels are fully compliant with AS/NZS 1163 and can be readily processed to Australian/New Zealand Standards and/or industry practice for:

- General, mechanical, piping and structural fabrication
- Rolling/bending member lengths
- Welding
- Galvanizing
- Surface preparation for top coats
- End Processing (Screwed, Roll Grooved, Swaged) – for CHS.

Due to the refined chemistry and higher level of working during the coil and tube manufacturing process, C350L0 steel grade is available in the following ATM tubular products:

- CHS
- RHS
- SHS
- Other sections based on enquiry.

ATM Grade C350L0 steel products are rated to meet AS/NZS 1163 steel quality and Charpy V-Notch impact test requirements at the test temperature of 0°C (i.e. L0). This property is important for use in lower temperatures and also critical for non-brittle behaviour of tubular products subject to dynamic loads – particularly for thicker sections and welded connections.

The mid-to-higher strength properties, ductility and ability to satisfy the above performance criteria of Grade C350L0 is achieved by the following material characteristics as required by AS/NZS 1163.

Specifications and Standards

Minimum Yield Strength:

- 350 MPa (a measure of how strong the tube is – see Table 1).

Standard designation:

- AS/NZS 1163 – C350L0.

Steelmaking process:

- Basic Oxygen, Fully Killed, Continuously Cast, Fine Grained practice.

Steel Feed manufacturing process:

- Coil from Hot Strip Mill.

Product manufacture:

- Cold-forming and high frequency Electric Resistance Welding (ERW) of steel strip. The cold-forming process enhances the strength, hardness and surface finish of the manufactured product.

Chemical composition:

- See Table 2 which applies to steelmake cast analysis and finished product analysis.

Carbon Equivalence (CE):

- 0.43 – see Table 2 for details.

Welding Code Steel Type:

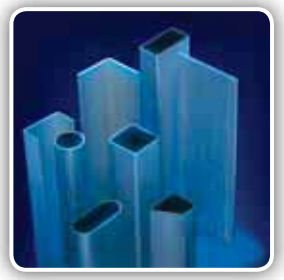
- Type 5 (from Table 4.6.1(B) of AS/NZS 1554.1 and AS/NZS 1554.5).

Mechanical properties:

- See Table 1 for tensile test and below for impact test requirements. For cold-flattening tests, AS/NZS 1163 requires deformation to 75% or less of initial tube depth.

Impact Properties:

- For nominal wall thickness (t) greater than or equal to 6 mm – satisfies Clause 10.6.2.1 of AS/NZS 1163 at the test temperature of 0°C (i.e L0) for L0 compliance.
- For nominal wall thickness (t) less than 6 mm – satisfies Clause 10.6.2.2 (b) of AS/NZS 1163 for L0 compliance.



1 Section
2 C350L0
3 Finish

Notes:

1. For Grade C350L0 product availability refer to the ATM Product Availability Guide (PAG). The PAG can be found at www.austubemills.com

Table 1: C350L0 Tensile test requirements to AS/NZS 1163

Grade	Minimum yield strength MPa	Minimum tensile strength MPa	Minimum elongation as a proportion of the gauge length $5.65\sqrt{S_o}$ %					
			Circular Hollow Sections (CHS) d_o/t			Non-CHS b/t, d/t (See Note 1 & 2)		
			≤ 15	> 15 & ≤ 30	> 30	≤ 15	> 15 & ≤ 30	> 30
C350L0	350	430	16	18	20	12	14	16

Table 1 Notes:
(1) Non-CHS refers to non-circular flat sided sections
(2) These limits apply to the face from which the tensile test is taken.

Table 2: C350L0 Chemical composition requirements to AS/NZS 1163

Grade	Chemical composition % max. (see Note 1)									
	C	Si	Mn	P	S	Mo	Al	Ti	MAE	CE
C350L0	0.20	0.45	1.60	0.03	0.03	0.10	0.10 (see Note 2)	0.04	0.15 (See Note 3)	0.43 (See Note 4)

Table 2 Notes:
(1) The following elements may be present to the limits stated in brackets: Cu (0.25%), Ni (0.25%)
(2) The limits specified are for soluble and total aluminium.
(3) MAE = Micro-alloying elements which applies to Nb, V and Ti only with V ≤ 0.10%.
(4) $CE = C + \frac{Mn}{6} + \frac{Cr + Mo + V}{5} + \frac{Ni + Cu}{15}$

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Grade C450PLUS®

Australian Tube Mills' (ATM) C450PLUS steels are fully compliant with AS/NZS 1163 and can be readily processed to Australian/New Zealand Standards and/or industry practice for:

- General, mechanical and structural fabrication
- Rolling/bending member lengths
- Welding
- Galvanizing
- Surface preparation for top coats

C450PLUS products comply with the requirements of two AS/NZS 1163 steel grades – Grades C350L0 for tensile test elongation requirements and C450L0 for strength requirements.

Due to the refined chemistry and higher level of working during the coil and tube manufacturing process, C450PLUS steels are available in the following ATM tubular products:

- RHS
- SHS
- Silo Sections
- Other sections based on enquiry.

ATM C450PLUS steel products are rated to meet AS/NZS 1163 steel quality and Charpy V-Notch impact test requirements at the test temperature of 0°C (i.e. L0).

This property is important for use in lower temperatures and also critical for non-brittle behaviour of higher strength products subject to dynamic loads – particularly for thicker sections and welded connections.

The higher strength properties, ductility and ability to satisfy the above performance criteria of C450PLUS is achieved by the following material characteristics as required by AS/NZS 1163.

Specifications and Standards

Minimum Yield Strength:

- 450 MPa (a measure of how strong the tube is – see Table 1).

Standard designation:

- AS/NZS 1163 – C450L0.
  Alternatively, if acceptable to the specifier/purchaser, the designation C450PLUS may be used.

Steelmaking process:

- Basic Oxygen, Fully Killed, Continuously Cast, Fine Grained practice.

Steel Feed manufacturing process:

- Coil from Hot Strip Mill.

Product manufacture:

- Cold-forming and high frequency Electric Resistance Welding (ERW) of steel strip. The cold-forming process enhances the strength, hardness and surface finish of the manufactured product.

Chemical composition:

- See Table 2 which applies to steelmake cast analysis and finished product analysis.

Carbon Equivalence (CE):

- 0.43 – see Table 2 for details. (Note: this is the same limit as for C350L0 products).

Welding Code Steel Type:

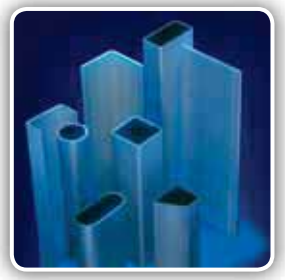
- Type 7B (from Table 4.6.1(B) of AS/NZS 1554.1 and AS/NZS 1554.5).

Mechanical properties:

- See Table 1 for tensile test and below for impact test requirements. For cold-flattening tests, AS/NZS 1163 requires deformation to 75% or less of initial tube depth.

Impact Properties:

- For nominal wall thickness (t) greater than or equal to 6 mm – satisfies Clause 10.6.2.1 of AS/NZS 1163 at the test temperature of 0°C (i.e L0) for L0 compliance.
- For nominal wall thickness (t) less than 6 mm – satisfies Clause 10.6.2.2 (b) of AS/NZS 1163 for L0 compliance.



1 Section
2 C450PLUS®
3 Finish

Table 1: C450PLUS Tensile test requirements to AS/NZS 1163

Grade	Minimum yield strength	Minimum tensile strength	Minimum elongation as a proportion of the gauge length $5.65\sqrt{S_o}$ %					
			Circular Hollow Sections (CHS) d_o/t (See Note 1)			Non-CHS b/t, d/t (See Note 2 & 3)		
	MPa	MPa	≤ 15	> 15 & ≤ 30	>30	≤ 15	> 15 & ≤ 30	>30
C450PLUS	450	500	16	18	20	12	14	16

Table 1 Notes:
(1) C450PLUS is generally supplied as Non-CHS.
(2) Non-CHS refers to non-circular flat-sided sections (e.g Silo Section).
(3) These limits apply to the face from which the tensile test is taken.

Table 2: C450PLUS Chemical composition requirements to AS/NZS 1163

Grade	Chemical composition % max. (see Note 1)									
	C	Si	Mn	P	S	Mo	Al	Ti	MAE	CE
C450PLUS	0.20	0.45	1.60	0.03	0.03	0.10	0.10 (see Note 2)	0.04	0.15 (See Note 3)	0.43 (See Note 4)

Table 2 Notes:
(1) The following elements may be present to the limits stated in brackets: Cu (0.25%), Ni (0.25%)
(2) The limits specified are for soluble and total aluminium.
(3) MAE = Micro-alloying elements which applies to Nb, V and Ti only with V ≤ 0.10%.
(4) $CE = C + \frac{Mn}{6} + \frac{Cr + Mo + V}{5} + \frac{Ni + Cu}{15}$

Notes:

1. For C450PLUS product availability refer to the ATM Product Availability Guide (PAG). The PAG can be found at www.austubemills.com.

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TS100 DuraGal[Ultra®] Profile Grades – C350L0/ C400L0/ C450L0

Australian Tube Mills (ATM) DuraGal[Ultra®] Profile Grades C350L0/C400L0 and C450L0 (i.e. "TS100") are fully compliant with:

- ATM Technical Specification TS100 DuraGal[Ultra®] Profiles – Angles, Channels, and Flats

and can be readily processed to Australian/New Zealand Standards and/or industry practice for:

- General, mechanical and structural fabrications
- Rolling/ bending member lengths
- Welding
- Surface preparation for top coats.

Due to the refined chemistry and higher level of working during the coil and profile manufacturing process, TS100 steel grades are available in the following ATM DuraGal[Ultra®] Profile range:

- Equal Angles
- Unequal Angles
- Channels
- Flats
- Lintels for Masonry Construction

ATM TS100 steel products are rated to meet Charpy V-Notch impact test requirements at the test temperature of 0°C (i.e. L0) as a minimum.

The higher strength properties, ductility and ability to satisfy the above performance criteria of TS100 grades is achieved by the following material characteristics.

Specifications and Standards

Minimum Yield Strength (a measure of how strong the steel is – see Table 1):

- 350 MPa for C350L0
- 400 MPa for C400L0
- 450 MPa for C450L0

Steelmaking process:

- Basic Oxygen, Fully Killed, Continuously Cast, Fine Grained practice.

Steel Feed manufacturing process:

- Coil from Hot Strip Mill.

Product manufacture:

- Cold-forming and in-line hot-dip galvanizing of low carbon steel strip. Both the cold-forming and the patented in-line galvanizing process enhances the strength, hardness, and surface finish of the manufactured product.

Chemical composition:

- See Table 2.

Carbon Equivalence (CE):

- See Table 2.

Welding Code Steel Type (according to Table 4.6.1(B) of AS/NZS 1554.1 and Table 4.5.1(B) of AS/NZS 1554.5)–

- Grade C350L0: Type 5
- Grade C400L0: Type 7B
- Grade C450L0: Type 7B

Mechanical Properties:

- See Table 1 for tensile test and below for Impact test requirements.

Impact Properties:

- L0 guaranteed Impact Properties at 0°C to AS/NZS 1163.

  L0 indicates that Profiles have Charpy V-notch impact properties as specified in TS100. Table 10.4.1 of AS 4100 Steel Structures permits L0 grades to have the following minimum permissible service temperatures:

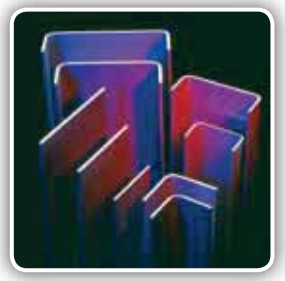

Table 1: TS100 Tensile test requirements

Grade	Minimum yield strength MPa	Minimum tensile strength MPa	Minimum elongation as a proportion of the gauge length $5.65\sqrt{S_o}$ %
C350L0	350	400	20
C400L0	400	450	16
C450L0	450	500	16

Actual Thickness (mm)	Lowest One Day Mean Ambient Temperature (°C)
$t \leq 6$	-30
$6 < t \leq 10$	-20

Table 2: TS100 Chemical composition requirements

Grade	Chemical composition % max.						
	C	Si	Mn	P	S	Al	CE
C350L0/ C400L0/ C450L0	0.20	0.05	1.60	0.04	0.03	0.10	0.39 (See Note 1)

Table 2 Notes: (1) $CE = C + \frac{Mn}{6} + \frac{Cr + Mo + V}{5} + \frac{Ni + Cu}{15}$

This value is used in AS/NZS 1554.1 Welding and Steel Structures, to determine the welding pre-heat required. Steel with CE less than 0.39 in general, do not require pre-heat.

Notes:

1. For further information on TS100 grades refer to the following publications available from www.austubemills.com:
   - OneSteel Technical Specification TS100 DuraGal[Ultra®] Profiles – Angles, Channels and Flats
   - DuraGal[Ultra®] Profiles Product Availability Guide for further details.

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Part 6 – Mill Coatings – Contents

Notes:

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Product availability & other information – As the section, grade and finish of all products are subject to continuous improvement, reference should be made to the ATM *PRODUCT AVAILABILITY GUIDE* (PAG) for information on the availability of listed sections and associated finishes. The PAG is found at: www.austubemills.com.

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Coating Types

General Description

Australian Tube Mills (ATM) product range is available in a variety of coating options to suit your needs. Coatings range from high protection hot-dipped galvanized finish to an uncoated finish.

ATM coating options include:

- NOPC (No Oil, Paint or Coating)
- Oil Coatings
- DuraPrimed
- Hot-Dip Galvanized Coatings

NOPC (No Oil, Paint or Coating)

NOPC products are manufactured with no additional surface treatment including no end colour code. These products are generally used in further processing or fabrication where surface coating may interfere with subsequent processes. It should be noted that products with this finish will be subject to the formation of immediate light surface oxidation (rust).

Oil Coatings

ATM oil coatings are intended for application where surface preparation is not required and where the coating must be easily removed.

Finish	Description	Features
LiteOil	Light (diluted with solvents) protective mineral based oil coating	• Temporary rust protection for dry storage • Easily removed for further processing
Oil	Protective mineral based oil coating	• Temporary rust protection for dry storage • Easily removed for further processing

DuraPrimed

ATM DuraPrimed is the result of years of research and development to obtain the perfect balance of adhesion for top coating applications while remaining strippable for additional hot-dip galvanizing and powder coating surface treatments.

The primary purpose of this coating is to protect the steel during internal storage and handling through warehousing and distribution.

The description and features of DuraPrimed are noted in Table 1.

Hot-Dip Galvanized Coatings

ATM pioneered the introduction of in-line and pre-galvanized hot-dip galvanized coatings in the Australian and New Zealand markets and are the registered owners of the DuraGal® and DuraGal^{Plus} brands.

Hot-dipped galvanized coatings are metallurgically bonded to the steel by passing a prepared steel surface through molten zinc. The metallurgical bond is critical for the adherence of the zinc coating during further processing as well as ensuring unobstructed sacrificial protection. Typically in-line and pre-galvanized coatings will be used in various forms of structural fabrication from benign to mild and moderate corrosion environments and can be readily used in sheltered (internal) environments.

They are also suitable with top coats for more aggressive environments. AS/NZS 2312 should be consulted for the appropriate use of galvanized coatings referencing the AS/NZS 4792 designation for each coating option.

ATM coating options include:

- In-line hot-dip galvanized
- Pre-galvanized
- Hot-dip galvanized using specialised process

The description and features of these coatings are noted in Table 2.

Table 1: Description and Features of ATM DuraPrimed coatings

Finish	Description	Features	Coating Thickness	Available Colours
DuraPrimed (DP)	Smooth general purpose paint applied in-line by a fully automated process to the external surface.	• Temporary rust protection for dry storage • Reduced surface preparation prior to fabrication and further processing • Strippable for powder coating and hot-dip galvanzing • Easily marked up for welding • Weld spatter is easily wiped off • Does not need to be ground before welding.	Coating thickness ranges from 6 to 20 microns dry film thickness.	DuraPrimed^{Red} DuraPrimed^{Blue} Clear

Table 2: Description and features of ATM Hot-Dip Galvanized (HDG) Coatings

	Process	Description	Features	Coating Weight	Designation / Standards	Additional Treatment
DuraGal®	In-line hot-dip galvanizing process	DuraGal® products are coated on the external surface using an in-line HDG process over a prepared metal surface to produce a fully intermetallic bonded coating.	• Intermetallic bonded HDG coating • Uniform, smooth external galvanized surface • Less weld fume compared with thicker HDG coatings • Suitable for top coating • Suitable for powder coating • Does not need to be ground before welding • Easily formed	Minimum average coating mass of 100g/m^2	ILG100 in accordance with AS/NZ 4792: Hot-dip galvanized (zinc) coatings on ferrous hollow sections, applied by a continuous or specialised process	Si-Tek® – surface passivation treatment (See Note below)
DuraGal^{Plus}	Pre-galvanized (manufactured using continuous hot-dip galvanizing process)	DuraGal^{Plus} and PreGal products are coated on the external and internal surface by utilising pre-galvanized HDG strip. The pre-galvanized strip is coated on a prepared metal surface to produce a fully intermetallic bonded coating.	• Made from HDG steel strip with intermetallic bonded coating • Internal and external coating • Has a smooth even finish compared with thicker HDG coatings • Less weld fume compared with thicker HDG coatings • Suitable for top coating • Suitable for powder coating • Does not need to be ground before welding • Easily formed	Minimum average coating mass of 100g/m^2	ZB100/100 in accordance with AS/NZ 4792: Hot-dip galvanized (zinc) coatings on ferrous hollow sections, applied by a continuous or specialiased process	Protective Coating – surface passivation treatment (See Note below)
Gal 140	Pre-galvanized (manufactured using continuous hot-dip galvanizing process)	GAL140 products are coated on the external and internal surface by utilising pre-galvanized HDG strip. The pre-galvanized strip is coated on a prepared metal surface to produce a fully intermetallic bonded coating.	• 40% more zinc than DuraGal® and DuraGal^{Plus} coatings • Made from HDG steel strip with intermetallic bonded coating • Internal and external coating • Has a smooth even finish compared with thicker HDG coatings • Less weld fume compared with thicker HDG coatings • Suitable for top coating • Suitable for powder coating • Does not need to be ground before welding • Easily formed	Minimum average coating mass of 140g/m^2	ZB135/135 in accordance with AS/NZ 4792: Hot-dip galvanized (zinc) coatings on ferrous hollow sections, applied by a continuous or specialised process	Si-Tek® – surface passivation treatment (See Note below)
HotDipGal	Semi-Automatic hot-dip galvanizing using specialised process	HDG products are coated on the external and internal surface by utilising a specialised hot-dip galvanizing process resulting in a higher coating thickness than inline processes. The galvanizing process is conducted after manufacture following preparation of the metal surface to produce a fully intermetallic bonded coating.	• 3 times more zinc than DuraGal® and DuraGal^{Plus} coatings • Internal and external coating • Longer lasting protection • Only available in CHS/Pipe • Suitable for a wide range of specific pipe-related applications	Minimum average coating mass of 300g/m^2	HDG300 in accordance with AS/NZ 4792: Hot-dip galvanized (zinc) coatings on ferrous hollow sections, applied by a continuous or specialised process	Surface passivation treatment with Polymer Coating

Si-Tek® Passivation Treatment: Si-Tek® is a non-hazardous galvanized steel passivation treatment which adheres to the surface of the zinc via a chemical bond. Unlike oil coatings this means that decorative paints can be applied directly without the need to remove the coating and powder coating can be carried out with standard preparation resulting in excellent adhesion. Additionally the thin Si-Tek® coating produces less fume than oil and resin coatings. Standard safe work practices should be adopted for welding of zinc coated steel products. Please refer to the MSDS for further information.

Protective Coating – surface passivation treatment: is a non hazardous and non-dangerous passivation treatment for galvanized steel substrates, which adheres to the surface of the zinc via a chemical bond. The thin coating will provide excellent corrosion resistant protection and will produce less fume than oil and resin coatings. Standard safe work practices should be adopted for welding zinc coated steel products. Please refer to the MSDS for further information.

Part 7 – Mill Processing – Contents

Notes:

Disclaimer – Whilst every care has been taken in the preparation of this information, Australian Tube Mills, and its agents accept no liability for the accuracy of the information supplied. The company expressly disclaims all and any liability to any person whether a purchaser of any product, or otherwise in respect of anything done or omitted to be done and the consequences of anything done or omitted to be done, by any such person in reliance, whether in whole or in part upon the whole or any part of this publication.

Product availability & other information – As the section, grade and finish of all products are subject to continuous improvement, reference should be made to the ATM *PRODUCT AVAILABILITY GUIDE* (PAG) for information on the availability of listed sections and associated finishes. The PAG is found at: www.austubemills.com.

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Threaded Pipe – Specifications

Pipe Grade C250L0 is available screwed on one or both ends, in accordance with AS 1074. The tapered Whitworth thread used complies with the requirements of AS ISO 7.1 and is suitable for both parallel and taper threaded sockets. Taper is 1 in 16.

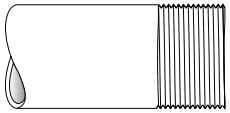
Available Products

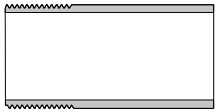
Refer to the Australian Tube Mills Product Availability Guide (PAG). The PAG can be found at www.austubemills.com.

Nominal Size (DN)	Outside Diameter (mm)	Threads per inch (tpi)	Pitch (mm)	Depth of Thread (mm)	Fitting Allowance (mm)	Wrenching Allowance (mm)	Useful Thread* (mm)
15	21.3	14	1.814	1.162	5.0	2.7	13.2
20	26.9	14	1.814	1.162	5.0	2.7	14.5
25	33.7	11	2.309	1.479	6.4	3.5	16.8
32	42.4	11	2.309	1.479	6.4	3.5	19.1
40	48.3	11	2.309	1.479	6.4	3.5	19.1
50	60.3	11	2.309	1.479	7.5	4.6	23.4
65	76.1	11	2.309	1.479	9.2	5.8	26.7
80	88.9	11	2.309	1.479	9.2	5.8	29.8
90	101.6	11	2.309	1.479	9.2	5.8	31.5
100	114.3	11	2.309	1.479	10.4	6.9	35.8
125	139.7	11	2.309	1.479	11.5	8.1	40.1
150	165.1	11	2.309	1.479	11.5	8.1	40.1

Notes:

1. * Minimum length of useful thread for basic gauge length.





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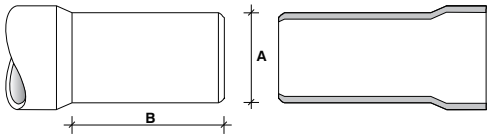
Swaged CHS/Pipe – Specifications

Pipe Grade C350L0 is available with one or both ends swaged in sizes DN 25 to DN 50. Swaged Pipe provides an economical, easy to assemble, labour saving alternative for joining lengths of CHS in the factory or in the field.

Available Products

→ Refer to the Australian Tube Mills Product Availability Guide (PAG). The PAG can be found at www.austubemills.com.

CHS Size		Shoulder Dimensions		
Nominal Size (DN)	Outside Diameter (mm)	Wall Thickness (mm)	Swage Diameter A (mm)	Av. Swage Length B (mm)
25	33.7	2.0XL	28.5	100.0
		2.6L	28.5	100.0
32	42.4	2.0XL	28.5	100.0
		2.6L	37.3	100.0
40	48.3	2.3XL	43.2	100.0
		2.9L	43.2	100.0
50	60.3	2.3XL	54.6	100.0
		2.9L	53.6	100.0



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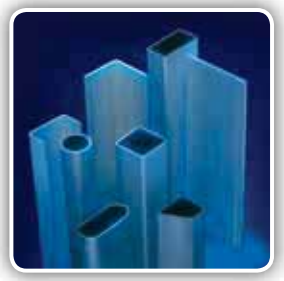
Part 8 – Fabrication – Contents



Notes:

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Product availability & other information – As the section, grade and finish of all products are subject to continuous improvement, reference should be made to the ATM *PRODUCT AVAILABILITY GUIDE* (PAG) for information on the availability of listed sections and associated finishes. The PAG is found at: www.austubemills.com.

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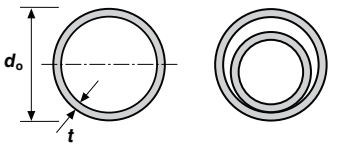
Telescoping Information – CHS/ Pipe

1 CHS/ Pipe
2 Grade
3 Finish



Female (outer) d_o		t		Male (inner) d_o	Nominal Clearance
mm		mm		mm	mm
508.0	x	12.7	CHS	457.0	16.0
		9.5	CHS	457.0	22.4
		6.4	CHS	457.0	28.6
457.0	x	12.7	CHS	406.4	16.6
		9.5	CHS	406.4	23.0
		6.4	CHS	406.4	29.2
406.4	x	12.7	CHS	355.6	17.8
		9.5	CHS	355.6	24.2
		6.4	CHS	355.6	30.4
355.6	x	12.7	CHS	273.1	50.8
		9.5	CHS	323.9	5.9
		6.4	CHS	323.9	12.1
323.9	x	12.7	CHS	273.1	19.4
		9.5	CHS	273.1	25.8
		6.4	CHS	273.1	32.0
273.1	x	12.7	CHS	219.1	23.7
		9.3	CHS	219.1	30.5
		6.4	CHS	219.1	36.3
		4.8	CHS	219.1	39.5
219.1	x	8.2	CHS	168.3	30.5
		6.4	CHS	168.3	34.1
		4.8	CHS	168.3	37.3
168.3	x	7.1	CHS	139.7	11.3
		6.4	CHS	139.7	12.7
		4.8	CHS	139.7	15.9
165.1	x	5.4	CHS	139.7	11.6
		5.0	CHS	139.7	12.4
		3.5	CHS	139.7	15.4
		3.0	CHS	139.7	16.4
139.7	x	5.4	CHS	114.3	12.1
		5.0	CHS	114.3	12.9
		3.5	CHS	114.3	15.9
		3.0	CHS	114.3	16.9
114.3	x	5.4	CHS	88.9	12.6
		4.5	CHS	101.6	**1.5**
		3.6	CHS	101.6	3.3
		3.2	CHS	101.6	4.1

Female (outer) d_o		t		Male (inner) d_o	Nominal Clearance
mm		mm		mm	mm
101.6	x	5.0	CHS	88.9	**0.8**
		4.0	CHS	88.9	2.8
		3.2	CHS	88.9	4.4
		2.6	CHS	88.9	5.6
88.9	x	5.9	CHS	60.3	15.3
		5.0	CHS	76.1	**1.2**
		4.0	CHS	76.1	3.2
		3.2	CHS	76.1	4.8
		2.6	CHS	76.1	6.0
76.1	x	5.9	CHS	60.3	2.6
		4.5	CHS	60.3	5.4
		3.6	CHS	60.3	7.2
		3.2	CHS	60.3	8.0
		2.3	CHS	60.3	9.8
60.3	x	5.4	CHS	48.3	**0.2**
		4.5	CHS	48.3	**2.0**
		3.6	CHS	48.3	3.8
		2.9	CHS	48.3	5.2
		2.3	CHS	48.3	6.4
48.3	x	4.0	CHS	33.7	5.4
		3.2	CHS	33.7	7.0
		2.9	CHS	33.7	7.6
		2.3	CHS	42.4	**0.1**
42.4	x	4.0	CHS	26.9	6.3
		3.2	CHS	33.7	**1.1**
		2.6	CHS	33.7	2.3
		2.0	CHS	33.7	3.5
33.7	x	4.0	CHS	n/a	n/a
		3.2	CHS	n/a	n/a
		2.6	CHS	26.9	**0.4**
		2.0	CHS	26.9	**1.6**
26.9	x	4.0	CHS	n/a	n/a
		3.2	CHS	n/a	n/a
		2.6	CHS	n/a	n/a
		2.3	CHS	n/a	n/a
		2.0	CHS	n/a	n/a

How to use this chart:

A. Select the size of Female (or Outer) member closest to your requirements from the left hand column.

B. The next column lists the closest size Male (Inner) Member when positioned in the Female Member as noted in the Figure at the bottom right of this page.

C. Based on (A) and (B) above, the Nominal Clearance between the Male and Female Members are listed in the last column(s). The configuration of these Nominal Clearances are as shown in the Figure below.

Note that the clearance is the total available difference between member dimensions, not the gap on both sides.

D. Depending on the two members being telescoped, the available clearance will also be dependent on end application requirements. Members may need to slide freely inside each other, or be locked with a pin, spot welded or fixed with wedges. This means, in some cases, a 'sloppy' fit may be suitable, while for others the tightest fit possible may be more appropriate.

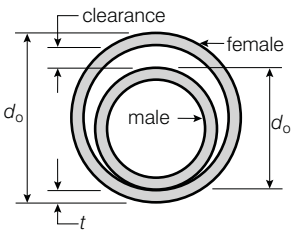
E. Where two telescoping sections are being used, thickness should be similar and will be determined by normal structural requirements. If a third section is to be used, consideration of both clearance and thickness within the size list available may be required.

F. Pipe may need to be fixed against twisting by welding or bolting.

G. Press Fit: for short pieces with no need for separation or sliding, an interference fit can be achieved using the available ductility of the steel. Sizes where clearance is shown as 0.0 may occasionally require press fit.

Notes:

1. ***REFER*** **to the Australian Tube Mills *PRODUCT AVAILABILITY GUIDE* (PAG) for information on the availability of listed sections and associated finishes. The PAG can be found at www.austubemills.com.**
2. Clearance = (AS/NZS 1163 Min. $d_o - 2t$) – (AS/NZS 1163 Max. d_o).
3. CHS is not a precision tube and all dimensions shown in this chart, although in accordance with the specifications, may vary marginally. Internal weld bead may need to be considered when a closer fit is required.
4. Sizes with a clearance less than 2.0 mm are shown **bold** in the charts.
5. For tight fits it is recommended that some form of testing is carried out prior to committing to material. Where telescoping over some length is required, additional allowance may be needed for straightness.



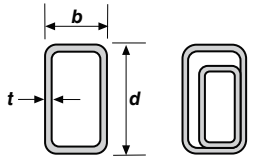
Telescoping Information – RHS

1 RHS
2 Grade
3 Finish

Female (outer) d	b	t		Male (inner) d	b	Nominal Clearance top	side
mm	mm	mm		mm	mm	mm	mm
400	300	16.0	RHS	350	250	18.0	18.0
		12.5	RHS	350	250	25.0	25.0
		10.0	RHS	350	250	30.0	30.0
		8.0	RHS	350	250	34.0	34.0
400	200	16.0	RHS	250	150	118.0	18.0
		12.5	RHS	250	150	125.0	25.0
		10.0	RHS	250	150	130.0	30.0
		8.0	RHS	250	150	134.0	34.0
350	250	16.0	RHS	300	200	18.0	18.0
		12.5	RHS	300	200	25.0	25.0
		10.0	RHS	300	200	30.0	30.0
		8.0	RHS	300	200	34.0	34.0
300	200	16.0	RHS	250	150	18.0	18.0
		12.5	RHS	250	150	25.0	25.0
		10.0	RHS	250	150	30.0	30.0
		8.0	RHS	250	150	34.0	34.0
		6.0	RHS	250	150	38.0	38.0
250	150	16.0	RHS	200	100	18.0	18.0
		12.5	RHS	200	100	25.0	25.0
		10.0	RHS	200	100	30.0	30.0
		9.0	RHS	200	100	32.0	32.0
		8.0	RHS	200	100	34.0	34.0
		6.0	RHS	200	100	38.0	38.0
		5.0	RHS	200	100	40.0	40.0
200	100	10.0	RHS	152	76	28.0	4.0
		9.0	RHS	152	76	30.0	6.0
		8.0	RHS	152	76	32.0	8.0
		6.0	RHS	152	76	36.0	12.0
		5.0	RHS	152	76	38.0	14.0
		4.0	RHS	152	76	40.0	16.0
152	76	6.0	RHS	127	51	13.0	13.0
		5.0	RHS	127	51	15.0	15.0
150	100	10.0	RHS	127	51	3.0	29.0
		9.0	RHS	127	51	5.0	31.0
		8.0	RHS	127	51	7.0	33.0
		6.0	RHS	127	51	11.0	37.0
		5.0	RHS	127	51	13.0	39.0
		4.0	RHS	127	51	15.0	41.0

Female (outer) d	b	t		Male (inner) d	b	Nominal Clearance top	side
mm	mm	mm		mm	mm	mm	mm
150	50	6.0	RHS	76	38	62.0	**0.0**
		5.0	RHS	76	38	64.0	2.0
		4.0	RHS	76	38	66.0	4.0
		3.0	RHS	76	38	68.0	6.0
		2.5	RHS	76	38	69.0	7.0
		2.0	RHS	76	38	70.0	8.0
127	51	6.0	RHS	76	38	39.0	**1.0**
		5.0	RHS	76	38	41.0	3.0
		3.5	RHS	76	38	44.0	6.0
125	75	6.0	RHS	100	50	13.0	13.0
		5.0	RHS	100	50	15.0	15.0
		4.0	RHS	100	50	17.0	17.0
		3.0	RHS	100	50	19.0	19.0
		2.5	RHS	100	50	20.0	20.0
		2.0	RHS	100	50	21.0	21.0
102	76	6.0	RHS	76	38	14.0	26.0
		5.0	RHS	76	38	16.0	28.0
		3.5	RHS	76	38	19.0	31.0
100	50	6.0	RHS	76	38	12.0	**0.0**
		5.0	RHS	76	38	14.0	2.0
		4.0	RHS	76	38	16.0	4.0
		3.5	RHS	76	38	17.0	5.0
		3.0	RHS	76	38	18.0	6.0
		2.5	RHS	76	38	19.0	7.0
		2.0	RHS	76	38	20.0	8.0
		1.6	RHS	76	38	20.8	8.8
76	38	4.0	RHS	50	25	18.0	5.0
		3.0	RHS	50	25	20.0	7.0
		2.5	RHS	50	25	21.0	8.0
75	50	6.0	RHS	50	25	13.0	13.0
		5.0	RHS	65	35	**0.0**	5.0
		4.0	RHS	65	35	2.0	7.0
		3.0	RHS	65	35	4.0	9.0
		2.5	RHS	65	35	5.0	10.0
		2.0	RHS	65	35	6.0	11.0
		1.6	RHS	65	35	6.8	11.8
75	25	2.5	RHS	n/a	n/a	n/a	n/a
		2.0	RHS	n/a	n/a	n/a	n/a
		1.6	RHS	n/a	n/a	n/a	n/a

Female (outer) d	b	t		Male (inner) d	b	Nominal Clearance top	side
mm	mm	mm		mm	mm	mm	mm
65	35	4.0	RHS	50	25	7.0	2.0
		3.0	RHS	50	25	9.0	4.0
		2.5	RHS	50	25	10.0	5.0
		2.0	RHS	50	25	11.0	6.0
50	25	3.0	RHS	n/a	n/a	n/a	n/a
		2.5	RHS	n/a	n/a	n/a	n/a
		2.0	RHS	n/a	n/a	n/a	n/a
		1.6	RHS	n/a	n/a	n/a	n/a
50	20	3.0	RHS	n/a	n/a	n/a	n/a
		2.5	RHS	n/a	n/a	n/a	n/a
		2.0	RHS	n/a	n/a	n/a	n/a
		1.6	RHS	n/a	n/a	n/a	n/a



How to use this chart:

A. Select the size of Female (or Outer) member closest to your requirements from the left hand column.

B. The next column lists the closest size Male (Inner) Member when positioned in the Female Member as noted in the Figure at the bottom right of this page.

C. Based on (A) and (B) above, the Nominal Clearance between the Male and Female Members are listed in the last column(s). The configuration of these Nominal Clearances are as shown in the Figure below.

Note that the clearance is the total available difference between member dimensions, not the gap on both sides.

D. Depending on the two members being telescoped, the available clearance will also be dependent on end application requirements. Members may need to slide freely inside each other, or be locked with a pin, spot welded or fixed with wedges. This means, in some cases, a 'sloppy' fit may be suitable, while for others the tightest fit possible may be more appropriate.

E. Where two telescoping sections are being used, thickness should be similar and will be determined by normal structural requirements. If a third section is to be used consideration of both clearance and thickness within the size list available may be required.

F. RHS has the obvious advantage that its shape prevents rotation of the section.

G. Press Fit: for short pieces with no need for separation or sliding, an interference fit can be achieved using the available ductility of the steel. Sizes where clearance is shown as 0.0 may occasionally require press fit.

Notes:

1. ***REFER*** **to the Australian Tube Mills *PRODUCT AVAILABILITY GUIDE* (PAG) for information on the availability of listed sections and associated finishes. The PAG can be found at www.austubemills.com.**
2. RHS is not a precision tube and all dimensions shown in this chart, although in accordance with the specifications, may vary marginally. Varying corner radii and the internal weld bead may need to be considered when a closer fit is required.
3. Sizes with a clearance less than 2.0 mm are shown **bold** in the charts.
4. For tight fits it is recommended that some form of testing is carried out prior to committing to material. Where telescoping over some length is required, additional allowance may be needed for straightness.

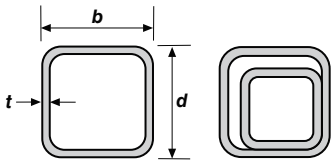
Telescoping Information – SHS

1 SHS
2 Grade
3 Finish

Female (outer) d	b	t		Male (inner) d	b	Nominal Clearance top	side
mm	mm	mm		mm	mm	mm	mm
400 x	400 x	16.0	SHS	350	350	18.0	18.0
		12.5	SHS	350	350	25.0	25.0
		10.0	SHS	350	350	30.0	30.0
350 x	350 x	16.0	SHS	300	300	18.0	18.0
		12.5	SHS	300	300	25.0	25.0
		10.0	SHS	300	300	30.0	30.0
		8.0	SHS	300	300	34.0	34.0
300 x	300 x	16.0	SHS	250	250	18.0	18.0
		12.5	SHS	250	250	25.0	25.0
		10.0	SHS	250	250	30.0	30.0
		8.0	SHS	250	250	34.0	34.0
250 x	250 x	16.0	SHS	200	200	18.0	18.0
		12.5	SHS	200	200	25.0	25.0
		10.0	SHS	200	200	30.0	30.0
		9.0	SHS	200	200	32.0	32.0
		8.0	SHS	200	200	34.0	34.0
		6.0	SHS	200	200	38.0	38.0
200 x	200 x	16.0	SHS	150	150	18.0	18.0
		12.5	SHS	150	150	25.0	25.0
		10.0	SHS	150	150	30.0	30.0
		9.0	SHS	150	150	32.0	32.0
		8.0	SHS	150	150	34.0	34.0
		6.0	SHS	150	150	38.0	38.0
		5.0	SHS	150	150	40.0	40.0
150 x	150 x	10.0	SHS	125	125	5.0	5.0
		9.0	SHS	125	125	7.0	7.0
		8.0	SHS	125	125	9.0	9.0
		6.0	SHS	125	125	13.0	13.0
		5.0	SHS	125	125	15.0	15.0
125 x	125 x	10.0	SHS	100	100	5.0	5.0
		9.0	SHS	100	100	7.0	7.0
		8.0	SHS	100	100	9.0	9.0
		6.0	SHS	100	100	13.0	13.0
		5.0	SHS	100	100	15.0	15.0
		4.0	SHS	100	100	17.0	17.0

Female (outer) d	b	t		Male (inner) d	b	Nominal Clearance top	side
mm	mm	mm		mm	mm	mm	mm
100 x	100 x	10.0	SHS	75	75	5.0	5.0
		9.0	SHS	75	75	7.0	7.0
		8.0	SHS	75	75	9.0	9.0
		6.0	SHS	75	75	13.0	13.0
		5.0	SHS	90	90	**0.0**	**0.0**
		4.0	SHS	90	90	2.0	2.0
		3.0	SHS	90	90	4.0	4.0
		2.5	SHS	90	90	5.0	5.0
		2.0	SHS	90	90	6.0	6.0
90 x	90 x	2.5	SHS	75	75	10.0	10.0
		2.0	SHS	75	75	11.0	11.0
89 x	89 x	6.0	SHS	75	75	2.0	2.0
		5.0	SHS	75	75	4.0	4.0
		3.5	SHS	75	75	7.0	7.0
		2.0	SHS	75	75	10.0	10.0
75 x	75 x	6.0	SHS	50	50	13.0	13.0
		5.0	SHS	65	65	**0.0**	**0.0**
		4.0	SHS	65	65	2.0	2.0
		3.5	SHS	65	65	3.0	3.0
		3.0	SHS	65	65	4.0	4.0
		2.5	SHS	65	65	5.0	5.0
		2.0	SHS	65	65	6.0	6.0
65 x	65 x	6.0	SHS	50	50	3.0	3.0
		5.0	SHS	50	50	5.0	5.0
		4.0	SHS	50	50	7.0	7.0
		3.0	SHS	50	50	9.0	9.0
		2.5	SHS	50	50	10.0	10.0
		2.0	SHS	50	50	11.0	11.0
		1.6	SHS	50	50	11.8	11.8
50 x	50 x	6.0	SHS	35	35	3.0	3.0
		5.0	SHS	40	40	**0.0**	**0.0**
		4.0	SHS	40	40	2.0	2.0
		3.0	SHS	40	40	4.0	4.0
		2.5	SHS	40	40	5.0	5.0
		2.0	SHS	40	40	6.0	6.0
		1.6	SHS	40	40	6.8	6.8
40 x	40 x	4.0	SHS	30	30	2.0	2.0
		3.0	SHS	30	30	4.0	4.0
		2.5	SHS	35	35	**0.0**	**0.0**
		2.0	SHS	35	35	**1.0**	**1.0**
		1.6	SHS	35	35	**1.8**	**1.8**

Female (outer) d	b	t		Male (inner) d	b	Nominal Clearance top	side
mm	mm	mm		mm	mm	mm	mm
35 x	35 x	3.0	SHS	25	25	4.0	4.0
		2.5	SHS	30	30	**0.0**	**0.0**
		2.0	SHS	30	30	**1.0**	**1.0**
		1.6	SHS	30	30	**1.8**	**1.8**
30 x	30 x	3.0	SHS	20	20	4.0	4.0
		2.5	SHS	25	25	**0.0**	**0.0**
		2.0	SHS	25	25	**1.0**	**1.0**
		1.6	SHS	25	25	**1.8**	**1.8**
25 x	25 x	3.0	SHS	n/a	n/a	n/a	n/a
		2.5	SHS	20	20	**0.0**	**0.0**
		2.0	SHS	20	20	**1.0**	**1.0**
		1.6	SHS	20	20	**1.8**	**1.8**
20 x	20 x	2.0	SHS	n/a	n/a	n/a	n/a
		1.6	SHS	n/a	n/a	n/a	n/a



How to use this chart:

A. Select the size of Female (or Outer) member closest to your requirements from the left hand column.

B. The next column lists the closest size Male (Inner) Member when positioned in the Female Member as noted in the Figure at the bottom right of this page.

C. Based on (A) and (B) above, the Nominal Clearance between the Male and Female Members are listed in the last column(s). The configuration of these Nominal Clearances are as shown in the Figure below. Note that the clearance is the total available difference between member dimensions, not the gap on both sides.

D. Depending on the two members being telescoped, the available clearance will also be dependent on end application requirements. Members may need to slide freely inside each other, or be locked with a pin, spot welded or fixed with wedges. This means, in some cases, a 'sloppy' fit may be suitable, while for others the tightest fit possible may be more appropriate.

E. Where two telescoping sections are being used, thickness should be similar and will be determined by normal structural requirements. If a third section is to be used consideration of both clearance and thickness within the size list available may be required.

F. SHS has the obvious advantage that its shape prevents rotation of the section.

G. Press Fit: for short pieces with no need for separation or sliding, an interference fit can be achieved using the available ductility of the steel. Sizes where clearance is shown as 0.0 may occasionally require press fit.

Notes:

1. ***REFER*** **to the Australian Tube Mills *PRODUCT AVAILABILITY GUIDE* (PAG) for information on the availability of listed sections and associated finishes. The PAG can be found at www.austubemills.com.**
2. SHS is not a precision tube and all dimensions shown in this chart, although in accordance with the specifications, may vary marginally. Varying corner radii and the internal weld bead may need to be considered when a closer fit is required.
3. Sizes with a clearance less than 2.0 mm are shown **bold** in the charts.
4. For tight fits it is recommended that some form of testing is carried out prior to committing to material. Where telescoping over some length is required, additional allowance may be needed for straightness.

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Welding Information – Welding Consumables Guide

Generally, standard procedures and consumables are used for welding Australian Tube Mills (ATM) products.

Slight modifications in technique may be required to obtain the optimum weld appearance and strength.

These are listed below for Manual Metal Arc-Welding (MMAW), Gas Metal-Arc Welding (GMAW) and Flux-Cored Arc Welding (FCAW) processes. As in any welding operation, it is recommended that the techniques be practiced and refined by welders before they are used in a production situation. The consumables listed below are suitable for welding Structural Steel Hollow Sections to AS/NZS 1163 and satisfy the requirements of the Structural Steel Welding Standard AS/NZS 1554.1 and 1554.5.

The use of spray-on spatter release compound prior to welding (but not sprayed into the joint) may be beneficial in the cleaning up of weld spatter following the welding operation.

All welds should have any slag (when present) removed by chipping, followed by wire brushing to clean the adjacent area.

In using the following guide, it should be noted that the Australian/NZ structural fabrication industry has standardised on the higher strength E48XX/W50X type consumables. This consumable designation is suitable for all of ATM's prime grade steels – including C450PLUS.

The welding consumable recommendations in this publication is not exhaustive and are to be used as a guide only for multi-positional welds. Before welding, check with your consumable manufacturer/supplier for specific recommendations relating to your particular requirements. Further information may be obtained from your local welding consumable manufacturer/supplier.

See Grade C250L0, Grade C350L0 and C450PLUS in Part 5 of this Product Manual for further information on parent material chemical composition, maximum Carbon Equivalence (CE) and mechanical properties.

Manual Metal Arc-Welding (MMAW)

Weld strength to match Grade C250L0 (Steel Type 2 – in AS/NZS 1554 Parts 1 & 5)

– – Rutile coated electrodes.

B-E49X6 U/B-E49X8 U – Basic coated electrodes.

Weld strength to match Grade C350L0 (Steel Type 5 in AS/NZS 1554 Parts 1 & 5)

Same as Grade C250L0 above.

Weld strength to match Grade C450L0 (Steel Type 7B in AS/NZS 1554 Parts 1 & 5)

Same as Grade C250L0 above.

Notes:

1. Excessive heat input should be avoided. Do not over-weld.
2. Keep arc length short to avoid burn-through and undercut.
3. Increase joint gaps in butt joints to ensure complete penetration.

Gas Metal-Arc Welding (GMAW)

Weld strength to match Grade C250L0 (Steel Type 2 – in AS/NZS 1554 Parts 1 & 5)

W502 ES4/B-G43 2U S4/B-G49 2U S4

– ES4/S4 type medium de-oxidised wires suitable with CO_2 and Argon based shielding gas mixture such as $Ar/CO_2/O_2$.

Weld strength to match Grade C350L0 (Steel Type 5 in AS/NZS 1554 Parts 1 & 5)

Same as Grade C250L0 above.

Weld strength to match Grade C450L0 (Steel Type 7B in AS/NZS 1554 Parts 1 & 5)

W502 ES4/B-G49 2U S4

– ES4/S4 type medium de-oxidised wire suitable with CO_2 and Argon based shielding gas mixture such as $Ar/CO_2/O_2$ or alternatively

– ES6/S6 type higher level de-oxidised wires may be used.

Notes:

1. CO_2 shielding gas may be used where good penetration is required but some weld spatter is produced.
2. $Argon/CO_2$ or $Argon/CO_2/O_2$ shielded gases may be used for improved weld appearance with reduced weld spatter.
3. Dip transfer welding method is generally used.
4. Spray transfer welding method may be used where the joint fit-up is good and the sections are thick enough to prevent burn-through.
5. W502 wires meet the L0 impact properties requirement. W503 wires, which exceed the L0 impact property requirement, can also be used.

Industry Associations

Australian Steel Institute (ASI)
(formerly Australian Institute of Steel Construction)
PO Box 6366
NORTH SYDNEY NSW 2059
Tel: +61-2-9931 6666
Fax: +61-2-9931 5406
E-mail: enquiries@steel.org.au
Internet: www.steel.org.au

Galvanizers Association of Australia (GAA)
124 Exhibition Street
MELBOURNE VIC 3000
Tel: +61-3-9654 1266
Fax: +61-3-9654 1136
E-mail: gaa@gaa.com.au
Internet: www.gaa.com.au

Welding Technology Institute Australia (WTIA)
PO Box 6165
SILVERWATER NSW 1811
Tel: +61-2-9748 4443
Fax: +61-2-9748 2858
E-mail: info@wtia.com.au
Internet: www.wtia.com.au

Flux-Cored Arc Welding (FCAW)

Weld strength to match Grade C250L0 (Steel Type 2 – in AS/NZS 1554 Parts 1 & 5)
B-T432U/B-T492U

Weld strength to match Grade C350L0 (Steel Type 5 in AS/NZS 1554 Parts 1 & 5)
Same as Grade C250L0 above.

Weld strength to match Grade C450L0 (Steel Type 7B in AS/NZS 1554 Parts 1 & 5)
B-T492U

Notes:

1. B-T432U/B-T492U wires meet the L0 impact property requirement.

Welding DuraGal[Ultra®] Profiles

DuraGal[Ultra®] is readily weldable. Its thin evenly applied galvanized coating ensures minimal welding fumes. However, welding of any metal products can be injurous to health unless sensible welding practices are used. The ventilation recommendations given in Table 17.2 of Technical Note 7 published by WTIA (Welding Technology Institute of Australia), July 1994 should be observed. Mechanical dilution ventilation is advised for open work space and mechanical ventilation by local exhaust system for limited work space and confined space. In addition, the "Fume Management Guidelines" which are available from the WTIA web site at www.wtia.com.au are also recommended.

DuraGal[Ultra®]'s carbon equivalent of less than 0.39 allows it to be welded in accordance with AS/NZS 1554.1 Welding of Steel Structures, without preheat.

The following are recommended consumables:

Process	Recommended Consumables
Manual Metal-Arc (AS/NZ 4855)	B-E49X6 U / B-E49X8 U - Basic coated electrodes
Submerged Arc (AS 1858.1)	W502Y
Flux-Cored Arc (AS/NZS ISO 17632)	B-T492U
Gas Metal-Arc (AS/NZS 2717.1 ISO 14341)	W502 ES4/ES6 / B-G49 2U S4/S6

Bending

Here are some guidelines on bending of CHS, SHS, RHS and profiles (angles, channels and flats). Best results are dependent upon the type of equipment, the quality of the formers, the centreline radius, the speed of bending and the thickness of member.

Draw Bending using an Internal Mandrel – CHS, SHS & RHS

If the appearance of the finish bend is all important, particularly if no flattening or distortion of the product is desired, cold draw bending using an inner mandrel is recommended for CHS, SHS and RHS. This method can achieve bend centreline radii as low as 2 times the outside diameter (d_o) for CHS and 4 times the section dimension (d or b), in the plane of bending, for SHS and RHS.

Press Bending or Draw Bending without a Mandrel – CHS

If a little distortion can be tolerated the cost of bending CHS can be reduced by draw bending without the mandrel or press bending. Both these methods can achieve bend centreline radii of $4d_o$ to $5d_o$ for the lightest wall thickness pipe. Heavier wall CHS can be bent to tighter radii with minimum distortion.

Roll Curving

Roll Curving – CHS

Information received from specialist benders, using appropriate profiled rolls, has shown that bend radii from 100 mm on 26.9 OD to 1500 mm on 219.1 OD are possible.

For more information contact the Roll Bending companies in your area.

Roll Curving – SHS & RHS

SHS and RHS can be economically bent by roll curving. Some distortion of the section will result using this method. If a flat roll, 3 roll bender is used, Australian Tube Mills (ATM) does not recommend bend centreline radii less than 30 times the depth of section in the plane of bending. If the 3 working rolls are profiled to suit the section being bent, bend centreline radii as low as 10 times the depth of section in the plane of bending can be achieved with reduction in section stiffness (I_x) of less than 10%. The actual values should be confirmed with your Roll Curving company as facilities and equipment may vary between companies.

Roll Curving – DuraGal[Ultra®] Angles, Channels and Flats

The following table sets out the known results of roll bending profiles:

Product	Size	Achieved Minimum Inside Bend Radii for Various Bending Modes (mm)			
		On Edge	Toe In	Toe Out	Weak axis*2
DuraGal[Ultra®] Angle	50 x 50 x 5.0 100 x 100 x 7.0 150 x 150 x 8.0	- - -	500 750 6000	350 3000 6500	- - -
DuraGal[Ultra®] Channel	100 x 50 x 4.0 150 x 75 x 5.0 200 x 75 x 5.0 250 x 90 x 6.0	*1 *1 *1 *1	1250 6000 3500 4500	1200 2100 2100 4300	- - - -
DuraGal[Ultra®] Flat	Thickness, t ≤ 6 Thickness, t > 6	No Trial to date	-	-	2.0 t 2.0 t

*1 *Not suitable for bending in this mode using trial equipment used for the trial (see next paragraph for more information).*

*2 *Bent in the longitudinal and transverse direction.*

Channels bent on edge collapsed during the rolling process. It was thought that adding support rolls between channel flanges would stop this crushing failure and would allow successful roll bending.

There was some minor scuffing/pick-up damage to the galvanized coating during roll bending, particularly on the edge of angles. The scuffing can be minimised if the rolls are smooth and hard.

The galvanized coating should not flake off the steel substrate but some peeling due to mechanical pressure or rubbing can occur.

Crush Bending – SHS & RHS

Tight radius SHS and RHS bends can be formed by crush bending, often using the press bending technique. This method of bending dramatically reduces the sectional properties of the hollow section and is therefore only suitable for applications which are non load-bearing, or lightly loaded, unless the deformed section is stiffened.

Ram Bending – CHS

Testing has shown that good bends can be made in CHS up to DN50 using a well maintained, simple ram bender. It is critical that a suitable former be used. If the former being used fails to bend cold formed ERW pipe, it is usually because the former does not give good support to the pipe during bending and/or the bend centreline radius is too small. There is a range of suitable formers available from most Merchants, as set out below.

An alternative range of formers is available from Dawn Tool & Vice. Because these formers are made from ductile iron, the surface finish of the completed bend is not as good as that achieved with the preferred formers.

ATM has not tested Ram Bender Formers for CHS sizes larger than DN50 (60.3 outside diameter) but this does not mean that the larger pipes can not be bent by this method. The difficulty of bending pipe increases as the outside diameter to thickness ratio (d_o/t) increases. ATM has successfully bent pipes with a d_o/t up to 27.4 (i.e. 60.3/2.2 = 27.4).

Ram Bending Recommended Formers – Machined from plate

Profile	Bend Centreline Radius (mm)					
	DN15 (21.3OD)	DN20 (26.9OD)	DN25 (33.7OD)	DN32 (42.4OD)	DN40 (48.3OD)	DN50 (60.3OD)
Cathedral	80	90	120	190	225	270
Circular	-	120	150	-	-	-

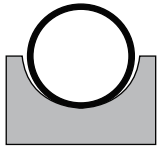
Ram Bending Alternative Formers (by Dawn Tool & Vice*) – Cast

Profile	Bend Centreline Radius (mm)					
	DN15 (21.3OD)	DN20 (26.9OD)	DN25 (33.7OD)	DN32 (42.4OD)	DN40 (48.3OD)	DN50 (60.3OD)
Cathedral	80	-	-	-	-	300
Elliptical	-	100	140	190	225	-

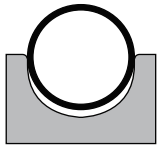
*Contact number for Dawn Tool & Vice: (03) 9462 1934

The Right Former

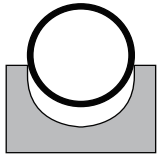
The most critical element is the former. It must give the pipe adequate support. Good results can be achieved from the simplest of benders if suitable formers are used. Three types of formers exist, each giving the bent section a different profile.



Circular:
Pipe generally falls to the bottom of the former. Absence of side support could result in pipe collapsing on bending. (Not recommended for Light or Extra-Light pipe).



Elliptical:
Pipe sits close to, but not on, the bottom of the former. Good side support, sides of the former are above the centreline of the pipe.



Cathedral:
Pipe sits on the entry to the former and will move to the bottom when bending starts. This action gives a small amount of squeeze that supports the lighter gauge pipe.

Ram Bending Hints

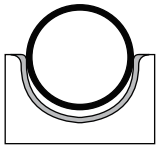
- Some wrinkling of the inside of the bend can be expected on CHS (DN32 and DN50 are most prone to wrinkling).
- If the bend collapses (i.e. the centre of the bend lifts out of the former) during bending, move the support rollers in. For the support roller centres used during development and testing of the formers refer to the following table:

Size (DN)	20	25	32	40	50
Rollers Centres (mm)	310	380	450	520	590

If the bend is still collapsing when the support rollers are at the suggested centres then check the condition of your former. If the former is damaged and/or badly worn bend failures may occur.

When bending CHS at these support pin centres it will generally be necessary to use a pivoting support block which is grooved to the OD of the tube being bent.

Recommended Weld Position



For best results, the weld should be touching the former in the shaded area, with the ideal weld location in the 3 or 9 o'clock position.

Problems encountered with ram bending

Flattening / Collapsing / Wrinkling.

Possible causes

The former is worn or the former does not adequately support the pipe.

Alternatives

- Try a former with an elliptical or cathedral profile to increase the side support, (recommended for Light and Extra-Light pipes)
- Go to a larger bending radius
- Move the supports closer to the centre
- Try a different bending technique
- Try a heavier gauge pipe

Effect of Bending Former profile

Using the Elliptical and Cathedral formers tabled in this section, a series of ram bending trials were performed on ATM's DuraGal® and DuraGal^{Plus} Extra-Light (350 MPa) CHS, sizes DN 20, 25, 32, 40 & 50.

With conventional (circular profile) formers this range of pipe would typically be expected to require the use of an internal mandrel.

The ATM results plotted on the chart below demonstrate how the increased side support to the pipe by the Elliptical and Cathedral profile, enabled the ATM pipes to be bent successfully without an internal mandrel.

Notes:

1. Centre line radius can vary between former manufacturers.
2. Results apply only to ATM products, and only for the sizes and grades listed above.
3. Roll type bender recommended for DuraGal® DN50 Extra-Light

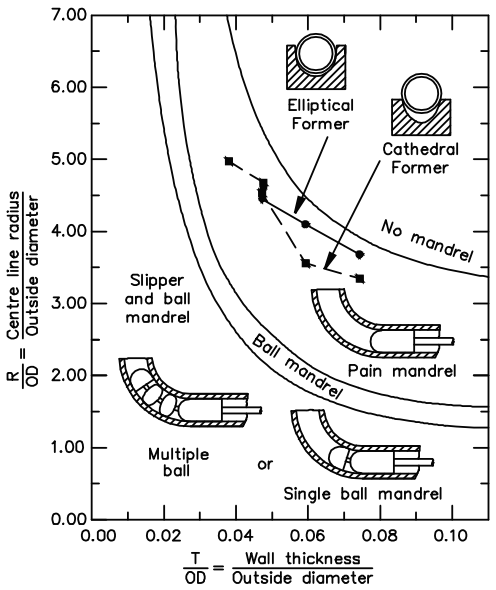


Chart: The Pipe Handbook, King, C Reno, McGraw-Hill Australia, 5th Edition (1967) pp 7-126, Fig 50 (Mandrel and shoe requirements for cold-bending of pipe)
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Australian Tube Mills ABN 21 123 666 679. PO Box 246 Sunnybank, QLD 4109 Australia Telephone +61 7 3246 2600 Facsimile +61 7 3246 2660 E-mail info@austubemills.com Internet www.austubemills.com

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