Australian Government
Australian Customs and Border Protection Service

R E P O R T

INVESTIGATION INTO THE ALLEGED DUMPING OF GALVANISED STEEL AND ALUMINIUM ZINC COATED STEEL

EXPORTED FROM

THE PEOPLE'S REPUBLIC OF CHINA, THE REPUBLIC OF KOREA AND TAIWAN

PUBLIC FILE VERSION

VISIT REPORT – AUSTRALIAN INDUSTRY

BLUESCOPE STEEL LIMITED

THIS REPORT AND THE VIEWS OR RECOMMENDATIONS CONTAINED THEREIN WILL BE REVIEWED BY THE CASE MANAGEMENT TEAM AND MAY NOT REFLECT THE FINAL POSITION OF CUSTOMS AND BORDER PROTECTION

October 2012

PUBLIC RECORD VERSION

1 TABLE OF CONTENTS

2 BACKGROUND

2.1 The applications

On 3 August 2012, applications were lodged on behalf of BlueScope Steel Limited (BlueScope) requesting that the Minister for Home Affairs (the Minister) publish dumping duty notices in respect of galvanised (zinc coated) steel and aluminium zinc coated steel exported to Australia from the People's Republic of China (China), the Republic of Korea (Korea) and Taiwan. These products are jointly referred to as coated steel in this report. Refer to the full description of the goods in section 4 of this report.

On 17 August 2012 and 27 August 2012 additional information and data was received in respect of the applications. As a result, Customs and Border Protection restarted the 20 day period for considering the applications.

Customs and Border Protection is treating these as two separate investigations, but is examining them together because BlueScope advised that many of the importers and exporters deal in both products.

2.1.1 Galvanised steel

BlueScope claimed that material injury in respect of galvanised steel commenced in 2010-11. It claimed that the Australian industry has suffered material caused by galvanised steel exported to Australia from China, Korea and Taiwan through:

- loss of sales volume;
- reduced market share;
- reduced revenues;
- price undercutting;
- price depression;
- price suppression;
- reduced profits;
- reduced profitability;
- reduced return on investment;
- reduced ability to raise capital for re-investment; and
- reduced employment.

2.1.2 Aluminium zinc coated steel

BlueScope claimed that material injury in respect of aluminium zinc coated steel commenced in 2010-11 and has been exacerbated in 2011-12. It claimed that the Australian industry has suffered material caused by aluminium zinc coated steel exported to Australia from China, Korea and Taiwan through:

- loss of sales volume;
- reduced market share;
- reduced revenues;
- price undercutting;

- price depression;
- price suppression;
- reduced profits;
- reduced profitability;
- reduced return on investment;
- reduced ability to raise capital for re-investment; and
- reduced employment.

2.1.3 Notification

Public notification of initiation of the investigation was made on 5 September 2012 in *The Australian* newspaper and Australian Customs Dumping Notice No. 2012/40).

2.2 Purpose of visit

We explained to BlueScope that the purpose of our visit was to:

- obtain general information about the Australian market for coated steel;
- gain a greater understanding of the BlueScope's manufacturing, marketing, sales and distribution processes;
- verify information provided in the applications;
- obtain additional financial data to assist in the analysis of the claimed injury to the Australian industry;
- give the company the opportunity to provide any further comments or raise any further issues it believed relevant to the investigation; and
- discuss and gather data relevant to establishing unsuppressed selling prices.

2.3 Contact details

The applicant provided the following contact details.

Company	BlueScope Steel Limited Five Islands Road Port Kembla NSW 2505
Company representative	Mr Alan Gibbs, Development Manager – International Trade
Telephone	02 4275 3859
Fax	02 4275 7810
Email	Alan.Gibbs@bluescopesteel.com
Nominated representative	Mr John O'Connor, John O'Connor & Associates Pty Ltd
Telephone	07 3342 1921
Fax	07 3342 1931
Email	jmoconnor@optusnet.com.au
Date of visits	9 to 12 October 2012

The following were present at various stages of the interview.

BlueScope	Mr Stuart Bell, Manager - Finance Mr Alan Gibbs, Development Manager – International Trade Mr Steve Weine, Manager Finance & Administration International Markets Mr Chad Uphill, Senior Finance Analyst Ms Ellicia De Guzman, Finance Analyst Mr Brian Kelly, Manager - Marketing Mr Anthony Palermo, Pricing & Service Offer Manager Mr Esa Mannisto, Manager - Costings Mr Ron Hehl, Product Costing Specialist
John O'Connor & Associates Pty Ltd	John O'Connor
Customs	Ms Joanne Reid, Director Operations 2 Mr Chris Vincent, Manager Operations 1 Ms Cienna Turpie, Supervisor, Operations 2

2.4 Investigation process and timeframes

We advised BlueScope of the investigation process and timeframes as follows:

- the investigation period is July 2011 to June 2012;
- Customs and Border Protection will examine the Australian market from July 2007 for the purpose of analysing the condition of the Australian industry;
- a preliminary affirmative determination may be made no earlier than 60 days after the date of initiation (5 November 2012) - provisional measures may be imposed at the time of the preliminary affirmative determination or at any time after the preliminary affirmative determination has been made, but Customs and Border Protection would not make such a determination until it was satisfied that there appears to be, or that it appears there will be, sufficient grounds for the publication of a dumping duty notice;
- statements of essential facts will be placed on the public record by 24 December 2012 or such later date as the Minister allows - the statements of essential facts will set out the material findings of fact on which Customs and Border Protection intends to base its recommendations to the Minister and will invite interested parties to respond, within 20 days, to the issues raised (submissions received in response to the statements of essential facts will be considered when compiling the report and recommendations to the Minister);
- Customs and Border Protection's reports to the Minister are due no later than 7 February 2012 - should the Minister approve an extension to the statements of essential facts this would mean that the due date of the final reports would also be extended - all interested parties would be notified and an Australian Customs Dumping Notice would be issued should extensions be requested and approved.

We explained to BlueScope that we would prepare a report of our visit. The report will be provided to the company to review its factual accuracy and to identify those parts of the report it considered confidential. Following consultation about

confidentiality, we would prepare a non-confidential version of the report for the public record.

3 COMPANY BACKGROUND

3.1 General

BlueScope Steel Limited is a publicly listed company with many subsidiary and associated companies throughout the world. A summary of it global interests is at **confidential attachment GEN 1**. Details of these affiliates were provided in the public versions of the applications and are also available in BlueScope's 2011-12 financial report. BlueScope produces coated steel at its Springhill (Port Kembla) and Western Port plants using hot rolled coil (HRC) that is mainly sourced from the Port Kembla Steelworks hot strip mill. During the investigation period, HRC was also produced at BlueScope's Western Port hot strip mill, but this mill was closed in October 2011 and the Western Port coated steel plant now only produces coated steel using HRC produced at Port Kembla. BlueScope Steel (AIS) Pty Ltd, operator of the Port Kembla Steelworks, is one of BlueScope's fully owned subsidiaries.

BlueScope supplies coated steel directly from its manufacturing plants and from seven service centres located in Sydney (Chullora and Erskine Park), Melbourne (Braeside and Sunshine), Brisbane (Acacia Ridge), Adelaide (Wingfield) and Perth (Myaree). It also sells coated steel through affiliated companies, including fully owned subsidiaries Lysaght Building Solutions Pty Ltd, BlueScope Water Pty Ltd and BlueScope Distribution Pty Ltd. The sales data provided by BlueScope includes all sales by BlueScope, including sales to its affiliated companies and sales by the service centres. Sales to affiliated companies represent about [%] of coated steel sales.

BlueScope explained that the different legal entities were a result of the company's history, for example the acquisition of BlueScope Steel (AIS) Pty Ltd in 1935 by BHP and the acquisition of BlueScope by BHP in 1979. BlueScope demerged from BHP in 2002.

BlueScope's Australian and New Zealand operations, incorporating all affiliated companies, are managed as a single unit. The coated steel plants are part of BlueScope's Coated Products Division. BlueScope's management structure is summarised at **confidential attachment GEN 2**.

BlueScope's statutory financial reports are generated using Hyperion, a reporting consolidation tool that extracts summary data from SAP. However, it explained that its day to day accounting is done in various systems such as an invoicing and settlement discounts system, debtor management, rebate model, manufacturing costs and freight model systems. A product costing reporting system, referred to as COGNOS, captures data from various systems. BlueScope explained that the trial balance from SAP may not agree with the COGNOS database as the database does not include accounting adjustments such as accruals. A summary of the Coated Products Division financial structure is at **confidential attachment GEN 3**.

BlueScope accounts are audited in accordance with Australian accounting practices and the company provided relevant financial documents in its application.

3.2 Related party transactions

HRC is transferred to the Costed Products Division at cost, but this is subsequently adjusted to reflect market prices. BlueScope stated that prices to affiliated companies were negotiated in the same way as prices to unrelated customers.

3.3 Changes during the investigation period

On 22 August 2011, BlueScope's board announced a restructure of its business and significantly reduced the Australian export business. The restructure included the closure of No. 6 Blast Furnace at Port Kembla and the Western Port hot strip mill. One of the metal coating lines at the Western Port plant was mothballed, but production could be resumed if market conditions improved.

In October 2011 the Western Port hot strip mill was closed and HRC was no longer produced. The Western Port plant now only produces pickled and oiled HRC and coated steel using HRC manufactured at Port Kembla.

Similarly, BlueScope significantly reduced its production for export.

BlueScope stated that this restructure required a workforce reduction of approximately 1000 people and at the time of the announcement it estimated a cash cost of $300 to $400 million as the company closed one blast furnace and one hot strip mill along with associated plant.

4 THE GOODS

4.1 The goods and like goods

Both products

BlueScope explained that steel products are coated to provide corrosion protection for certain applications. General information on metallic coated steel is at **non-confidential attachment GEN 4**. Galvanised or zinc coated steel has been in existence since the 1800s and is used due to its sacrificial quality, that is, the zinc coating will give itself up in order to protect the underlying steel. Aluminium zinc coated steel was developed by BlueScope in the 1970s and provides up to four times the life of a zinc coated product as it slows the rate at which the zinc is sacrificed. The coating is approximately 55% aluminium and 45% zinc. Manufacturers in other countries can only use this specific coating combination under licence by BlueScope, however BlueScope advised that other aluminium zinc coatings are being developed in competition.

BlueScope claimed that the vast majority of coated products go through a further production process called roll-forming prior to being put into final use. Roll-forming involves progressive forming of the coated coil product into the desired shape, such as downpipes or guttering. BlueScope provided an illustration of the roll-forming process at **non-confidential attachment GEN 5**.

The thickness of both galvanised steel and aluminium zinc coated steel can be described in two ways – base metal thickness (BMT) or total coated thickness (TCT). BMT refers to the thickness of the base steel (i.e. substrate) only, whereas TCT refers to the steel base thickness plus the metallic coating thickness. Most international standards refer to the products in terms of BMT. BlueScope advised that most customers will also order product based on BMT, although there are some circumstances where TCT is specified. References to thicknesses in this report are to the BMT.

4.1.1 Galvanised steel

The imported goods the subject of this application are:

> *flat rolled products of iron and non-alloy steel, of a width less than 600mm and, equal to or greater than 600mm, plated or coated with zinc.*

The application stated that trade and other names often used to describe galvanised steel, include:

- GALVASPAN®;
- GALVABOND®;
- ZINCFORM®;
- ZINCANNEAL;
- ZINCHITEN®;
- GALVAFORM®;
- DECKFORM®;

- ZINCSEAL;
- Galv;
- GI;
- hot dip zinc coated steel;
- hot dip zinc/iron alloy coated steel; and
- Galvanneal.

The application also stated that the amount of zinc coating on the steel is described as its coating mass and is nominated in grams per metre squared (g/m^2), with the prefix being Z (zinc) or ZF (zinc converted to a zinc/iron alloy coating). The applicant claims that the common coating masses used for zinc coating are: Z350, Z275, Z200, Z100, and for zinc/iron alloy coating are: ZF100, ZF80 and ZF30 or equivalents based on international standards and naming conventions.

BlueScope advised that galvanised steel is preferable to aluminium zinc coated steel for use on thicker steel as it provides greater sacrificial protection to the larger areas of exposed steel cut edges. From the sales data provided in the application, we noted that during the investigation period galvanised steel was sold with thicknesses of 0.3 mm to 3.5 mm, A technical bulletin describing the benefits of zinc coatings on steel is at **non-confidential attachment GEN 6**.

Tariff classification

The application states that the goods are classified to tariff subheadings 7210.49.00 (statistical codes 55, 56, 57 and 58), and 7212.30.00 (statistical codes 61) of Schedule 3 to the *Customs Tariff Act 1995*. Customs and Border Protection's Trade Services Branch confirmed that the goods are correctly classified to these tariff subheadings. The general rate of duty is currently 5%, the DCS duty rate is free and the DCT rate is 5%. Imports from China are subject to the DCS duty rate while imports from Korea and Taiwan are subject to the DCT duty rate.

BlueScope stated that it is only aware of two tariff concession orders (TCOs) current for galvanised steel. Both these TCO's are currently being reviewed by BlueScope steel for validity. Details of these TCOs are at **confidential attachment GEN 7**.

4.1.2 Aluminium zinc coated steel

The imported goods the subject of this application are:

> *flat rolled products of iron and non-alloy steel, of a width equal to or greater than 600mm, plated or coated with aluminium-zinc alloys, not painted, whether or not including resin coating.*

The application stated that trade and other names often used to describe aluminium zinc coated steel, include:

- ZINCALUME®;
- TRUECORE®;
- GALVALUME®;
- Aluzinc, Supalume, Superlume, ZAM, GALFAN;
- zinc aluminium coated steel;

- aluminium zinc coated steel;
- Alu-Zinc steel sheet in coils;
- Al/Zn; and
- hot dipped 55% aluminium-zinc alloy coated steel sheet in coil.

The application also stated that the amount of aluminium zinc coating on the steel is described as its coating mass and is nominated in g/m^2 with the prefix being AZ (aluminium zinc). The applicant claims that the common coating masses used are AZ200 and AZ150 with some imported AZ100 making a presence in the market (<AZ150 is not recognised by the Australian Standard)

At the visit BlueScope provided a conversion table that showed the coating mass for a range of BMT and TCT thicknesses (**non-confidential attachment GEN 8**).

BlueScope advised that a large proportion of the aluminium zinc coated steel that it produces is painted and the majority of this product is sold as COLORBOND® steel, a registered product of BlueScope. From the sales data provided in the application, we noted that during the investigation period sales of painted aluminium zinc coated steel, as a proportion of all sales of aluminium zinc coated steel, was [%] by volume and [%] by value. Sales of painted aluminium zinc coated steel as a proportion of sales by the Coated Products Division was [%] by volume of [%] by revenue.

BlueScope advised that aluminium zinc coated steel is preferable to galvanised steel in applications requiring thinner steel and is typically used as materials for roofing and walling. From the sales data provided in the application, we noted that during the investigation period aluminium zinc coated steel was sold with thicknesses of 0.3 mm to 1.6 mm, but over 70% of sales were goods with a thickness of less than 0.5 mm and over 90% were goods with a thickness of less than 1.0 mm. A technical bulletin describing the benefits of aluminium zinc coatings on steel is at **non-confidential attachment GEN 9**.

Tariff classification

The application states that the goods are classified to tariff subheading 7210.61.00 (statistical codes 60, 61 and 62) of Schedule 3 to the *Customs Tariff Act 1995*. Customs and Border Protection's Trade Services Branch confirmed that the goods are correctly classified to these tariff subheadings. The general rate of duty is currently 5%, the DCS duty rate is free and the DCT rate is 5%. Imports from China are subject to the DCS duty rate while imports from Korea and Taiwan are subject to the DCT duty rate.

BlueScope stated that it does not believe there are any TCO's current for aluminium zinc coated steel.

4.1.3 Australian and international standards

The applications stated that there are a number of relevant International Standards for zinc and aluminium zinc coated products. Typically each international standard has a range of steel grades nominated as formable, commercial or structural grades. The formable/commercial grades are those with mechanical properties suitable for general pressing and forming whereas the structural grades are those with

guaranteed minimum strength properties that structural engineers utilise in their final product designs.

BlueScope stated that most coated steel imported into Australia was made to the Australian or Japanese standards. Copies of Australian Standadrd AS 1397-2011 and Japanese Standards JIS G 3302 (galvanised steel) and JIS G 3321 (aluminium zinc coated steel) are at **confidential attachment GEN 10**. A technical bulletin with a builders guide to Australian steel sheet and strip standards and a document about steel being compliant are at **non-confidential attachment GEN 11**.

In the applications, BlueScope compared various grades for Australian and major international standards. This comparison is summarised in the following table.

International standard	Grade names
General and commercial grades	
AS/NZS 1397	G1, G2
ASTM A 653 / A 653M (zinc) and ASTM A 792 (aluminium zinc)	CS types A, B and C
EN10346	DX51D, DX52D
JIS 3302 (zinc)	SGCC, SGHC
JIS 3321 (aluminium zinc)	SGLCC
Forming, pressing and drawing grades	
AS/NZS 1397	G3
ASTM A 653 / A 653M (zinc) and ASTM A 792 (aluminium zinc)	FS, DS, types A and B
EN10346	DX53D, DX54D
JIS 3302 (zinc)	SGCD, SGCDD
JIS 3321 (aluminium zinc)	SGLCD, SGLCDD
Structural grades	
AS/NZS 1397	G250, G300, G350, G450, G500, G550
ASTM A 653 / A 653M (zinc) and ASTM A 792 (aluminium zinc)	33 (230), 37 (255), 40 (275), 50 (340), 55 (380), 89 (550)
EN10346	S220GD, S250GD, S280GD, S320GD, S350GD, S550GD
JIS 3302 (zinc)	SGC340, SGC400, SGC440, SGC490, SGC570, SGH340, SGH400, SGH440, SGH490, SGH570
JIS 3321 (aluminium zinc)	SGLC400, SGLC440, SGLC490, SGLC570

At the visit BlueScope provided a further summary that showed the relevant international standard and grade that conformed to its registered trade name products, for both galvanised and zinc aluminium products (**confidential attachment GEN 12**).

4.1.4 Excluded goods

Painted zinc aluminium coated steel is excluded from the description of the goods. This was noted in the application for the investigation and subsequent initiation

notice. Following discussions with BlueScope, further investigation and confirmation from BlueScope, it was also confirmed that the following goods are not goods the subject of the applications:

- pre-painted and painted galvanised steel products (some of which are imported under TCOs which were not nominated in the application); and
- electro-galvanised steel product.

BlueScope does not manufacture electro-galvanised steel and does not consider that pre-painted steel products are covered by these applications.

4.2 Like goods

Physical likeness

BlueScope stated that the steel chemistry, degree of cold reduction, annealing temperature and line speeds are used to produce the required mechanical properties. It stated that coated steel made locally by BlueScope has a physical likeness to the goods exported from China, Korea and Taiwan and that both are manufactured to achieve mechanical properties designated by Australian and international standards.

Commercial likeness

BlueScope's stated that the coated steel it produces competes directly with imported coated steel in the Australian market.

Functional likeness

BlueScope stated that both locally produced and imported coated steel have comparable or identical end-uses.

Production likeness

BlueScope stated that locally produced and imported coated steel are manufactured in a similar manner using similar production processes.

Conclusion

Based on information submitted in the application and gathered during the visit, we are satisfied that locally produced coated steel are like goods to imported coated steel. Customs and Border Protection will further consider this issue during visits to importers and exporters.

Customs and Border Protection considers that there is an Australian industry producing like goods.

5 AUSTRALIAN INDUSTRY

5.1 Introduction

BlueScope stated that it is the only Australian manufacturer of coated flat steel and that it has been producing coated steel since the early 1960's. During the investigation period, BlueScope manufactured coated steel at both its Springhill (Port Kembla) and Western Port plants. As Western Port no longer has a hot strip mill, HRC is transported from Port Kembla by sea or rail to be further processed into coated steel.

5.2 Production process

The production process is summarised at **non-confidential attachment GEN 13**.

5.2.1 Hot rolled coil

The main raw materials used in the production of steel are iron ore, coal and fluxes (limestone and dolomite). The raw materials are fed into the top of the blast furnace in predetermined proportions and sequences. Air, which is heated to about 1200°C, is blown into the blast furnace. This causes the coke to burn, producing carbon monoxide which creates the required chemical reaction. The iron ore is reduced to molten iron by removing the oxygen. Molten iron and slag is periodically drained from the blast furnace and the molten iron is transported to the steelmaking area.

The basic oxygen steelmaking (BOS) process creates liquid steel from molten iron, scrap steel and alloying materials. The BOS vessel is charged and a lance that blows 99% pure oxygen onto the steel and iron causes the temperature to rise to about 1700°C. This melts the scrap, lowers the carbon content of the molten iron and helps remove unwanted elements. Samples are tested and computer analyses of the steel are done to ensure the desired chemistry is achieved. The steel can be further refined by adding alloying materials which give the steel special properties required by the customer. The liquid steel is cast into slabs of various dimensions so that it can be rolled.

HRC was manufactured on either of two hot strip mills. The slab is reheated in a furnace to obtain consistent temperature of around 1200°C. The heated slab is reduced in thickness by passing through a set of five or six rolling mill stands to produce HRC of the desired thickness and widths. The HRC is then tranferred to the Springhill and Western Port coating mills.

5.2.2 Coated steel

Pickling

HRC is pickled to remove scale (iron oxide) formed during the hot rolling process. The HRC is unwound, side trimmed to the customers required width and passed through a bath of 70°C hydrochloric acid, washed, dried and recoiled.

Cold rolling

The pickled HRC is cold rolled to reduce the steel thickness. The cold rolling process is conducted at room temperature. The cold rolling process involves passing the HRC through a number of rolling mill stands to progressively reduce the thickness without changing the width. For example, a 1,200 metre coil of 2.5 mm thickness could be reduced to 0.5 mm thickness and 6,000 metres long. During the process the grain structure is elongaged, making the steel hard and springy. This intermediate steel product is known as a Cold Rolled Fully Hard (CRFH) product.

Metal coating

The cold rolled coil is cleaned to remove any oils from the cold rolling process and any traces of surface oxide and is then annealed in an inert atmosphere furnace. Where formability is the prime requirement, the coil is fully annealed. Where high strength and limited formability is required, the coil is partially annealed.

The clean and annealed coil then passes from the furnace through a molten metal bath of the required composition where the molten metal chemically bonds to the steel surface. Aluminium zinc coated steel can be supplied with a range of surface treatments (passivation coating and a resin coating) to protect the service or supplied skin passed and without surface treatment for feed for paint lines. Thinner gauges of galvanised steel are coated with oil, but thicker gauges are produced bare.

5.2.3 Australian industry

Based on information submitted in the application and gathered during the visit, we are satisfied that there is an Australian industry producing like goods.

5.3 Capacity, employment and annual turnover

The capabilities of each plant in terms of number of coating lines, dimensions and finishes are at **confidential attachment GEN 14**. In summary:

- Port Kembla has three coating lines – one for galvanised, one for aluminium zinc and one that can produce either;
  - the width range for these lines is 600 mm to 1,325 mm;
  - line two is the only line that can produce thicker gauges of galvanised steel; and
  - line three does not have a resin coating capability so any aluminium zinc coated steel must be transferred to the paint line;
- Western Port has two operating coating lines, - one for galvanised and the other for aluminium zinc coated steel;
  - line five aluminium zinc coating line was mothballed in November 2011;
  - the width range for these lines is 680 mm to 1,550 mm;
  - the metal coating capability of line six has a maximum width capability of 1,815 mm, but is practically restricted by the capability of the Westernport pickling line and as such, has a maximum width of 1550mm.

The current capacities of these lines are:

- galvanised steel – 730,000 tonnes per annum
- zinc aluminium coated steel – 480,000 tonnes per annum (700,000 tonnes per annum including the mothballed line)
- the dual pot coating line that can produce both galvanised and zinc aluminium coated steel product has a capacity of 215,000 tonnes per annum and is additive to the above capacities.

The total combined metallic coating capacity is around 1,645,000 tonnes per annum.

The turnover for galvanised steel during the investigation period was [$] million, or [%] of the total revenue of the Coated Products Division. The turnover for aluminium zinc coated steel during the same period was [$] million, or [%] of the total revenue of the Coated Products Division.

Total employment in respect galvanised steel was [*number*] during the investigation period, a reduction of about [*number*] over the previous year. BlueScope advised that production on the heavy galvanised line was reduced from 24 hours per day seven days per week to five days per week. Total employment in respect aluminium zinc coated steel was [*number*] during the investigation period, a reduction of about [*number*] over the previous year. We note that the mothballed production line at Western Port produced aluminium zinc coated steel.

6 AUSTRALIAN MARKET

6.1 Demand

Galvanised and aluminium zinc coated steel are sold into the same market segments, but have different end uses.

Locally produced and imported galvanised steel is mainly used in the building and construction industry and the manufacturing industry. In the building and construction industry, its main uses are for light structural sections (purlins and girts) in commercial and industrial buildings, for structural sections for carports, sheds and garages, plastering and ceiling accessories, garage door tracks, structural nail-plates, post stirrups, frame connectors and bracing for timber frames. In the manufacturing industry, its main uses are for air-conditioning ducting, cable trays, components in domestic appliances, hot water system components, automotive pressings, electrical meter cabinets, tool-boxes, grain silos components and general manufactured articles.

Locally produced and imported aluminium zinc coated steel is also mainly used in the building and construction industry and the manufacturing industry. In the building and construction industry, its main uses are for roll formed roof and wall cladding, rain water goods such as guttering and downpipes, roof flashing and trims, residential roof trusses, residential roofing battens, ceiling battens, residential house framing, wall structural sections, office wall framing, garden sheds and garage door panels. In the manufacturing industry its main uses are for components in domestic appliances, hot water system components, cabinets, flues, ducting, grain silos and general manufactured articles.

BlueScope claimed that the Australian market for these products has been depressed for the last 24 months. Manufacturing and commercial construction is slow, the automotive industry is struggling and residential construction is at a ten year low. BlueScope claimed that architectural and engineering firms are laying off staff and that this indicates the market will take some years to improve given the lead times from planning to construction.

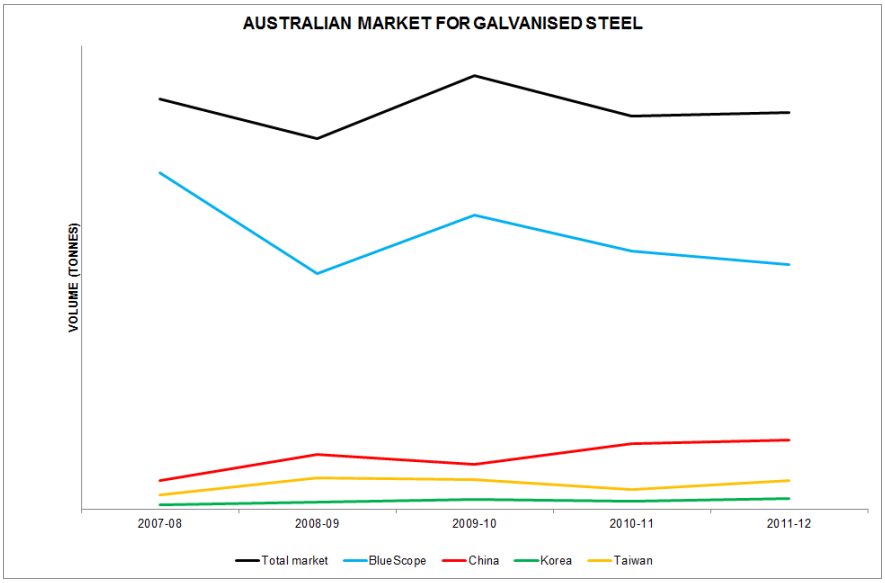
In respect of the automotive industry, BlueScope claimed that once manufacturers had established a supply chain for a particular model, that such arrangements did not change during the life of the model.

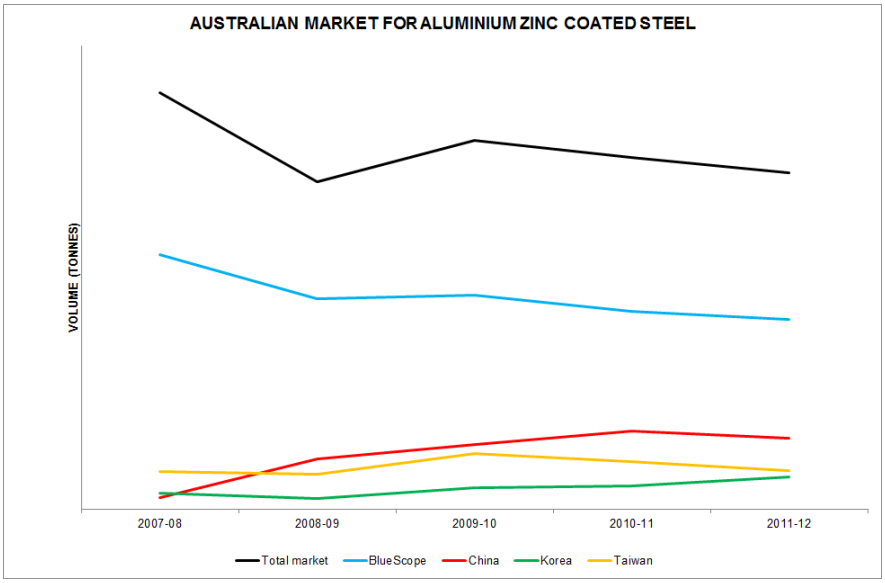
BlueScope claimed that the South East Asian markets are somewhat stronger, although the Chinese market is softening. However, producers in these areas in recent years decided to expand capacity. This capacity is now coming on line and these producers are looking for markets in which to sell their products.

6.2 Market size

We have estimated the size of the Australian market using data from Customs and Border Protection's import database and information verified during out visit. The market for galvanised steel was almost 650,000 tonnes in 2011-12, while the market

for aluminium zinc coated steel was a little over 200,000 tonnes. The Australian market is illustrated in the following charts.





6.3 Marketing and distribution

BlueScope sells coated steel under several brand names. BlueScope stated that different brands were sold into different market sectors and that this enabled BlueScope to develop marketing strategies that targeted particular market sectors.

GALVABOND® is the largest selling brand of galvanised steel and is a commercial grade suitable for forming, pressing and drawing. This product has the typical spangled surface that forms as the zinc coating dries. ZINCANNEAL is a similar product but the zinc coating is subjected to direct fire gas furnace post exiting the coating bath and consequently the surface has a much finer crystalline structure. GALVASPAN® is the second largest selling brand of galvanised steel and is aimed at the construction market for the production of purlins and girts. The vast majority of sales of this brand have a zinc coating mass of 350 g/m^2. ZINCHITEN® is a structural product that can have the same structural properties, but is typically sold

with a lower coating mass. GALVAFORM® is a brand specially developed for the automotive sector and DECKFORM® was developed specifically for the steel decking market.

ZINCALUME® and TRUECORE® are the main brands of aluminium zinc coated steel. ZINCALUME® is the largest selling brand. TRUECORE® may have the same structural properties but it is targeted to the house framing market. It is produced in limited sizes to suit the framing market and is coated with a blue tinted resin.

Product information about major brands is at **non-confidential attachment GEN 15**.

About [%] of galvanised steel sales are made directly to the domestic building product manufacturing industry. These customers roll form the steel into building products such as structural sections for commercial buildings, garages and sheds. The building product manufacturers then distribute the manufactured products to builders. If these customers require slit coils it is supplied from the service centres. Typically delivery is made four to five weeks after the order is placed, but there are many common sizes that may be delivered within two or three days. Smaller quantities are sold directly to customers in the automotive (car and component manufacturers), manufacturing and pipe and tube sectors. The balance is sold through distributors such as [*company*] and [*company*].

About [%] of aluminium zinc coated steel sales are made directly to the domestic building product manufacturing industry. These customers roll form the steel into building products such as building cladding. The building product manufacturers then distribute the manufactured products to builders. Most of the balance is sold through distributors such as [*company*] and [*company*] (only a very smal volume is sold into other market sectors).

Distributors and resellers may offer a range of services such as smaller parcels of product, along with credit facilities and further processing (such as sheeting, slitting and blanking). Distributors normally purchase imports or BlueScope's products, but some purchase from both sources.

Both BlueScope and importers of coated steel compete in all states and territories in Australia and across each segment via the same distribution channels in order to sell product into the market.

7 SALES

7.1 Domestic sales

BlueScope sells galvanised and aluminium zinc coated steel to the building and construction, general manufacturing, distribution, and automotive markets in Australia. Its products and the prices are defined by grade (or model), thickness, width and coating mass.

During the verification of sales data to the financial statements (refer to section 7.6) the appendices for each application (A2, A3, A4 and A6) for 2011-12 was reconciled to the COGNOS data which was subsequently reconciled to the audited financial statements.

BlueScope divided sales into four thickness ranges in the revised Appendix A4 spreadsheets for each type of coated steel;

- less than or equal to 0.40 mm;
- greater than 0.40 mm to less than or equal to 0.60 mm;
- greater than 0.60 mm to less than or equal to 1.0 mm; and
- greater than 1.0 mm.

BlueScope divided sales into three width ranges:

- less than or equal to 600 mm;
- greater than 600 mm to less than or equal to 1220 mm; and
- greater than 1220 mm.

BlueScope also included in each sales listing the model and grade (commercial, forming or structural) of each sale. The model name indicated firstly the name of the product (for example, proprietary brands such as GALVABOND© for galvanised steel and ZINCALUME© for aluminium zinc coated steel). The product grade is indicated by codes such as G2, G350 and G550. The sales listings also identified the coating mass. BlueScope explained that a letter indicated the type of coating (for example, 'Z' indicating zinc and 'AZ' indicating aluminium zinc) and a numeric code indicating the mass of the coating expressed as a guaranteed minimum grams per square metre (for example, 'Z450' denotes a guaranteed minimum of 450 grams of zinc per square metre of steel).

BlueScope considered that the model, grade and coating mass, along with width, thickness finish and pack size, were the main price determinates.

7.2 Pricing

BlueScope described itself as a price-taker rather than a price setter in the Australian metal coated steel markets. Prices for all coated steel are set using a methodology BlueScope refers to as import parity pricing (IPP). IPP takes into *[pricing strategy and process]*

BlueScope maintains customer-specific price lists, and provided examples with its application. As a result of the discounts and rebates structure in place, prices paid by customers are typically lower than the list price.

BlueScope provided a copy of its March 2012 distributor price schedule (**confidential attachment DOM 1**). This price list was issued in March 2012 and applied to deliveries in June 2012 and identifies prices for common brand specifications (for example, GALVABOND®G2 Z275) for a number of variations such as base metal thickness and width. The price list also identifies extra prices for variations in factors such as grade and coating mass.

7.3 Rebates and discounts

BlueScope explained that it offered a range of rebates to its customers. These were generally classified as either *[type]* or *[type]* rebates. Rebates are a normal part of BlueScope's pricing mechanisms and *[pricing strategy and process]*

In addition to rebates, BlueScope offered what was referred to as an 'early payment' discount. This was generally between [%] applicable when customers paid by the due date.

7.4 Ordering, manufacture and delivery

Orders are generally filled within three to four weeks, with the exception of orders of common sizes received from roll forming customers, which may be delivered *[timing]*. BlueScope has an electronic ordering system named 'Steel Connect' to which customers have direct access to place orders. Steel Connect feeds order information into the computer system which plans production at the steelworks.

BlueScope sells its products on a free-into-store basis. Freight and delivery are organised (at the Port Kembla steelworks) by the logistics branch, which invoices the steelworks.

BlueScope explained that the vast majority of its product is made to order. A small volume of product, known as 'surplus' product (which is that overproduced for an order) is sold monthly in an auction-style at considerably lower prices. BlueScope confirmed that these sales were included in the Appendices A4.

7.5 Sales to the related parties

BlueScope explained that BlueScope Distribution centres and BlueScope Lysaght businesses purchase *[amount]* volumes of both types of coated steel. Distributors typically sell small parcels to their customers, while larger customers buy direct from BlueScope.

BlueScope explained that the selling prices to related entities such as BlueScope Distribution and BlueScope Lysaght were comparable to those offered to major unrelated customers. We examined the sales data provided and found that selling prices for both types of coated steel were similar for related and unrelated parties.

7.6 Verification to financial accounts

We sought to reconcile the sales data provided in both applications to BlueScope's 2011-12 audited financial accounts to ensure completeness. Note 51 to BlueScope's consolidated accounts is a statement of comprehensive income for the parent entity and identified revenue of 2,468.4 million. BlueScope identified Hyperion revenue for coated sales [$] and revenue from other sources which reconciled to total revenue. The main other sources were Lysaght sales revenue [$], which is revenue from the sale of roll formed steel, corporate revenue [$] which is primarily intercompany interest and guarantee fees and eliminations [$].

The Coated Products Division identified revenue of [$]. The difference from the coated sales revenue above is sundry revenue less items reclassified from revenue. The trial balance for the Coated Products Division (SAP account 1310) reconciles to this revenue figure after excluding export commissions which are included as a cost in the Coated Products Division profit and loss statement. Refer to **confidential attachment DOM 2**.

BlueScope's day to day accounting is done in various systems such as an invoicing and settlement discounts system , debtor management, rebate model, manufacturing costs and freight model systems. These systems feed into the COGNOS database, which lists the line-by-line domestic and export sales revenue and all associated costs for all products. The totals in the database differ from the totals in the trial balance in SAP, which reconcile with the audited financial statements. BlueScope explained that this was because the COGNOS database did not take into account any accounting adjustments that occurred, such as accruals or changes to transfer pricing.

COGNOS identifies gross revenue (which is the invoice value), rebates, discounts and commissions (which only apply to export sales). BlueScope downloaded COGNOS into an Excel spreadsheet for each quarter during the investigation period. It expressed the difference between COGNOS and SAP as dollars per tonne and adjusted the revenue components for each line in new columns that reconcile to SAP. It added a new column for other charges, which is the difference between gross revenue in SAP and COGNOS, plus sales deductions and allowances that were entered into SAP, but not COGNOS. The differences between SAP and COGNOS for gross domestic income was [$] per tonne, domestic rebates was [$]per tonne, discounts was [$]per tonne and other charges were [$]per tonne. Given that the average selling price for the Coated Products Division was approximately [$]per tonne, we consider that the adjusted COGNOS sales values are suitable for our analysis.

We are satisfied that the revised COGNOS data reconciles to the audited financial statements.

Each Appendix A4 was created using the revised COGNOS data. However, gross revenue was that in COGNOS to ensure that selected sales invoices reconciled to Appendix A4. As noted above, the difference between SAP and COGNOS gross revenue was included in other charges. Rebates and discounts were the revised data from COGNOS.

BlueScope also provided all COGNOS datasets for the period 2007-08 to 2011-12 and trial balance to COGNOS reconciliation files for the same period. We verified that the COGNOS data collected during the visit did not change. We reconciled domestic sales for galvanised steel and aluminium zinc coated steel from the Appendix A4 for each product group to the COGNOS data. The reconciliation is summarised at **confidential attachment DOM 3**.

7.7 Verification to source documents

Prior to the visit, eight sales from Appendix A4 for galvanised steel were selected for verification:

No.	Customer name	Product model	Invoice number	Invoice date
1	[redacted]			
2				
3				
4				
5				
6				
7				
8				

Nine sales from Appendix A4 for aluminium zinc coated steel were selected for verification:

No.	Customer name	Product model	Invoice number	Invoice date
1	[redacted]			
2				
3				
4				
5				
6				
7				
8				
9				

For each sale BlueScope provided:

- the online order submitted by the customer through BlueScope's online ordering system;
- the commercial tax invoice;
- proof of payment reconciling to the commercial tax invoice; and
- a credit adjustment note for each customer recieving a discount for early payment.

We reconciled each sale to Appendix A4. These documents are at **confidential attachment DOM 4.**

Some product in the third selected sale of galvanised steel had a unit invoice value of [$] per tonne. BlueScope explained that this sale was not of product, but a slitting fee for product the customer had purchased in a separate transaction. It explained that this should be classified as *[type]* rather than 'galvanised' in COGNOS.

Following the visit, BlueScope provided copies of rebate schedule for three selected zinc aluminium coated steel customers and two selected galvanised steel customers. BlueScope also provided a customer ledger showing accrual of rebates credited to that customer's account. We collected copies of internal credit adjustment notes for each of the selected customers that tied back to the verified sales invoices and to COGNOS. As discussed above, Appendix A4 reconciles to SAP, using an adjusting amount per tonne for each quarter to take account of additional rebates not in COGNOS. Accordingly, the rebate credit notes we received did not precisely align with Appendix A4 because of the abovementioned quarterly adjustment. The additional documents relating to the selected sales are at **confidential attachment DOM 5.**

7.7.1 Freight costs

We verified the freight costs for each selected sale. The freight cost comprised up to three components:

- outward freight from the plant to either the customer or to a service centre;
- a warehousing charge for the service centre; and
- freight from the service centre to the customer, where applicable.

BlueScope explained that the outward freight from the plant was allocated in the COGNOS database using a rate card. The rate cards contain information relating to the cost of freight using a standard costs model taking into account the type of transport (for example rail or truck) and destination. BlueScope advised that the freight rate is reviewed monthly. BlueScope explained that the freight rate card referred to freight of finished coated steel directly to customer. Freight from the service centre to the customer and warehousing costs are amalgamated in each service centre's works, freight and process costs. This part of freight was also isolated and added to the freight line in each Appendix A6. The freight cost reflects COGNOS records, which show the amount for standard, rather than actual costs, with an adjustment to reflect actual costs made in SAP when preparing the trial balance. Each of these steps were observed at the verification, and although it was not possible to reconcile actual freight costs to sales at a line-by-line level of detail, we are satisfied that the costs recording systems for freight are robust. Documents supporting freight costs for the selected sales is at **confidential attachment DOM 6**.

7.7.2 Packing costs

Packing costs are similarly calculated using standard cost models. The packing costs are specific to the product model and destination, with BlueScope indicating there are some *[number]* packing model cost combinations. Packing costs are also included in manufacturing costs in BlueScope's financial systems but had been isolated for the purposes of compiling each Appendix A6.

7.8 Conclusion

We have verified the sales information provided by BlueScope in the Appendix A4 for each type of coated steel. We are satisfied the data is relevant and accurate, and suitable for the purposes of injury analysis.

8 COST TO MAKE AND SELL

8.1 Approach to verification

As noted in section 7, BlueScope provided revised data following our visit. BlueScope provided an Appendix A6 for each type of coated steel identifying revenue and costs during the investigation period. It provided electronic copies of the Coated Products Division trial balance and COGNOS database for each quarter of 2011-12. During the verification of sales we verified this trial balance to the audited accounts for BlueScope. The parent entity details in the audited accounts do not separately identify the cost of goods sold and we sought to reconcile the costs in each Appendix A6 to the trial balance for the Coated Products Division. We have previously verified net revenue in each Appendix A6.

8.2 Production volumes

BlueScope stated that its reported production was total sales of coated steel. It explained that it considered sales to be an appropriate measure of production as goods were made to order. Sale tonnes are captured from an order tracking inventory system. Sales include numerous products to both export and domestic customers. We verified that the sales volume of the two types of coated steel to domestic customers in the COGNOS database in each quarter matched production reported in Appendix A6.

We noted that there were higher production costs in 2008-09. BlueScope explained that this was due to a fall in production volumes in this period due to the effect of the global financial crisis.

8.3 Cost to make

8.3.1 Verification to financial statements

BlueScope advised that the manufacturing cost reported in SAP is total costs less freight, scrap income and selling, general and administration (SG&A) expenses. Costs for individual models cannot be identified in SAP. In August 2011, BlueScope announced a major restructure of its Australian operations that resulted in significant additional costs in 2011-12. These costs included assets written off and the cost to achieve the reorganisation. The revised data submitted by BlueScope excluded these costs. We examined the costs excluded and are satisfied that they relate to the restructure. We consider that it is necessary to exclude the restructure costs so that cost trends will not be distorted by the restructure.

In COGNOS standard manufacturing costs are captured for each invoice line from a management accounting system. Costs are identified for each product by grade, dimension, coating mass and other variables. The full cost of manufacture in COGNOS includes these standard costs. Freight to the customer is obtained from a freight module and is separately reported in COGNOS. However, freight to the service centres and warehousing are included in the COGNOS full cost of manufacture. BlueScope separately reported freight and warehousing in SG&A expenses and it deducted these costs from the full cost of manufacture. As noted in

section 8.3.2, HRC was invoiced to the Coated Products Division at cost, as recorded by Cognos. In SAP this price was changed to reflect a monthly market price based on sales to unrelated customers in the *[sector].* This adjustment is not reported in COGNOS. BlueScope therefore adjusted the full cost of manufacture to include the transfer price adjustment.

SAP picks up manufacturing costs at a high level and costs for individual products cannot be identified. Variances are accounted for as actual costs are entered into SAP. The adjusted COGNOS costs were further adjusted to reflect the difference between the manufacturing costs from SAP. This adjustment in effect reflects the variances between standard and actual costs. The variance in the September quarter 2011 was less than [%], in the December quarter 2011 was [%], in the March quarter 2012 was [%] and in the June quarter 2012 was [%]. BlueScope stated that the June variance was largely driven by lower production volumes required to achieve closing inventory targets. We consider the adjusted COGNOS costs reflect BlueScope's actual cost of production.

Using pivot tables, we reconciled the adjusted COGNOS costs to the cost to make in Appendix A6 for each product group. BlueScope excluded packing costs from the cost to make and included them in SG&A expenses. As noted above, freight to the service centres and warehousing was deducted from the full cost of manufacture and combined with the freight to the customer separately reported in COGNOS. These costs were included in SG&A expenses. The COGNOS database also included SG&A expenses (not including freight and warehousing costs). Freight, warehousing, packing costs and SG&A expenses were adjusted by reference to SAP data in the same manner as the adjusted cost of manufacture. We reconciled these costs to SG&A expenses in the Appendix A6 for each product group. Summaries of the reconciliation are at **confidential attachment COSTS 1**.

As noted above, the parent entity details in the audited accounts do not separately identify the cost of goods sold and we sought to reconcile the costs in each Appendix A6 to the trial balance for the Coated Products Division, which we had reconciled to the audited financial statements. We are satisfied that the cost to make and sell in Appendix A6 for each product group reconcile to the trial balance for the Coated Products Division.

8.3.2 Verification to source documents

As noted above, BlueScope uses standard costs that are captured from a product costing model that feeds into COGNOS. Examples of the standard cost for models of galvanised and aluminium coated steel are at **confidential attachment COSTS 2**. These standard costs identify detailed costs through every process, including material costs, processing costs and losses. BlueScope advised that there is a standard cost for each coating mass, thickness and width for each model. BlueScope stated that there are *[number]* of different product costs. Freight and packing costs are captured from separate systems that feed into COGNOS. These costs are used to value inventory during the various stages of production.

HRC is sourced from a related company, BlueScope Steel (AIS) Pty Ltd. BlueScope is invoiced at cost for HRC, but this price is later adjusted to a market price using HRC sales of base grade product to external customers in the *[sector*]. This

adjustment is referred to a transfer pricing adjustment. BlueScope considers these sales are the most comparable because of volumes involved and the like specifications. The costing model identifies the base cost, extras for grade and dimensions and inward handling costs.

The Appendix A6 identifies feed costs which is the works feed cost from COGNOS after the transfer price adjustment. BlueScope advised that the works feed cost is a standard cost based on an estimate of the HRC feed cost to BlueScope plus any inwards handling costs and dimension / grade extras. The selling prices of HRC to the Coated Products Division were verified during the current HRC investigation. However, BlueScope advised that there is always a difference between the invoice price and the feed cost because of the estimate of feed costs and inwards handling charges. Comparisons of COGNOS feed costs and invoiced prices are summarised in the following table/

	Feed cost	**Invoice price**
September quarter 2011		
December quarter 2011		
March quarter 2012		

Given that feed costs are estimated, that there are additional charges and that other factors may influence the comparison (such as timing differences - coil invoiced may not be put into production immediately), we consider that the feed costs in COGNOS are a reflection of the invoiced price of HRC.

HRC, coating costs and freight account for more than [%] of the cost to make coated steel. In the standard costing system, coated metals, freight and exchange rates are adjusted *[timing],* scrap quarterly and processing costs *[timing].*

The first process in the production process is the pickled and oil line and the cold rolling line. In the Springhill plant this is a combined process, but in Western Port plant they are two separate processes. The main costs are processing costs, but there are some metal losses which are partly offset by scrap credits. We did not further investigate these costs.

The product at this stage is referred to as cold rolled fully hard. The next process is the metal coating line where the HRC is passed through the metal baths to achieve the coating of the required thickness and processed to achieve the required physical properties required by the customer. The largest cost component in this production stage is the metal coating cost. These costs are estimated using data from the London Metal Exchange and exchange rates. We sought to test the reasonableness of standard metal costs by reference to actual purchases during 2011-12. Copies of invoices for purchases of aluminium and zinc are at **confidential attachment COSTS 3**. The standard costs of aluminium and zinc at confidential attachment COSTS 2 were [$] and [$] respectively in April 2012. A premium was added to this cost and it was converted to Australian dollars using an exchange rate of *[number].* The standard costs reflected the price paid for aluminium and zinc in April 2012.

The cost of aluminium and zinc in the standard costs is calculated by reference to the required coating mass, the thickness of the particular product and the mass of bare

steel per cubic metre. BlueScope stated that it used thicknesses groups to reduce the number of product groups. For example, costs for thicknesses in the range of *[number]* mm to *[number]* mm are calculated using a thickness of *[number]* . Further, to guarantee the stated coating mass the standard cost is calculated using a higher coating mass. For example, to guarantee a zinc coating mass of 275 gram per square metre, BlueScope calculates the standard cost using *[number]* gram per square metre.

8.4 SG&A expenses

BlueScope used SG&A expenses from COGNOS, adjusted for difference from SAP. For domestic sales it applied [%] to selling expenses, [%] to administrative expenses and [%] to finance expenses. We verified that the SG&A expenses, as a percentage of net revenue, were similar to this ratio for the company overall.

BlueScope also included delivery, warehousing and packing expenses. We verified the allocation of these expenses when verifying the cost to make.

We have accepted the SG&A expenses presented by BlueScope.

8.5 Conclusion

We have verified the cost information provided by BlueScope and we are satisfied the data is relevant and accurate, and suitable for the purposes of injury analysis. An annual summary of each appendix A6 data is at **confidential appendix 1**.

9 ECONOMIC CONDITION OF THE INDUSTRY

9.1 Galvanised steel

9.1.1 Introduction

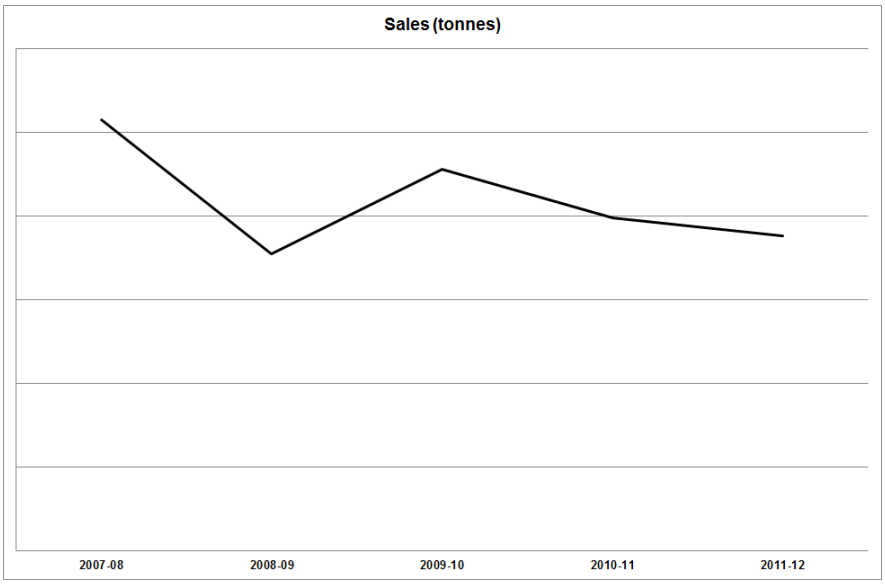
BlueScope estimates that injury from exports of galvanised steel from China, Korea and Taiwan commenced to impact profit and profitability in 2010-11. It achieved a recovery in its domestic sales of galvanised steel in 2009-10 following the global financial crisis and commenced to lose sales volume and market share in 2010-11, impacting profit and profitability. BlueScope claimed it has suffered injury in the form of:

- loss of sales volume;
- reduced market share;
- reduced revenues;
- price undercutting;
- price depression;
- price suppression;
- reduced profits;
- reduced profitability;
- reduced return on investment;
- reduced ability to raise capital for re-investment; and
- reduced employment.

9.1.2 Volume effects

Sales volume

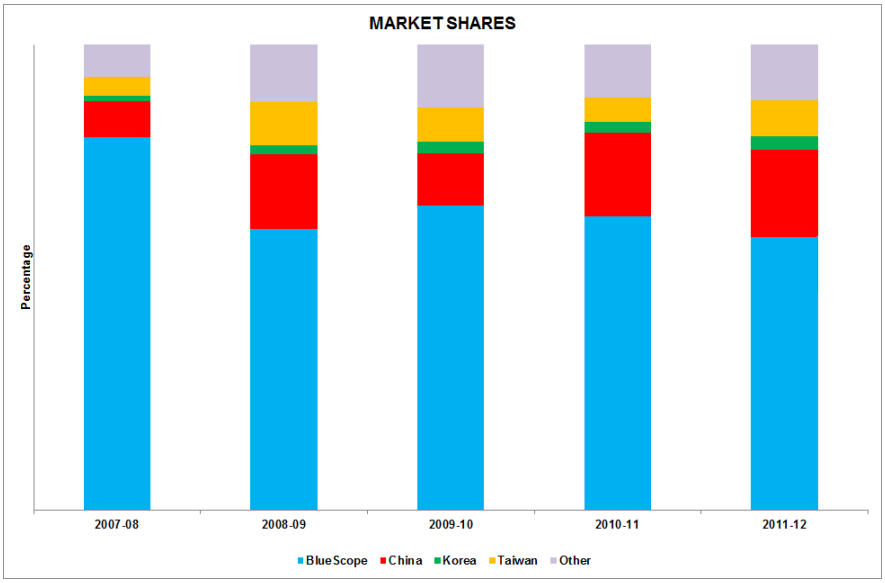
BlueScope's sales volume over the injury analysis period is illustrated in the following chart.



BlueScope's sales volume fell in 2008-09, rose in 2009-10, fell in 2010-11 and fell again in 2011-12. The volume achieved in 2011-12 was lower than in 2007-08. We consider that BlueScope has suffered injury in the form of reduced sales volume.

Market shares

We have estimated market shares using data from Customs and Border Protection's import database and information verified during the visit. Movements in market shares are illustrated in the following chart.



BlueScope's market share has fallen since 2009-10. We consider that BlueScope has suffered injury in the form of reduced market share.

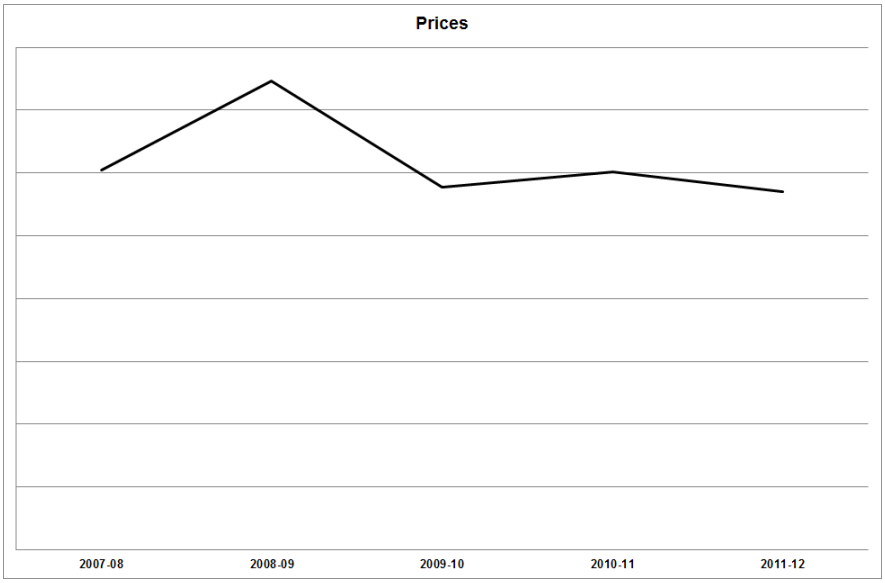
9.1.3 Price effects

Price undercutting

Price undercutting occurs when imported product is sold at a price below that of the Australian manufactured product. BlueScope's claim of price undercutting will be assessed when visits to importers are completed.

Price depression

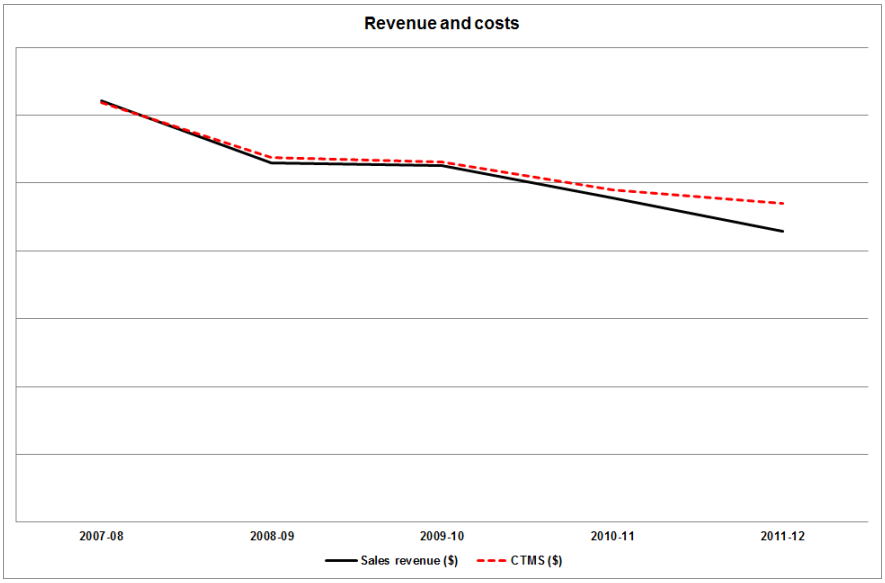
Price depression occurs when there is a reduction in prices. Movements in BlueScope's prices are illustrated in the following chart.



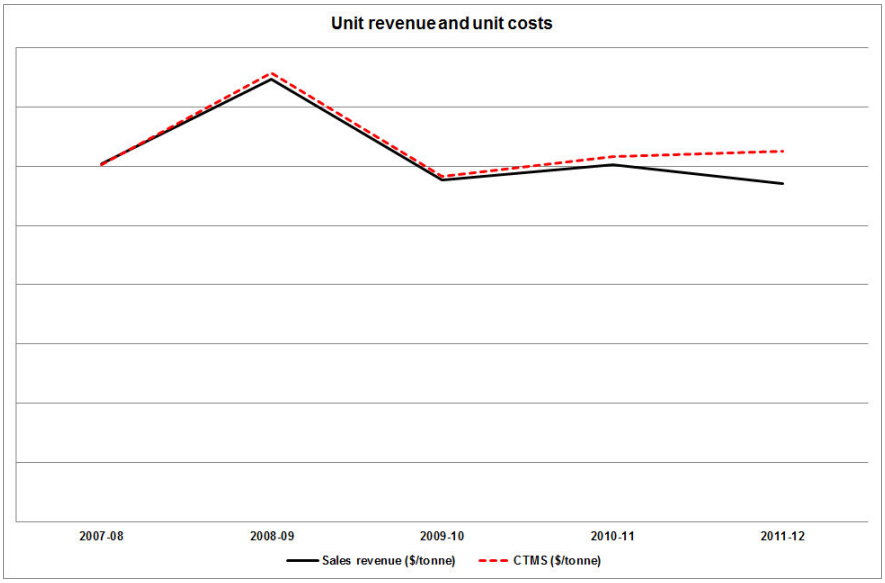
BlueScope's prices rose in 2008-09, fell in 2009-10, rose marginally in 2010-11 and fell marginally in 2011-12. BlueScope's prices in 2011-12 were marginally lower than in 2007-08, but were much lower than prices in 2008-09. We consider that BlueScope has suffered injury in the form of price depression.

Price Suppression

Price suppression occurs when price increases for the applicant's product, which otherwise would have occurred, have been prevented. An indicator of price suppression may be the margin between revenues and costs. The relationship between unit and total revenues and costs are illustrated in the following charts.



Total revenue and costs were similar from 2007-08 to 2010-11, with both revenue and costs falling each year. In 2011-12, total revenue fell while costs rose; total costs were higher than total revenue.

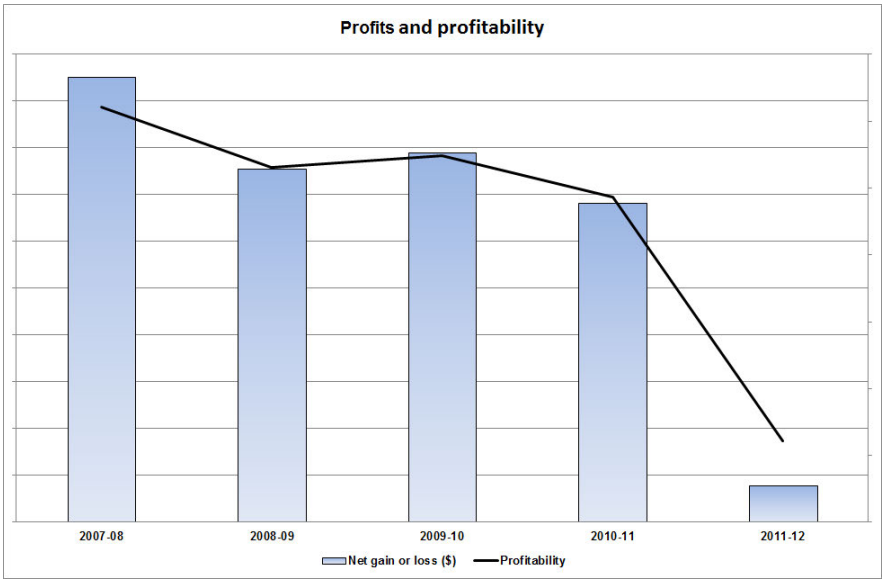


Unit revenue and costs were also similar from 2007-08 to 2010-11. Unit revenue and costs rose in 2008-09, fell in 2009-10 and rose marginally in 2010-11. In 2011-12, unit revenue fell while costs rose; unit costs were higher than unit revenue.

We consider that BlueScope has suffered injury in the form of price suppression.

9.1.4 Profits and profitability

BlueScope's profits and profitability are illustrated in the following chart. Profitability is profits expressed as a percentage of revenue.



BlueScope's profits and profitability fluctuated from 2007-08 to 2010-11, but fell significantly in 2011-12. We consider that BlueScope has suffered injury in the form of reduced profits and profitability.

9.2 Aluminium zinc coated steel

9.2.1 Introduction

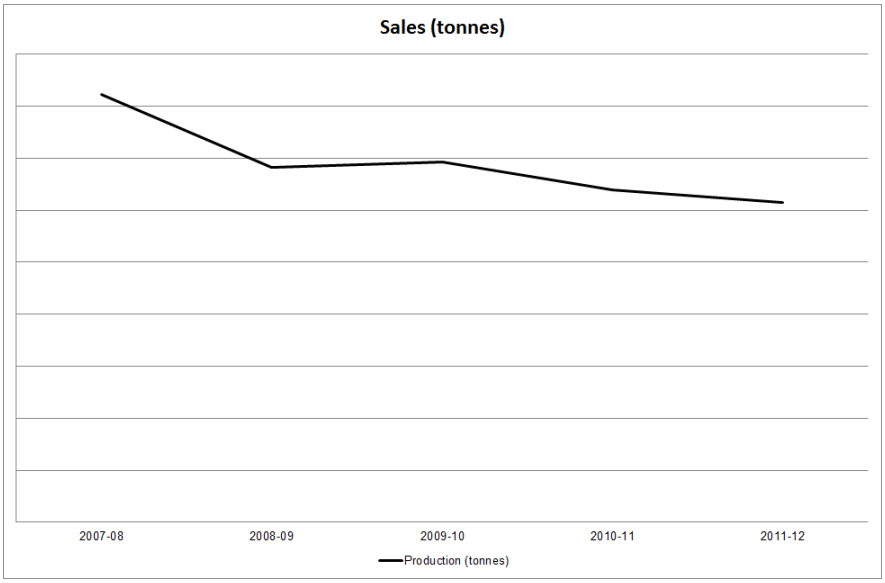
BlueScope claimed that material injury in respect of aluminium zinc coated steel commenced in 2010-11 and has been exacerbated in 2011-12. It claimed it has suffered injury in the form of:

- loss of sales volume;
- reduced market share;
- reduced revenues;
- price undercutting;
- price depression;
- price suppression;
- reduced profits;
- reduced profitability;
- reduced return on investment;
- reduced ability to raise capital for re-investment; and
- reduced employment.

9.2.2 Volume effects

Sales volume

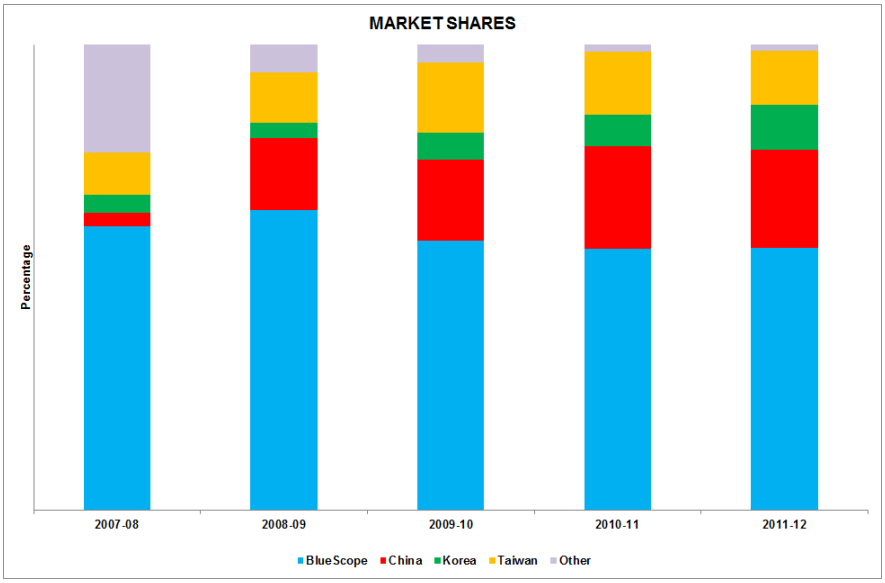
BlueScope's sales volume over the injury analysis period is illustrated in the following chart.



BlueScope's sales volume fell in 2008-09, rose marginally in 2009-10, fell in 2010-11 and fell again in 2011-12. The volume achieved in 2011-12 was lower than in 2007-08. We consider that BlueScope has suffered injury in the form of reduced sales volume.

Market shares

We have estimated market shares using data from Customs and Border Protection's import database and information verified during the visit. Movements in market shares are illustrated in the following chart.



BlueScope's market share fell in 2009-10, but has remained stable since.

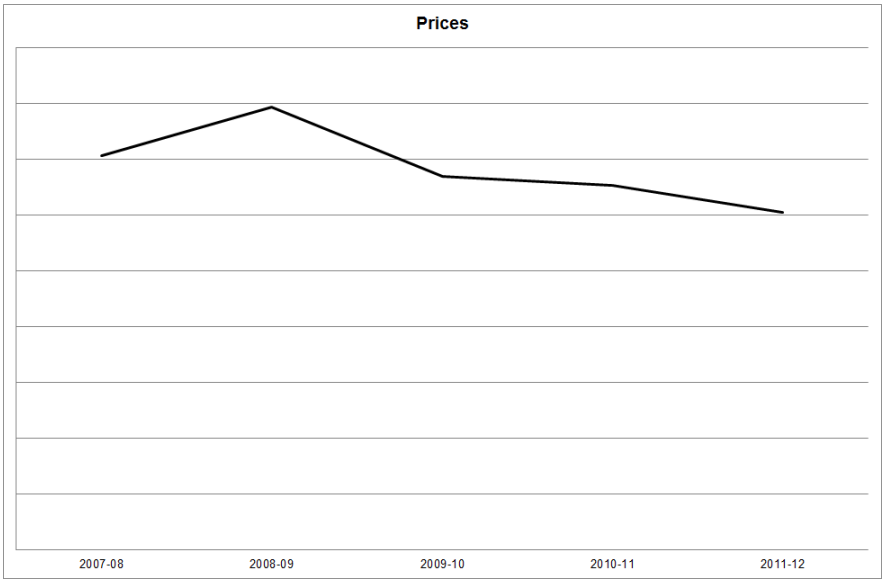
9.2.3 Price effects

Price undercutting

Price undercutting occurs when imported product is sold at a price below that of the Australian manufactured product. BlueScope's claim of price undercutting will be assessed when visits to importers are completed.

Price depression

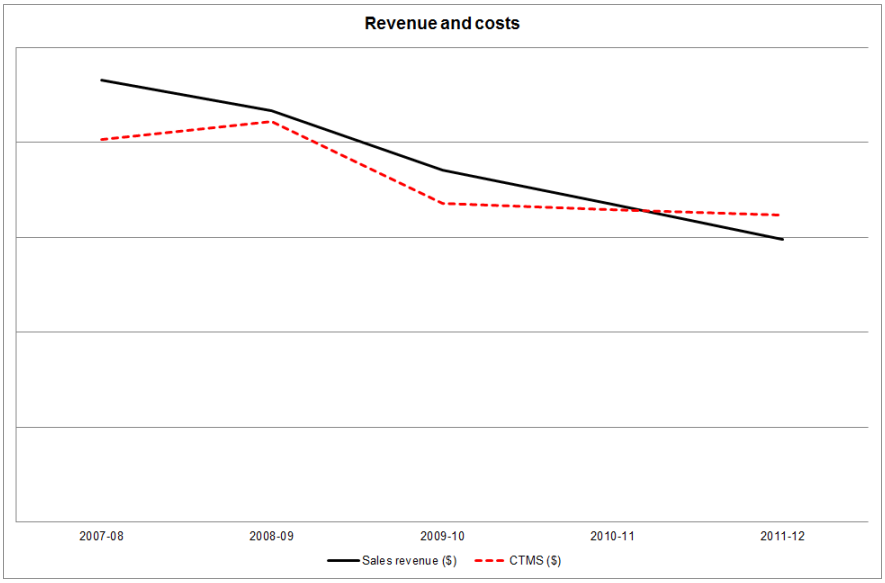
Price depression occurs when there is a reduction in prices. Movements in BlueScope's prices are illustrated in the following chart.



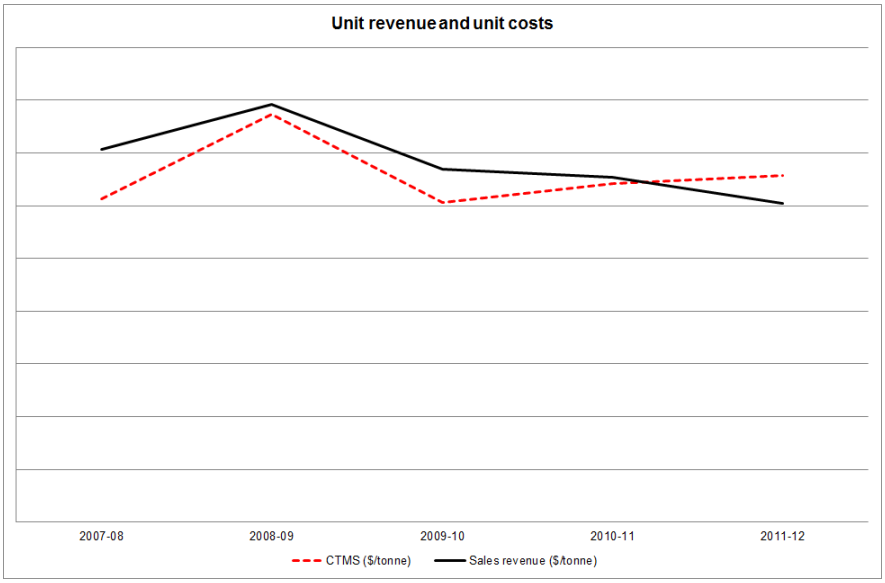
BlueScope's prices rose in 2008-09, but has fallen since 2009-10. BlueScope's prices in 2011-12 were lower than in 2007-08. We consider that BlueScope has suffered injury in the form of price depression.

Price Suppression

Price suppression occurs when price increases for the applicant's product, which otherwise would have occurred, have been prevented. An indicator of price suppression may be the margin between revenues and costs. The relationship between unit and total revenues and costs are illustrated in the following charts.



Total revenue exceeded total costs from 2007-08 to 2009-10. Since 2009-10 both total revenue and total costs have fallen, but total revenue has fallen at a greater rate. Total costs now exceed total revenue.

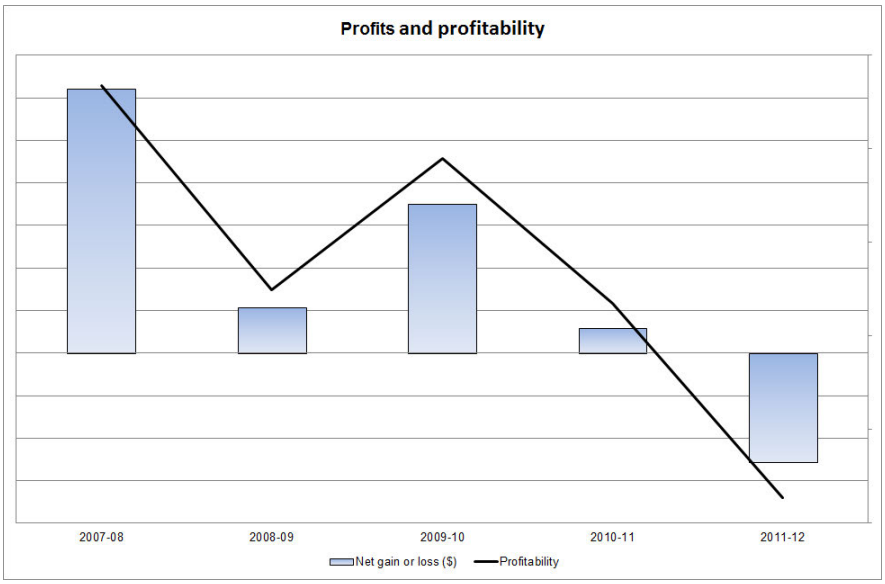


Unit revenue exceeded unit cost from 2007-08 to 2009-10. Since 2009-10 unit cost has risen and unit revenue has fallen and unit cost now exceed unit revenue.

We consider that BlueScope has suffered injury in the form of price suppression.

9.2.4 Profits and profitability

BlueScope's profits and profitability are illustrated in the following chart. Profitability is profits expressed as a percentage of revenue.



BlueScope's profits and profitability fluctuated from 2007-08 to 2010-11, but fell significantly in 2011-12. We consider that BlueScope has suffered injury in the form of reduced profits and profitability.

9.3 Other economic factors

BlueScope completed an Appendix A7 for both galvanised steel and aluminium zinc steel from 2008-09 to 2011-12.

Assets

The value of assets in the production of galvanised steel fell each year. BlueScope stated that the main drivers are annual impairment charges and, in 2011-12, the effect of the closure of the coating line.

The value of assets used in the production of aluminium zinc steel increased significantly in 2010-11 followed by a decrease in 2011-12. BlueScope stated that the increase was due to costs associated with *[name and description].* BlueScope stated that the development of *[name and description].* BlueScope advised that it had obtained funding approval for *[name and description]* in *[timing]*

[name and description] and *[timing]*

(**confidential attachment INJ 1**).

Capital investment

Capital investment in both galvanised steel and aluminium zinc steel followed similar trends, with a decrease in 2009-10, an increase in 2010-11 and a decrease in 2011-12. In view of the 2011 restructure we are unable to draw any meaningful conclusions about capital investment.

Research and development (R&D) expenditure

R&D expenditure for both galvanised steel and aluminium zinc steel was relatively stable throughout the period examined. We asked BlueScope *[name and description]* and BlueScope advised that the majority of costs associated *[name]* were capitalised.

Revenue

Revenue fell from each type of coated steel each year during the period examined.

Return on income

Return on income, measured as earnings before interest and tax over total assets, for both products fell consistently and significantly over the period 2009-10 to 2011-12. Aluminium zinc steel showed negative returns in 2011-12, while galvanised steel showed negative returns over the three year period 2009-10 to 2011-12.

Capacity

Capacity in relation to zinc aluminium steel has fallen consistently over the period examined. Capacity in relation to galvanised steel increased in 2010-11 but fell in 2011-12. BlueScope explained that the reductions associated with both products are associated with both the closure of the coating line as well as reductions in the number of operating shifts for the remaining lines.

Capacity utilisation

Capacity utilisation fell in 2011-12, despite the reduction in capacity associated with the restructure.

Employment

Employment followed similar trends to capacity, with zinc aluminium steel showing a more marked reduction in employment in 2011-12, associated with the closure of the coating line.

Productivity

Productivity in relation to galvanised steel remained relatively stable over the period 2009-10 to 2011-12, while productivity in relation to zinc aluminium steel increased in 2011-12.

Stocks

Stock levels for both products fluctuated throughout the period examined, however as BlueScope generally manufacture to order the stock level is not indicative of any underlying injury associated with dumping.

Wages

The wage bill for both products decreased during 2011-12, associated with the reduction in employment.

9.4 Conclusion

The data indicates that BlueScope suffered injury through:

- loss of sales volume;
- reduced revenues;
- price undercutting;
- price depression;
- price suppression;
- reduced profits;
- reduced profitability;
- reduced return on investment;
- reduced ability to raise capital for re-investment; and
- loss of employment.

Injury in the form of price undercutting will be assessed when visits to importers are completed.

10 CAUSATION

10.1 Pricing

BlueScope explained that its pricing is based on import parity pricing and therefore, the price of imports is a key determinant of its selling price and directly causes price injury resulting in lost revenue and profits.

BlueScope explained that the price of imported coated steel was generally released into the market three months before the date by which the purchased goods would eventually be imported. Following the visit BlueScope provided several examples of the import offers that were made available to importers during the investigation period (**confidential attachment INJ 2**).

BlueScope explained that it used market intelligence to gather information regarding the current price offers. It consolidated these offers 9including offers for dumped coated steel from China, Korea and Taiwan) and determined a benchmark import parity price. It then based its price on the benchmark with a premium based on the extra value it offered as a local producer *[strategy]*. BlueScope advised that this premium was in the range of *[% range]* for galvanised products during the investigation period, but had been higher historically. Higher premiums can be applied to the ZINCALUME® branded product, but lower premiums apply in the distribution segment.

BlueScope does not always benchmark to the lowest offered price but takes into consideration *[pricing strategy]*

BlueScope explained that it then provided its offers for the same delivery time as imports, *[timing]* weeks after the price of imports were released. This might be followed by a period of price negotiation between itself and its customers. Orders would subsequently be placed four to six weeks prior to delivery.

BlueScope provided us with a copy of a IPP workings spreadsheet where it collected market intelligence and calculated benchmark prices for both galvanised and aluminium zinc coated steel (**confidential attachment INJ 3**). As noted above, BlueScope previously provided us with several copies of import offers in the application. BlueScope explained that while it sought to get hard copy evidence of prices in the market, in many instances it could only *[process].* In these cases BlueScope would ensure that the information received was consistent with what it heard from other sources. BlueScope informed us that it did not benchmark against verbal prices.

BlueScope stated that factors other than import prices are taken into consideration when determining price, for example manufacturing costs and margins, however maintaining market share and volume is the key determinant so as to at least cover fixed costs.

10.2 Other possible causes of injury

BlueScope noted that the coated steel markets have not recovered to their position prior to the global financial crisis and building activity is still suppressed. It also noted that the strength of the Australian dollar has some impact on the attractiveness of import offers. However, despite these observations, BlueScope noted that neither of these factors displaces the impact of having to compete with dumped import prices. Given its import parity pricing policy dumped import prices have a direct and identifiable impact on BlueScope's prices.

10.3 Conclusion

We consider that it is difficult to draw conclusions solely from an examination of BlueScope's claims. The issue of causation will be assessed and discussed in the statement of essential facts, or if appropriate, in a preliminary affirmative determination.

11 UNSUPPRESSED SELLING PRICE

Unsuppressed selling price and non-injurious price issues are examined at an early stage of an investigation and, where possible and appropriate, preliminary examinations are made during the application consideration period for the purpose of assessing injury and causal link and therefore the appearance of reasonable grounds for the publication of a dumping duty notice.

Customs and Border Protection generally derives the non-injurious price by first establishing a price at which the applicant might reasonably sell its product in a market unaffected by dumping. This price is referred to as the unsuppressed selling price.

Customs and Border Protection's preferred approach to establishing unsuppressed selling prices observes the following hierarchy:

- industry selling prices at a time unaffected by dumping;
- constructed industry prices – industry cost to make and sell plus profit; or
- selling prices of un-dumped imports.

Having calculated the unsuppressed selling price, Customs and Border Protection then calculates a non-injurious price by deducting the costs incurred in getting the goods from the export free on board point (or another point if appropriate) to the relevant level of trade in Australia. The deductions normally include overseas freight, insurance, into-store costs and amounts for importer expenses and profit.

BlueScope advised that it will provide a further submission on the unsuppressed selling price and injury in due course.

12 LIST OF ATTACHMENTS

Confidential Appendix 1	Annual summary of Appendix A6 data
Confidential Attachment GEN 1	BlueScope's global interests
Confidential Attachment GEN 2	BlueScope's management structure
Confidential Attachment GEN 3	Summary of Coated Products Division financial structure
Attachment GEN 4	General information on metallic coated steel
Attachment GEN 5	Illustration of the roll-forming process
Attachment GEN 6	Technical bulletin describing the benefits of zinc coatings on steel
Confidential Attachment GEN 7	Details of TCOs
Confidential Attachment GEN 8	Conversion table that showed the coating mass for a range of BMT and TCT thicknesses
Attachment GEN 9	Benefits of aluminium zinc coatings on steel
Confidential Attachment GEN 10	Australian Standadrd AS 1397-2011 and Japanese Standards JIS G 3302 and JIS G 3321
Attachment GEN 11	Technical bulletin with a builders guide to Australian steel sheet and strip standards
Confidential Attachment GEN 12	Comparison of international standards and grades
Attachment GEN 13	Production process
Confidential Attachment GEN 14	Capabilities of BlueScope's plants
Attachment GEN 15	Product information about major brands
Confidential Attachment DOM 1	March 2012 distributor price schedule
Confidential Attachment DOM 2	Coated Products Division reconciliation
Confidential Attachment DOM 3	Reconciliation of COGNOS data and appendices
Confidential Attachment DOM 4	Documents supporting selected shipments
Confidential Attachment DOM 5	Documents supporting rebates
Confidential Attachment DOM 6	
Confidential Attachment COSTS 1	Summaries of the reconciliation of COGNOS and SAP
Confidential Attachment COSTS 2	Examples of the standard costs
Confidential Attachment COSTS 3	Invoices for purchases of aluminium and zinc
Confidential Attachment INJ 1	Evidence supporting postponement of major project
Confidential Attachment INJ 2	Examples of the import offers
Confidential Attachment INJ 3	IPP spreadsheet

NON CONFIDENTIAL ATTACHMENT 4

Metallic Coated Steel

MC
GI

GENERAL INFORMATION

Revision 4, November 2003
This literature supersedes all previous issues

GENERAL DESCRIPTION

The metallic coated products of BlueScope Steel Limited are generally described by a registered trade mark followed by a designation of the steel base and coating class as outlined in Australian Standard 1397:2001.

Continuously hot-dipped metallic-coated steels

As the surface of steel products gradually reverts to its most stable form, that is, iron oxide, it is necessary to isolate the surface from atmospheric conditions to prevent the unsightly oxide forming. This can be achieved by covering the surface with metals or organic materials such as paint or PVC laminate. The latter materials and some metals merely provide a blanket covering to protect the steel from the atmosphere and this is successful provided the complete coverage remains intact. Some metals, such as zinc, give an added feature of sacrificial protection at areas where the steel base is exposed such as cut edges, holes and scratches. A zinc/aluminium alloy coating combines the best features of both aluminium and zinc coatings. Metallic coating with zinc or zinc/aluminium alloy by the hot dip method is a universally proven and accepted system. The continuous hot-dip metallic coating lines operated by BlueScope Steel Australia produce a range of zinc-coated and zinc/aluminium coated steel sheet and strip products to meet the requirements of manufacturers in Australia.

The degree of corrosion protection afforded by each coating type and class depends on the many macro and micro environments in which it performs and therefore cannot be simply quantified. However it can generally be assumed that for a particular coating the life of the sheet would be in direct proportion to the coating mass on the sheet. For normal exterior protection the life of ZINCALUME® steel coating is far superior to the life of an equivalent thickness zinc coating.

ZINCANNEAL® and ZINCSEAL® are hot-dipped, zinc/iron alloy coated cold rolled steels which have smooth matte finish suitable for direct on painting in critical surface applications. This material is produced as a zinc coating which is heat treated after the hot dip coating process to provide a smooth zinc/iron alloy coating.

Zinc coatings are superior where products manufactured from them come into contact with concrete or concrete based products and are also superior for sheds used in intensive animal farming.

In addition, some manufacturers prefer the increased ductility of zinc coatings when forming metallic coated steel sheet into articles with very tight bends.

ZINCALUME® and GALVALUME® steel are the brand names of BlueScope Steel alloy-coated steel sheet. They are more readily painted than zinc surfaces for which added precautions are necessary in pretreatment and priming to ensure adequate paint adhesion.

ZINCALUME® zinc/aluminium alloy-coated steel is now supplied standard with a new specially formulated water-based clear acrylic resin film factory roller- coated and oven cured over the conventional passivation layer. The resin film, in combination with the passivation layer, has excellent adhesion to the substrate, very good impact resistance and flexibility, excellent marking resilience and the resin film acts as a lubricant during forming operations. GALVALUME® zinc/aluminium alloy-coated steel is essentially the same product as ZINCALUME® except that it is not supplied with a resin coating.

Please ensure you have the current data sheet for this product as displayed at www.bluescopesteel.com.au

BlueScope Steel Limited
BlueScope Steel Limited ABN 16 000 011 058
BlueScope Steel (AIS) Pty Ltd ABN 19 000 019 625

SYDNEY: (02) 9795 6700 **MELBOURNE:** (03) 9586 2222 **BRISBANE:** (07) 3845 9300 **ADELAIDE:** (08) 8243 7333 **PERTH:** (09) 9330 0666

Produced by Artimprint (02) 9984 8586

Metallic Coated Steel

MC GI

GENERAL INFORMATION Continued

Revision 4, November 2003
This literature supersedes all previous issues

Designation System - Base Steel

The steel base grades of BlueScope Steel Limited continuously heat-treated, hot-dipped qualities are designated with the letter "G" followed by characters which indicate formability or strength and condition. Refer Table 1.

Designation System - Coatings

Metallic coatings on steel sheet and strip are divided into five different types. Refer Table 2.

Coating Mass

The ability of a metallic-coated sheet and strip product to withstand corrosion in a particular environment is a function of the amount (and type) of coating on the surface of the steel base. This is quantified as the "coating mass" and is the mass of coating on both sides of the steel base expressed in grams per square metre (g/m^2).

Coating Class

Coating Class is designated by the specified coating type and the minimum mass of coating on both sides of the sheet measured by the triple spot test as detailed in Australian Standard 1397:2001, eg AZ150, zinc/aluminium coating with a minimum coating of 150 g/m^2.

Coating Adhesion

The ability of a metallic coating to withstand deformation without peeling from the steel substrate varies with coating type and coating mass. Table 3 lists the guaranteed performance of the various metallic coatings and base combinations.

This table is an EXPLANATION of the DESIGNATION SYSTEM ONLY

It does not imply that all combinations are available
Regularly available products are listed in the Data Sheets

Table 1 – Designation System for Base Steel of Metallic-Coated Steel Sheet & Strip

GROUPS	CHARACTER POSITION			
	1	2	3	4
Formable (Ductile)	Product Type	Degree of Formability	Condition	Surface Quality
	G – Continuously heat-treated and hot-dip coated	1 – Profiling 2 – Commercial forming 3 – Drawing	B – Bake hardenable S – Skin – passed N – Non-ageing	F – Fully inspected E – Exposed applications
Example	G	2	S	
Structural (Strength)	Product Type	Strength (Minimum Yield Strength – MPa)		
	G – Continuously heat-treated and hot-dip coated	Numeral	Numeral	Numeral
Example	G	2	5	0

Table 2 – Metallic coating types and designations

Coating Type	Coating Designation
Hot-dipped zinc (Zn)	Z
Hot-dipped aluminium/zinc (Al/Zn)	AZ
Hot-dipped zinc/iron (Zn/Fe)	ZF, ZS

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BLUESCOPE STEEL

SYDNEY: (02) 9795 6700 **MELBOURNE:** (03) 9586 2222 **BRISBANE:** (07) 3845 9300 **ADELAIDE:** (08) 8243 7333 **PERTH:** (09) 9330 0666

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This table is an EXPLANATION of the DESIGNATION SYSTEM ONLY

It does not imply that all combinations are available
Regularly available products are listed in the Data Sheets

Table 3 – Approximate coating thickness (total both sides) resulting from coating mass values

Coating Class Designation	Nominal Total Coated Thickness Calculation Factor
Z100	0.02 mm
Z200	0.03 mm
Z275	0.04 mm
Z350	0.05 mm
Z450	0.07 mm
Z600	0.09 mm (≤ 2.00 mm BMT)
Z600	0.10 mm (> 2.00 mm BMT)
AZ50	0.02 mm
AZ150	0.05 mm
AZ200	0.06 mm
ZF80	0.01 mm
ZF100	0.02 mm
ZS30	0.01 mm
45F45	0.01 mm
60F60	0.01 mm

Note: BMT – base metal thickness

BlueScope Steel Limited

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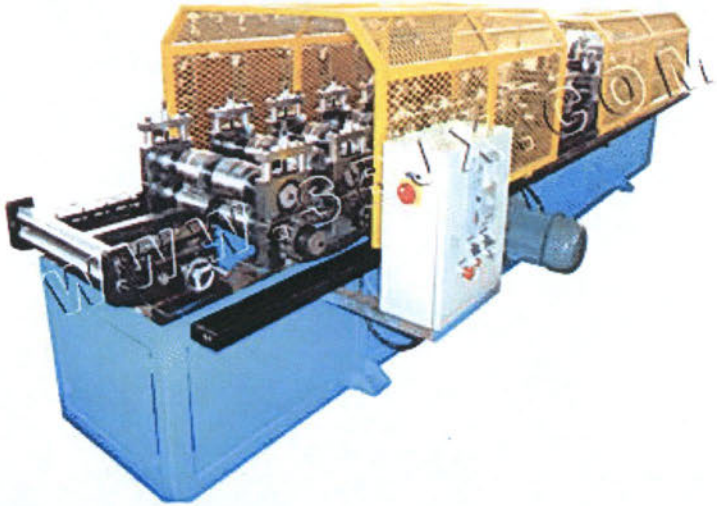
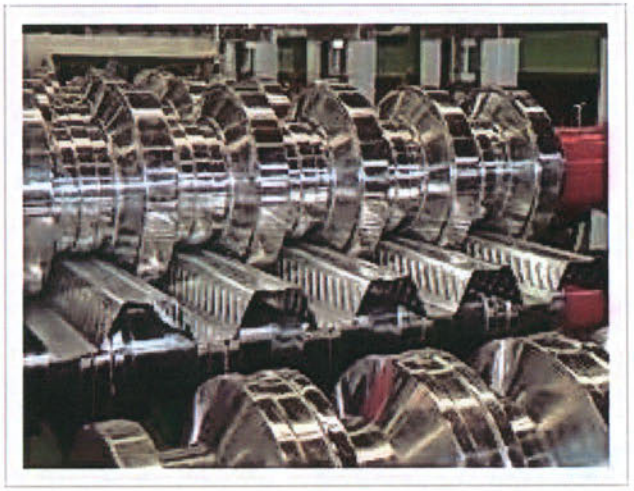
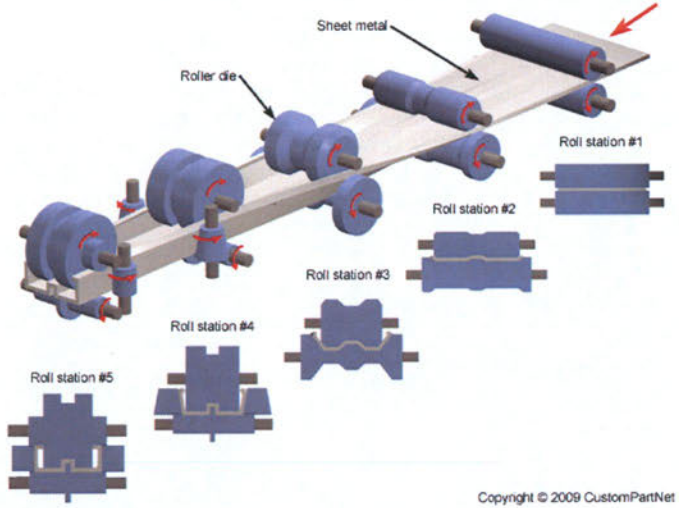
A roll-former progressively form flat steel product







NON CONFIDENTIAL ATTACHMENT 6

CORROSION

ZINC COATINGS ON STEEL

TECHNICAL BULLETIN CTB-3

Rev 3, November 2003
This issue supersedes all previous issues

In relatively dry air a zinc oxide film is initially formed on zinc surfaces by reaction of zinc with atmospheric oxygen. In the presence of moisture in the atmosphere the zinc oxide film is quickly converted to zinc hydroxide and the carbon dioxide normally present in the air reacts to form insoluble basic zinc carbonate. Zinc owes its high degree of atmospheric corrosion resistance to the formation of such films.

The more important factors which control the rate at which zinc corrodes in atmospheric exposures are relative humidity, rain fall, temperature and industrial or marine pollutants such as chlorides, ammonia, sulphur dioxide and dust.

The principals of galvanic corrosion are used to an advantage for protecting steel with a metallic coating of zinc which is more active than the steel substrate.

Provided the coating is continuous and impervious, the galvanized steel's corrosion behaviour will be identical to that of the zinc coating. However, should the zinc coating become perforated or discontinuous as a result of mechanical damage *(ie. deep scratches or sheared edges)* a steel/zinc galvanic couple will be created and in the presence of moisture, corrosion or dissolution of the zinc will occur. The zinc will become the anode of the corrosion cell and its corrosion rate will be increased whilst the steel will become cathodic and its corrosion rate reduced. The steel is then said to be sacrificially or galvanically protected.

Please ensure you have the current Technical Bulletin as displayed at www.bluescopesteel.com.au

BlueScope Steel

BlueScope Steel Limited ABN 16 000 011 058
BlueScope Steel (AIS) Pty Ltd ABN 19 000 019 625

9 320075 034658

BLUESCOPE STEEL

AUSTRALIA

SYDNEY	Telephone: (02) 9795 6700
MELBOURNE	Telephone: (03) 9586 2222
BRISBANE	Telephone: (07) 3845 9300
ADELAIDE	Telephone: (08) 8243 7333
PERTH	Telephone: (08) 9330 0666

OVERSEAS

BlueScope Steel (Malaysia) Sdn Bhd	Telephone: (603) 3250 8333
BlueScope Steel (Thailand) Limited	Telephone: (66 38) 685 710
PT BlueScope Steel Indonesia	Telephone: (62 21) 570 7564
BlueScope Steel Southern Africa (Pty) Limited	Telephone: (27 21) 555 4265

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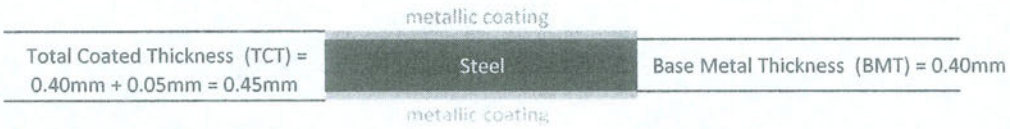
NON CONFIDENTIAL ATTACHMENT 8

Zincalume AZ150 Product on a 0.40mm steel base **AZ150g/m2 coating = 0.05mm thick**



Base Metal Thickness (BMT) = the base steel thickness only

Total Coated Thickness (TCT) = the steel base thickness plus the metallic coating thickness

nb/. Coating is described/sold in g/m2 of coverage as nominated in all country standards

THEORETICAL AREA PER TONNE OF UNPAINTED SHEET & STRIP					
Nominal Base Metal Thickness	Coating Class				
	AZ100	AZ150	Z183	Z200	Z275
BMT (mm)	(m2/t)	(m2/t)	(m2/t)	(m2/t)	(m2/t)
0.30	404	396	389	388	378
0.31	392	384	378	377	367
0.32	380	373	367	366	357
0.33	369	362	357	356	347
0.34	359	352	347	346	338
0.35	349	343	338	337	329
0.36	339	334	329	328	321
0.37	331	325	321	320	313
0.38	322	317	313	312	306
0.39	314	309	305	305	298
0.40	307	302	298	298	292
0.41	300	295	291	291	285
0.42	293	288	285	284	279
0.43	286	282	279	278	273
0.44	280	276	273	272	267
0.45	274	270	267	266	262
0.46	268	264	262	261	256
0.47	263	259	256	256	251
0.48	257	254	251	251	246
0.49	252	249	246	246	242
0.50	247	244	242	241	237
0.51	243	240	237	237	233
0.52	238	235	233	232	229
0.53	234	231	229	228	225
0.54	229	227	225	224	221
0.55	225	223	221	220	217
0.56	221	219	217	217	213
0.57	218	215	213	213	210
0.58	214	212	210	210	206
0.59	210	208	206	206	203
0.60	207	205	203	203	200
0.61	204	202	200	200	197
0.62	201	199	197	197	194
0.63	197	195	194	194	191
0.64	194	193	191	191	188
0.65	191	190	188	188	185
0.70	178	177	175	175	173
0.75	166	165	164	164	162
0.80	156	155	154	154	152
0.85	147	146	145	145	144
0.90	139	138	137	137	136
0.95	132	131	130	130	129
1.00	125	125	124	124	123

THEORETICAL AREA PER TONNE OF UNPAINTED SHEET & STRIP					
Nominal Total Coated Thickness	Coating Class				
	AZ100	AZ150	Z183	Z200	Z275
(mm)	(m2/t)	(m2/t)	(m2/t)	(m2/t)	(m2/t)
0.30	446.5	468.9	428.7	427.4	429.0
0.31	431.4	452.3	414.8	413.6	415.0
0.32	417.3	436.8	401.7	400.6	401.9
0.33	404.0	422.3	389.4	388.3	389.6
0.34	391.6	408.7	377.9	376.9	378.1
0.35	379.9	396.0	367.0	366.0	367.2
0.36	368.9	384.1	356.7	355.8	356.9
0.37	358.6	372.9	347.0	346.1	347.2
0.38	348.7	362.3	337.8	337.0	338.0
0.39	339.4	352.2	329.1	328.3	329.2
0.40	330.6	342.8	320.8	320.1	320.9
0.41	322.3	333.8	312.9	312.2	313.0
0.42	314.3	325.3	305.4	304.7	305.5
0.43	306.7	317.2	298.2	297.6	298.4
0.44	299.5	309.5	291.4	290.8	291.5
0.45	292.7	302.1	284.9	284.3	285.0
0.46	286.1	295.1	278.7	278.1	278.8
0.47	279.8	288.4	272.7	272.2	272.8
0.48	273.8	282.0	267.0	266.5	267.1
0.49	268.0	275.9	261.5	261.0	261.6
0.50	262.5	270.1	256.2	255.8	256.3
0.51	257.2	264.5	251.2	250.8	251.3
0.52	252.1	259.1	246.3	245.9	246.4
0.53	247.2	253.9	241.7	241.3	241.8
0.54	242.5	249.0	237.2	236.8	237.2
0.55	238.0	244.2	232.8	232.5	232.9
0.56	233.6	239.6	228.6	228.3	228.7
0.57	229.4	235.2	224.6	224.3	224.7
0.58	225.4	230.9	220.7	220.4	220.8
0.59	221.4	226.8	217.0	216.6	217.0
0.60	217.7	222.8	213.3	213.0	213.4
0.61	214.0	219.0	209.8	209.5	209.9
0.62	210.5	215.3	206.4	206.1	206.5
0.63	207.0	211.7	203.1	202.8	203.2
0.64	203.7	208.3	199.9	199.7	200.0
0.65	200.5	204.9	196.9	196.6	196.9
0.70	185.9	189.7	182.7	182.5	182.8
0.75	173.3	176.5	170.5	170.3	170.5
0.80	162.2	165.1	159.8	159.6	159.8
0.85	152.5	155.0	150.4	150.2	150.4
0.90	143.9	146.1	142.0	141.9	142.0
0.95	136.2	138.2	134.5	134.4	134.5
1.00	129.3	131.1	127.8	127.6	127.8

Formula

For TCT

$$\frac{1000000}{(((\text{Nominal Total coated thickness} - \text{Coating thickness factor}) \times 7850) + \text{coating mass calcualtion factor})}$$

For BMT

$$\frac{1000000}{(((\text{Nominal Base Metal thickness}) \times 7850) + \text{coating mass calcualtion factor})}$$

Coating Mass Calculation Factors

Coating Thickness Factors
0.02
0.03
0.05
0.06
0.02
0.02
0.03
0.03
0.03
0.04

Coating class	Coating Mass Calculation Factors
AZ 50	**70**
AZ 100	120
AZ 150	170
AZ 200	220
Z100	130
Z150	175
Z183	213
Z200	220
Z220	240
Z275	290

NON CONFIDENTIAL ATTACHMENT 9

CORROSION

ALUMINIUM/ZINC COATING ON STEEL

TECHNICAL BULLETIN CTB-6

Rev 3, Nov 2003
This issue supersedes all previous issues

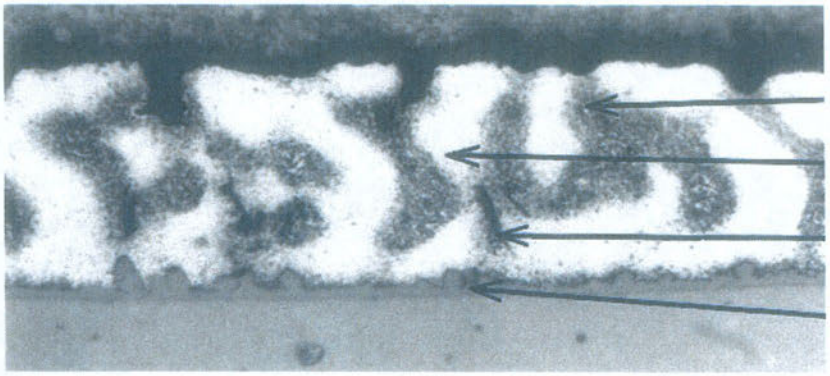
COATING STRUCTURE

ZINCALUME® zinc/aluminium alloy coated steel consists of a steel substrate coated on both sides with a zinc/aluminium alloy. The alloy coating is applied in a hot dipping process.

The alloy composition is approximately 55% aluminium, 1.5% silicon and the balance zinc.

A typical microstructure of the alloy coated steel is shown in cross section in Figure 1. The structure which forms on cooling is essentially two phase, comprising about 80% by volume of an aluminium rich phase and the remainder a zinc rich phase with a thin intermetallic layer next to the steel substrate.

Figure 1: ZINCALUME® Steel Microstructure



CORROSION PERFORMANCE OF ZINCALUME® STEEL COATING

When the coating corrodes initially the zinc rich phase corrodes preferentially until the formation of corrosion products reduces further activity in these areas. As there is a smaller area of zinc exposed compared to a galvanized coating, the overall corrosion rate is correspondingly lower. During the initial stage of corrosion the coating behaves like a zinc coating. In the latter stages of corrosion when the coating is essentially comprised of zinc corrosion products carried in an aluminium rich matrix, the corrosion becomes more characteristic of the aluminium rich phase, resulting in a lower corrosion rate, more typical of aluminium.

Results of atmospheric corrosion rate testing together with field history obtained from rural, marine and industrial outdoor exposure sites have shown that ZINCALUME® steel can be expected to provide between two to four times the comparable life of a galvanized coating of equal thickness under the same exposure conditions. Figure 2.

Figure 2: Corrosion Rates of Galvanized Steel and 55% Al-Zn Alloy Coated Steel at Australian Atmosphere Exposure Test Sites.

Site	Galvanized Steel		55% Al-Zn Alloy Coated Steel	
	g/m2/y	um/y	g/m2/y	um/y
Severe Marine	140	9.8	16	2.2
Marine	18	1.3	4.0	0.54
Industrial/Marine	20	1.4	4.2	0.57
Rural	4	0.28	1.3	0.17

g/m² - two sided um - one side

BLUESCOPE STEEL

GALVANIC PROTECTION OF STEEL BY ZINCALUME® STEEL COATINGS

It is natural, with the wide spread use of ZINCALUME® steel sheet in traditional zinc-coated building applications, that the question of comparative cut edge performance should be raised.

Unpainted ZINCALUME® steel will perform in a very similar manner at the cut edge to zinc-coated sheet in the relatively narrow range of thicknesses associated with roofing, wall cladding, gutters and downpipes.

Prepainted ZINCALUME® steel, which may be supplied in thicknesses greater than 1.2 mm, may be subject to corrosion mechanisms at the cut edge. This occurs as a result of the increased ratio of exposed steel to metallic coating at the ZINCALUME® steel sheet cut edge.

To illustrate the comparative benefits of sacrificial protection, a series of grooves ranging from 0.4 mm to 4.0 mm in width was cut through the coatings down to the base metal of both galvanized and ZINCALUME® steel samples. The samples we re-exposed for 12 months in an aggressive industrial/marine atmosphere.

The following photographs of the samples with similar coating thicknesses illustrate the lack of base corrosion, especially in the narrower channels. The latter correspond to thicknesses used for roofing and guttering and other rainwater goods applications.

Figure 3: ZINCALUME® AZ150 sample.

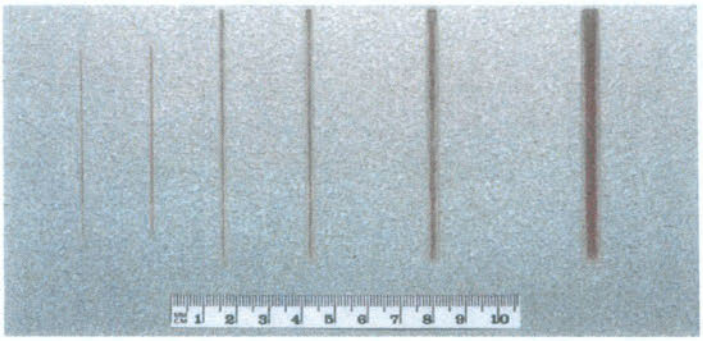


Figure 4: Zinc-coated sample, Z275.

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BlueScope Steel

BlueScope Steel Limited ABN 16 000 011 058
BlueScope Steel (AIS) Pty Ltd ABN 19 000 019 625

9 320075 034689

AUSTRALIA

SYDNEY	Telephone: (02) 9795 6700
MELBOURNE	Telephone: (03) 9586 2222
BRISBANE	Telephone: (07) 3845 9300
ADELAIDE	Telephone: (08) 8243 7333
PERTH	Telephone: (08) 9330 0666

OVERSEAS

BlueScope Steel (Malaysia) Sdn Bhd	Telephone: (603) 3250 8333
BlueScope Steel (Thailand) Limited	Telephone: (66 38) 685 710
PT BlueScope Steel Indonesia	Telephone: (62 21) 570 7564
BlueScope Steel Southern Africa (Pty) Limited	Telephone: (27 21) 555 4265

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NON CONFIDENTIAL ATTACHMENT 11

BUILDERS GUIDE TO AUSTRALIAN STEEL SHEET AND STRIP STANDARDS

TECHNICAL BULLETIN TB-14

Rev 4, November 2003
This issue supersedes all previous issues

With growing consumer awareness of products and their potential performance, it is becoming increasingly important that manufacturers and tradesmen adhere to those Australian standards which relate to the products they use and their installation.

Australian standards are compiled by committees of interested scientific, industrial and government groups under the direction of Standards Australia. Copies of published standards are available from their state offices.

This technical bulletin sets out to explain the terminology of metallic-coated steel sheet and strip adopted in the standards in order to simplify their interpretation and use.

There are two standards for the base steel sheet materials used in building trades:

AS 1397:2001 for zinc-coated and aluminium/zinc alloy-coated steel sheet and,
AS 2728 for prepainted steel sheet.

Australian standards also cover other aspects of the trade with specifications for products manufactured from steel sheet materials and their installation. These are:

AS 2179 for metal rainwater goods.
AS 2180 for selection and installation of metal rainwater goods.
AS 1445 for corrugated steel sheet, and
AS 1562 for design and installation of metal roofing.

STEEL SHEET MATERIAL STANDARDS

AUSTRALIAN STANDARD 1397:2001 "STEEL SHEET AND STRIP - HOT-DIPPED ZINC-COATED OR ALUMINIUM/ZINC-COATED"

All hot-dipped metallic-coated sheet and strip produced by BlueScope Steel complies with Australian Standard 1397:2001. The products in this Standard include materials for a variety of building applications. These include:

ROOF CLADDING
ZINCALUME® AZ150
Zinc-coated Z450 (see note)

WALL CLADDING
ZINCALUME® AZ150
Zinc-coated Z275 (see note)

RAINWATER ITEMS
ZINCALUME® AZ150
Zinc-coated Z275 (see note)

Note: It is important to note that the introduction and development of ZINCALUME® zinc/aluminium alloy-coated steel sheet and strip has given a much improved life to the above products. Consequently, BlueScope Steel Limited recommends ZINCALUME® steel sheet be specified for these applications if a metallic-coated finish is desired. Exterior products manufactured from COLORBOND® prepainted steel sheet or strip, besides being decorated in one of a number of colours, have a superior outdoor performance. For recommended finishes for various environments, refer to Technical Bulletin TB-1a *"Steel roofing products selection guide"* and/or TB-1b *"Steel walling products - selection guide"*. Using the correct product in manufacturing building products is the responsibility of the manufacturer or specifier.

COATING CLASS

This term refers to the coating type, Z or AZ (Zinc or Aluminium/Zinc) and the minimum mass (weight) of coating per square metre of steel sheet. Typical coatings are Z275 and AZ150. these designations signify:

for Z275
Z = Zinc
and 275 = 275 grams minimum of zinc per square metre, the total on both sides.
for AZ150
AZ = Aluminium/Zinc
and 150 = 150 grams minimum of aluminium/zinc alloy per square metre, the total on both sides.

MECHANICAL PROPERTIES

The guaranteed minimum yield strength is specified by a number following the letter "G". This indicates the mechanical properties of the steel were obtained by inline heat treatment prior to hot-dip coating. Yield strength is the point to which steel can be stressed before it deforms permanently. Yield strength is expressed in megapascals (MPa) and the higher the number, the greater the structural strength.

For example: G250 is a structural grade with a minimum yield strength of 250 megapascals,
G300 is a slightly higher strength grade ideal for roll-forming
G550 is a very high strength steel.

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SUMMARY

Ideally, specifications should state:

1. the base steel thickness, eg, 0.60 mm
2. the minimum yield strength, eg, G300
3. the coating class, eg, AZ150.

For example:

0.60 mm AZ150 for ZINCALUME® zinc/aluminium alloy-coated steel,
0.60 mm G300 Z450 zinc-coated steel.

IMPORTANT

It is not sufficient to simply state whether the sheet should be zinc-coated or ZINCALUME® steel without being specific as to the coating mass, ie, the protection required.

REMEMBER, THE SERVICE LIFE OF METALLIC-COATED STEEL IS DEPENDENT ON THE THICKNESS OF THE COATING AND NOT THE THICKNESS OF THE STEEL BASE.

The base thickness of some building materials is described as "BMT" - base metal thickness. Product thickness has been, in isolated instances, nominated as "TCT" or Total Coated thickness. This can be misleading and should not be used in specifications.

However, a measure of TCT can be used to indicate whether the specific base thickness has been supplied.

The following table provides the approximate overall thickness (approximate TCT) for a nominated base thickness.

ZINC-COATED STEEL			ZINCALUME® Steel	
Approx TCT mm	Coating class	Base thickness ◄ mm►	Coating class	Approx TCT mm
0.39	Z275	0.35	AZ150	0.40
0.46	Z275	0.42	AZ150	0.47
0.54	Z275	0.50	AZ150	0.55
0.59	Z275	0.55	AZ150	0.60
0.67	Z450	0.60	AZ150	0.65
0.69	Z600	0.60	AZ200	0.66

Australian Standard 2728 "Prepainted and Organic Film/Metal Laminate Products for interior/Exterior Applications in Buildings"

This standard divides environments into categories in which prepainted products must perform and the paint properties to achieve a satisfactory performance. Details of the COLORBOND® steel type to perform in the various types of environments are given in Technical Bulletin TB–1a and TB-1b.

PRODUCT STANDARDS

These are standards for finished goods made from steel sheet materials:

AS 1445 for corrugated steel sheet, and
AS 2179 for metal rainwater goods.

Specification of the base steel sheet standard and the product standard will ensure the correct material is used and that the finished product is made to specified quality standards.

INSTALLATION STANDARDS

These standards ensure a correctly manufactured steel sheet building product is fixed to a building in a specified manner. The standards are:

AS 1562 for design and installation of metal roofing, and
AS 2180 for selection and installation of metal rainwater goods.

COATING TYPES AND THEIR COMPATIBILITY WITH OTHER METALS

Two basic coating types are generally in use in building and allied industries – zinc (galvanised steel) and zinc/aluminium alloy (ZINCALUME® steel). BlueScope Steel recommends that for all conditions involving atmospheric exposure, ie, roofing and walling, accessories and rainwater items, ZINCALUME® steel will provide the better long term performance.

Both coatings are affected adversely by run off from or contact with copper. Uncoated lead must not be used with ZINCALUME® steel products.

Further information on acceptability of direct contact between various materials is given in Australian Standard 2180.

Although compatible with respect to physical contact, zinc coatings should not be used for rainwater goods and tanks where water from ZINCALUME® steel roof runs onto them (refer Technical Bulletin TB-15 *"Recommended Steel Gutter Systems"*)

HOW TO SPECIFY FOR BEST PRODUCT PERFORMANCE

A. CORRUGATED ROOFING/WALL CLADDING

Where shown, corrugated roofing and wall cladding shall be custom length ZINCALUME® steel or COLORBOND® steel (profile name) roll-formed from strip complying with Australian Standard 1397:2001 and branded accordingly (refer Technical Bulletin TB-1a or TB-1b for recommended finish to suit environment). The finished product shall comply with Australian Standard 1445.

All roofing accessories shall be of similar material to the roof. Minimum coating class shall be AZ150.

BLUESCOPE STEEL

Fixing shall be to manufacturer's recommendations. Sealants shall be as specified. Refer Technical Bulletin TB-9 *"Sealants for Exterior Finishes"*.

During the fixing period swarf should be removed from the roof and guttering daily (refer Technical Bulletin TB-5 *"Swarf Staining of Steel Roofing and Walling Profiles"*).

Copper or uncoated lead shall not be used for flashing (refer Technical Bulletin TB-8 "Flashing Materials for ZINCALUME® and COLORBOND® Steel Sheet").

Discharge from copper pipes shall not flow onto roof.

B. OTHER PROFILES – ROOFING WALL CLADDING

Where shown, roofing and wall cladding shall be custom length ZINCALUME® steel or COLORBOND® steel (profile name) roll-formed from material complying with Australian Standard 1397:2001 and branded accordingly (refer TB-1a or TB-1b for selection).

Minimum coating class shall be AZ150.

All roofing accessories shall be of similar material to the roof.

Fixing shall be to manufacturer's recommendations.

Sealants shall be as specified.

Swarf shall be removed from the roof and guttering daily.

Copper or uncoated lead shall not be used for flashing.

Discharge from copper pipes shall not flow onto roof.

C. RAINWATER GOODS

Where shown, eaves, guttering/spouting, ridge capping, box or valley gutters and downpipes shall be formed from ZINCALUME® steel complying with Australian Standard 1397:2001. The finished product shall comply with Australian Standard 2179 and Australian Standard 2180. Base steel grade and thickness will depend on profile. Coating mass shall be AZ150 (refer to TB-1a or TB-1b for material finish in various environments).

Accessories shall be of similar material to the gutter/spouting. Downpipes shall be ZINCALUME® or COLORBOND® steel. Installation shall be to normal trade practice.

Sealants shall be as specified.

CONCLUSION

It is in the best interest of the specifier and end-user of hot-dipped metallic-coated steel products to demand compliance with relevant Australian Standards. It should be noted that products do not necessarily have to comply with a standard unless compliance is claimed by statement, literature or branding, or if the specification or order call for it.

By combining the correct thickness of coating, base strength, associated materials and installation practice, the greatest potential value and performance are realised often at no extra cost.

BLUESCOPE STEEL

The information and advice contained in this Bulletin is of a general nature only, and has not been prepared with your specific needs in mind. You should always obtain specialist advice to ensure that the materials, approach and techniques referred to in this Bulletin meet your specific requirements.

BlueScope Steel Limited makes no warranty as to the accuracy, completeness or reliability of any estimates, opinions or other information contained in this Bulletin, and to the maximum extent permitted by law, BlueScope Steel Limited disclaims all liability and responsibility for any loss or damage, direct or indirect, which may be suffered by any person acting in reliance on anything contained in or omitted from this document.

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9 320075 034412

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Is your roofing, walling & light structural steel compliant?

BLUESCOPE STEEL | AUSTRALIAN MADE

Steel made by BlueScope Steel meets the requirements of the relevant Australian Standards referenced by the BCA. Is your steel compliant? Know the risks. Get the facts.

The risks of using imported steel	**The facts** – steel made by BlueScope Steel
It may not automatically meet the "deemed to satisfy" requirements of the Building Code of Australia (BCA).	☑ Steel made by BlueScope Steel meets the requirements of the relevant Australian Standards referenced by the Building Code of Australia (BCA).
It may not have been tested, for as long or as rigorously in the Australian environment.	☑ BlueScope Steel has been rigorously testing and improving its steel products for over 40 years. There are now thousands of test samples undergoing exposure in many test sites and environmental conditions in Australia.
The minimum single-spot coating mass requirement in the American Standard ASTMA792M is lower than required by the Australian Standard AS1397:2001. If the lower coating mass side is exposed, the material may not perform the same as an AS1397:2001 compliant product.	☑ All steel made by BlueScope Steel is quality assured to meet or exceed Australian Standards. Both sides of BlueScope Steel metallic coated products have a minimum coating requirement as defined by AS1397:2001.
It may have base steel properties that are different to those required by Australian Standards and therefore may have lower ductility and be more prone to cracking under design load.	☑ All steel by BlueScope Steel is quality assured to meet or exceed Australian Standards which can specify minimum requirements for mechanical properties eg. ductility.
Who would back up your warranty if your steel failed?	☑ BlueScope Steel stands by its reputation as Australia's leading flat steel maker with local on the ground technical support and a range of warranties* for various applications.
If the metallic coated steel product is not legibly and durably marked with 'AS1397' then it may not comply with AS1397:2001.This requirement does not apply to pre-painted steel products.	☑ Metallic coated steel products made by BlueScope Steel that meet AS1397:2001 are legibly and durably marked to visibly show compliance. This marking is a requirement of this Australian Standard.
Many foreign standards use Total Coated Thickness (TCT - see over) to describe steel product thickness which may not be suitable for design loads under Australian Standards.	☑ The thickness of BlueScope Steel products is specified as Base Metal Thickness (BMT) not TCT. BMT is the relevant measurement for structural strength.
Some pre-painted steel products sold in Australia to AS2728:2007 do not use AS1397:2001 compliant substrate (base metallic coated steel).	☑ BlueScope Steel's COLORBOND® steel meets AS2728:2007 and has a steel substrate compliant to AS1397:2001. COLORBOND® steel is marked with 'COLORBOND® steel made by BlueScope Steel' for identification purposes.

Examples of relevant technical bulletins available

Technical Bulletin TB-1a and TB-1b
Detailed information about matching the right product to the environment

Technical Bulletin TB-4
Refers to maintenance procedures to contribute to long life

Technical Bulletin TB-5
Refers to cutting and avoidance of swarf damage

Technical Bulletin TB-7
"Care and Storage of Exterior Products Prior to Installation"

Technical Bulletin TB-14
"Builders Guide to Australian Steel Sheet and Strip Standards"

Technical Bulletin TB-16
"Fasteners for Roofing and Walling Products – Selection Guide"

Technical Bulletin TB-30
"Sheds and Garages"

Technical Bulletin TB-34
"Steel Homes"

Technical Bulletins are also available for Special Service Environments

For more information about this important industry topic, please contact **BlueScope Steel** on **1800 022 999** or visit **www.steelselect.com/check**

steelselect.com/check

AUSTRALIAN GUARANTEED STANDARDS

Zincalume® Truecore® Galvaspan® Colorbond®

*Warranty subject to application and eligibility criteria. For full terms and conditions and to determine the eligibility of your building for the warranty visit bluescopesteel.com.au/warranties or call 1800 022 999.

Not all steels are created equal. Look for our good name.

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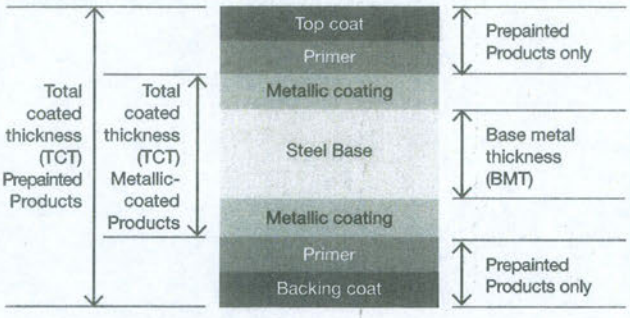
AUSTRALIAN GUARANTEED STANDARDS

Important: specify Base Metal Thickness not Total Coated Thickness for determining structural performance

Base Metal Thickness (BMT) V Total Coated Thickness (TCT)



Structural capability is a function of base metal thickness and steel grade, whereas corrosion performance is afforded by metallic coating thickness and type.

Insist on Base Metal Thickness (BMT) to manage your risk

For example: If a design has been specified as 0.42mm BMT steel, supply of an imported 0.42mm TCT would deliver inferior structural performance as 0.42mm TCT is ONLY 0.37mm BMT*. The table below outlines the important difference in structural steel thicknesses for unpainted imported steel supplied on a TCT basis rather than BMT.

AZ150 to AS1397 ZINCALUME® steel supplied as BMT	AZ150 Imported Zinc-Aluminium coated steel supplied as TCT
0.30mm	0.30mm TCT = 0.25mm BMT (16% thinner)
0.35mm	0.35mm TCT = 0.30mm BMT (14% thinner)
0.42mm	0.42mm TCT = 0.37mm BMT (12% thinner)
0.48mm	0.48mm TCT = 0.43mm BMT (10% thinner)

*assuming equivalent mechanical properties

Protect your good name, insist on BlueScope Steel's ZINCALUME®, COLORBOND® and TRUECORE® steel products which are only sold on a BMT basis.

Choosing the correct BlueScope Steel roofing product

Marine Environment Severity	Distance from Breaking Surf* or Exposed Marine*	Distance from Calm Marine*	Recommended Product
Very Severe Marine	0m – 100m	N/A	COLORBOND® Stainless steel
Severe Marine	101m – 200m	0m – 100m	COLORBOND® Ultra steel
Marine	201m – 400m	101m – 200m	COLORBOND® steel
Moderate	401m – 1000m	201m – 1000m	COLORBOND® steel, COLORBOND® Metallic steel, ZINCALUME® AZ150 steel
Benign	1001m+	1001m+	COLORBOND® steel, COLORBOND® Metallic steel, ZINCALUME® AZ150 steel

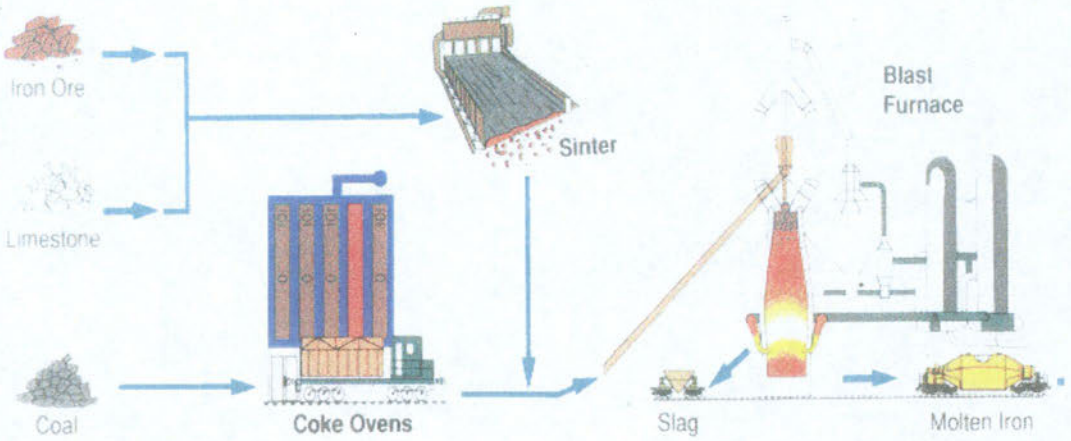
The above refers to marine environments only. Where roof cladding, both internal and external, is subject to heavy dust, emissions, contaminant fallout or corrosive chemicals, it is essential to consult with your local BlueScope Steel Sales Office.

*Definitions and examples of surf, exposed and calm marine are outlined in Technical Bulletin TB-35 "Australian Marine Classifications".

Zincalume® Truecore® Colorbond®

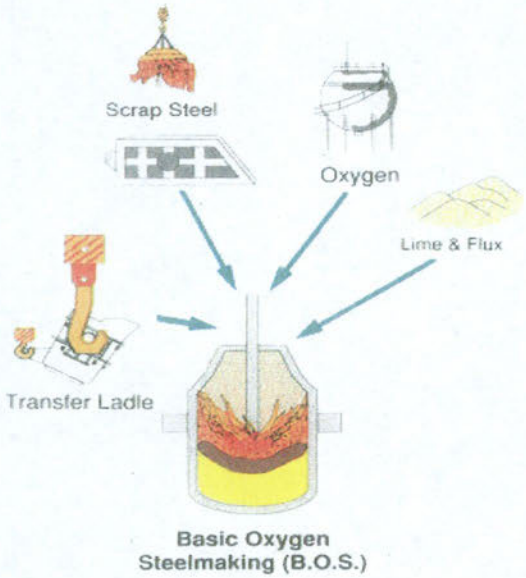
BLUPK32723J

Iron Making



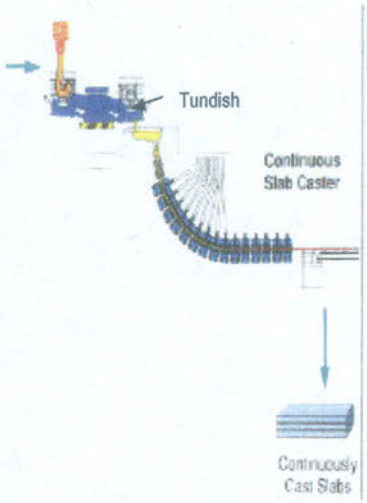
- Iron ore,lime stone and coke are the row material to make steel
- Extraction of iron in blast furnace by reduction process.
- Hot air (1200 °C) blown into the furnace through nozzles (tuyers) at the lower part of the furnace.
- The air burn the coke produce CO, which crates the chemical reaction. The ore is reduced to molten iron by removing the oxygen.
- Every two hour the taphole of furnace is opened and the molten iron and slag is drained.
- The torpedo ladle transport to steel making.

Steel Making



- To make steel, the C content of metallic iron is lowered (>1%) by an oxidation process in a Basic Oxygen Steel making (BOS) furnace.
- Pure Oxygen is blow on top onto molten metal to react with the carbon and also react with most of the other impurities (P,S, Mn & Si) .
- The fluxing material (~ 5% Lime)& recycled scrap steel (10- 15 %) added into the furnace which absorbs impurities of the steel making process to form slag.
- After refining in BOS furnace, the alloys are added onto the molten metal and control the chemical properties of steel as per the requirements.
- Cycle time ~ 40 –50 min Tap to Tap

Continuous Casting / Shaping

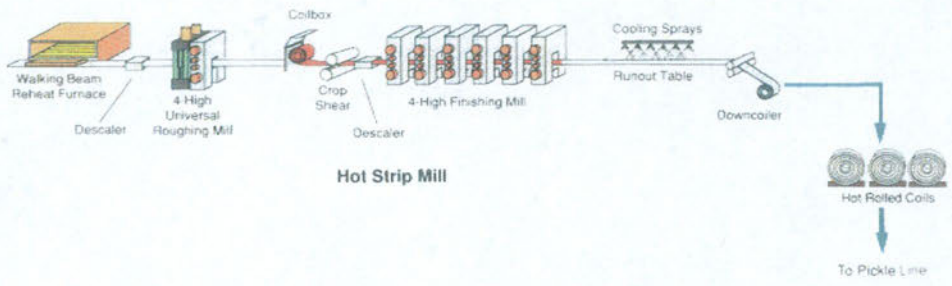


- Molten steel from BOS at ~1500 C cast into Tundish (holding reservoir) before casting into strands.
- Oscillating mould to feed steel down into machine.
- Rate of casting and speed dependent on grade and width being cast.
- Spray cooling of slab to aid solidification
- Strand cut to length to produce slab.
- Automatic mould & tundish level control
- Continuous monitoring of tundish temperature and feedback speed control
- Breakout detection system

Hot Strip Mill

- Slab reheated to ~ 1250 C
- Roughing mill reduces thickness from 230 mm to ~ 30 mm.
- Edging roll to reduce width of slab
- Coil box– uniform temperature, large coil mass, energy saving (no zoom rolling)
- Finish mill reduces transfer bar to desired thickness (1.48 – 12 mm)
- Laminar flow cooling on run out table (ROT) for cooling temperature and therefore property control
- Recoiling (temperature of Sheet ~ 400 C)

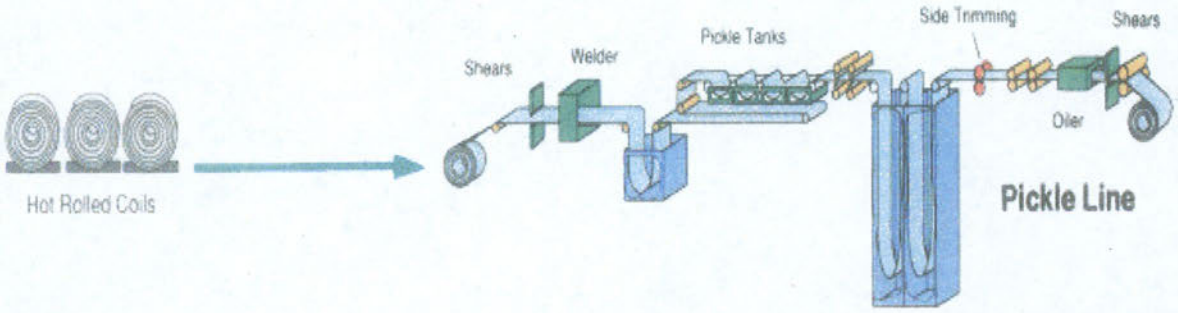
- End Uses: Structural section, trailers, LPG vessels, truck chassis/ bodies, shipping containers, automotive components, Agricultural etc.



Hot Strip Mill

Pickling Line

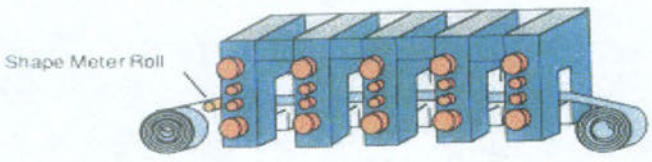
- Remove the oxides / scales formed during hot rolling by acid picking (HCl) process
- The temperature of acid bath is more than 70° C
- Oil is applied during rewinding to prevent rust



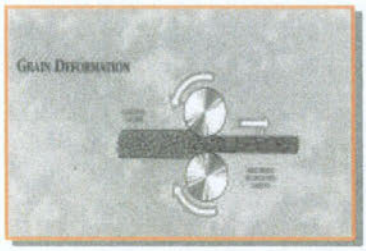
Cold Rolling

- Hot rolled pickled coil used for cold rolling.
- Final thickness reduction is carried out at room temperature
- The process increases the strength, makes steel thinner (0.3 – 3.2mm) and produce a bright smooth surface
- The grain structure is elongated making steel hard and springy
- This coil is called cold rolled full hard (CRFH)
- To restore the steel to a soft, usable, ductile form it is heated to above the recrystallisation temperature

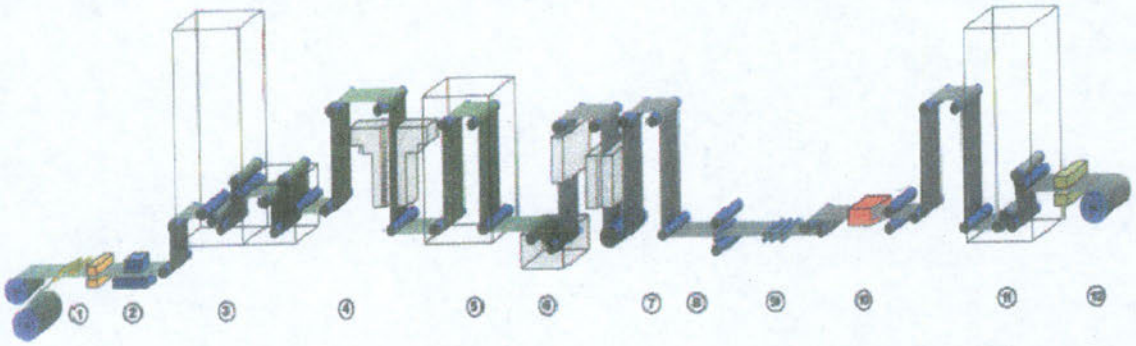
- End uses: Automotive, agricultural, appliances, Drums, Structural Sections,



4-High Tandem Cold Rolling Mill



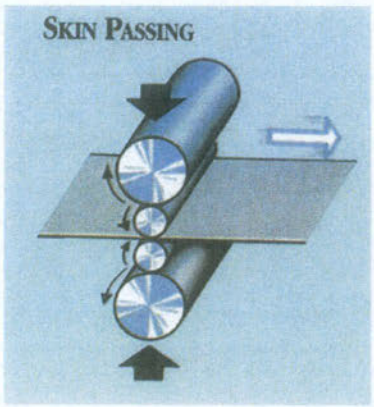
Typical Zinc/aluminum alloy coating line – Zincalume® Steel



1. Uncoiler 2. Welder 3. Entry Accumulator
4. Cleaning, rinsing & drying 5. Furnace 6. Coating pot
7. Cooling tower 8. Skin pass mill 9. Tension leveller
10. Chemical treatment 11. Exit accumulator 12. Recoiler

Metal Coating

- Bath composition – Aluminum 55%, Silicon
- 1.6% , Zinc 44.6%
- Coating mass is controlled by air knives
- Excess liquid metal back into molten Zinc or
- Zinc aluminium alloy bath



Skin Passing

- It removes the streture strain of the strip
- It suppress the yield strength
- It maintain the flatness of the strip
- It smoothes the surface of the strip

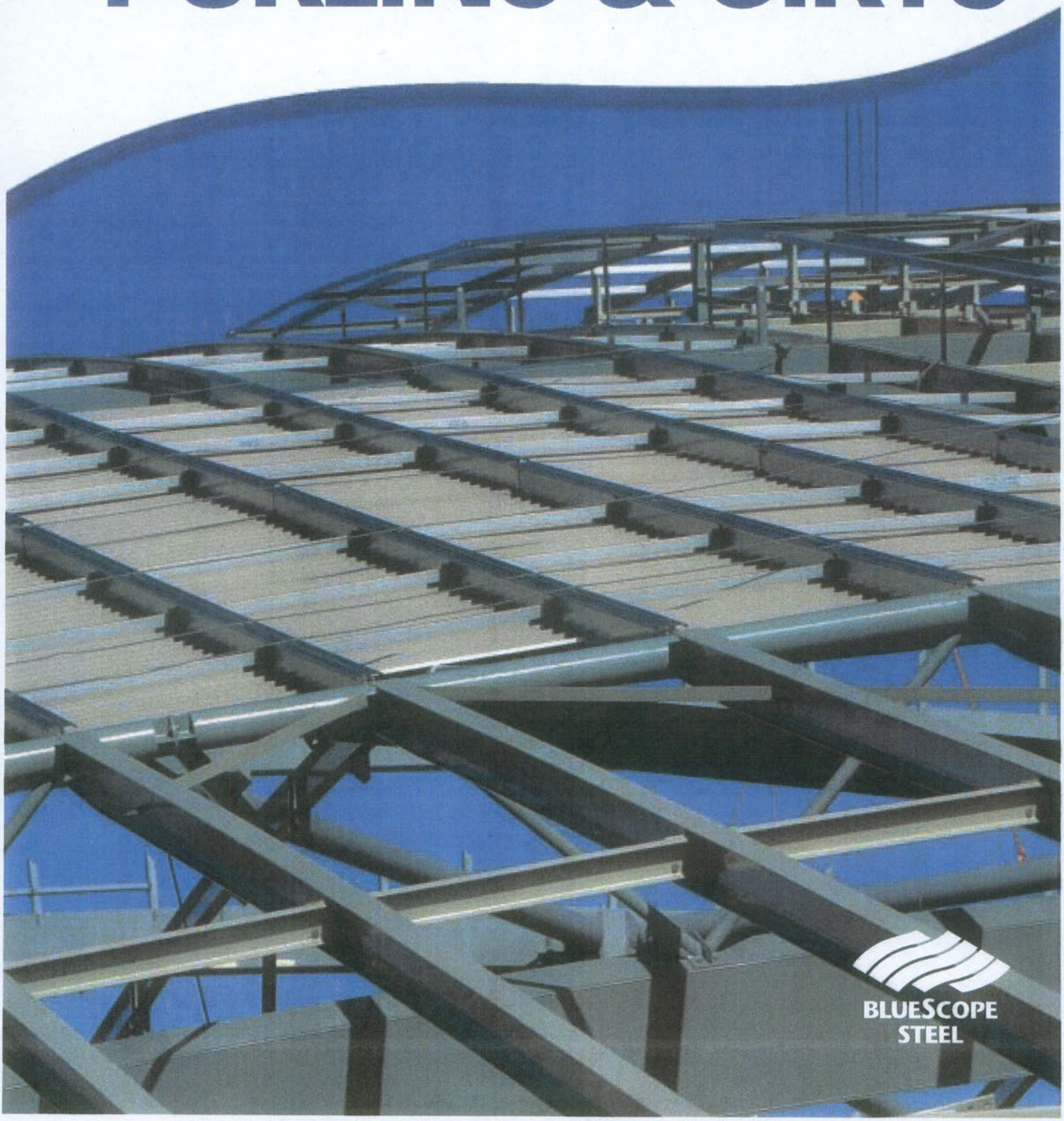
NON CONFIDENTIAL ATTACHMENT 15

Galvaspan®

Made Only By BlueScope Steel

A GUIDE TO USING

PURLINS & GIRTS



PROVEN PERFOF

When it comes to purlins and girts, few can match the strength, weight, useability and durability of those made from GALVASPAN® steel.

Purlins and girts made from GALVASPAN® steel are proven performers, delivering cost effective, design-efficient, highly innovative building solutions.

Like the Dunc Grey Velodrome (shown on the cover and below left) – venue for the cycling events at the Sydney 2000 Olympic Games – where in a world's first, pairs of back-to-back curved purlins helped achieve the striking roof design.

RMANCE

GALVASPAN® steel, made only by BlueScope Steel, is a special grade of high strength, hot-dipped galvanised steel strip. It's been specifically developed for purlins and girts, and is cold roll-formed into a wide range of sizes and thicknesses.

There's plenty of reasons why you should ask only for GALVASPAN® steel when specifying or ordering purlins and girts.

Readily available

GALVASPAN® steel is manufactured in Australia by BlueScope Steel. Our Australia-wide customer/distributor network is your best assurance of timely site delivery, no matter where you are.

Greater spanning capabilities

You can span further and potentially save on overall construction costs. GALVASPAN® steel is made from hi-tensile steel, which means it has a strength-to-weight ratio approximately 60% greater than hot rolled steel. In short, it's **strong** and **durable**.

Easier to handle

The higher strength-to-lower weight ratio means purlins made from GALVASPAN® steel are easier to transport and handle on site.

Cladding fixes easier and faster

Because of the relatively thin profile of purlins made from GALVASPAN® steel, fixing of roof and wall cladding is fast and easy with self-drilling, self-tapping screws.

Low maintenance costs

The continuously hot-dipped galvanised finish of GALVASPAN® steel is superior to post painting in terms of toughness, adhesion and corrosion resistance. This means it stands up better during handling, erection and over the life of the structure, reducing maintenance costs.

Backed by BlueScope Steel

Only BlueScope Steel makes GALVASPAN® steel. Genuine GALVASPAN® steel is warranted* and backed by BlueScope Steel.

Technical support when you need it

BlueScope Steel supports users of GALVASPAN® steel with project-specific advice and on-call technical assistance.

HI-TENSILE

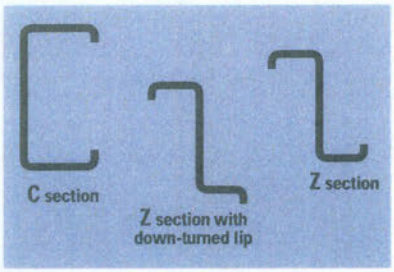
DURABILITY

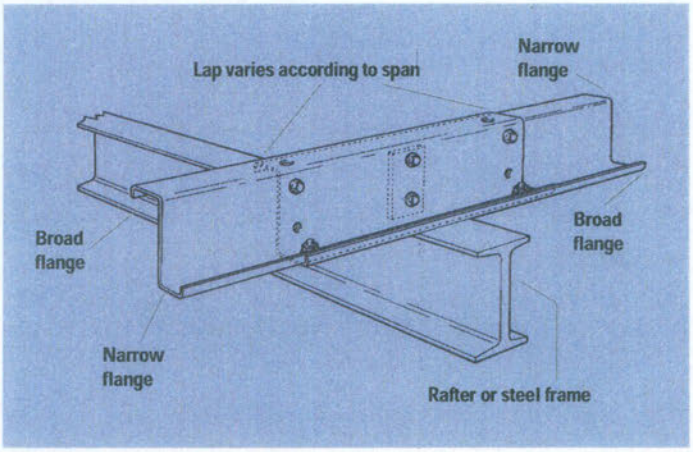
Shapes and sections: which one?

Purlins made from GALVASPAN® steel are roll-formed into two standard shapes – C and Z sections. Both perform effectively, and in many instances the choice comes down to personal preference.

When to use C sections

Generally, C sections are used for simple span construction, with the purlins butted at internal supports. In cases where deflection is a design limitation and the building is of a suitable size, single C sections can be used over two or more bays.





When to use Z sections

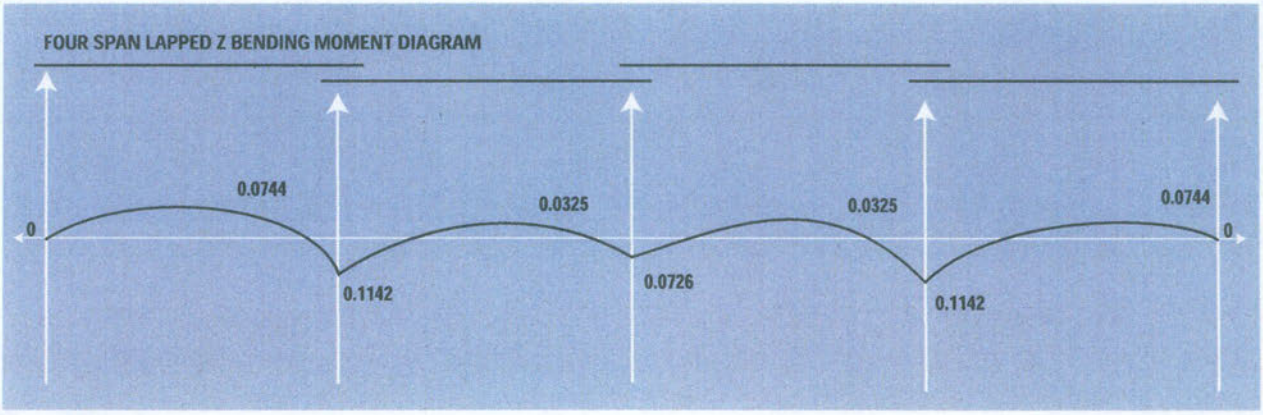
Z sections with one broad and one narrow flange are designed to nest neatly, and are intended for lapping at the internal supports. This produces structurally continuous lines of purlins for the length of the building.

Structural continuity results in improved rigidity, but lapping also doubles the thickness of purlin over supports where the bending moments are greatest. This results in a saving of up to 50 per cent – but typically 30 to 40 per cent – of the steel in the purlins, compared with simple span C sections.

Where additional strength is required from the purlins – for example in end bays, or where additional loads are applied locally – Z sections of the same depth but greater thickness can be lapped as required.

Special applications

In some applications, such as grain or coal handling facilities or wood machining factories, the upturned lip of conventional and C section purlins may form a trap for dust and debris. For this reason, Z sections are also available with downturned bottom lips. These sections are normally only used over simple spans with the ends butted rather than lapped.



Codes, standards and regulations

There are no Australian Standards specifically for purlins, but several are relevant.

AS/NZS4600, the SAA Cold formed steel structures code

This code is referred to in the Building Code of Australia and various state building regulations. Compliance with it is a requirement of the building codes.

AS/NZS4600 cites three material standards, namely:

- AS1397, Steel sheet and strip – Hot-dipped zinc-coated or aluminium zinc coated
- AS1594, Hot rolled steel flat products
- AS1595, Cold rolled unalloyed low carbon steel sheet and strip.

Purlins are normally rolled from steel manufactured in accordance with one of these standards.

Other steels are not excluded but their properties and suitability must be established by the purlin manufacturer by analysis, test or other means. It's then up to the design engineer to independently satisfy him or herself of the suitability of the steel.

Other relevant standards include:

- AS1170, the SAA Loading code. (Part 1: Dead and live loads and load combinations. Part 2: Wind forces.)
- AS4100, the SAA Steel structures code.

Design issues

Meeting the codes

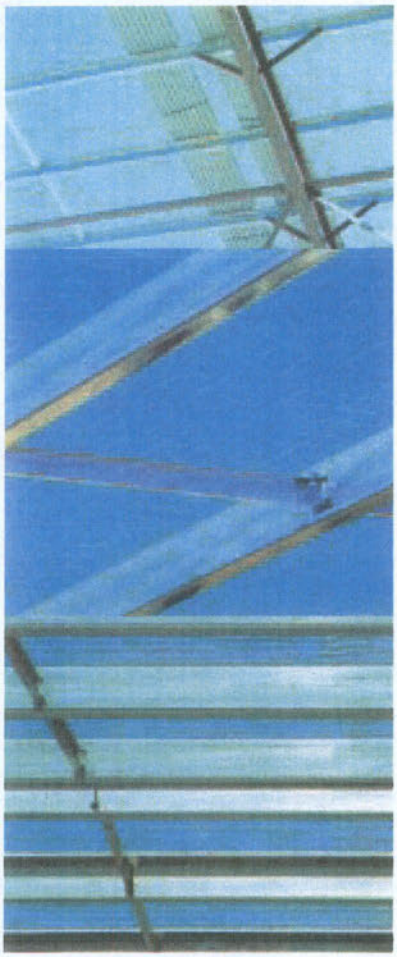
The design of cold formed sections made from GALVASPAN® steel is subject to the requirements of AS/NZS4600, the SAA Cold formed steel structures code. The code contains the rules by which the physical design of the section should be carried out and its load capacities calculated. It is intended as a supplement to, and should be used in conjunction with, AS4100 (the SAA Steel structures code) to carry out the structural design.

Any part of a steel structure must be designed for loads laid down in a number of codes specified in AS4100. Purlin loads are generally established from AS1170, the SAA Loading code (Part 1: Dead and live loads, and Part 2: Wind forces). In practice, the loads are dead load, roof live load and wind load and, in some areas, snow load. The nett load effect may act inward or outward (often the latter under typical Australian wind conditions) and the purlins may need to be analysed for both cases.

Load tables

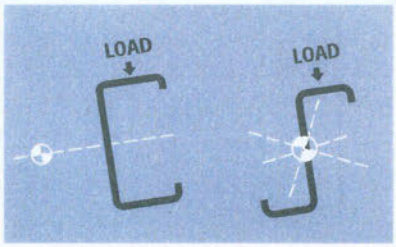
For design ease, some manufacturers provide detailed load tables that are either calculated in accordance with AS/NZS4600, or established by test (as permitted under the code).

DE



Bridging

Light gauge cold formed purlins are capable of carrying loads over quite large spans in relation to their depth (commonly 40D and more). But because of this, they have a tendency to twist or buckle laterally. In the case of C sections, this is due to the shear centre lying outside the section; with Z sections, it's because the loading axes do not coincide with the principal axes.



This problem can be overcome by using lateral bracing (bridging). Running transverse to the purlins, bridging braces and stabilises the purlin webs, usually at mid span or approximately third points.

Boltless bridging systems

Some manufacturers provide bridging that is designed to hook into and lock the purlins in position quickly and easily, without the need for nuts, bolts or tie rods. These boltless bridging systems can reduce installation and construction costs, as well as increasing the safety for riggers installing the purlins.

Tolerances

Precision roll-forming of GALVASPAN® steel produces purlins to quite close dimensional tolerances. Typical tolerances are:

Depth ± 1mm

Hole centres ± 2mm

Flange width ± 2mm

Camber 1 in 500

Overall length ± 5mm

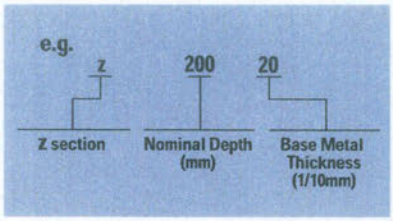
Bow 1 in 250

Tolerances for material thickness are nominated in AS1365: "Tolerances for hot rolled and cold rolled unalloyed low carbon steels (coils and cut lengths)."

Sizes and dimensions

There are no official standard sizes for purlins, but most purlins made from GALVASPAN® steel come in nominal depths of **100, 150, 200, 250, 300** and **350mm.** Not all sizes are available in both C and Z profiles.

Sections are generally designated by a code number signifying the nominal depth and material thickness, with a letter prefix to indicate the profile.



LOW MAINTENANCE

SIGN EFFICIENT

Metric or imperial?

While some manufacturers produce true metric-sized purlins, others produce to superseded imperial dimensions, which are then referred to by their soft metric conversions. Thus, a 200 series purlin could be 200mm or 203mm (eight inches) deep, depending on the manufacturer. While purlin depths are reasonably rationalised, the same cannot be said of other dimensions such as flange width, lip length or thickness.

Other variations between manufacturers

It's important to take into account the variations in detail between sections produced by different roll-formers when comparing their likely performance.

In particular, the effective section rules of AS/NZS4600 require careful attention, as variations in flange width, lip length and thickness can have a significant influence on the load capacity of the section.

Other variables can be material strength and thickness. GALVASPAN® steel from BlueScope Steel is a hi-tensile galvanised steel strip that conforms to AS1397-G450 (450MPa minimum yield stress); or for thicknesses less than 1.5mm, AS1397-G500. Clearly, lower strength materials from other steel producers will not deliver the same structural performance.

Steel thicknesses

Purlins made from GALVASPAN® steel are generally produced in thicknesses of **1.0, 1.2, 1.5, 1.9, 2.4,** and **3.0.**

For design purposes, the relevant material thickness is the base steel thickness before galvanising or painting. Galvanised coatings, in particular, add appreciably to the thickness, but the zinc coating contributes little to strength and is not considered when calculating load capacities.

CORROSION PRO

Corrosion protection

AS/NZS4600 requires that cold formed sections must be adequately protected from corrosion attack.

The available protection options range from basic painting systems through to heavy galvanised coatings (like that used by BlueScope Steel for GALVASPAN® steel).

Before specifying what type of purlin, you need to consider:

- the structure, climatic or other local conditions
- maintenance provision, and
- the forming process used (in cases where the coating is applied before forming).

The zinc coating and quality-controlled galvanising process used by BlueScope Steel to make GALVASPAN® steel ensures a high standard of corrosion protection.

Coating classes

GALVASPAN® steel is available with two standards of corrosion protection. These are:

- 350g/m² zinc coating weight
- 450g/m² zinc coating weight.

Both 300mm and 350mm purlin sizes are usually produced with 450g/m² zinc coating.

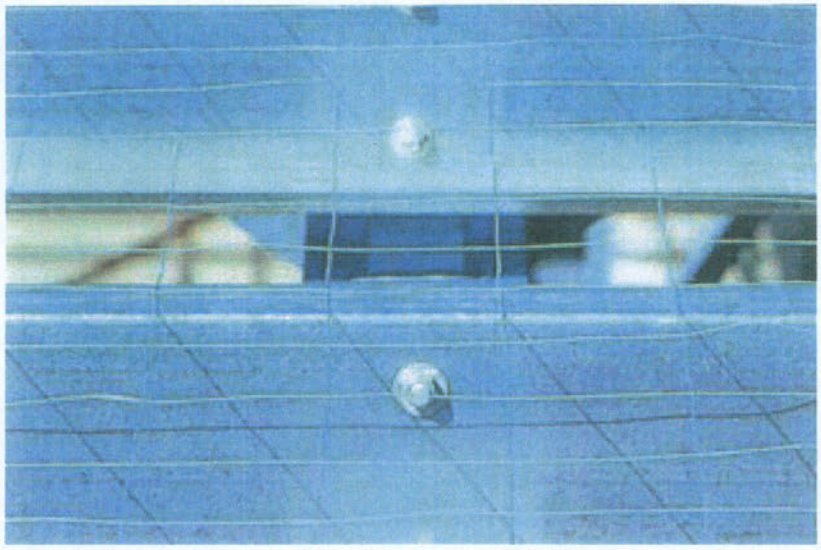
The zinc coating weight is the total weight of zinc on the base steel, and is usually referred to by the coating class, ie. 350g/m² of zinc is class Z350. The respective coating classes represent approximate coating thicknesses of:

- Z350 – 24µm
- Z450 – 31µm

of zinc on each side of the strip.

Base Metal Thickness	Coating Class	Total Coated Thickness (mm)
1.5	Z350	1.548
1.6	Z350	1.648
1.9	Z350	1.948
2.0	Z350	2.048
2.4	Z350	2.448
2.5	Z350	2.548
1.5	Z450	1.562
1.6	Z450	1.662
1.9	Z450	1.962
2.0	Z450	2.062
2.4	Z450	2.462
2.5	Z450	2.562
3.2	Z450	3.262

)TECTION



The galvanising story

The galvanised finish on GALVASPAN® steel is applied by BlueScope Steel on a continuous galvanising line as part of the steel production process. (The base steels used are produced to AS1397.)

In conventional hot-dip galvanising, the clean steel surface is wetted by the molten zinc, producing zinc/iron alloy layers. With the continuous galvanised line process used by BlueScope Steel to produce GALVASPAN® steel, this alloying is controlled to ensure that the ductility of the coating matches that of the base steel.

Consequently, the molecular bond ensures that the zinc coating on GALVASPAN® steel:

- does not flake or peel during cold forming
- is highly resistant to damage during handling, transport and erection, and
- maintains its bright, attractive appearance.

In addition, the unique cathodic properties of GALVASPAN® steel – otherwise referred to as its in-built 'cut edge protection' – ensure that any cut edges, holes and minor coating damage are protected from subsequent corrosion by the sacrificial action of the surrounding zinc.

Painted purlins do not offer this inbuilt corrosion protection. They are prone to coating damage during handling and erection, which in turn may lead to corrosion and higher maintenance costs over time. For this reason, painted purlins have been largely superseded by galvanised purlins.

Compatibility with other steel products

The zinc coating on purlins made from GALVASPAN® steel is fully compatible with the zinc and aluminium/zinc coatings used on roof and wall sheeting made from other quality BlueScope Steel products.

If minor damage occurs to the purlin coating, the base steel is protected by its own surrounding coating. Furthermore, the protective coating on the sheeting is not corroded by an unprotected base steel nearby.

Specifying for corrosive environments

Z450 purlins should be specified for environments requiring additional corrosion protection. Talk to your local BlueScope Steel office, or call BlueScope Steel Direct on 1800 022 999, for assistance in detailing purlin specifications for severe exposure environments.

A more complete guide to coating class recommendations is also provided in our Technical Bulletin No. 17 – "Selection Guide For Galvanised Steel Purlin Products."

LONG-LIFE

STRUCTURAL PE

Storage and handling

Like other building materials, purlins made from GALVASPAN® steel require care during storage and handling on site. Follow these recommendations:

- ideally, deliveries should be arranged so that the period between delivery and installation is minimised
- if the purlins aren't required for immediate use, the bundles should be stacked clear of the ground and, if in the open, protected with waterproof covers
- if the bundles do become wet, the purlins should be separated, wiped dry and covered. (Any moisture that gets between bundled purlins cannot easily evaporate, and may cause unsightly coating damage that can reduce the life of the product), and
- bolts and nuts should be kept clean, dry and free of dirt or dust to prevent difficulties when tightening.

It's important to take care when lifting bundles of purlins. Long lengths should be lifted using a spreader bar and fabric slings. Take special care to prevent damage at the lifting points.

Installation

Purlins are bolted to the primary frame by cleats welded to the rafters or columns by the steel fabricator.

The cleats and the associated hole geometry have been standardised in the AISC Standardised Structural Connections. (Most manufacturers comply with the standard and the hole centres, as shown in the diagram below.)

Bolts

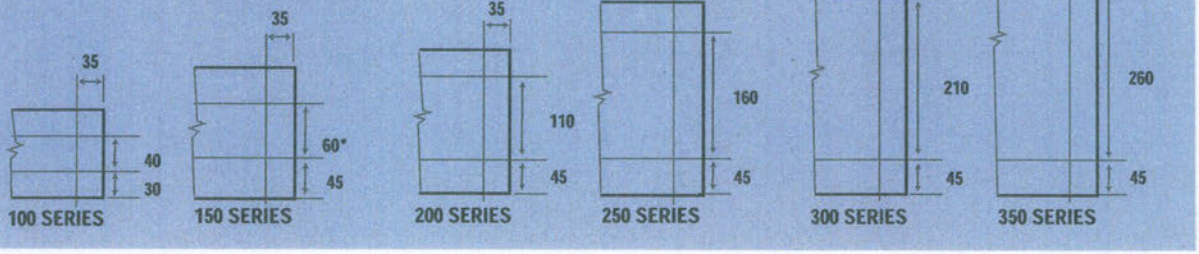
Bolts are usually M12 Grade 4.6 requiring snug tightening to make an effective connection. These can be ordered from purlin manufacturers, some of whom supply special types, such as bolts with short 16mm plain shanks and M12 threads, nuts and bolts with integral washer faces, etc.

Standard hole geometry

100-250 Series usually 18mm diam. or 18 x 22mm slots.

300 and 350 Series usually 22mm diam. holes.

*150 Series in Victoria have 70mm gauge length.



ERFORMANCE

Clearance holes

To allow for minor variations in frame alignment, purlins made from GALVASPAN® steel generally have quite large clearance holes; typically 18mm diameter holed for 12mm diameter bolts. Some manufacturers produce 18mm x 22mm slots for greater adjustment. These generous clearances make for easier assembly, but won't affect structural performance.

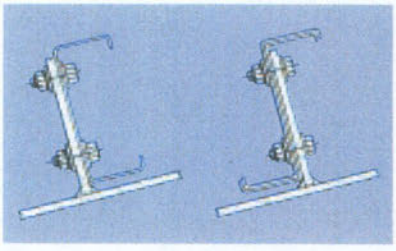
When Z purlins are lapped, additional holes are provided to ensure structural continuity. It's here that the extra clearances are especially useful. Purlins are usually engineered for M12 bolts and in these cases, M16 should not be used. In fact, with lapped Z purlins in some of the thicker gauges, the holes cover one another sufficiently to prevent assembly with M16 bolts unless they are forced.

Top flange facing up

Purlins should always be installed with the top flange facing up the slope from the cleat, ie:

- C sections should be fitted on the high side of the cleat, open face facing up the slope
- Z sections should be fitted with the web on the low side of the cleat, with the top flange above it.

This is to minimise the tendency of the sections to rotate between supports or bridgings.

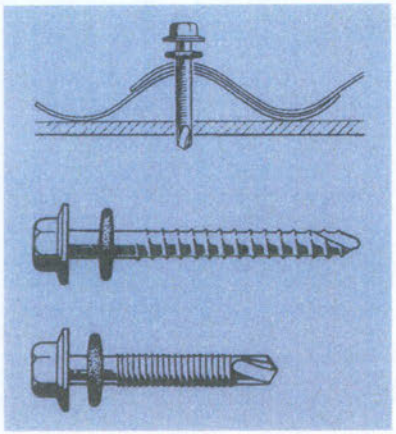


Fitting the bridging and cladding

While purlin fixing is quite straightforward, the sections are very flexible until they become part of the total sheeted system. The aim, therefore, should be to maintain a stable framework by fitting the bridging as the purlins are attached.

Ideally, the cladding should also be progressively fixed, although this isn't always practical if the jobs are handled by different sub-contractors.

Bundles of roof sheeting **should not** be placed on unsheeted purlins, as this can cause overloading and result in permanent deformation of the sections.



Cladding

A major benefit of cold formed purlins made from GALVASPAN® steel is the ease with which cladding can be fixed. The relatively thin material of the purlin flange means that drilling and fixing is one simple operation, using self-drilling, self-tapping screws with preassembled seals.

Non-cyclonic areas

In non-cyclonic areas, fixing may be through the crests or valleys of the sheets. On roofs, valley-fixing introduces some risk of leakage, but on walls it is the usual practice. Check with BlueScope Steel or your sheeting manufacturer/supplier for the recommended fixing method for the sheeting product you're using.

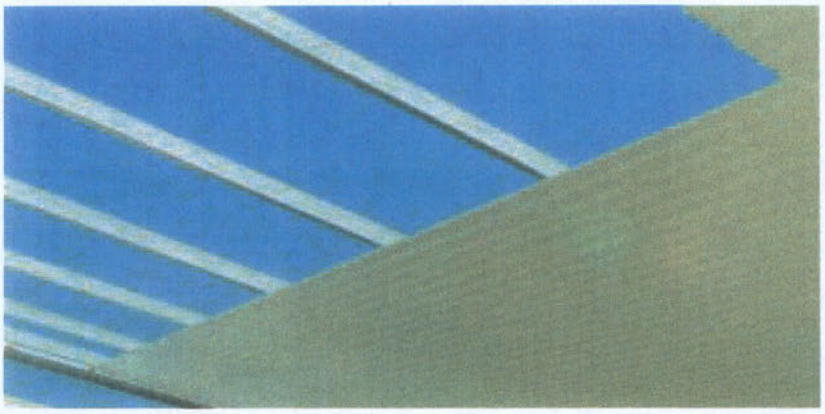
Cyclonic areas

In cyclonic areas, some claddings should only be crest-fixed. With the cyclic nature of the loading, thin hi-tensile claddings can fatigue quickly due to a lack of flexibility around the valley fixing. The sheeting fails by cracking around the screw heads. (Again, check with BlueScope Steel or your sheeting supplier on the appropriate fixing method.)

Secret-fixed decks

These types of cladding are attached to clips screwed to the purlins.

From a structural viewpoint, steel cladding properly fixed will always provide adequate lateral restraint for the top flange. However, the same cannot be said of other metals or brittle sheeting materials.



TECHNICAL ADVICE

WARRANTY

Specifying and ordering

In the absence of specific product standards, designers have several options when specifying purlins:

- nominate the purlins by size and specific manufacturer, to the exclusion of all others
- specify by size and manufacturer and allow equivalent manufacturers, or
- specify the major dimensions and properties, ie:
  - depth
  - flange width
  - base metal thickness
  - yield strength
  - protective coating
  - mass of section

and leave the choice of manufacturer to the contractor.

To make sure your product is genuine GALVASPAN® steel by BlueScope Steel, it's important to **nominate the use of GALVASPAN® steel.**

Selection of the correct coating weight – Z350 or Z450 – is also critical. The choice is dependant on the environment in which the purlin is to be used. Z350 will suit most applications that are not subject to unusually corrosive conditions. In more corrosive applications, Z450 coating class may be appropriate.

Again, be sure to consider any minor detail differences between different products from different manufacturers to ensure they meet the design requirements.

Ordering to length

Purlins made from GALVASPAN® steel are normally produced to order for each project. They are usually:

- custom-cut to precise lengths,
- pre-punched with all necessary fixing and bracing holes, and
- delivered to site, ready to erect, with bridging, bolts and all other accessories.

Length limits for purlins are about 12m for the smaller sizes, increasing to about 20m for the larger. Most manufacturers will look at going beyond these limits on a job-to-job basis. But ultimately, maximum lengths will be determined by local transport regulations and practical handling issues.

BlueScope Steel's vast customer/distributor network helps to ensure on-time delivery to site. However, orders should still be placed early to allow for manufacture and delivery to meet the construction program.

Getting the order list right

Take care in preparing an order list. The order forms provided by most roll-formers will help.

Remember, too, that manufacturers offer a wide range of purlins and accessories, and the same purlin reference number alone does not necessarily mean the same load capacity or durability.

Again, make sure you are getting 'the genuine article'. Only BlueScope Steel makes GALVASPAN® steel, and only GALVASPAN® steel is covered by a BlueScope Steel warranty*.

A guide to selecting and using purlins and girts

A specifying checklist

When specifying **purlins,** include:

- catalogue number (identifying section, shape, size, thickness, protective coating and material grade)
- length (calculated by the detailer, taking into account frame spacing, end laps, clearances and overhangs as required)
- hole details (for end connections and bridging). Additional holes may be specified for fly bracing, etc. Where possible, standard gauge lines and hole dimensions should be specified to speed delivery
- number required, and
- special markings to facilitate erection.

When specifying **bridging,** include:

- catalogue number
- purlin spacing centre to centre, and
- number required.

Fascia bridging and adjustable ridge ties are ordered in the same way.

Accessories

Components such as bolts, brackets, etc. are usually ordered by catalogue number and number required.

The precise ordering procedure and the range of accessories offered may vary slightly from manufacturer to manufacturer, but the principles are generally the same.

A complete system

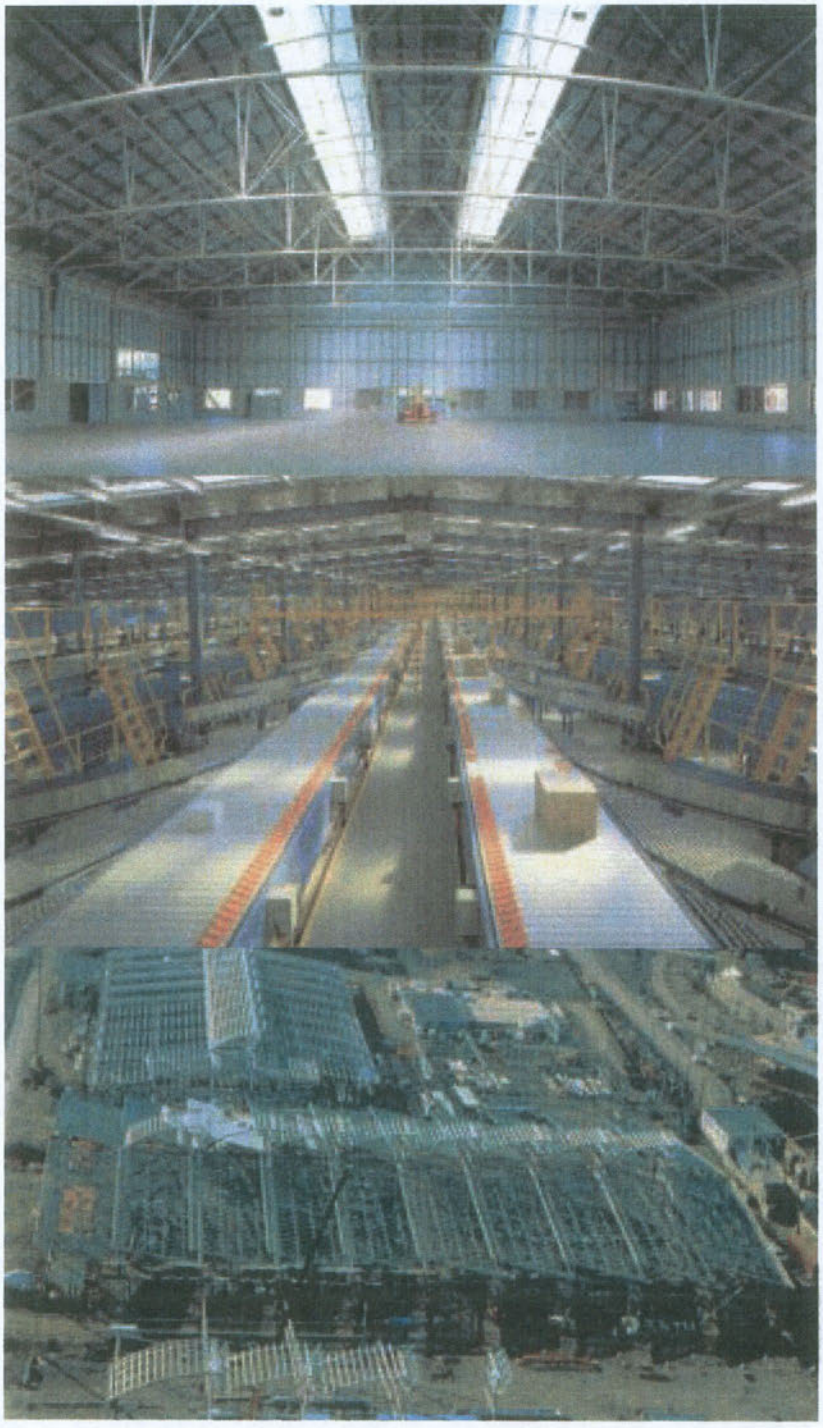
Purlins made from GALVASPAN® steel are part of an economical building system that promises good service for years to come. You should make the fullest possible use of the complete system and its accessories, such as ridge ties, raking girts, girt hangers, fascia purlins and multi-purpose angle connectors.

Inspection

Inspection of purlin systems normally requires only measuring and visual checking.

- **ensure the purlins meet the specification.** This should be done soon after delivery and before installation, and
- **visually check** that bolts are correctly fitted, all bridging correctly installed and the whole system is neat and true.

BACKED BY BLUESCOPE STEEL



Galvaspan®

BLUESCOPE STEEL

This simple checklist is your guarantee of the superior BlueScope Steel difference:

- ☑ Made only by BlueScope Steel in Australia for Australian conditions
- ☑ Meets Australian building standards
- ☑ Product performance is field-tested
- ☑ Supported by a BlueScope Steel warranty*
- ☑ Durable, strong and lightweight

To make sure your product is from BlueScope Steel, look for the GALVASPAN® steel brand mark.

BlueScope Steel Limited ABN 16 000 011 058

Sydney (02) 9795 6700
Melbourne (03) 9586 2222
Brisbane (07) 3845 9300
Adelaide (08) 8243 7333
Perth (08) 9330 0666

*Warranty terms and conditions apply. Ask your supplier for details. Clemenger/BHC0053/November 03 (P76)

DURABILITY | DESIGN FLEXIBILITY | ENVIRONMENTALLY FRIENDLY | WARRANTY

9 320075 033934

For further information please phone BlueScope Steel Direct on 1800 022 999 or visit www.galvaspan.com

Metallic Coated Structural GALVASPAN® G450 steel

MC
S

Revision 7, November 2003
This literature supersedes all previous issues

GENERAL DESCRIPTION

GALVASPAN® G450 steel is a hot-dipped zinc-coated structural steel with a spangled surface and guaranteed minimum yield strength of 450MPa. Suitable for roll forming to a minimum internal diameter of 4t.

TYPICAL USES

Roll-formed sections for structural applications.

AUSTRALIAN STANDARDS

AS 1365
AS 1397:2001

GUARANTEED PROPERTIES OF STEEL BASE

MECHANICAL PROPERTIES	GUARANTEED MINIMUM
Yield strength (MPa)	450
Tensile Strength (MPa)	480
Elongation on 80mm (≥ 0.60 mm) %	9
90° transverse bend (L axis)	4t

CHEMICAL PROPERTIES	GUARANTEED MAXIMUM %
Carbon (C)	0.20
Phosphorus (P)	0.04
Manganese (Mn)	1.20
Sulphur (S)	0.03

Note – tensiles tested in longitudinal direction

COATING ADHESION – 180° BEND TEST

COATING CLASS	GUARANTEED
Z350	2t
Z450	2t

FIRE HAZARD PROPERTIES

IGNITABILITY INDEX	(range 0-20)	0
SPREAD OF FLAME INDEX	(range 0-10)	0
HEAT EVOLVED INDEX	(range 0-10)	0
SMOKE DEVELOPED INDEX	(range 0-10)	0

DIMENSIONAL CAPABILITIES

Thickness Ranges mm	Max. Width mm
≥1.50 ≤ 1.60	1350
>1.60 ≤ 1.80	1235
>1.80 ≤ 2.00	1220
>2.00 ≤ 2.50	1200
>2.50 ≤ 3.20	1150

Slitting and shearing available on request from BlueScope Steel sales offices.

These dimensions are a reflection of technical capability to produce. Supply conditions may be subject to dimensional restrictions and is subject to BlueScope Steel Sales and Marketing confirmation.

NORMAL/OPTIONAL SUPPLY CONDITIONS

	Normal	Optional
Coating Class	Z350	Z450
Surface Condition	Spangled	–
Surface Treatment	Passivated	–
Tolerance Class		
Dimensions	A Class	–
Flatness	A Class	–
Branding	Branded	–

Important Notes

Material should be used promptly (within 6 months) to avoid the possibility of a storage related phenomena of galvanised coatings termed intergranular corrosion.

For selection of the most appropriate metallic coated steel, please refer to technical bulletins TB1a, TB1b, CTB21 and CTB22.

For storage, rollforming lubricant and other information please refer to the Technical Bulletins.

Please ensure you have the current data sheet for this product as displayed at www.bluescopesteel.com.au

BlueScope Steel Limited
BlueScope Steel Limited ABN 16 000 011 058
BlueScope Steel (AIS) Pty Ltd ABN 19 000 019 625

SYDNEY: (02) 9795 6700 **MELBOURNE:** (03) 9586 2222 **BRISBANE:** (07) 3845 9300 **ADELAIDE:** (08) 8243 7333 **PERTH:** (09) 9330 0666

Produced by Artimprint (02) 9984 8586

Metallic Coated Structural GALVASPAN® G450 steel

MC
S

Revision 7, November 2003
This literature supersedes all previous issues

Continued

TYPICAL PROPERTY RANGES (FOR NORMAL SUPPLY PRODUCT)

Thickness mm	Yield Strength/Proof Strength & Tensile Strength MPa															
	480	490	500	510	520	530	540	550	560	570	580	590	600	610	620	630
1.5																
1.9																
2.4																
3.0																

Key: yield strength; tensile strength

Thickness mm	Total Elongation on 80mm (%)									
	8	9	10	11	12	13	14	15	16	17
1.5										
1.9										
2.4										
3.0										

FABRICATING PERFORMANCE

Method	Rating
Bending	3
Drawing	NR
Pressing	NR
Roll-Forming	3
Welding (design must allow for some strength reduction near welds)	5
Painting (Pretreatment)	5

where 1 = limited to 5 = excellent, or NR = not recommended

TYPICAL CHEMICAL COMPOSITION OF STEEL BASE

	%
Carbon (C)	0.035 - 0.070
Phosphorus (P)	0.00 - 0.02
Manganese (Mn)	0.20 - 0.30
Sulphur (S)	0.00 - 0.02
Silicon (Si)	0.00 - 0.02
Aluminium (Al)	0.02 - 0.07
Nitrogen (N)	0.000 - 0.008

IMPORTANT NOTES:

- Typical Mechanical Properties are based on typical product dispatched to customers. Note that ductility will decline through a natural aging process during storage and/or paint stoving cycle.

Please ensure you have the current data sheet for this product as displayed at www.bluescopesteel.com.au

BlueScope Steel Limited
BlueScope Steel Limited ABN 16 000 011 058
BlueScope Steel (AIS) Pty Ltd ABN 19 000 019 625

SYDNEY: (02) 9795 6700 **MELBOURNE:** (03) 9586 2222 **BRISBANE:** (07) 3845 9300 **ADELAIDE:** (08) 8243 7333 **PERTH:** (09) 9330 0666

Produced by Artimprint (02) 9984 8586

Metallic Coated MC
Structural S
ZINC HI-TEN® G450 steel
G450S steel

Revision 9, November 2003
This literature supersedes all previous issues

GENERAL DESCRIPTION

ZINC HI-TEN® G450 steel is a hot-dipped zinc-coated structural steel with a spangled surface and guaranteed minimum yield strength of 450 MPa. Suitable for roll-forming to a 4t minimum internal diameter.

ZINC HI-TEN® G450S steel is skinpassed to improve surface quality. This skinpassed product is only available up to 2mm thick.

TYPICAL USES

Purlins, structural decking, scaffoldling.

AUSTRALIAN STANDARDS

AS 1365
AS 1397:2001

GUARANTEED PROPERTIES OF STEEL BASE

MECHANICAL PROPERTIES	GUARANTEED MINIMUM
Yield Strength (MPa)	450
Tensile Strength (MPa)	480
Elongation on 80mm (≥ 0.60 mm) %	9
90° transverse bend (L axis)	4t

CHEMICAL PROPERTIES	GUARANTEED MAXIMUM %
Carbon (C)	0.20
Phosphorus (P)	0.04
Manganese (Mn)	1.20
Sulphur (S)	0.03

Note – tensiles tested in longitudinal direction

COATING ADHESION – 180° BEND TEST

COATING CLASS	GUARANTEED
Z100	0t
Z200	1t
Z275	2t
Z450	2t
Z600	3t

FIRE HAZARD PROPERTIES

IGNITABILITY INDEX	(range 0-20)	0
SPREAD OF FLAME INDEX	(range 0-10)	0
HEAT EVOLVED INDEX	(range 0-10)	0
SMOKE DEVELOPED INDEX	(range 0-10)	0

DIMENSIONAL CAPABILITIES

Thickness Ranges mm		Max. Width mm
≥ 1.50 ≤ 1.60	G450, G450S	1350
> 1.60 ≤ 1.80	G450, G450S	1235
> 1.80 ≤ 2.00	G450, G450S	1220
> 2.00 ≤ 2.50	G450	1200
> 2.50 ≤ 3.20	G450	1150

Slitting and shearing available on request from BlueScope Steel sales offices.

These dimensions are a reflection of technical capability to produce. Supply conditions may be subject to dimensional restrictions and is subject to BlueScope Steel Sales and Marketing confirmation.

NORMAL/OPTIONAL SUPPLY CONDITIONS

	Normal	Optional
Coating Class	Z275	Z200, Z450, Z600
Surface Condition	Spangled	Minimised spangle
Surface Treatment	Passivated	–
Tolerance Class		
Dimensions	A Class	–
Flatness	A Class	–
Branding	Branded	–

Important Notes

Material should be used promptly (within 6 months) to avoid the possibility of a storage related phenomena of galvanised coatings termed intergranular corrosion.

For selection of the most appropriate metallic coated steel, please refer to technical bulletins TB1a, TB1b, CTB21 and CTB22.

For storage, rollforming lubricant and other information please refer to the Technical Bulletins.

Please ensure you have the current data sheet for this product as displayed at www.bluescopesteel.com.au

BlueScope Steel Limited
BlueScope Steel Limited ABN 16 000 011 058
BlueScope Steel (AIS) Pty Ltd ABN 19 000 019 625

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Produced by Artimprint (02) 9984 8586

Metallic Coated Structural ZINC HI-TEN® G450 steel

MC S G450S steel

Revision 9, November 2003
This literature supersedes all previous issues

Continued

TYPICAL PROPERTY RANGES (FOR NORMAL SUPPLY PRODUCT)

Thickness mm	Yield Strength/Proof Strength & Tensile Strength MPa																		
	470	480	490	500	510	520	530	540	550	560	570	580	590	600	610	620	630	640	650
1.5																			
2.0																			
2.5																			
3.0																			

Key: yield strength; tensile strength

Thickness mm	Total Elongation on 80mm (%)									
	8	9	10	11	12	13	14	15	16	17
1.5										
2.0										
2.5										
3.0										

FABRICATING PERFORMANCE

Method	Rating
Bending	3
Drawing	NR
Pressing	NR
Roll-Forming	4
Welding (design must allow for some strength reduction near welds)	5
Painting (Pretreatment)	5

TYPICAL CHEMICAL COMPOSITION OF STEEL BASE

	%
Carbon (C)	0.035 - 0.070
Phosphorus (P)	0.00 - 0.02
Manganese (Mn)	0.20 - 0.30
Sulphur (S)	0.00 - 0.02
Silicon (Si)	0.00 - 0.02
Aluminium (Al)	0.02 - 0.07
Nitrogen (N)	0.000 - 0.008

where **1** = limited to **5** = excellent, or **NR** = not recommended

IMPORTANT NOTES:

- Typical Mechanical Properties are based on typical product dispatched to customers. Note that ductility will decline through a natural aging process during storage and/or paint stoving cycle.
- The Skin-Passing of ZINC HI-TEN® G450 steel will generally give a marginally higher yield strength and marginally reduced % elongation.

Please ensure you have the current data sheet for this product as displayed at www.bluescopesteel.com.au

BlueScope Steel Limited
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Produced by Artimprint (02) 9984 8586

Zincalume®

Zincalume®

With a lifetime of up to four times that of ordinary galvanised steel, ZINCALUME® steel delivers outstanding durability.

But, more importantly, it also gives you the confidence that the award winning material you've chosen for your next project will perform today and for years to come.

ZINCALUME® steel can be bent, folded, stamped, punched or crimped for easy fastening. The special resin coating reduces the need for lubricants for rollforming, making it less slippery and easier to handle. Its smooth satin-smooth finish has an ideal surface for easy painting.

It's a design classic. ZINCALUME® steel has the unique ability to compliment both traditional or ultra modern architecture. Use it with confidence. It's flexible and cost effective, so the design choice is yours.

Metallic Coated Structural ZINCALUME® G550 steel

MC
S
G550S steel

Revision 10, November 2003
This literature supersedes all previous issues

GENERAL DESCRIPTION

ZINCALUME® G550 steel is a hot-dipped zinc/aluminium alloy – coated structural steel with a spangled surface and a guaranteed minimum yield strength of 550 MPa with limited ductility. Suitable for roll forming to a minimum internal diameter of 4t.

ZINCALUME® G550S steel is skinpassed to improve surface quality. Skinpassed material is used to supply COLORBOND® steel and is not available without the COLORBOND® paint finish.

TYPICAL USES

Roll-formed decking and walling.

AUSTRALIAN STANDARDS

AS 1365
AS 1397:2001

GUARANTEED PROPERTIES OF STEEL BASE

MECHANICAL PROPERTIES	GUARANTEED MINIMUM
Yield Strength, MPa	550
Tensile Strength, MPa	550
Elongation on 80mm (≥ 0.60mm) %	2

CHEMICAL PROPERTIES	GUARANTEED MAXIMUM %
Carbon (C)	0.2
Phosphorus (P)	0.04
Manganese (Mn)	1.2
Sulphur (S)	0.03

Note – tensiles tested in longitudinal direction

COATING ADHESION – 180° BEND TEST

COATING CLASS	GUARANTEED
AZ150	2t
AZ200	2t

FIRE HAZARD PROPERTIES

IGNITABILITY INDEX	(range 0-20)	0
SPREAD OF FLAME INDEX	(range 0-10)	0
HEAT EVOLVED INDEX	(range 0-10)	0
SMOKE DEVELOPED INDEX	(range 0-10)	0-1

DIMENSIONAL CAPABILITIES

Thickness Ranges mm		Max. Width mm
≥ 0.30 < 0.32	G550/ G550S	1070
≥ 0.32 < 0.33		1100
≥ 0.33 < 0.35		1150
≥ 0.35 < 0.40		1220
≥ 0.40 ≤ 0.60		1235
> 0.60 ≤ 1.00		1220

Slitting and shearing available on request from BlueScope Steel sales offices.

These dimensions are a reflection of technical capability to produce. Supply conditions may be subject to dimensional restrictions and is subject to BlueScope Steel Sales and Marketing confirmation.

NORMAL/OPTIONAL SUPPLY CONDITIONS

	Normal	Optional
Coating Class	AZ150	AZ200
Surface Condition	Spangled	–
Surface Treatment	Passivated/ Resin coated	–
Tolerance Class		
Dimensions	A Class	B Class
Flatness	A Class	–
Branding	Branded	–

Important Notes

Material should be used promptly (within 6 months) to avoid the possibility of storage related corrosion.

For selection of the most appropriate metallic coated steel, please refer to technical bulletins TB1a, TB1b, CTB21 and CTB22.

Mechanical properties are guaranteed at ambient/room temperatures. Please consult technical representatives at BlueScope Steel Sales office for high/low temperature use.

Please ensure you have the current data sheet for this product as displayed at www.bluescopesteel.com.au

BlueScope Steel Limited
BlueScope Steel Limited ABN 16 000 011 058
BlueScope Steel (AIS) Pty Ltd ABN 19 000 019 625

SYDNEY: (02) 9795 6700 **MELBOURNE:** (03) 9586 2222 **BRISBANE:** (07) 3845 9300 **ADELAIDE:** (08) 8243 7333 **PERTH:** (09) 9330 0666

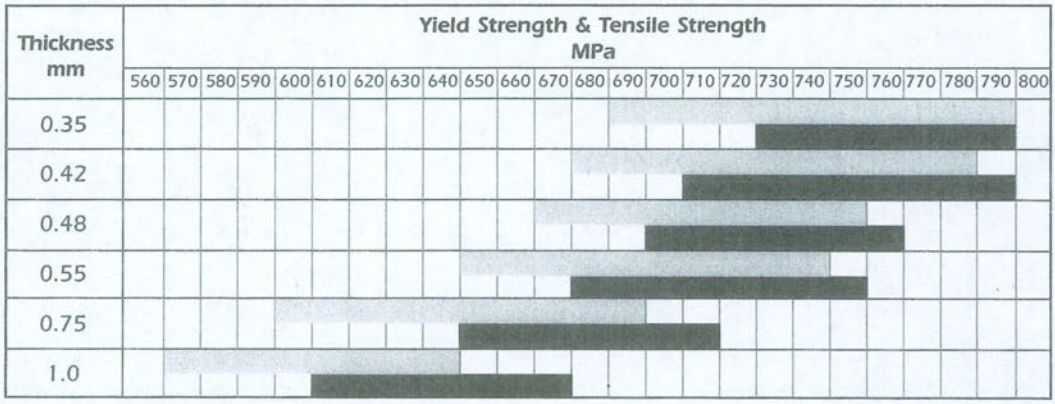
Produced by Artimprint (02) 9984 8586

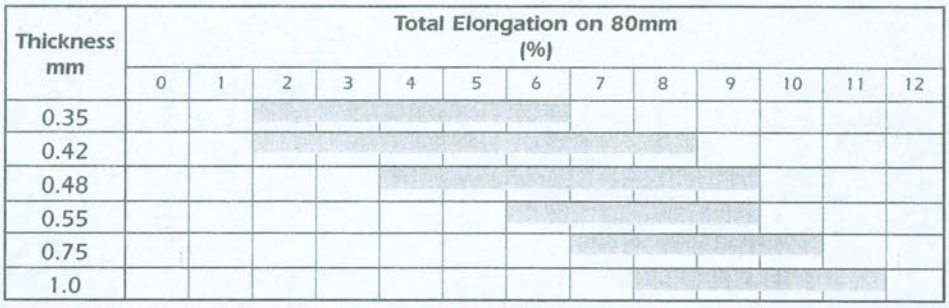
Metallic Coated Structural ZINCALUME® G550 steel / MC S G550S steel

Revision 10, November 2003
This literature supersedes all previous issues

Continued

TYPICAL PROPERTY RANGES (FOR NORMAL SUPPLY PRODUCT)





FABRICATING PERFORMANCE

Method	Rating
Bending	1
Drawing	NR
Pressing	NR
Roll-Forming	3
Welding (design must allow for some strength reduction near welds)	4
Painting (Pretreatment)	5

TYPICAL CHEMICAL COMPOSITION OF STEEL BASE

	%
Carbon (C)	0.035 - 0.070
Phosphorus (P)	0.00 - 0.02
Manganese (Mn)	0.20 - 0.30
Sulphur (S)	0.00 - 0.02
Silicon (Si)	0.00 - 0.02
Aluminium (Al)	0.02 - 0.07
Nitrogen (N)	0.000 - 0.008

where 1 = limited to 5 = excellent, or NR = not recommended

IMPORTANT NOTES:

- Typical Mechanical Properties are based on typical product dispatched to customers. Note that ductility will decline through a natural aging process during storage and/or paint stoving cycle.
- The Skin-Passing of ZINCALUME® G550S steel will generally give a marginally higher yield strength and marginally reduced % elongation.

Please ensure you have the current data sheet for this product as displayed at www.bluescopesteel.com.au

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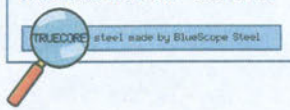
TrueCore®

BLUESCOPE STEEL

This simple checklist is your guarantee of the superior BlueScope Steel difference:

- ☑ Dimensionally stable
- ☑ Durable, strong, lightweight
- ☑ Termite proof
- ☑ Environmentally friendly
- ☑ OH&S considerate
- ☑ 50 year* BlueScope Steel warranty
- ☑ Manufactured only by BlueScope Steel especially for Australian conditions

To make sure your product is manufactured from steel made by BlueScope Steel, look for the TRUECORE® steel brand.



For further information please phone BlueScope Steel Direct on 1800 022 999 or visit www.truecore.com.au

*Warranty available on application. For full terms and conditions and to determine the eligibility of your building see www.truecore.com.au or call BlueScope Steel Direct on 1800 022 999. Installation guidelines are available from your supplier.

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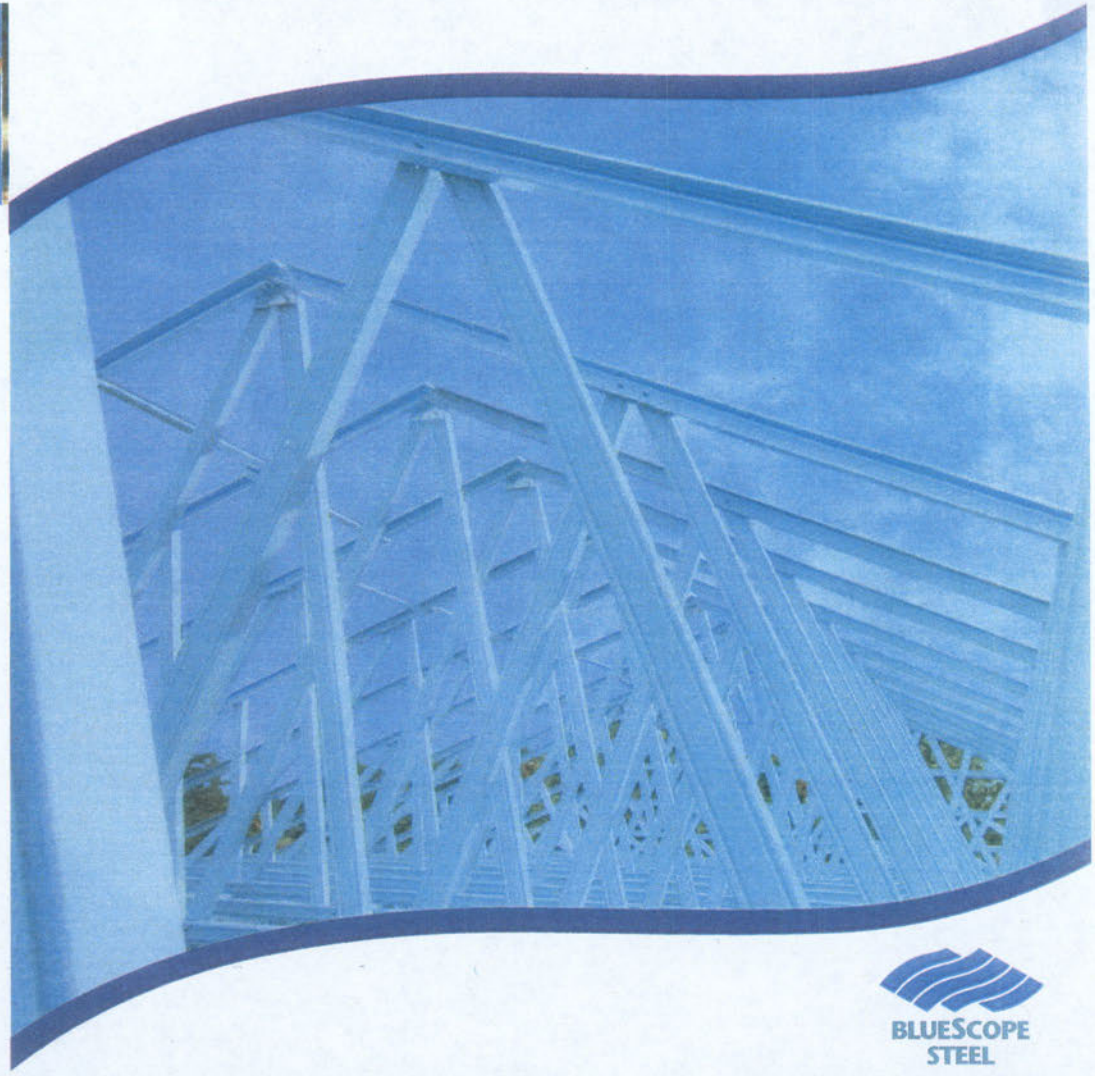
TrueCore®

Made Only By BlueScope Steel

THE FRAMEWORK FOR YOUR BUSINESS OF THE FUTURE

STEEL FRAMING



BLUESCOPE STEEL

THE HOUSE FRAME OF THE FUTURE CAN BUILD

YOUR BUSINESS.

With growing homeowner demand for steel frames, a host of performance advantages and the ability to meet environmental and building regulations and guidelines, building frames made from TRUECORE® steel can help build the home of the future and your business.

100% termite proof

A house frame made from TRUECORE® steel is 100% termite proof, without the need to apply chemical treatments. Always will be, no ifs, buts or maybes. It's an easy way to address homeowner concerns and safeguard your reputation.

Especially for the residential market

With growing awareness of investment and environmental issues, homeowners are increasingly relying on steel building frames when given the choice. That's exactly why BlueScope Steel has introduced TRUECORE® steel to the residential market.

Ready for the future

Strong and lightweight, house frames made from TRUECORE® steel are well positioned to meet environmental and building design regulations and guidelines. From termite control to site sedimentation issues, from flat blocks to difficult sites, frames made from TRUECORE® steel give you the flexibility to be able to deal with the increase in regulations and guidelines in the domestic construction industry.

100% recyclable

Steel is one of the most recycled materials on Earth. All steel made by BlueScope Steel includes recycled steel in its manufacture. 100% of your house frame can be recycled.

Straight and true

TRUECORE® steel is dimensionally stable. So building frames made from TRUECORE® steel won't warp, twist, sag or shrink. Internal walls stay perfectly straight, reducing the risk of jamming doors, sticking windows, cracked cornices, and sagging and wavy rooflines.

You have happier customers and fewer call-backs.

Quick and easy to work with

Framing made from TRUECORE® steel is exceptionally quick to erect. Pre-fabrication and modern fixing techniques make construction simple. Holes can be pre-punched for electrical and plumbing needs.

Supports OH&S objectives

Building frames made from TRUECORE® steel are strong yet lightweight. That means an easier day for your crew, less stress on you.

A new world of home design

House frames made from TRUECORE® steel can offer a new world of contemporary design features for you and your clients. The strength of steel provides excellent spanning capabilities. Cross ventilation opportunities can be maximised to help your designs meet emerging energy efficiency requirements. Your designers and clients can enjoy newfound freedom with open space contemporary design and feature ceilings such as bulkheads and coffered recesses.

The strength to last a lifetime

TRUECORE® steel is a zinc/aluminium alloy coated steel with a striking blue surface finish, especially for residential house framing.

Manufactured by BlueScope Steel and tested in Australia for Australian conditions, TRUECORE® steel has a 50 year* warranty, so your customers and your reputation enjoy the backing of BlueScope Steel.

* Warranty available on application. For full terms and conditions and to determine the eligibility of your building see www.truecore.com.au or call BlueScope Steel Direct on 1800 022 999.

Metallic Coated Structural TRUECORE® G550 Steel

MC S

Revision 4, March 2011

This literature supersedes all previous issues.

GENERAL DESCRIPTION

TRUECORE® G550 Steel is manufactured using blue tinted resin and metal coated steel. It is specifically designed for the residential house framing market.

TYPICAL USES

Residential House Framing where the product is not visible.

APPLICABLE STANDARDS

AS/NZS 1365:1996
AS 1397:2001

GUARANTEED PROPERTIES OF STEEL BASE

MECHANICAL PROPERTIES	Guaranteed
Longitudinal Tensile	
Upper Yield Strength, f	550 min
Tensile Strength, MPa	550 min
Elongation on 80mm %	2 min
180° Transverse Bend (L axis)	-

CHEMICAL COMPOSITION OF STEEL BASE

CHEMICAL PROPERTIES	GUARANTEED %	TYPICAL %
	Maximum	
Carbon - C	0.20	0.035-0.070
Phosphorus - P	0.040	0.00-0.02
Manganese - Mn	1.20	0.20-0.30
Silicon - Si	-	0.00-0.02
Sulphur - S	0.030	0.00-0.02
Aluminium - Al	-	0.02-0.07
Titanium - Ti	-	-
Nitrogen - N	-	0.000-0.008

METAL COATING ADHESION - 180° BEND Test

COATING CLASS	Guaranteed
AZ150	2t

FIRE HAZARD PROPERTIES

INDEX	RANGE	RESULT
IGNITABILITY INDEX	0-20	0
SPREAD OF FLAME INDEX	0-10	0
HEAT EVOLVED INDEX	0-10	0
SMOKE DEVELOPED INDEX	0-10	0-1

DIMENSIONAL CAPABILITIES

The standard sizes* of TRUECORE® G550 Steel are:
Slit Coil.
0.42 x 103mm
0.55 x 150mm, 160mm, 170mm, 187mm
0.75 x 150mm, 160mm, 170mm, 195mm
1.00 x 134mm, 163mm, 195mm
Mill Coil.
0.42 x 1145mm
0.55 x 1165mm ME
0.75 x 1165mm ME
1.00 x 1145mm ME

Note: Slitting and shearing available on request from BlueScope Steel Sales Offices.
*For requirements outside the standard product range please contact your local Sales Office.

These dimensions are a reflection of technical capability to produce. Supply conditions may be subject to dimensional restrictions and is subject to BlueScope Steel Sales and Marketing confirmation.

NORMAL/OPTIONAL SUPPLY CONDITIONS

	Normal	Optional#
Coating Class	AZ150	
Surface Finish	Spangled	-
Surface Treatment	Passivated	-
	Resin Coated	
Tolerance Class AS/NZS 1365:1996		
- Thickness	A Class	B Class
- Width	A Class	B Class
- Length	A Class	B Class
- Flatness	A Class	-
Branding	Branded	-

Optional supply conditions may be subject to dimensional restrictions

FABRICATING PERFORMANCE

Method	Rating
Bending	1
Drawing	NR
Pressing	NR
Roll Forming	3
Welding	4*
Painting (Pretreatment)	

* Welding design must allow for some strength reduction near welds.
Where: **1** = Limited to **5** = Excellent or **NR** = Not Recommended

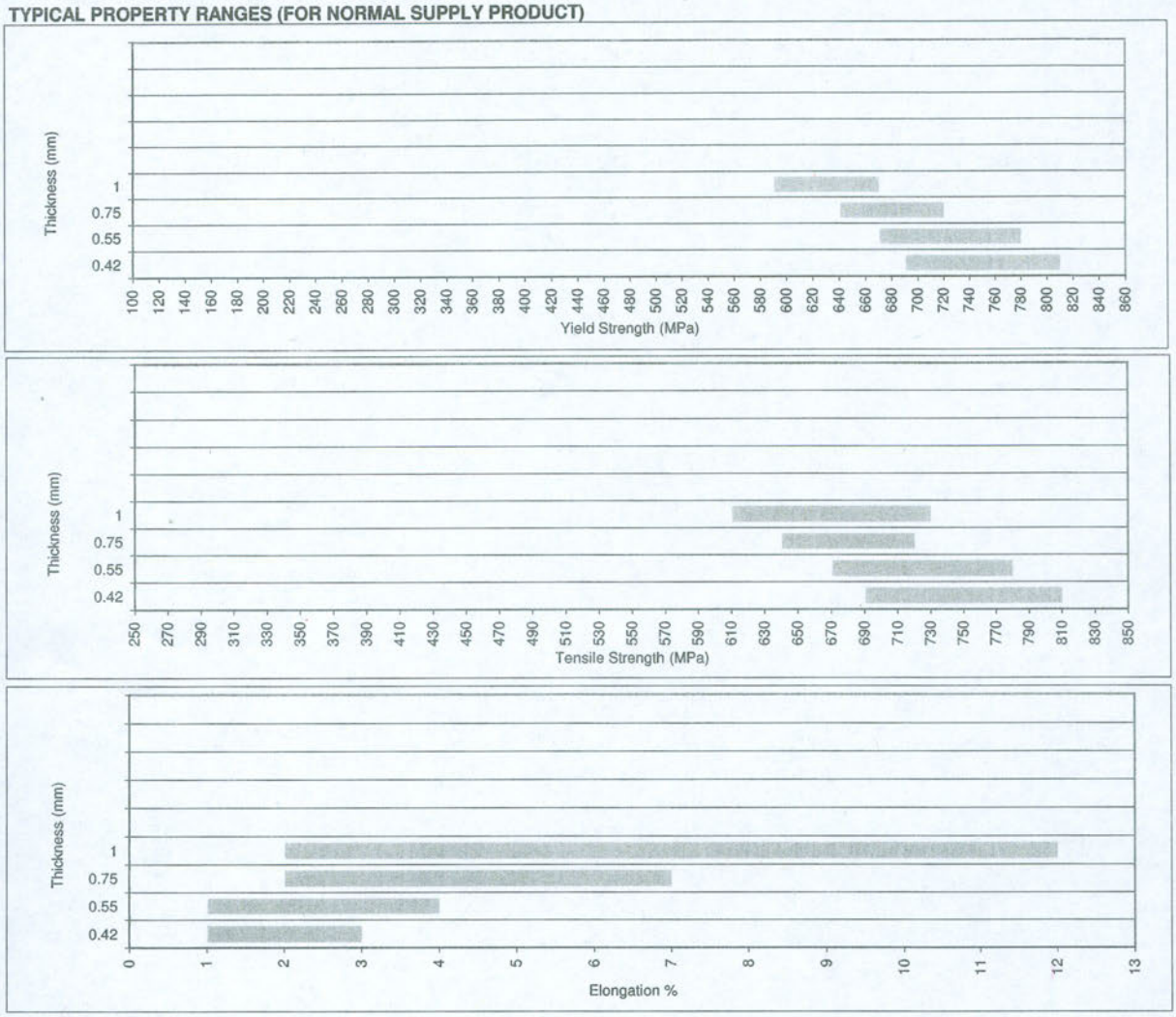
BLUESCOPE STEEL

Metallic Coated Structural TRUECORE® G550 Steel

MC
S

Revision 4, March 2011
This literature supersedes all previous issues.

TYPICAL PROPERTY RANGES (FOR NORMAL SUPPLY PRODUCT)



IMPORTANT INFORMATION

Material should be used promptly (within six months) to avoid the possibility of a storage related corrosion. For selection of the most appropriate metallic coated steel, please refer to technical bulletins TB1a, TB1b, CTB21 and CTB22. For storage, rollforming lubricants and other information please refer to the Technical Bulletins.

Typical mechanical properties are based on typical product despatched to customers. Note that ductility will decline through a natural ageing process during storage.

Prolonged exposure to UV Light (> 6 months) will cause the specially designed resin coating to degrade and breakdown. Degradation will not be uniform in nature and will compromise the aesthetic performance of the product.

Where utilised as intended in Residential House Framing, TRUECORE® G550 Steel will be supported by a 50 year warranty against structural failure of componentry resulting from corrosion- warranty conditions apply.

Please ensure you have the current datasheet for this product as displayed at www.bluescopesteel.com

9 320075 066949

BlueScope Steel Limited
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BlueScope Steel (AIS) Pty Ltd ABN 19 000 019 625
SYDNEY (02) 9795 6700 **MELBOURNE** (03) 9586 2222 **BRISBANE** (07) 3845 9300 **ADELAIDE** (08) 8243 7333 **PERTH** (08) 9330 0666