Australian Government
Department of Industry, Innovation and Science

National Measurement Institute

Interim Provisional Certificate of Approval NMI P6/14B/28

VALID FOR VERIFICATION PURPOSES UNTIL 25 AUGUST 2016

Issued by the Chief Metrologist under Regulation 60
of the
National Measurement Regulations 1999

This is to certify that an approval for use for trade has been granted in respect of the instruments herein described.

Accurate Systems Model AS-DT2 Discontinuous Totalising Automatic Weighing Instrument

submitted by Accurate Weighing Machines Pty Ltd
trading as Accurate Systems
40 Punari Street
Currajong QLD 4812

NOTE: This Certificate relates to the suitability of the pattern of the instrument for use for trade only in respect of its metrological characteristics. This Certificate does not constitute or imply any guarantee of compliance by the manufacturer or any other person with any requirements regarding safety.

This approval has been granted with reference to document NMI R 107, *Discontinuous Totalising Automatic Weighing Instruments (Totalising Hopper Weighers)*, dated July 2004.

DOCUMENT HISTORY

Rev	Reason/Details	Date
0	Pattern and variant 1 provisionally approved – interim certificate issued	25/2/16

CONDITIONS OF APPROVAL

General

Instruments purporting to comply with this approval shall be marked with pattern approval number 'NMI P6/14B/28' and only by persons authorised by the submittor.

It is the submittor's responsibility to ensure that all instruments marked with this approval number are constructed as described in the documentation lodged with the National Measurement Institute (NMI) and with the relevant Certificate of Approval and Technical Schedule. Failure to comply with this Condition may attract penalties under Section 19B of the National Measurement Act and may result in cancellation or withdrawal of the approval, in accordance with document NMI P 106.

Auxiliary devices used with this instrument shall comply with the requirements of General Supplementary Certificate No S1/0B.

The values of the performance criteria (maximum number of scale intervals etc.) applicable to the instrument shall be within the limits specified herein and in any approval documentation for the components where they are approved separately.

This approval shall NOT be used in conjunction with General Certificate No 6B/0

Special Conditions of Approval: (Provisional Approval)

This approval is limited to

1 (one) instrument only, located at:

Sugar Australia Pty Ltd
Peak Downs Highway
Mackay QLD 4740
[as described for the pattern and variant 1];

Instruments purporting to comply with this approval shall be marked with approval number 'NMI P6/14B/28' and only by persons authorised by the submittor. (Note: The 'P' in the approval number may be a temporary marking.)

The approval will remain provisional pending completion of satisfactory testing and evaluation (results of verification testing shall be copied to the Pattern Approval Section at NMI).

In the event of unsatisfactory performance the approval may be cancelled (or varied).

The submittor shall implement such modifications as required by NMI. In the event that such modifications (if any are required by NMI) are not made to the satisfaction of NMI, this approval may be withdrawn.

1. Description of Pattern provisionally approved on 25/2/16

An Accurate Systems model AS-DT2 Class 0.5 discontinuous totalising automatic weighing instrument (DTAWI) having a weigh hopper of 750 kg maximum capacity.

The instrument is installed in a permanently fixed location.

Note: This approval has been granted with reference to document NMI R 107, *Discontinuous Totalising Automatic Weighing Instruments (Totalising Hopper Weighers)*, dated July 2004. The following description is intended to introduce terms used in this Certificate and Technical Schedule which may be additional to those in that document but which are consistent with the terminology in the document.

The system aims to provide a *bulk load delivery* using a particular automatic *delivery sequence* (the term 'delivery' may also be taken to refer to 'receipt').

This sequence involves the delivery of a number of *discrete load deliveries* or *weighing cycles*, each of which involves the division of the bulk product into *discrete loads*, according to a *target discrete load* the mass of which is then determined by weighing to give the *discrete load delivered* following which the product is discharged to the bulk output. Note that the *target discrete load* may be achieved by stopping or slowing the bulk product delivery prior to the *target discrete load* value being reached according to *discrete load target shutoff adjustments* (such as inflight adjustments or slow flow pre-sets).

The *target discrete load* is generally a pre-selected value that is the same for most of the *discrete load deliveries* (this may be termed the *pre-selected target discrete load*). However for the final one or two deliveries in the *bulk load delivery* the *target discrete load* may differ (for example to avoid excessively large or small *discrete loads*). In addition, arrangements for stopping or slowing the bulk product delivery prior to the *target discrete load* value being reached may vary for the final discrete deliveries in the delivery sequence according to *target totalised load shutoff adjustments* (such as inflight adjustments or slow flow pre-sets).

The *discrete load delivered* values are totalised to provide the *totalised bulk load delivered* (at any point during the sequence this may be termed the *cumulative totalisation*).

The *totalised bulk load delivered* may be intended to be close to a requested amount (*target totalised load*) in which case adjustments and pre-sets as described above may be used to achieve this as closely as possible.

Alternatively the *totalised bulk load delivered* may be the quantity measured without a particular target totalised load.

The *totalised bulk load delivered* is the cumulative totalisation (sum of all discrete loads delivered), in the complete *bulk load delivery*. The transaction is based on the *totalised bulk load delivered* (not the *target totalised load*).

1.1 Details

The Accurate Systems AS-DT2 instrument is a Class 0.5 discontinuous totalising automatic weighing instrument having a weigh hopper with a maximum capacity of 750 kg. The indication of the weigh hopper (which is used to determine discrete load values that are totalised and then rounded to the nearest totalisation scale interval to provide the totalised load value) has a scale interval of 0.5 kg.

The instrument is approved for use with a minimum totalised load (Σ_{min}) of not less than 500 kg and a totalisation scale interval of 0.5 kg. The instrument is set to have a target discrete load of from 500 to 700 kg.

The AS-DT2 instrument permanently records the *totalised bulk load delivered* and the net value of each discrete load delivered. This information can be sent to a printer if required.

Note: The discrete load values are NOT approved for trade use. The totalised bulk load delivered (a total of the discrete load delivered values) is the value approved for trade use.

Note: The hopper weighing instrument is not approved for operation as a non-automatic weighing instrument, however the hopper weighing instrument may be used as a control instrument (for weighing of material test loads in testing of the instrument). Where the hopper weighing instrument is used in this way, for the purposes of determining accuracy of the control instrument the verification scale interval of the hopper weighing instrument may be taken as 0.5 kg.

1.2 Weighing System

The pattern comprises components as described below.

(*) For items marked (*) below, 'Compatible and Equivalent' equipment may be used. 'Compatible and Equivalent' refers to equipment of the same or better specifications, requiring no changes to software for satisfactory operation of the complete system.

(a) A weigh hopper with out-feed gate, using three (4) HBM model HLCA1C3 load cells of 1100 kg maximum capacity. The load cells are also described in the documentation of approval NMI S498. The load cells are located symmetrically around the weigh hopper.

(b) A Rinstrum model R420 digital indicator for the weighing system (the digital indicator is also described in the documentation of approval NMI S502). The indicator is fitted with associated networking and input/output modules as necessary to control gates of the hoppers, interface with relevant sensors (e.g. discharge hopper fill level), and communicate with any plant control system, computer, printer etc.

(c) A Schneider Electric model Modicon M340 P342020 (*) programmable logic controller (PLC). Special temperature limits of 0°C to 40°C apply.

(d) Accurate Systems SATAKE_PC software (V1.0.00) which runs on the programmable logic controller mentioned in (c) above, and utilises the weight readings from the digital indicator to determine the discrete load values and totalises them, rounding to the nearest totalisation scale interval, and storing the weighing data.

Note: The software version may have an associated 'Build number'. Build numbers subsequent to Build V1.0.00 are acceptable provided they do not involve metrological changes.

(e) A Red Lion model G10 HMI (*) to provide the operator interface by which the operator can control the system, access the protected weighing data, and provide a *target discrete load* value to the PLC.

Note: The system may also be controlled and weighing data accessed by other (networked) computers, e.g. as part of a plant wide SCADA (supervisory control and data acquisition) system.

(f) A server PC that incorporates an SQL database (RRITS) into which the discrete load delivered values are recorded, and from which reports providing *totalised bulk load delivered* values are generated.

(g) Actuators and associated position sensors to control the product in-feed and the out-feed gates for the weigh hopper. (*)

(h) A printer (to print transaction data), or equivalent record in electronic form. (*)

The system is designed to ensure retention of metrological information in the event of a power failure, including transition to an emergency power supply if necessary for this purpose.

1.3 Indicator and PLC Control

The SATAKE_PLC software running on the PLC, along with weight data from the digital indicator, controls the weighing sequence, including checking of various aspects of the system operation (blocked chutes, gates open or closed as appropriate) and filling of the weigh-hopper by starting and stopping of product flow (opening and closing of in-feed and out-feed doors) according to messages from the plant operator's control system.

The SATAKE_PLC software running on the PLC uses inputs from the system to determine when no further product delivery is required (e.g. when the in-feed hopper is empty, the out-feed hopper is full, or the downstream process has stopped). In some cases these inputs may be provided by the plant operator's control system (e.g. to start or stop the process).

The weight data, together with information regarding the weighing sequence status, is provided continually to the operator interface computer(s).

Weight data from each discrete load delivery is also provided by the PLC to be stored in the RRITS SQL database.

Reports may be produced from the SQL database (e.g. for a ship loading), such reports totalise the weight data for a number of discrete loads to provide the *totalised bulk load delivered*. The totalised load value is only acceptable for trade use where it exceeds the Minimum Totalised Load (i.e. 500 kg).

1.4 Operation

The following provides an overview of the sequence of operation.

The system is considered to be a discontinuous totalising automatic weighing instrument as it follows a predetermined program of automatic processes characteristic of the instrument. The product is weighed by individual discrete loads, which are totalised to determine the bulk product weighed.

(a) After power up initialisation, the weighing system requires a signal from the plant operator's control system before permitting weighing operations to commence. All plant equipment, including the weigh scale indicator and load cell combination must also be functioning correctly. When these prerequisites are satisfied and the downstream plant is running in sequence, the batch weigher is able to start its operating cycle. The weighing process will stop if a fault is detected on any piece of equipment.

(b) A normal start of the weighing cycle occurs following a process system start, or immediately following the completion of a previous cycle. However in some cases a re-start from a previously interrupted delivery may occur. The state of the weighing cycle is recorded on an interruption, so that upon re-start, the cycle can recommence in the appropriate state.

(c) At the start of the weighing cycle, the cycle number is incremented, and the target gross weight (target discrete load) is set in the PLC of the weighing system, generally this is a fixed value and will not vary between deliveries.

(d) The weigh hopper is then filled by opening the feed hopper doors. The PLC utilises information from the weighing indicator, and calculations regarding 'in-flight material', to determine a 'fill target' weight at which closing of the feed hopper doors is triggered.

(f) Once the doors are closed, and the weigh hopper indicator provides a stable unchanging reading for 15 updates of the scale output (i.e. 1.5 seconds), the full ('gross') weight value from the weigh hopper indicator is recorded, along with the cycle number, time and date.

(g) The discharge hopper level is then checked to ensure that it has sufficient capacity to accept the full weigh hopper discharge. Weigh hopper emptying is then permitted.

(h) The weigh hopper doors are opened to discharge the product into the discharge hopper below.

To achieve an efficient cycle time (system throughput), the system uses an 'Empty Target', determined from discharge rates in previous measurement cycles. Once the 'Empty Target' is reached, this triggers closing of the weigh hopper doors.

(i) Once the doors are closed, and the weighing indicator shows a stable unchanging reading for 15 updates of the scale output (i.e. 1.5 seconds), the empty ('tare') hopper weight is recorded, along with the cycle number, time and date.

(j) The gross weight value for the loaded hopper at (f), minus the tare weight value for the empty hopper at (i) is the discrete load delivered from the weigh hopper (shown as 'net' value). This can then be added to previous cycles to provide a cumulative totalised load.

(k) If the downstream process has stopped or errors are present, the PLC ceases the weighing cycle until a further delivery is initiated by the plant operator's control system. Otherwise the batch weighing cycle is continued at step (b) above.

(l) The gross, tare and net weight for each weighing cycle (from (f), (i) and (j) above) are provided to the RRITS and permanently recorded in the system database for determining the *totalised bulk load delivered*. Various reports are available to view or print.

1.5 Verification Provision

Provision is made for the application of a verification mark.

1.6 Sealing Provision

The digital indicator shall be sealed as described in the documentation of its approval (see 1.2 (b) above). Access to the software is password protected.

1.7 Markings and Notices

(a) Instruments carry the following markings, grouped together in a clearly visible place on the instrument, either on a descriptive plate fixed near the indicating device or on the indicating device itself:

Manufacturer's mark, or name written in full	Accurate Systems
Indication of accuracy class	0.5
Pattern approval mark for the instrument	NMI P6/14B/28
Model number	AS-DT2
Serial number of the instrument	.....
Maximum capacity	*Max* = 750 kg (#)
Minimum capacity	*Min* = 500 kg (#)
Minimum totalised load (not less than)	Σ_{min} = 500 kg (#)
Totalisation scale interval	d_t = 0.5 kg
Special temperature limits	0°C / 40°C
Material to be measured	.....

(#) These markings shall also be shown near the display of the result if they are not already located there.

(b) Instruments carry a notice visible to the operator stating TARGET DISCRETE LOAD SHALL BE xxxx kg to yyyy kg ONLY, or similar wording (where xxxx and yyyy are in the range of 500 kg to 700 kg).

Note 1: Markings for variants vary according to particular characteristics.

Note 2: The 0 °C limit of the special temperature limits derives from the specified operating temperature range of the programmable logic controller (item 1.2(c) above). Where the programmable logic controller is within an environment controlled to be within the 0°C to 40°C range, the normal operating temperature range of -10°C to 40°C applies to other items of equipment (e.g. load cells).

2. Description of Variant 1 provisionally approved on 25/2/16

The pattern (model AS-DT2) as a Class 0.5, 1 or 2 discontinuous totalising automatic weighing (DTAWI) instrument having a weigh hopper of 750 kg maximum capacity, a totalisation scale interval (d_t) of 0.5 kg. The instrument is set to have a *target discrete load* in the range of 500 kg to 700 kg, and shall have a minimum totalised load value (Σ_{min}) of no less than 500 kg.

The indication of the weigh hopper (which is used to determine discrete load values that are totalised and then rounded to the nearest totalisation scale interval to provide the totalised load value) has a scale interval of no greater than 0.5 kg.

TEST PROCEDURE No P6/14B/28

Instruments shall be tested in accordance with any relevant tests for this category of instrument.

Signed by a person authorised by the Chief Metrologist to exercise their powers under Regulation 60 of the *National Measurement Regulations 1999*.

Dr A Rawlinson

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