Australian Government
Department of Industry and Science

National Measurement Institute

36 Bradfield Road, West Lindfield NSW 2070

Certificate of Approval

NMI 6/14B/15

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.

Accuweigh Model DW20 Class 0.2 Discontinuous Totalising Automatic Weighing Instrument

submitted by AccuCorp Pty Ltd
12 Kembla Way
Willeton WA 6155

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.

This approval becomes subject to review on **1/09/20**, and then every 5 years thereafter.

DOCUMENT HISTORY

Rev	Reason/Details	Date
0	Pattern provisionally approved – interim certificate issued	7/08/00
1	Pattern & variants 1 & 2 approved – interim certificate issued	18/09/01
2	Pattern & variants 1 & 2 approved – certificate issued	16/10/01
3	Pattern & variants 1 & 2 amended (address) & reviewed – variants 3 & 4 approved – certificate issued	21/08/07
4	Pattern & variants 1 to 4 reviewed & updated – certificate issued	2/09/15
5	Test procedure error correction – certificate issued	7/03/18

CONDITIONS OF APPROVAL

General

Instruments purporting to comply with this approval shall be marked with approval number 'NMI 6/14B/15' and only by persons authorised by the submittor.

Instruments purporting to comply with this approval and currently marked 'NMI P6/14B/15' may be re-marked 'NMI 6/14B/15' but 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:

The submittor shall advise NMI in writing of the proposed location and specifications of each instrument prior to it being verified. Instruments shall not be verified until the person intending to carry out the verification has been advised in writing by NMI of the suitability of the instrument.

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

Darryl Hines

Manager
Pattern Approval, Policy & Licensing Section

TECHNICAL SCHEDULE No 6/14B/15

1. Description of Pattern — provisionally approved 7/08/00, approved on 18/09/01

An Accuweigh model DW20 Class 0.2 discontinuous totalising automatic weighing instrument of 12 000 kg maximum capacity. May also be known as an AccuCorp model DW20.

Note: The following description is intended to introduce terms used in this Certificate and Technical Schedule which may be additional to those in the NMI document NSC R 107, *Discontinuous Totalising Automatic Weighing Instruments, 1997,* but which are consistent with the terminology in that document.

The system aims to provide a *bulk load delivery* of close to a requested amount (*target totalised load*) using a particular *delivery sequence*.

This sequence involves the totalisation of the results 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).

Each *discrete load delivered* is totalised (at any time this may be termed the *cumulative totalisation*).

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). These adjustments or pre-sets are generally aimed at achieving a *totalised bulk load delivered* which is as close as possible to the *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 instrument is a Class 0.2 discontinuous totalising automatic weighing instrument with a maximum capacity (for the *target discrete load*) of 12 000 kg and a minimum capacity (for the *target discrete load*) of 5000 kg. The instrument is approved for use with a minimum totalised load (Σ_{min}) of not less than 5000 kg (*) and a totalisation scale interval of 5 kg.

(*) The actual value of Σ_{min} is dependent on particular site conditions. It will be considered as part of the authorisation process described in the Special Condition of Approval and/or may be determined on site for each installation.

1.2 Weighing System

The pattern (Figures 1 and 2) comprises:

a) An Accuweigh model DW20 hopper-type weigh bin directly supported by four symmetrically-located load cells (Figures 1 and 2).

b) Four Avery Berkel model 8708 load cells of 7000 kg maximum capacity mounted as shown in Figure 3. The load cells are also described in the documentation of approval NMI No S176B.

c) A Ranger Instruments model 5100 digital indicator.

d) An Accuweigh DW20 control box.

In addition, an Allen-Bradley model MicroLogix 1000 programmable logic controller (PLC) and a personal computer may be connected to monitor and supervise the operation of the installation.

Note: Ducting/containment arrangements for delivery of material and handling of the displaced air can influence instrument performance. (see Note in Test Procedure).

1.3 Indicator

The Ranger Instruments model 5100 digital indicator controls the measurement functions, totalising, process starting and stopping, upper and lower gate controls, gate limit switches, and alarm functions. In normal operation the measurement data is entered and read on the operator's personal computer. The indicator is also described in the documentation of NSC approval No S363, and the photograph in that certificate may be used for identification purposes. However the indicator used in this instrument has software specifically intended for this application. The software version (version 2.2) is shown immediately after '5100' in the display sequence after the indicator is switched on.

1.4 Printout

The system produces a printout similar to that shown in Figure 4.

1.5 Programmable Logic Controller

An Allen-Bradley model MicroLogix 1000 programmable logic controller (PLC) is connected to the Ranger 5100 indicator. The PLC provides sequencing and interlocks (additional to that of the Ranger 5100 indicator) for input from sensors and switches, and output signals to drive actuators, indicator lights and alarms.

1.6 Operation

The automatic weighing cycle is shown in Figure 4 and is known as the 'full - preceding empty' method. The instrument operating parameters, such as *target discrete load*, *target totalised delivery*, and *shutoff adjustments*, are programmed via the keyboard on the indicator. Alternatively, these parameters may be entered via the operator's personal computer. The initiation of a delivery sequence may be initiated locally at the DW20 control box, or remotely via the operator's personal computer.

1.7 Verification Provision

Provision is made for the application of a verification mark.

1.8 Sealing Provision

Provision is made for the calibration adjustments in the indicator to be sealed by means of the method described in the approval documentation for the indicator.

1.9 Descriptive Markings and Notices

(a) Instruments are marked with the following data, together in one location, in the form shown at right:

Manufacturer's mark, or name written in full	AccuCorp Pty Ltd
Indication of accuracy class	0.2
Pattern approval number for the instrument	NMI (or NSC) 6/14B/15
Model number	DW20
Serial number of the instrument	…….....
Maximum capacity	*Max* ..... kg
Minimum capacity	*Min* ……. kg
Minimum totalised load	Σ_{min} …….. kg
Totalisation scale interval	d_t ……..... kg
Material to be measured	…….....

(b) Instruments carry a notice visible to the operator stating TARGET LOAD SHALL BE NO LESS THAN 5000 kg AND NO GREATER THAN 12 000 kg, or similar wording. (This refers to the *target discrete load*.)

2. Description of Variant 1 **approved on 18/09/01**

With an alternative automatic weighing cycle as shown in Figure 6 and known as the 'full - following empty' method. This method is preferable where the quantity in use for trade is that delivered from the instrument. The software version of the Ranger Instruments model 5100 digital indicator may differ from that of the pattern (refer clause **1.3 Indicator**) and will be specified in the 'authorisation to verify advice' to be issued by NMI, and referred to in the Special Conditions of Approval.

3. Description of Variant 2 **approved on 18/09/01**

Instruments of other capacities and configurations may be authorised by NMI in accordance with the Special Condition of Approval.

4. Description of Variant 3 **approved on 21/08/07**

Similar to the pattern, but with a maximum capacity (for the *target discrete load*) of 30 000 kg and a minimum capacity (for the *target discrete load*) of 5000 kg (see Figures 7 and 8). The instrument is approved for use with a minimum totalised load (Σ_{min}) of not less than 50 000 kg (*) and a totalisation scale interval of 10 kg.

(*) The actual value of Σ_{min} is dependent on particular site conditions. It will be considered as part of the authorisation process described in the Special Condition of Approval and/or may be determined on site for each installation.

Three Avery Berkel (aka Avery Weigh-Tronix) model T302 load cells of 22 500 kg maximum capacity are used. The load cells are described, including approved mounting methods, in the documentation of approval NSC S386. (Cancelled as from 1 March 2012.).

Note that the system may utilise HBM model SB01A zener barriers in the load cell cabling. The use of these zener barriers will reduce the excitation voltage supplied to the load cells from that normally provided by the indicator, hence the actual voltage supplied to the load cells shall be measured for the purpose of carrying out calculations for minimum sensitivity of the digital indicator similar to those of General Certificate NMI 6B/0. The normal excitation provided by the indicator shall be used for calculations regarding load cell impedance.

5. Description of Variant 4 approved on 21/08/07

A Fuji programmable logic controller may be used instead of the Allen Bradley programmable logic controller described for the pattern.

TEST PROCEDURE No 6/14B/15

The instrument shall not be adjusted to anything other than as close as practical to zero error, even when these values are within the maximum permissible errors.

Maximum Permissible Errors

The maximum permissible errors are specified in Schedule 1 of the *National Trade Measurement Regulations 2009*.

Test Procedure

The test procedures to be used are based on NMI R 107-1, *Discontinuous Totalising Automatic Weighing Instruments, 2004*.

The following assumes use of the separate verification method. Care shall be taken to ensure that the control instrument and its method of use are adequate, in accordance with NMI R 107.

Note: Practical circumstances for particular installations may necessitate variations to this test procedure. Such variations shall only be implemented with the agreement of the appropriate trade measurement authority.

1. Tests

Carry out testing with *target discrete loads* and *target totalised loads* determined as follows.

(i) Deliveries with target discrete load of Max

From the intended Σ_{min} and the Max value, calculate $N_{(max)}$, the number of weighing cycles required to deliver the minimum totalised load when operating with discrete loads of Max.

Where $N_{(max)}$ is 5 or more, one delivery shall be carried out with a target discrete load of Max – the quantity of the test load (delivery) shall be Σ_{min}.

If $N_{(max)}$ is less than 5, two deliveries shall be carried out with the target discrete load set to Max, as follows:

- one with a test load (target totalised load) of Σ_{min}; and
- another with a test load (target totalised load) of 5 × Max.

(ii) Deliveries with target discrete load of Min

Similarly, from the intended Σ_{min} and the Min value, calculate $N_{(min)}$, the number of weighing cycles required to deliver the minimum totalised load when operating with discrete loads of Min.

Where $N_{(min)}$ is 5 or more, one delivery shall be carried out with a target discrete load of Min – the quantity of the test load (delivery) shall be Σ_{min}.

If $N_{(min)}$ is less than 5, two deliveries shall be carried out with the target discrete load set to Min, as follows:

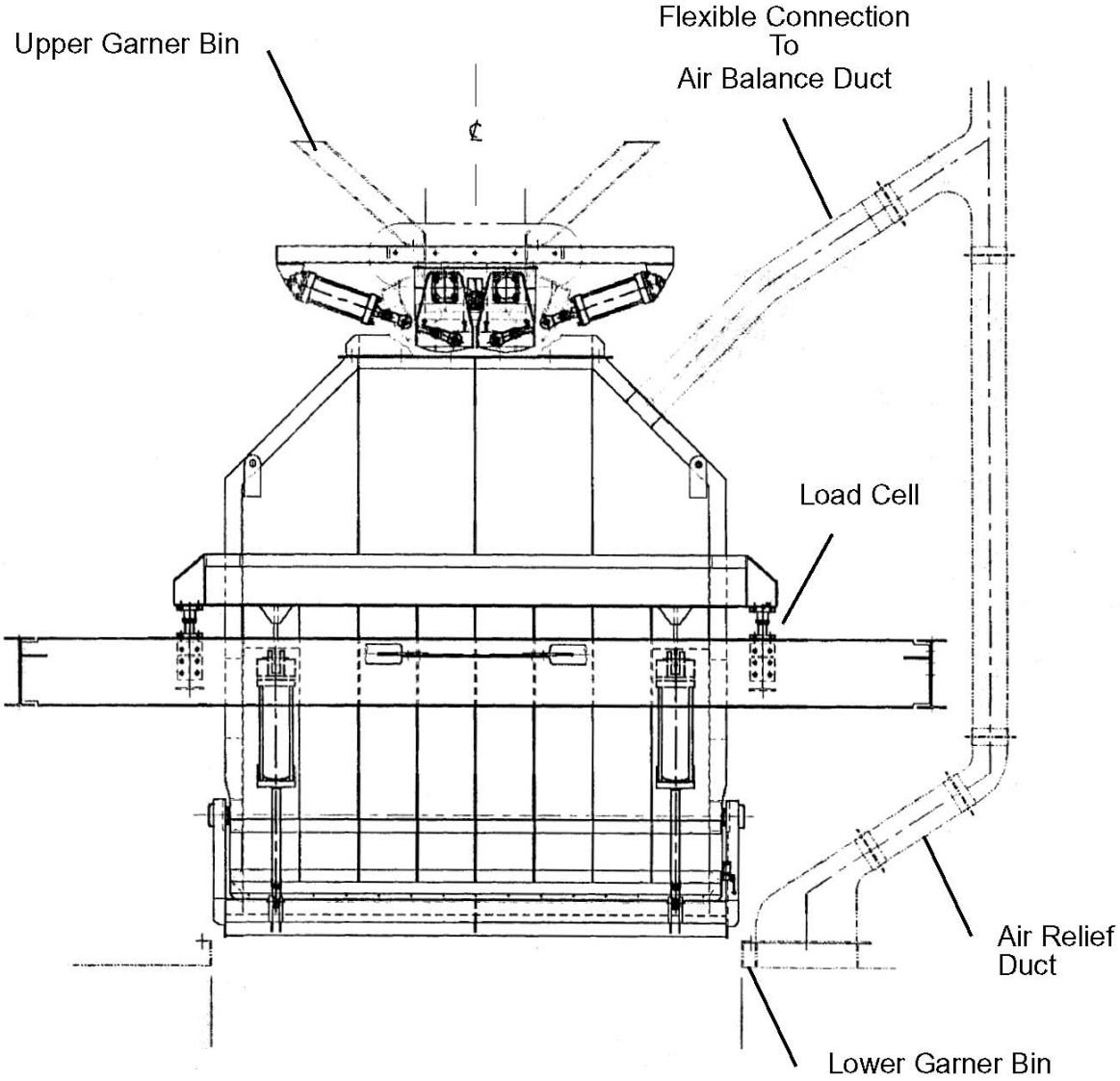
- one with a test load (target totalised load) of Σ_{min}; and
- another with a test load (target totalised load) of 5 × Min.

(iii) Additional test if the procedure indicates less than three tests

In some cases the above procedure may indicate only two tests to be performed. If this is the case an additional test is carried out (to achieve a total of three material tests). For this test, the test load (target totalised load) is to be Σ_{min} with the instrument operating with target discrete loads of a value which is typical for the installation (if it is difficult to arrive at a typical value use Min).

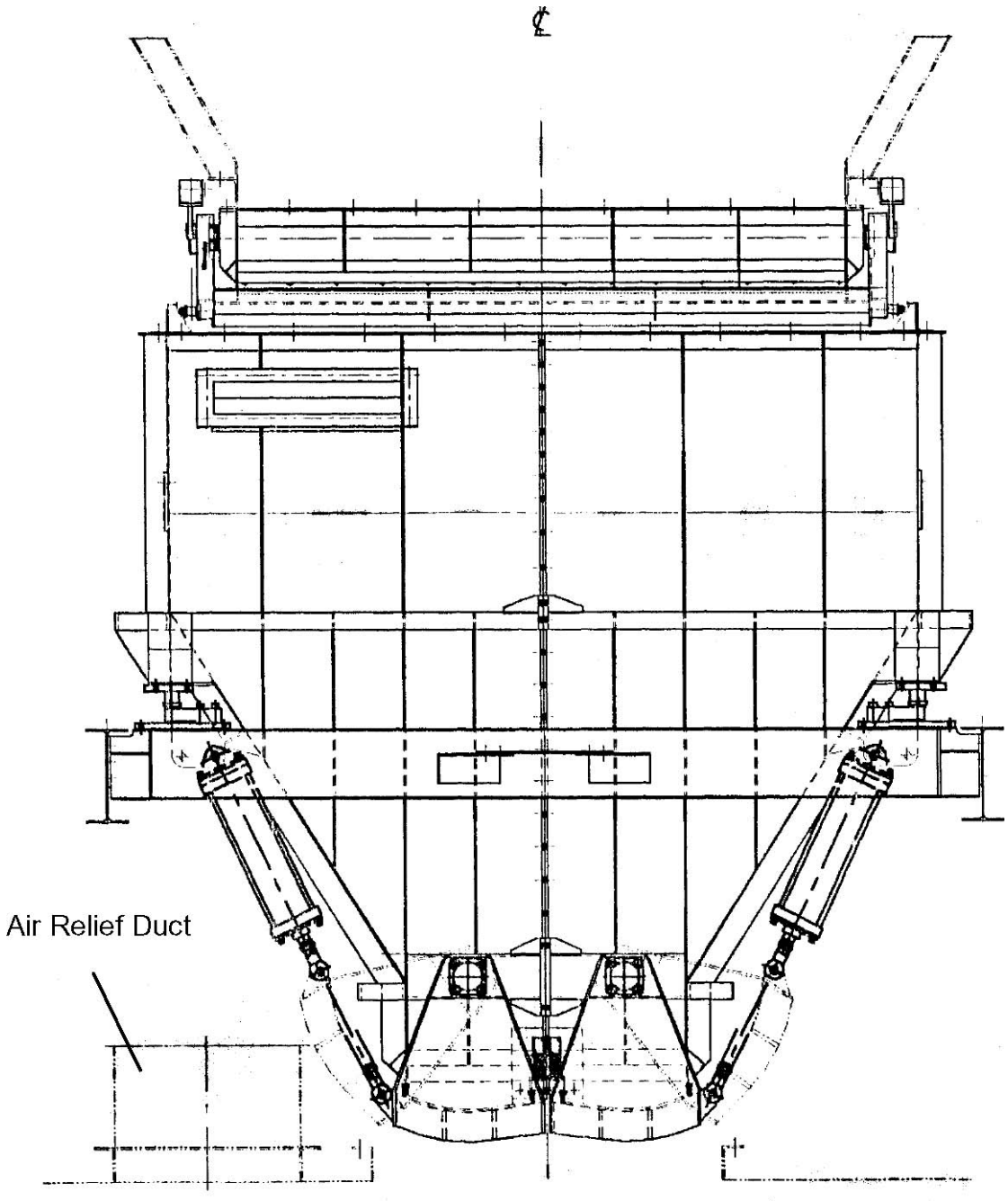
Note: For some types of instrument the quantity delivered must be an integer multiple of the discrete load, whereas for other instruments this is not required. In the former case unless the minimum totalised load is an integer multiple of the discrete load, it may be necessary to use the next larger possible test load (which is an integer multiple of the discrete load).

FIGURE 6/14B/15 – 1



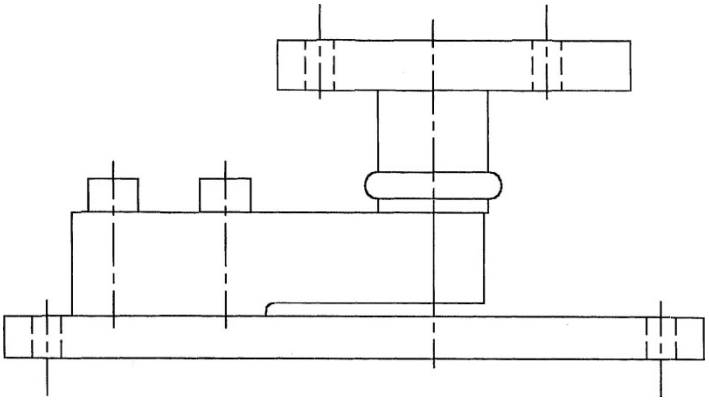
Accuweigh Model DW20 Hopper Weighing Instrument – Front View

FIGURE 6/14B/15 – 2

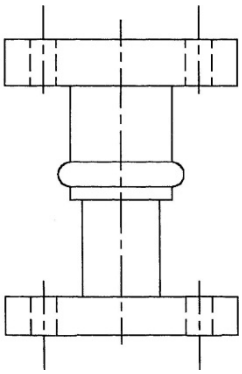


Accuweigh Model DW20 Hopper Weighing Instrument – Side View

FIGURE 6/14B/15 – 3



Side View



End View

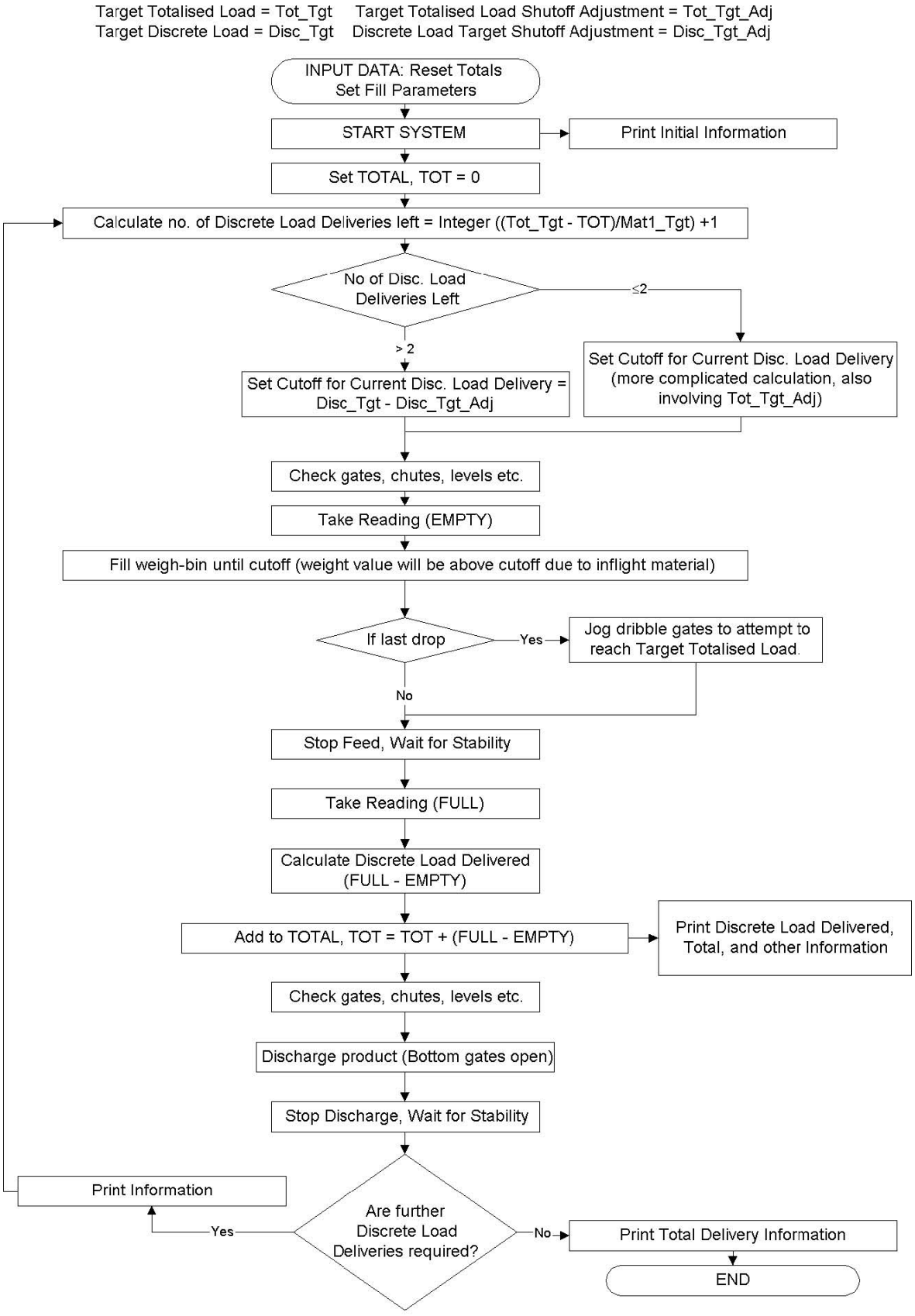
Load Cell Mounting

FIGURE 6/14B/15 – 4

```
Recipe  1: REC 01
  BATCHES:         1
    TOTAL:     62005 kg
TotalTest2
BM2                C
Recipe  1: REC 01
11/08/2000

TARGET WEIGHT:     62000
        UNITS:        kg

DROP TIME    TARGET    START      END       NET      TOTAL   BALANCE  INT.
-------------------------------------------------------------------------
  1 14:16     10000         0     9895      9895      9895     52105  27.5
  2 14:17     10000         0    10910     10910     20805     41195  23.4
  3 14:17     10000         0    10925     10925     31730     30270  27.3
  4 14:17     10000         0    10955     10955     42685     19315 220.4
  5 14:21      9457         0    10380     10380     53065      8935 201.3
  6 14:25      8935         0     9410      9410     62475       475 211.3

BATCH TOTAL:     62475 kg

Recipe  1: REC 01
  BATCHES:         2
    TOTAL:    124480 kg
```

Typical Printout

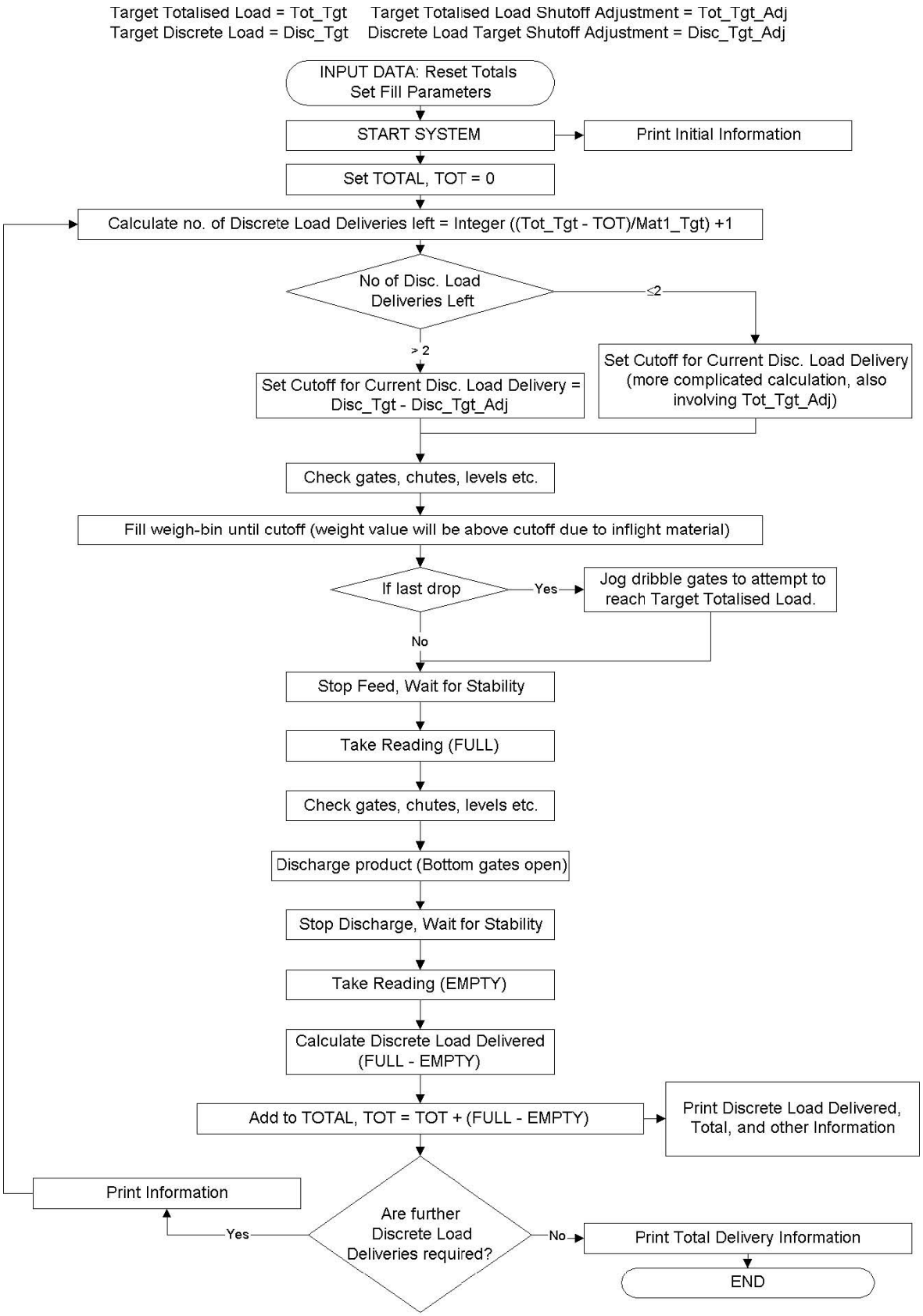
FIGURE 6/14B/15 – 5



Full - Preceding Empty Method

Weighing Cycle for the Pattern (Full - Preceding Empty Method)

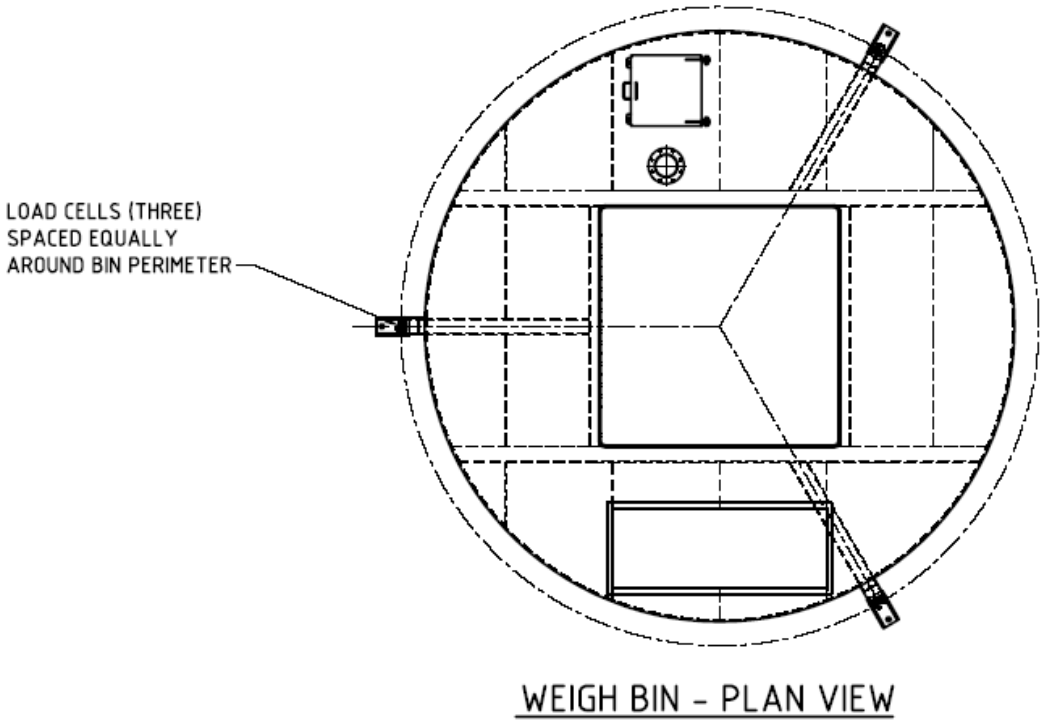
FIGURE 6/14B/15 – 6



Full - Following Empty Method

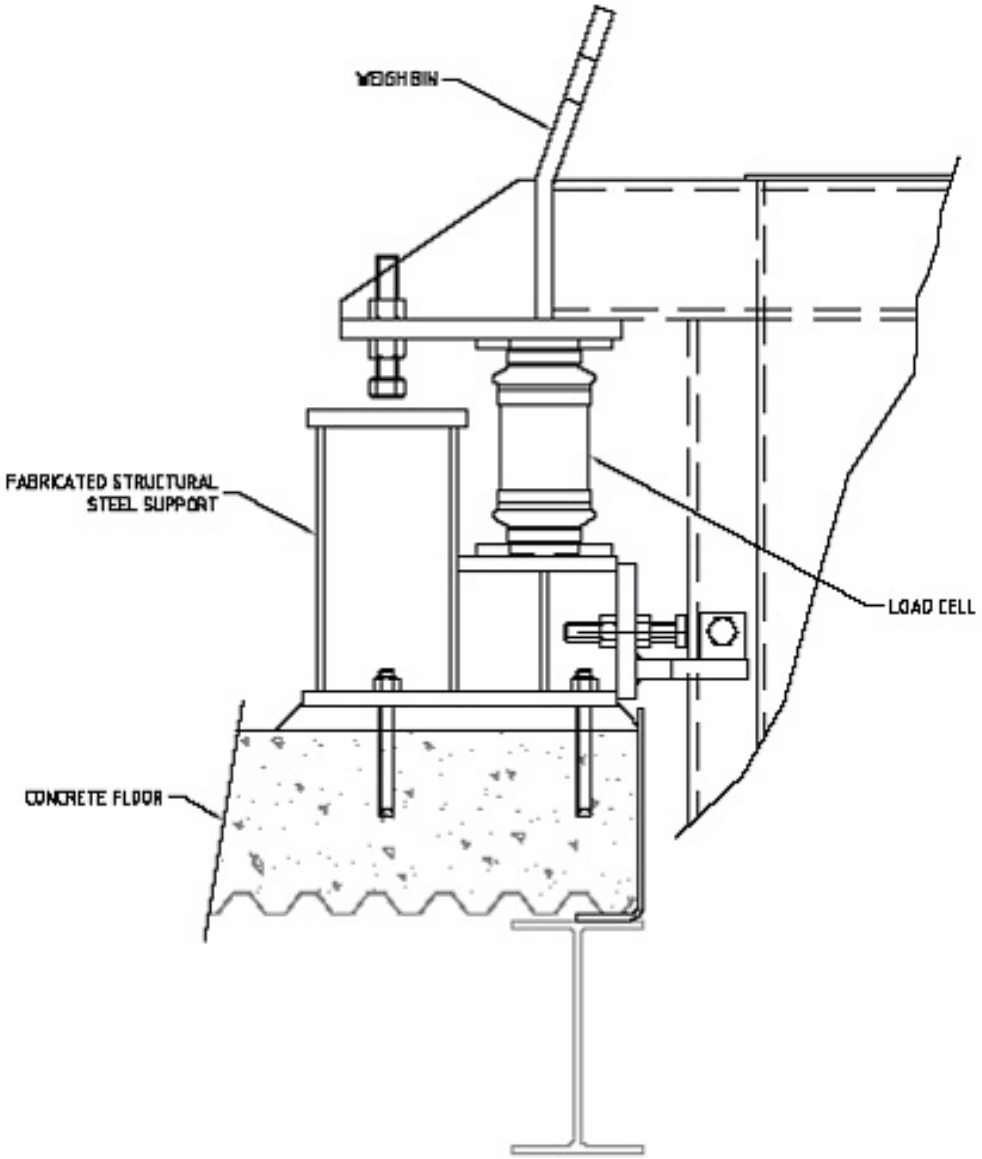
Weighing Cycle for Variant 1 (Full - Following Empty Method)

FIGURE 6/14B/15 – 7



Typical Weigh Bin Arrangement – Variant 3

FIGURE 6/14B/15 – 8



Typical Load Cell Mounting Arrangement – Variant 3

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