



Australian Government

**National Measurement
Institute**

Bradfield Road, West Lindfield NSW 2070

Certificate of Approval

NMI 6/9C/291

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.

A & D Mercury Model SB-60K11 Weighing Instrument

submitted by A & D Australasia Pty Ltd
 (formerly A & D Mercury Pty Ltd)
 32 Dew Street
 Thebarton SA 5031

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 76, *Non-automatic weighing instruments, Parts 1 and 2*, dated July 2004.

This approval becomes subject to review on **1/08/16**, and then every 5 years thereafter.

DOCUMENT HISTORY

Rev	Reason/Details	Date
0	Pattern & variants 1 & 2 approved – interim certificate issued	26/07/06
1	Pattern & variants 1 & 2 – certificate issued	10/10/06
2	Pattern & variants 1 & 2 reviewed & updated – certificate issued	18/10/11

CONDITIONS OF APPROVAL

General

Instruments purporting to comply with this approval shall be marked with approval number 'NMI 6/9C/291' and only by persons authorised by the submitter.

It is the submitter'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 Certificates No S1/0/A or 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.

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

A handwritten signature in black ink, consisting of a series of loops and flourishes, positioned to the right of the signature text.

TECHNICAL SCHEDULE No 6/9C/291

1. Description of Pattern **approved on 6/07/06**

An A & D Mercury model SB-60K11 self-indicating weighing instrument of 60 kg maximum capacity and a verification scale interval of 0.02 kg.

Instruments may be fitted with output sockets (output interfacing capability) for the connection of peripheral and/or auxiliary devices.

Instruments are powered by mains supply or by an integral rechargeable 6 V battery.

1.1 Basework

The model SB-60K11 basework (Figure 1) has the load receptor directly supported by a single load cell. The load receptor has maximum nominal dimensions of 330 × 424 mm.

1.2 Load Cell

An A & D model LC:127-60K class C3 load cell of 102 kg maximum capacity is used.

1.3 Indicator

An A & D model AD-4406 digital indicator (Figure 1) is used. The indicator is described in the documentation of approval NMI S451.

1.3.1 Zero

Zero is automatically corrected to within $\pm 0.25e$ whenever power is applied and whenever the instrument comes to rest within $0.5e$ of zero.

The initial zero-setting device of the pattern has a nominal range of not more than 20% of the maximum capacity of the instrument.

The instrument has a semi-automatic zero-setting device with a nominal range of not more than 4% of the maximum capacity of the instrument.

1.3.2 Tare

A semi-automatic and/or a non-automatic keyboard-entered subtractive taring device, each of up to the maximum capacity of the instrument may be fitted.

1.3.3 Display Check

A display check is initiated whenever power is applied.

1.4 Levelling

The instrument is provided with adjustable feet and adjacent to the level indicator is a notice advising that the instrument must be level when in use.

1.5 Verification Provision

Provision is made for the application of a verification mark.

1.6 Sealing Provision

Provision is made for the calibration adjustments to be sealed as described in the approval documentation for the indicator.

1.7 Markings

Instruments carry the following markings:

Manufacturer's mark, or name written in full	A & D Australasia Pty Ltd
Indication of accuracy class	Ⓜ
Maximum capacity	Max kg *
Minimum capacity	Min kg *
Verification scale interval	e = kg *
Tare capacity (if less than Max)	T = - kg
Serial number of the instrument
Pattern approval mark for the instrument	6/9C/291

- * These markings shall also be shown near the display of the result if they are not already located there.

Instruments of less than 100 kg maximum capacity are marked 'NOT FOR TRADING DIRECT WITH THE PUBLIC' (or similar wording).

2. Description of Variant 1

approved on 26/07/06

Certain other models of the SB series as listed in Table 1.

TABLE 1

Instrument Model:	SB-15K10	SB-60K11	SB-100K12	SB-200K12
Maximum capacity	15 kg	60 kg	100 kg	200 kg
Maximum platform size	250 × 250	330 × 424	390 × 530	390 × 530
Typical verification scale interval. (kg)	0.005 kg	0.02 kg	0.02 kg	0.05 kg
Maximum number of verification scale intervals n_{LC}	3000	3000	3000	3000
Load cell:				
A&D model	LC:126-15K	LC:127-60K	LC:128-100K	LC:128-220K
Classification	C3	C3	C3	C3
Load cell maximum capacity (E_{max}) kg	27	108	180	360
Number of load cells	1	1	1	1
Minimum value of verification scale interval for basework (v_{min} of load cell) kg	0.003	0.012	0.02	0.04
DR value kg	--	--	--	--
Load cell sensitivity at E_{max}	1.8 mV/V	1.8 mV/V	1.8 mV/V	1.8 mV/V
Input impedance	1190 Ω	1190 Ω	1190 Ω	1190 Ω
Excitation voltage (maximum)	15 V	15 V	15 V	15 V
Cable length (±0.1m) (#)	3	3	3	3
Number of leads (plus shield)	4	4	4	4

- (#) The load cell cable length supplied with the basework shall not be shortened.

3. Description of Variant 2

approved on 26/07/06

Certain baseworks of this approval used with a compatible NMI approved (by Supplementary Certificate) indicator provided the conditions set out below are met.

In addition to the markings specified in clause 1.7 **Markings**, instruments are marked with the NMI approval number for the indicator used, together in the same location.

The approved baseworks and their limiting characteristics are given in Table 1.

The conditions to be met are given below, and include calculations using the following terms:

E_x = Excitation from indicator (V)

LC_Sens = Load cell sensitivity (mV/V)

E_{max} = Load cell maximum capacity (kg)

Indicator Sensitivity = Minimum sensitivity value per verification scale interval for the indicator (μV)

e = verification scale interval of the instrument (kg). ***In the case of multi-interval or multiple range instruments, any reference to 'e' refers to the smallest verification scale interval (i.e. e_1).***

e_1, e_2, \dots = verification scale interval of each range for multiple range instruments (or partial weighing ranges for multi-interval instruments), e_1 refers to the smallest verification interval.

Max = the maximum capacity of the instrument. This refers to the maximum capacity of the highest range (i.e. Max_r for multiple range instruments).

Max_r = the maximum capacity of the instrument for a multiple range instrument, i.e. the maximum capacity of the highest range.

Max₁ Max₂ ... = the maximum capacity of the various ranges for a multiple range instrument. Max_1 refers to the maximum capacity of the smallest range.

n_{LC} = the maximum number of verification intervals for which the load cell or basework is approved (e.g. 3000 for a 'class C3' load cell).

DR = dead load return value for the load cell. Note: Many load cells do not have a specified DR value.

The conditions are:

- The excitation voltage used is within the range approved for the baseworks.
- The maximum load applied to the basework (live load plus any dead load) does not exceed the load cell maximum capacity.
- The verification scale interval is not less than the minimum value specified. ***In the case of multi-interval or multiple range instruments, the verification scale interval refers to the smallest verification scale interval (i.e. e_1).***

- The number of verification scale intervals is less than or equal to the n_{\max} value specified. ***In the case of multi-interval or multiple range instruments, the number of verification scale intervals refers to the largest number in any weighing range or partial weighing range (i.e. the largest of Max_1/e_1 , Max_2/e_2 etc).***
- The signal voltage per verification scale interval is not less than the minimum sensitivity value per verification scale interval for the indicator (as specified in the approval documentation for the indicator), i.e.

$$\text{Indicator Sensitivity} \leq 1000 \times Ex \times LC_Sens \times e / E_{\max}$$

Additional requirement for multi-interval operation:

In the case of indicators which are configured to form a multi-interval weighing instrument the instrument shall comply with one of the following conditions:

- (i) The smallest verification scale interval (e_1) shall satisfy the following:***

$$e_1 \geq Max/n_{LC}$$

- (ii) Or, the smallest verification scale interval (e_1) shall satisfy the following:***

$$e_1 \geq 2 \cdot DR \cdot Max/E_{\max}$$

Of course (ii) cannot apply where a value of 'Deadload return' DR is not given.

The instrument shall also comply with the following condition:

$$Max_i / e_{i+1} \geq 500 \text{ (e.g. } Max_1/e_2 \geq 500 \text{ and } Max_2/e_3 \geq 500 \text{)}$$

Additional requirement for multiple range operation:

In the case of indicators which are configured to form a multiple range weighing instrument the instrument shall comply with one of the following conditions:

- (i) The smallest verification scale interval (e_1) shall satisfy the following:***

$$e_1 \geq 0.4 Max_r/n_{LC}$$

- (ii) Or, the smallest verification scale interval (e_1) shall satisfy the following:***

$$e_1 \geq DR \cdot Max_r/E_{\max}$$

Of course (ii) cannot apply where a value of 'Deadload return' DR is not given.

TEST PROCEDURE No 6/9C/291

Instruments shall be tested in accordance with any relevant tests specified in the National Instrument Test Procedures.

Maximum Permissible Errors

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

FIGURE 6/9C/291 – 1



Typical A & D Mercury TPF Series Weighing Instrument