



**Australian Government**  
**National Measurement  
Institute**

Bradfield Road, West Lindfield NSW 2070

**Cancellation**  
**Certificate of Approval**  
**No 5/6B/80B**

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

This is to certify that the approval for use for trade granted in respect of the

Avery Hardoll Model BM250 Bulk Flowmetering System

submitted by           Gilbarco Australia Limited  
                                  20 Highgate Street  
                                  Auburn    NSW    2144

has been cancelled in respect of new instruments as from 1 April 2011.

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 a long horizontal stroke at the bottom.



# Australian Government

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## National Standards Commission

12 Lyonpark Road, North Ryde NSW 2113 Australia

### Certificate of Approval

**No 5/6B/80B**

Issued 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

Avery Hardoll Model BM250 Bulk Flowmetering System

submitted by Gilbarco Australia Limited  
20 Highgate Street  
Auburn NSW 2144.

**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 Certificate is issued upon completion of a review of NSC approval No 5/6B/80A.

### CONDITIONS OF APPROVAL

This approval becomes subject to review on 1 March 2008, and then every 5 years thereafter.

Instruments purporting to comply with this approval shall be marked NSC No 5/6B/80B 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 Commission 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 the Commission's Document NSC P 106.

The Commission reserves the right to examine any instrument or component of an instrument purporting to comply with this approval.

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

### DESCRIPTIVE ADVICE

**Pattern:** approved 23 February 2004

- An Avery Hardoll model BM250 bulk flowmetering system.

**Variants:** approved 23 February 2004

1. As a loading-rack or gantry type bulk flowmetering system.
2. Using certain other Avery Hardoll BM series flowmeters.
3. Using certain Avery Hardoll CM series flowmeters.

Technical Schedule No 5/6B/80B describes the pattern and variants 1 to 3.

### FILING ADVICE

The documentation for this approval comprises:

Certificate of Approval No 5/6B/80B dated 25 February 2004  
Technical Schedule No 5/6B/80B dated 25 February 2004 (incl. Tables 1 to 2,  
and Test Procedure)  
Figures 1 to 4 dated 25 February 2004

Signed by a person authorised under Regulation 60 of the National Measurement Regulations 1999 to exercise the powers and functions of the Commission under this Regulation.



## TECHNICAL SCHEDULE No 5/6B/80B

**Pattern:** Avery Hardoll Model BM250 Bulk Flowmetering System

**Submittor:** Gilbarco Australia Limited  
20 Highgate Street  
Auburn NSW 2144

### 1. Description of Pattern

The Avery Hardoll model BM250 positive displacement flowmeter (Figure 1 and Table 1) approved for bulk metering of liquid petroleum products within the stated field of operation. The flowmetering system is installed in a fixed location for metering the volume dispensed. The flowmeter is adjusted to be correct for the liquid for which it is to be verified/certified as marked on the data plate.

#### 1.1 Field of Operation

The field of operation of the measuring system is determined by the following characteristics:

- Minimum measured quantity,  $V_{min}$  200 L
- Maximum flow rate,  $Q_{max}$  1150 L/min
- Minimum flow rate,  $Q_{min}$  115 L/min
- Maximum pressure of the liquid,  $P_{max}$  1050 kPa
- Dynamic viscosity range at 20°C 0.5 to 20 mPa.s
- Maximum temperature of the liquid,  $T_{max}$  50°C
- Minimum temperature of the liquid,  $T_{min}$  -10°C
- Accuracy class 0.5

#### 1.2 Components of the Flowmetering System

##### (i) Tank

The supply tank is configured for the type of pump used and may incorporate a detector for low liquid-level, which prevent measurements when the low liquid-level is reached. The outlet pipe of the tank, supplying liquid to a pump, shall have a diameter not less than the size of the pump inlet.

##### (ii) Pump

Either a positive displacement, centrifugal or submersible turbine type pump may be used subject to the following requirements.

A positive displacement pump may be fitted in either suction lift or flooded suction, i.e. either above or below the liquid level in the supply tank. Such installations shall include a gas separator near the inlet of the meter.

A centrifugal type pump may only be installed below the liquid level of the supply tank. Submersible turbine type pumps may also be used either alone or supplying a centrifugal type pump positioned above or below the liquid level of the supply tank. These systems shall include a gas extractor near the inlet of the meter.

In any case, for all combinations of usage, the pump shall be of sufficient capacity to ensure that each meter can operate over its approved flow rate range.

**(iii) Non-return Valve**

A non-return valve is fitted between the pump and the flowmeter to prevent reverse flow of the liquid.

**(iv) Gas Elimination Device**

An Avery Hardoll Type (size) D LSMY2 or LSMY3 gas elimination device with an integral strainer assembly is fitted as close as practical to the meter inlet (Figure 2).

The gas elimination device prevents flow through the meter when significant air or gas is detected.

**(v) Measurement Transducer**

The measurement transducer is an Avery Hardoll model BM250 positive displacement meter (Figure 3) with a mechanical output shaft that rotates proportional to the volume throughput.

A calibration mechanism is fitted to the meter capsule which incorporates a calibration screw for adjusting the speed of rotation of the meter output shaft for a fixed volume throughput. The adjustment is stepless and has a range of 6%. An optional rate of flow indicator may be fitted to the front cover of the calibration mechanism.

The calibration mechanism may be replaced with a compatible Commission-approved electronic pulse output device for use with a compatible Commission-approved electronic calculator/indicator.

The meter is adjusted (verified/certified) using the liquid it is intended to measure.

Provision is made for inserting a thermometer and fitting a pressure gauge for the purpose of measuring the liquid temperature and pressure at the meter. The thermometer well and the pressure gauge may be fitted in the vicinity of the meter outlet. Alternatively, the thermometer well may be incorporated in the gas elimination device if the device is in close proximity to the meter inlet.

**(vi) Calculator/Indicator**

The meter output shaft is connected to a mechanical indicator (register) for indicating the metered volume. The Veeder-Root model 7887 mechanical indicator (which may be marked 'Avery Hardoll', Figure 3) is a zero start volume indicator with the mechanical reset mechanism located on the side of the indicator. A prominent notice at the front of the indicator warns not to use the reset mechanism while the register is counting.

The scale interval of the right-hand mechanical wheel is marked in 0.1 L graduations for a minimum delivery not less than 100 L, and in 1 L graduations for applications with deliveries of not less than 500 L.

The register may be fitted with an optional mechanical printer that prints the volume displayed, including the units of measurement.

The register may be fitted with an optional mechanical pre-set device between the meter and the indicator with a mechanical linkage to a valve that starts and automatically stops the delivery. This valve defines the transfer point. The pre-set mechanism is approved only to facilitate the delivery and is marked Pre-set Quantity Not In Use For Trade, or similar wording.

#### **(vii) Transfer Device**

The transfer device, which defines the start and finish of volume measurement, is in the form of a positive shut-off valve, manually or automatically operated, installed downstream of the meter with no intermediate outlet.

The pipework between the gas elimination device and the transfer point is maintained full of liquid during the measurement and shutdown periods.

### **1.3 Verification/Certification Provision**

Provision is made for the application of a verification/certification mark.

### **1.4 Sealing Provision**

The access to the meter calibration adjustment screw is sealed.

### **1.5 Descriptive Markings and Notices**

Each measuring system shall bear the following information, placed together either on the indicating device or on a data plate:

Pattern approval mark	NSC No 5/6B/80B
Manufacturer's identification mark or trade mark	.....
Meter model	.....
Serial number of the instrument	.....
Year of manufacture	.....
Maximum flow rate, $Q_{max}$	..... L/min
Minimum flow rate, $Q_{min}$	..... L/min
Maximum pressure, $P_{max}$	..... kPa
Environmental class	class I
Cyclic Volume	..... L/rev
Type of liquid for which the system is verified	.....

The minimum measured quantity ( $V_{min}$ ) is clearly visible on the indicating device, e.g. "Minimum Delivery 500 L".

## 2. Description of Variants

### 2.1 Variant 1

A loading-rack or gantry type flowmetering system. This system is similar to the pattern except that the transfer device is replaced by one of the following:

- (i) Top-loading arrangement (Figure 4) – the highest point of the pipework forms a sharply defined weir at a fixed level from which the delivery pipe drains to the outlet for all configurations of the hose or loading arm whilst in operation. The outlet control valve is installed at or upstream of the highest point and either a siphon breaker is installed to ensure complete draining of the pipework downstream of the weir or an anti-drain valve is fitted which maintains the pipework full of liquid; or
- (ii) Bottom-loading arrangement – A self-sealing coupling or shut-off valve is located at the delivery point of the pipework.

In addition, the indicator is fitted with a mechanical pre-set device between the meter and the indicator with a mechanical linkage to a valve that starts and automatically stops the delivery. The pre-set mechanism is approved only to facilitate the delivery and is marked Pre-set Quantity Not In Use For Trade, or similar wording.

### 2.2 Variant 2

Using certain other Avery Hardoll BM series flowmeters as listed in Table 1.

TABLE 1

Meter Model	Capsule/s	Pipeline Size mm (inch)	Flow Rate (L/min)		Minimum Measured Quantity (L)	Gas Eliminator Model Number	Cyclic Volume (L/rev)
			$Q_{max}$	$Q_{min}$			
BM250	Single	63 (2.5)	1150	115	200	(#1)	2.27
BM950	Single	76 (3.0)	1370	130	200	(#1)	2.27
BM450	Double	76 (3.0)	2050	200	500	(#1)	4.54
BM550	Double	102 (4.0)	2280	220	500	(#1)	4.54
BM350	Double	102 (4.0)	2500	250	500	(#1)	4.54
BM650	Triple	102 (4.0)	3000	300	2000	(#2)	6.82
BM750	Triple	152 (6.0)	3000	300	2000	(#2)	6.82
BM850	Triple	152 (6.0)	3850	385	2000	(#2)	6.82

(#1) Avery Hardoll Type (size) D LSMY2 or LSMY3 series gas elimination device

(#2) Avery Hardoll Type (size) A, B, C or D LSMY2 or LSMY3 series gas elimination device

### 2.3 Variant 3

Using certain Avery Hardoll CM series flowmeters as listed in Table 2.

TABLE 2

Meter Model	Capsule/s	Pipeline Size mm (inch)	Flow Rate (L/min)		Minimum Measured Quantity (L)	Gas Eliminator Model Number	Cyclic Volume (L/rev)
			$Q_{max}$	$Q_{min}$			
CM1000	Single	63 (2.5)	1000	100	100	(#)	2.27
CM1400	Single	76 (3.0)	1400	140	100	(#)	2.27
CM2000	Double	76 (3.0)	2000	200	200	(#)	4.54
CM2500	Double	102 (4.0)	2500	250	200	(#)	4.54
CM3000	Triple	102 (4.0)	3000	300	500	(#)	6.82
CM4000	Triple	152 (6.0)	4000	400	500	(#)	6.82

(#) Avery Hardoll Type (size) D LSMY2 or LSMY3 series gas elimination device

### TEST PROCEDURE

Instruments should be tested in accordance with any relevant tests specified in NSC Test Procedure No 13, *Non-driveway Flowmeters* using the type of liquid with which they will be used and which is marked on the instrument. Tests should be conducted in conjunction with any tests specified in the approval documentation for any indicator/controller and/or any conversion device, etc. used.

#### Maximum Permissible Errors

##### General Applications (accuracy class 0.5)

For other than pipeline flowmetering systems, the maximum permissible errors for deliveries greater than 3 times the minimum measured quantity are:

±0.5% for the complete metering system (in-service tolerance).

±0.3% for calibration/adjustment of the meter. (\*)

(\*) It is forbidden to adjust the calibration of the meter to give an error other than as close as practical to zero average error.

**Other applicable maximum permissible errors are:**

##### Elimination of Air or Gas

The maximum permissible errors applicable for the elimination of air or gas are:

±0.5% for liquids having a dynamic viscosity not exceeding 1 mPa.s (e.g. petrol); and

±1% for liquids having a dynamic viscosity exceeding 1 mPa.s (e.g. kerosene, distillate)





# Australian Government

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## National Standards Commission

12 Lyonpark Road, North Ryde NSW 2113 Australia

### Notification of Change

### Certificate of Approval No 5/6B/80B

### Change No 1

The following change is made to the approval documentation for the  
Avery Hardoll Model BM250 Bulk Flowmetering System

submitted by Gilbarco Australia Limited  
20 Highgate Street  
Auburn NSW 2144.

In Certificate of Approval No 5/6B/80B dated 25 February 2004;

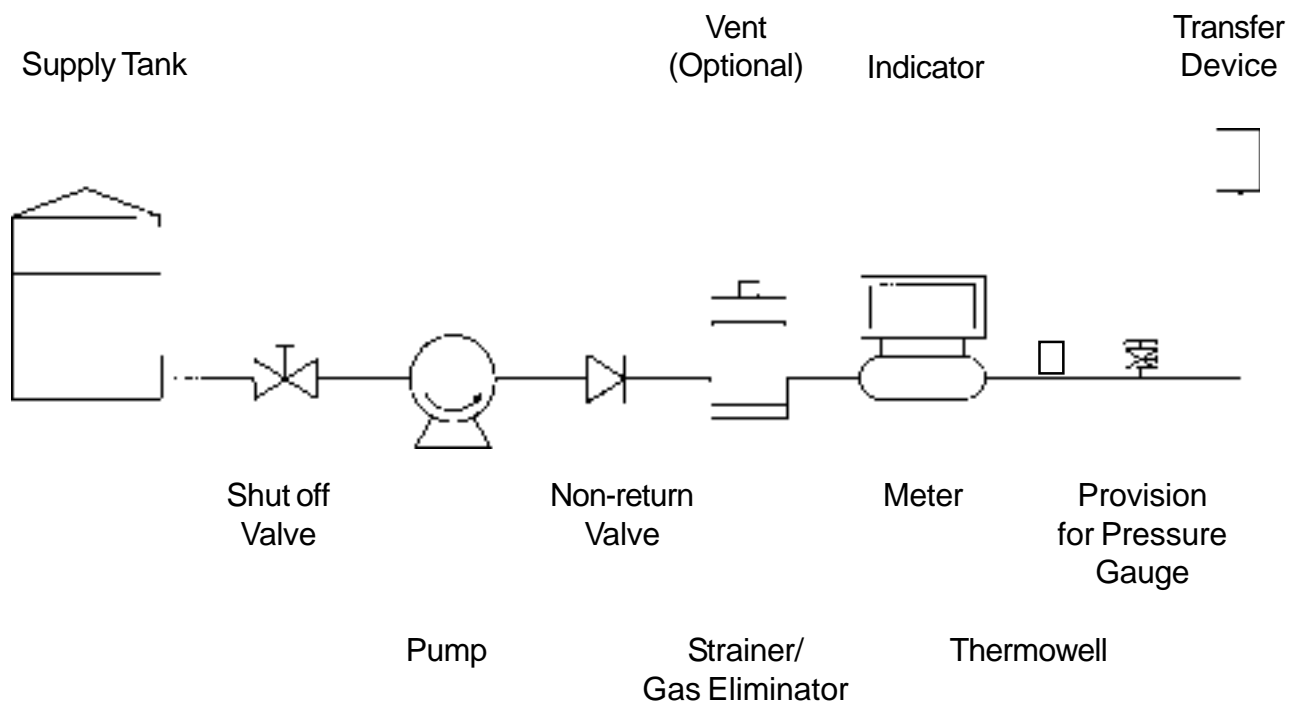
The Condition of Approval referring to the review of the approval should be amended to read:

“This approval becomes subject to review on 1 March **2009**, and then every 5 years thereafter.”

Signed by a person authorised under Regulation 60 of the National Measurement Regulations 1999 to exercise the powers and functions of the Commission under this Regulation.

A handwritten signature in black ink, appearing to be "J. G. T.", written in a cursive style.

FIGURE 5/6B/80B – 1



Typical Flowmetering System

5/6B/80B  
25 February 2004

FIGURE 5/6B/80B – 2



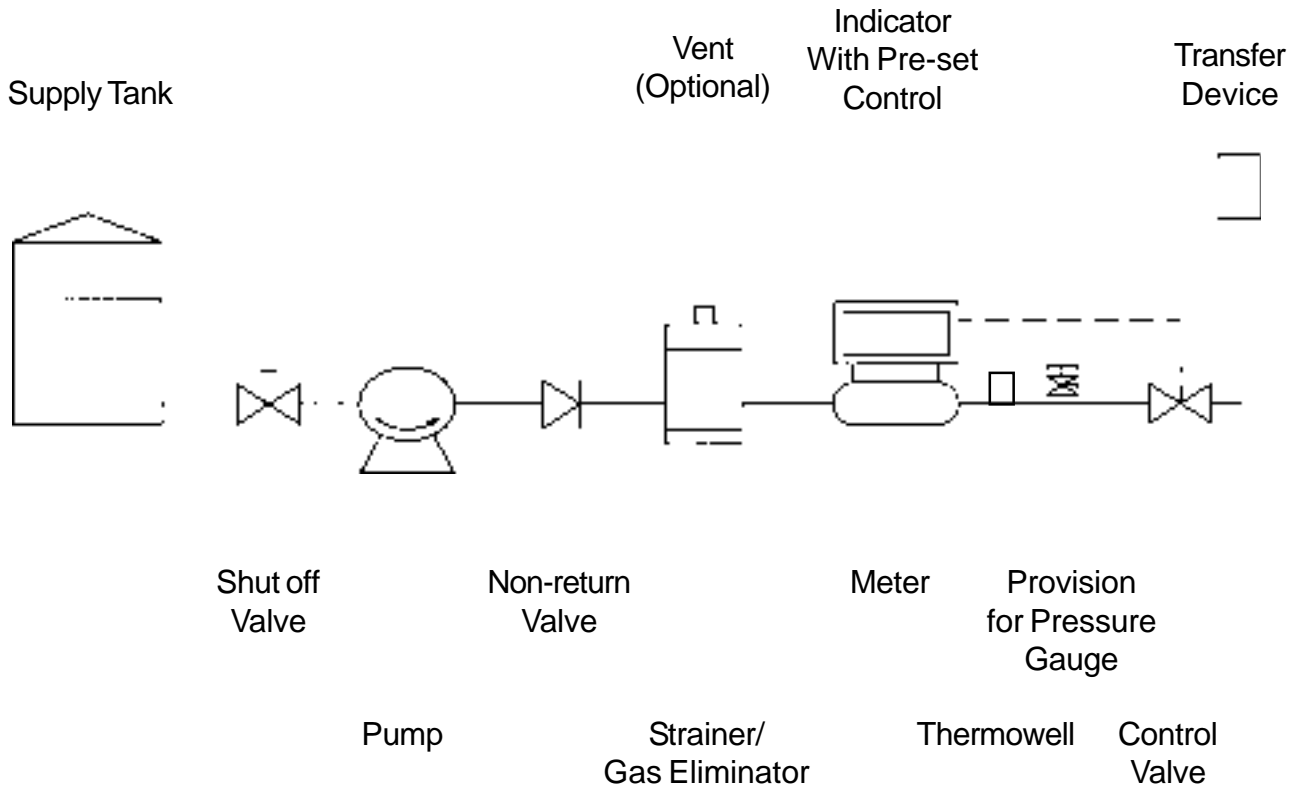
Avery Hardoll Type D LSMY Series Strainer/Gas Eliminator

FIGURE 5/6B/80B – 3



Avery Hardoll Model BM250 Flowmeter

FIGURE 5/6B/80B – 4



Typical Loading-rack or Gantry Flowmetering System