

# National Standards Commission



## Certificate of Approval

**No 5/6B/57A**

Issued under Regulation 9  
of the  
National Measurement (Patterns of Measuring Instruments) Regulations

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

Liquid Controls Model M-7 Bulk Flowmetering System

submitted by   Liquip Sales Pty Ltd  
                    13 Hume Road  
                    Smithfield   NSW   2164.

This Certificate is issued upon completion of reviews of NSC approvals Nos 5/6B/30, 5/6B/57, 5/6H/5 and 5/6H/6.

**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.

### CONDITIONS OF APPROVAL

This approval is subject to review on or after 1/5/98.  
This approval expires in respect of new instruments on 1/5/99.

Instruments purporting to comply with this approval shall be marked NSC No 5/6B/57A and only by persons authorised by the submitter.

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

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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 106.

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

DESCRIPTIVE ADVICE

**Pattern:** approved 13/4/93

- A bulk flowmetering system using a Liquid Controls model M-7 flowmeter which is approved for use with liquid hydrocarbons having a kinematic viscosity between 0.5 and 12.5 mm<sup>2</sup>/s.

**Variants:** approved 13/4/93

1. With a Liquid Controls model M-5 flowmeter.
2. As a loading-rack flowmetering system.
3. As a modular flowmetering system.
4. As a drum-filling flowmetering system.
5. For use with liquid hydrocarbons having a kinematic viscosity between 12.5 and 1450 mm<sup>2</sup>/s.

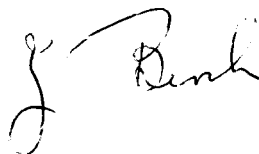
Technical Schedule No 5/6B/57A describes the pattern and variants 1 to 5.

FILING ADVICE

The documentation for this approval comprises:

Certificate of Approval No 5/6B/57A dated 5/11/93  
Technical Schedule No 5/6B/57A dated 5/11/93 (incl. Test Procedure)  
Figures 1 to 5 dated 5/11/93

Signed and sealed by a person authorised under Regulation 9 of the National Measurement (Patterns of Measuring Instruments) Regulations to exercise the powers and functions of the Commission under this Regulation.

A handwritten signature in black ink, appearing to read 'J. Dench', is written over a faint, larger signature that is partially visible in the background.



## National Standards Commission

### TECHNICAL SCHEDULE No 5/6B/57A

**Pattern:** Liquid Controls Model M-7 Bulk Flowmetering System.

**Submittor:** Liquip Sales Pty Ltd  
13 Hume Road  
Smithfield NSW 2164.

#### 1. Description of Pattern

A bulk flowmetering system using a Liquid Controls model M-7 flowmeter which is approved for use with liquid hydrocarbons having a kinematic viscosity between 0.5 and 12.5 mm<sup>2</sup>/s with maximum and minimum flow rates of 380 L/min and 40 L/min respectively and only when used with the pressure at the meter above 130 kPa. The minimum quantity is 100 litres.

##### 1.1 Pipeline Flowmetering System (Figure 1)

The system comprises:

##### (i) Tank

A supply tank.

##### (ii) Pump

A pump of either positive displacement or centrifugal type - in the latter case the pump is mounted lower than the minimum height of the liquid in the supply tank. The supply pipe from the tank has a continuous fall to the pump.

If the pump is not for the exclusive use of the flowmeter the flow rate through the meter must stay within the appropriate flow rate range for all combinations of alternative uses of the pump.

##### (iii) Non-return Valve

A non-return valve between the pump and the meter or an arrangement of the components and piping to keep the system full of liquid at all times.

##### (iv) Gas Purger/Strainer

A gas purger/strainer assembly fitted as close as practical to the meter inlet (Figure 2). The gas purger is approved on the condition that the pump is operated under a positive suction head.

The gas purger/strainer assembly may be modified for use as a strainer only where the tank has automatic alarming of low-liquid level, or has a float-operated shut-off valve in the pump supply, or has other means to prevent gas entering the system.

**(v) Meter**

A Liquid Controls model M-7 (\*) flowmeter (Figure 2). Provision shall be made for a pressure gauge to be connected downstream of the meter.

NOTE: (\*) The meter model given above is the basic model number only - the full model number may have a variety of additional alphanumeric characters.

- 'M' designates meter.
- 'S' designates steel case; "blank" if other than steel.
- 'A' designates working pressure; may be 'AA', 'A', 'B', 'C' or "blank".
- '7' designates the capacity of the meter.
- 'C' designates accessory combinations fitted to the meter, e.g. preset valve, air eliminator, printer, etc; may be any character 'A' to 'Z'.
- '1' designates the material of the measuring element; may be from '1' to '37'.

**(vi) Indicating System**

Any combination of the following assemblies:

- (a) A Veeder-Root 1624 series or 7887 series zero start indicator.
- (b) A Veeder-Root 7085 series or 7890 series zero-start indicator with ticket printer.
- (c) A Liquid Controls model D4130 or D4160 or a Veeder-Root 7889 series preset counter with a Liquid Controls preset-counter-operated outlet-control valve; a pressure relief pipe may be fitted between the valve and the gas purger/strainer. The preset counter is marked PRESET NOT IN USE FOR TRADE.
- (d) A rigid extension drive from the meter to the indicator and ticket printer.

- (e) Any compatible Commission-approved pulse generator, electronic bulk flowmeter controller/indicator (which may incorporate a volume conversion for temperature device), and flow control valve.

NOTE: Where systems include a pulse generator and electronic indicator, the pulse generator shall be driven directly from the output shaft of the meter; it shall not be driven via a mechanical indicator nor via reduction gear trains.

The use of a right-angled drive would be considered as direct as long as the drive consists of two bevel gears with a 1:1 ratio and provided the right-angled drive is before the drive to any mechanical indicator.

Where the pulse generator is not driven directly, any electronic indicator connected to it shall be marked NOT IN USE FOR TRADE.

**(vii) Transfer Device**

A transfer device in the form of a positive shut-off component such as a manually or automatically-operated control valve located downstream of the meter with no intermediate outlet.

**1.2 Markings**

Instruments are marked with the following data, together in the one location:

|  |                 |                           |
|--|-----------------|---------------------------|
| Manufacturer's name or mark                    |                 |                           |
| Meter model                                    |                 |                           |
| Serial number                                  |                 |                           |
| NSC approval number                            |                 | 5/6B/57A                  |
| Maximum flow rate                              |                 | ..... L/min               |
| Minimum flow rate                              |                 | ..... L/min               |
| Nominal flow rate                              |                 | (when flow rate is within |
|  | ±5% of nominal) | ..... L/min               |
| Minimum quantity                               |                 | ..... L                   |
| Type of liquid for which the meter is verified |                 | .....                     |
| Maximum operating pressure                     |                 | ..... kPa                 |

In addition, preset counters (other than on drum-filling flowmeters complying with cl. 2.4 Variant 4) shall be marked PRESET COUNTER NOT IN USE FOR TRADE.

### 1.3 Sealing and Verification/Certification Provision

Provision is made for sealing the calibration device of the meter. If an electronic indicator is used which incorporates calibration facilities, provision shall be made for sealing access.

Provision is also made for a verification/certification mark to be applied.

## 2. Description of Variants

### 2.1 Variant 1

With a Liquid Controls model M-5 (\*) flowmeter which is approved for use with maximum and minimum flow rates of 230 L/min and 25 L/min respectively and only when used with the pressure at the meter above 130 kPa. The minimum quantity is 50 litres.

NOTE: (\*) The basic model number only - refer to cl. 1.1 (v) for the pattern.

### 2.2 Variant 2

As a loading-rack flowmetering system (Figure 3) which is similar to the pipeline system except that the control valve is installed at or upstream of the transfer device, which is one of the following:

- (i) Top-loading arrangement - the highest point of the pipework forms a 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. A syphon breaker is installed to ensure complete draining of the pipework downstream of the weir.

Alternatively, an anti-drain valve which retains a pressure of not less than 55 kPa may be installed at the delivery point of the pipework or hose; or

- (ii) Bottom-loading arrangement - a dry-break coupling located at the delivery point of the pipework or hose.

### 2.3 Variant 3

As a modular flowmetering system (Figure 4) which is similar to the pipeline and loading-rack systems, except that it is a module of metering components in its own assembly rather than built into another structure. It may be portable, including being vehicle-mounted.

The system consists of a gas purger/strainer, a meter and a transfer device. It may contain the pump, together with a pressure control valve (if necessary), and a hose reel.

In the latter case, the transfer device is in the form of either a nozzle or dry-break coupling at the end of a flexible hose.

The pump is located lower than the minimum height of the liquid in the supply tank. A non-return valve is located between the pump and the meter, or the components and piping are arranged to keep the system full of liquid at all times.

Any nozzle used shall have an integral outlet control valve. If fitted with an integral anti-drain valve, the valve shall be immediately before the outlet control valve. A separate anti-drain valve may be fitted to the nozzle end of the hose if an integral anti-drain valve is not part of the nozzle. The anti-drain valve retaining pressure shall be not less than 55 kPa.

## 2.4 Variant 4

As a drum-filling flowmetering system (Figure 5) which is similar to the pipeline and loading-rack systems except for the following:

- (i) The minimum flow rates shall be 76 L/min for the model M-7 (the pattern) and 46 L/min for the model M-5.
- (ii) The meter is fitted with a Liquid Controls A2600 series preset control valve, a modified Veeder-Root 7887 or 7889 series preset counter and an outlet control valve with integral anti-drain valve. The outlet control valve may be closed manually or by the preset counter.

The indicator is approved to repeat deliveries of 60, 200 or 205 litres, and is marked PRESET FOR '#' LITRES (where '#' equals one of the approved preset quantities).

**Only the model M-5 flowmeter shall be used for batches of 60 litres.**

Unlike the pattern, the preset counter of this variant need NOT be marked PRESET NOT IN USE FOR TRADE.

- (iii) The system is arranged such that the meter operates at a constant flow rate ( $\pm 5\%$  of nominal) within the maximum and minimum flow rate range.
- (iv) The outlet is either a drum-filling spear or a hose. If a spear is used, it is arranged to fully drain after each delivery so that the control valve is the transfer device. If a hose is used, it is fitted with a Commission-approved nozzle which has an anti-drain valve installed either in the nozzle or immediately before it, and having a retaining pressure of not less than 55 kPa; the nozzle is the transfer device.

## 2.5 Variant 5

For use with liquids having a kinematic viscosity between 12.5 and 1450 mm<sup>2</sup>/s.

### TEST PROCEDURE

Instruments should be tested in accordance with the Inspector's Handbook using the product with which they will be used and which is marked on the data plate. Tests should be conducted in conjunction with any tests specified in the approval documentation for any indicator and/or conversion device, etc. used.

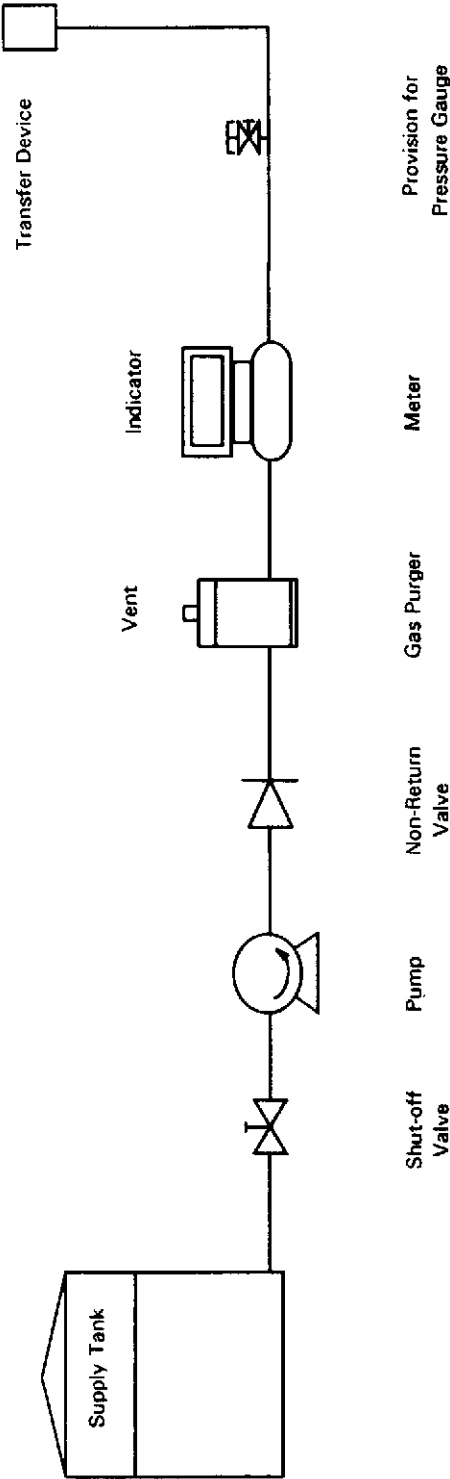
#### Maximum Permissible Errors at Verification/Certification

The maximum permissible error applied during a verification test from normal flow rate to the minimum flow rate specified in the Certificate of Approval or Technical Schedule is  $\pm 0.3\%$ .

Where an instrument is fitted with a device to convert the registered volume to volume at reference conditions, the maximum permissible error specified above is increased by 0.2%. Reference conditions for petroleum liquids are specified in Australian Standard 2649 - 1983, *Petroleum Liquids and Gases - Measurement - Standard Reference Conditions*.



FIGURE 5/6B/57A - 1

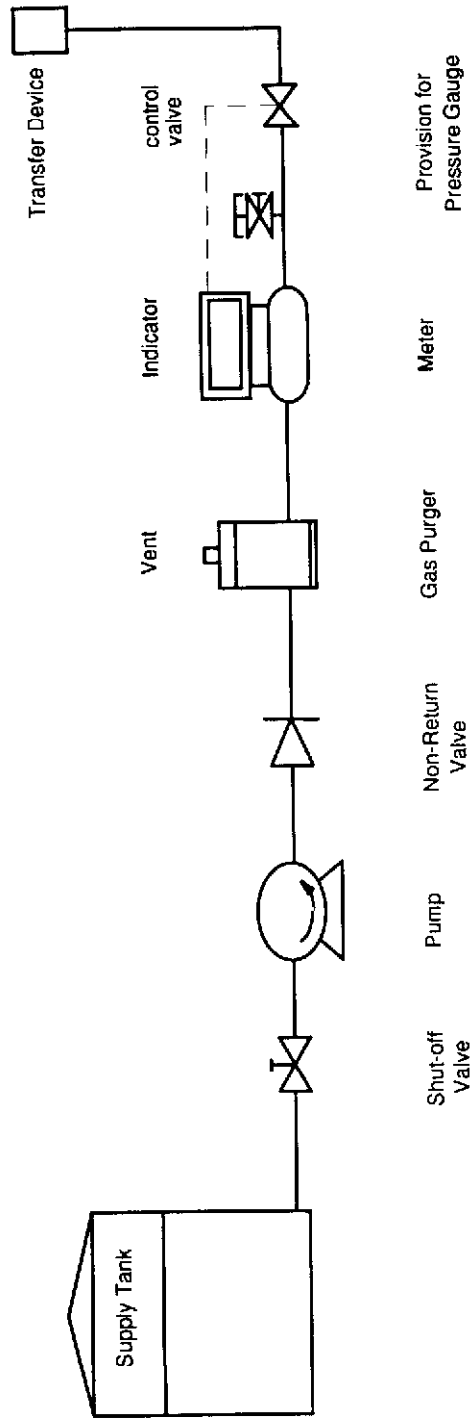


Typical Pipeline Flowmetering System

FIGURE 5/6B/57A - 2



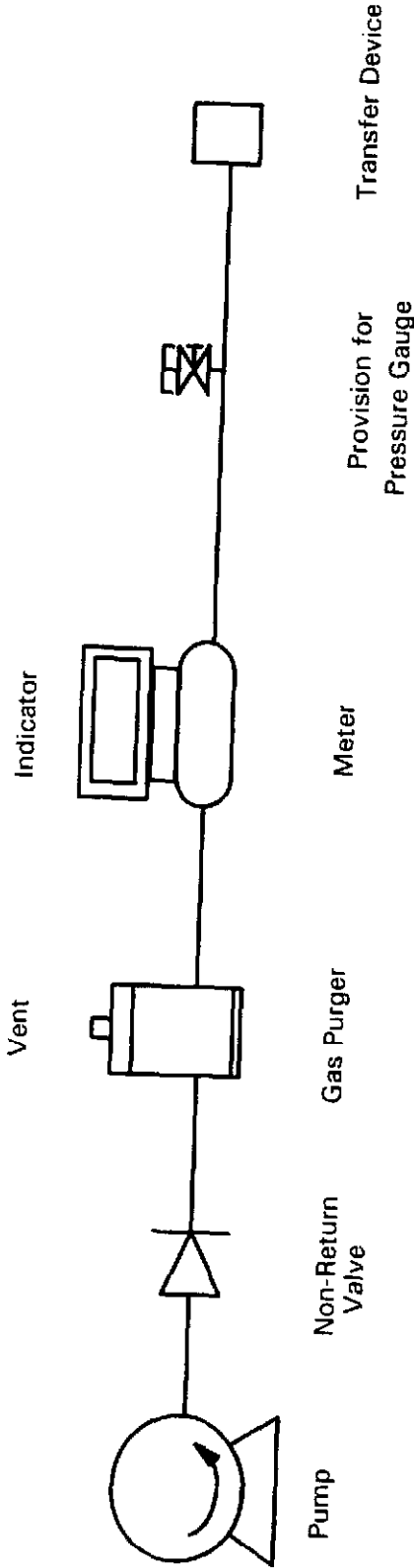
FIGURE 5/6B/57A - 3



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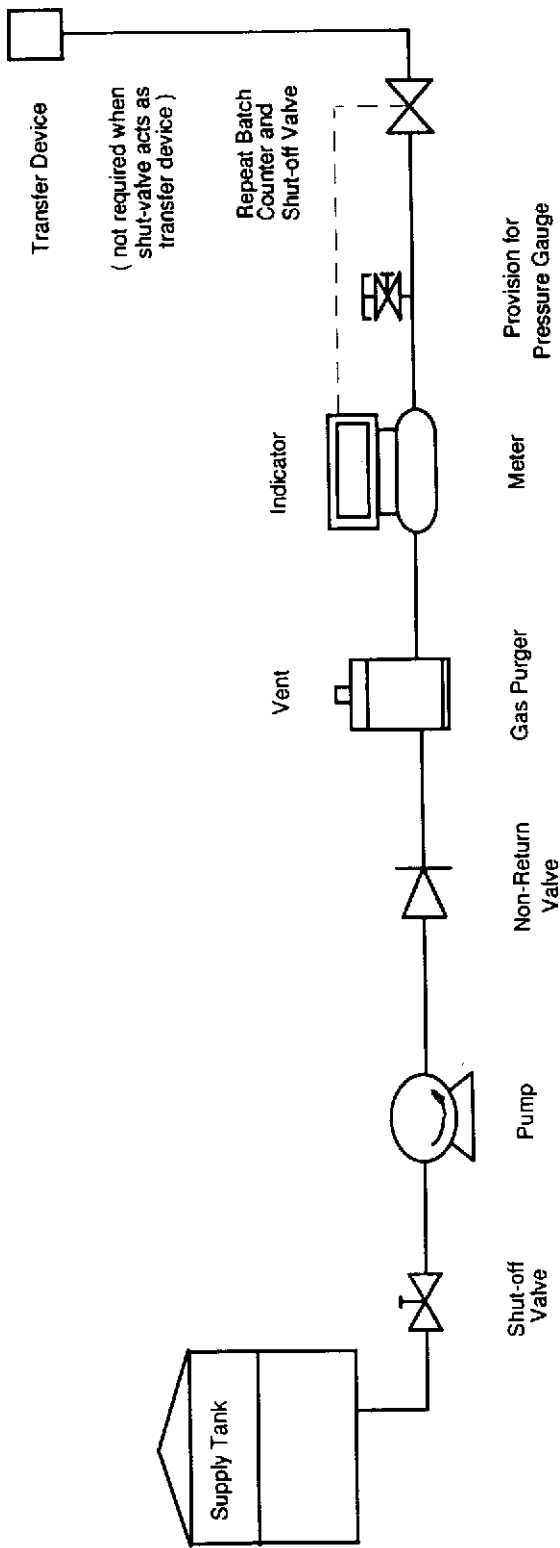
Typical Loading-rack Flowmetering System

FIGURE 5/6B/57A - 4



Typical Modular Flowmetering System

FIGURE 5/6B/57A - 5



Typical Drum-filling Flowmetering System