



Australian Government
Department of Industry and Science

**National
Measurement
Institute**

Certificate of Approval

NMI 5/6B/222

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.

Acme Model VTM-150A Liquid-Measuring System

submitted by Acme Fluid Handling Pty Ltd
 32 Greens Road
 Dandenong VIC 3175

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 117 Measuring Systems for Liquids Other than Water, dated June 2011.

This approval becomes subject to review on 1/08/20, and then every 5 years thereafter.

DOCUMENT HISTORY

Rev	Reason/Details	Date
0	Pattern & variants 1 & 2 approved – certificate issued	30/07/15

CONDITIONS OF APPROVAL

General

Instruments purporting to comply with this approval shall be marked with pattern approval number 'NMI 5/6B/222' 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.

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

TECHNICAL SCHEDULE No 5/6B/222

1. Description of Pattern

approved on 30/07/15

An Acme model VTM-150A bulk flowmetering system incorporating an Acme model 150A turbine flowmeter (Figure 1 and Table 1) approved to dispense Diesel Exhaust Fluid (DEF) (AUS32 - aqueous urea solution 32.5%) (also known as AdBlue). The meter is adjusted to be correct for the liquid for which it is to be verified.

1.1 Field of Operation

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

- Minimum measured quantity (V_{min}) 100 L (#1)
- Maximum flow rate (Q_{max}) 500 L/min
- Minimum flow rate (Q_{min}) 50 L/min
- Maximum pressure of the liquid (P_{max}) 1000 kPa
- Minimum pressure of the liquid (P_{min}) 30 kPa (nominal) (#2)
- Range of liquids viscosity 0.4 to 20 mPa.s (at 20°C) (#3)
- Liquid temperature range 0°C to 30°C
- Ambient temperature range -10°C to 55°C
- Accuracy class 0.5

(#1) When the calculator/indicator is set to indicate volume in 1 L increments.

(#2) Minimum pressure required for effective operation of the gas elimination device.

(#3) The flowmeter is adjusted to be correct for DEF - AUS32 (aqueous urea solution 32.5%) for which it is to be verified.

1.2 Components of Measuring System

(i) Supply tank

The supply tank, which may incorporate a detector for low liquid-level. A positive displacement, centrifugal or submersible turbine type pump may be used to provide flow through one or more flowmeters.

(ii) Pump

The pump is required to have sufficient capacity to allow flow rates at least three times the minimum flow rate specified for the flowmeter. If the pump is not for the exclusive use of the flowmeter, the pump shall be of sufficient capacity to ensure that flow rate through each meter is maintained above its respective specified minimum flow rate and the pressure is maintained above the minimum backpressure recommended for each meter for all combinations of alternative uses of the pump.

A positive displacement type, centrifugal type, or submersible turbine type pump may be installed in a flooded suction configuration. Systems which incorporate submersible turbine type pumps, may in addition include centrifugal type pumps fitted above the liquid level in the supply tank as supplementary 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 (up to the transfer point) full of liquid at all times.

(iv) Gas Elimination Device

The pattern is fitted with an LC model F7-A8985 gas eliminator (Figure 2).

(v) Straightening Elements

The meter is installed between straightening elements of straight pipe of at least 10 pipe diameters in length upstream of the meter inclusive of a flow conditioner and straight pipe 5 pipe diameters in length downstream of the meter.

(vi) Measurement Transducer

The measurement transducer is an Acme model VTM-150A turbine flowmeter (Figure 3) with dual pick-off coils producing an electrical output signal proportional to volume throughput. The pick-off signal is conditioned by a dual signal pre-amplifier to produce a square wave output signal.

(vii) Calculator/Indicator

An Acme model 6000 controller/indicator (Figure 4) is used as described in approval NMI S170C.

(viii) Transfer Device

A transfer device is located downstream of the meter to define the start and finish of volume measured by the flowmeter and may be in the form of a shut-off valve or a decoupling valve fitted to the end of a hose or loading arm.

The transfer device may also be designed to control the flow rate, or a separate flow control valve may be fitted between the meter and the transfer device, provided that the flow control system maintains the operation of the meter within the approved field of operation.

1.3 Verification Provision

Provision is made for the application of a verification mark.

1.4 Sealing Provision

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

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 number	NMI No 5/6B/222
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 of the liquid, P_{max} kPa (#1)
Minimum pressure of the liquid, P_{min} kPa
Liquid temperature range	... to ... °C (#2)
Type of liquid for which the system is verified (#3)
Environmental class	class N
Accuracy class	0.5

(#1) Required for systems with flexible outlet pipework.

(#2) Required if temperature converted volume to 15°C is reported.

(#3) This may be located separately, e.g. on a metal tag sealed to the instrument.

The minimum measured quantity (V_{min}) is clearly visible on the indicating device, e.g. 'Minimum Delivery 100 L', or the pre-set of the controller is limited to deliveries equal to or greater than the minimum delivery specified for the flowmeter.

2. Description of Variant 1

approved on 30/07/15

With certain other VTM series flowmeters as listed below in Table 1. The specifications for the meter of the pattern are in **bold** type.

TABLE 1

Flowmeter Model	Minimum Flow Rate (Q_{min}) (L/min)	Maximum Flow Rate (Q_{max}) (L/min)	Minimum Delivery (V_{min}) (L)
VTM-050A	5	50	5
VTM-075A	10	100	20
VTM-100A	32	320	20
VTM-150A	50	500	100
VTM-200A	145	1450	200

Note: The flow rates must be at least a 10:1 ratio, maximum to minimum.

2.1 Field of Operation

(a) Systems may be used to dispense **Diesel Exhaust Fluid (DEF)** (as described for the pattern), in which case the liquid temperature range of 0°C to 30°C applies.

- (b) Systems may be used for bulk metering of **generalised petroleum products** other than LPG in which case the liquid temperature range of -10°C to 50°C applies.

Approved products include industrial oils, various grades of liquid hydrocarbons including petrol/ethanol blends and pure ethanol ('E100') and various grades of pure biodiesel and biodiesel/distillate blends (to Australian government standard).

The flowmeter is adjusted to be correct for the liquid for which it is to be verified.

2.2 Gas Elimination Device

When metering generalised petroleum products, alcohols or glycols, an LC model A8197 or other compatible (#) air eliminator will be incorporated.

- (#) 'Compatible' is defined to mean that no additions/changes to the hardware/software specified in this approval are required for satisfactory operation of the system.

3. Description of Variant 2 approved on 30/07/15

A bulk flowmetering system (Figure 6) as listed below in Table 2 incorporating any flowmeter of this approval for use with **high viscosity liquids such as petroleum based industrial oils, and cooking/edible oils**. The specifications for the meter of the pattern are in **bold** type.

TABLE 2

Flowmeter Model	Minimum Flow Rate (Q_{min}) (L/min)	Maximum Flow Rate (Q_{max}) (L/min)	Minimum Delivery (V_{min}) (L)
VTM-050A	4	40	2
VTM-075A	7	70	5
VTM-100A	25	250	20
VTM-150A	40	400	50
VTM-200A	100	1000	100

Note: The flow rates must be at least a 10:1 ratio, maximum to minimum.

3.1 Gas Elimination Device

When metering **high viscosity liquids**, a low level shutoff valve will be used to prevent the metering of air or vapour.

TEST PROCEDURE

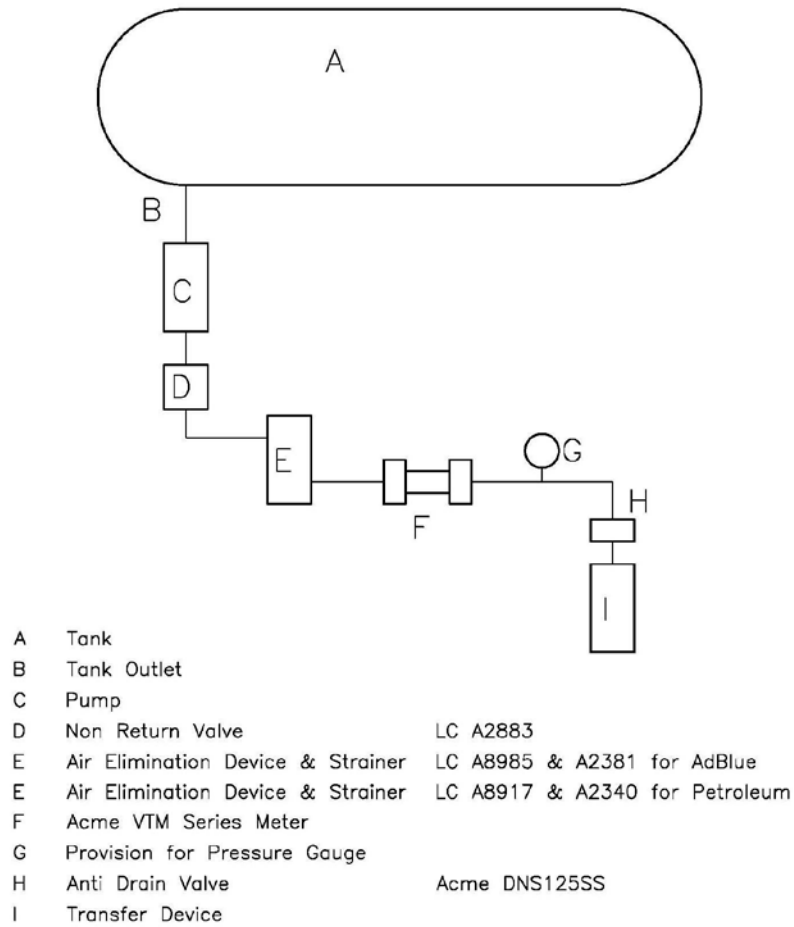
Instruments shall be tested and verified in conjunction with any tests specified in the approval documentation for the instruments to which the pattern is connected, as appropriate, and in accordance with any relevant tests specified in the National Instrument Test Procedures, using the type of liquid with which they will be used and which is marked on the instrument.

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 the *National Trade Measurement Regulations 2009*.

FIGURE 5/6B/222 – 1



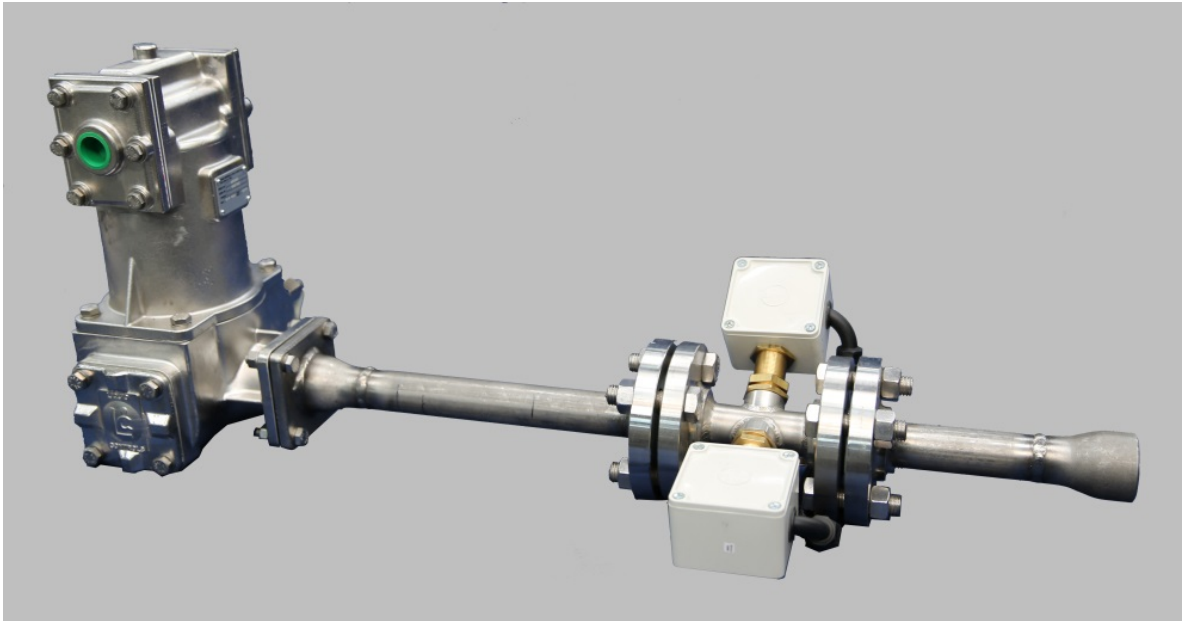
Acme Model VTM-150A Liquid-Measuring System
(for Generalised Petroleum Products, Pattern & Variant 1)

FIGURE 5/6B/222 – 2



LC Model F7-A8985 Air Eliminator

FIGURE 5/6B/222 – 3



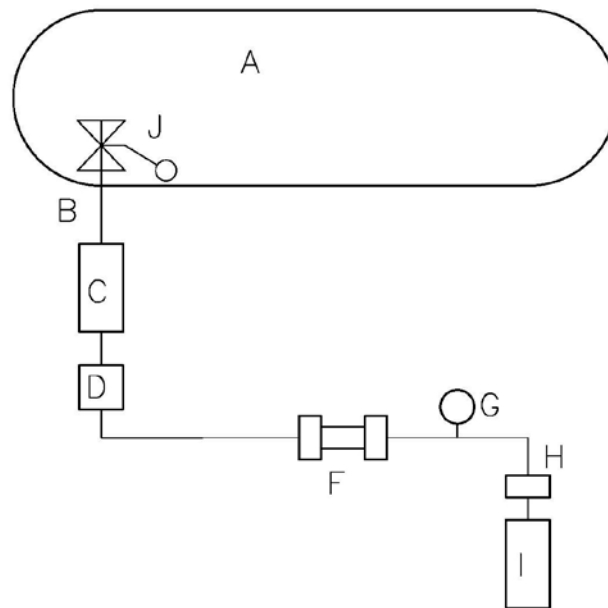
Acme VTM Turbine Meter With Air Eliminator and Strainer

FIGURE 5/6B/222 – 4



Acme Model 6000 Controller/Indicator

FIGURE 5/6B/222 – 5



- A Tank
- B Tank Outlet
- C Pump
- D Non Return Valve LC A2883
- F Acme VTM Series Meter
- G Provision for Pressure Gauge
- H Anti Drain Valve Acme DNS125SS
- I Transfer Device
- J Valve – Low Level Shutoff

Acme VTM Series Liquid-Measuring System (for high viscosity products, Variant 2)

~ End of Document ~