Australian Government

Department of Industry, Science, Energy and Resources

National Measurement Institute

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36 Bradfield Road, West Lindfield NSW 2070

Certificate of Approval

NMI 5/6B/95A

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.

Smith Meter® Model *PRIME 4* Bulk Flowmetering System

submitted by TechnipFMC
FMC Technologies Measurement Solutions Inc.
1602 Wagner Avenue
Pennsylvania 16610
United States of America

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 1/08/21, and then every 5 years thereafter.

DOCUMENT HISTORY

Rev	Reason/Details	Date
0	Pattern & variant 1 approved – interim certificate issued	26/02/04
1	Pattern & variant 1 approved – certificate issued	19/04/04
2	Pattern amended – notification of change issued	26/08/06
3	Pattern & variant 1 reviewed – notification of change issued	24/08/08

Document History (cont…)

Rev	Reason/Details	Date
4	Pattern amended (submitted by) – certificate issued	07/07/20

CONDITIONS OF APPROVAL

General

Instruments purporting to comply with this approval shall be marked with pattern approval number NMI or NSC 5/6B/95A 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 Certificates No S1/0/A or 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*.

Phillip Mitchell
A/g Manager
Policy and Regulatory Services

TECHNICAL SCHEDULE NMI 5/6B/95A

1. Description of Pattern approved on 26/02/04

A bulk flowmetering system incorporating a Smith Meter® model *PRIME 4* (*) positive displacement flowmeter (Figures 1 and 2) approved for petroleum products (other than liquefied petroleum gas). The meter is fitted with a pulse output device that interfaces to a Smith Meter Inc AccuLoad III model ALIII (#) loading controller as described in the documentation of NMI or NSC approval No s413 for displaying the volume throughput.

(*) Abbreviated model number – the full model number has additional alphanumeric characters and is *PRIME 4*-B-1-1-0-0.

(#) Abbreviated model number.

1.1 Field of Operation

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

• Minimum measured quantity, V_{min}	500 L	(#1)
• Maximum flow rate, Q_{max}	2850 L/min	
• Minimum flow rate, Q_{min}	285 L/min	
• Maximum pressure of the liquid, P_{max}	2500 kPa	(#2)
• Minimum pressure of the liquid, P_{min}	200 kPa	(#3)
• Dynamic viscosity range at 20°C	0.5 to 20 mPa.s	(#4)
• Maximum temperature of the liquid, T_{max}	50°C	
• Minimum temperature of the liquid, T_{min}	-10°C	
• Maximum ambient temperature	55°C	
• Minimum ambient temperature	-10°C	
• Nominal pulse output	13 pulses/L	
• Accuracy class	0.5	

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

(#2) In the range 1034 to 2500 kPa as defined by the model designation.

(#3) For satisfactory operation of the gas elimination device.

(#4) The flowmeter is adjusted to be correct for the liquid for which it is to be verified as marked on the data plate.

1.2 System Description

(i) Tank

A supply tank situated either above or below ground with sufficient capacity to maintain the system full of liquid. The supply tank may incorporate a detector for low liquid level and prevent measurements when the low liquid-level is reached.

(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 with positive displacement pumps are installed so that the pump stops when the liquid level in the supply tank is low.

Systems that incorporate submersible turbine type pumps may in addition include centrifugal type pumps fitted above the liquid level in the supply tank as supplementary pumps.

(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

To prevent metering of gas/vapours, a 100 mm Smith Meter Inc strainer/gas purger (Figure 3) is fitted as close as practicable to the meter inlet.

(v) Measurement Transducer

The measurement transducer is a Smith Meter Inc model *PRIME 4*-B-1-1-0-0 100 mm positive displacement flowmeter (Figure 4) with integral pulse generator/ transmitter, having output proportional to the volume throughput.

Pulse output specifications: Supply voltage: 6 to 28 volts
Pulse output: 13 pulses/litre (nominal K-factor)

For calibration/verification of the flowmeter, provision is made in the pipework for a thermometer well and for measurement of pressure of the liquid flowing through the flowmeter.

(vi) Calculator/Indicator

The pulse output from the flowmeter is interfaced to a Commission-approved Smith Meter Inc AccuLoad III model ALIII-S (*) loading controller as described in the documentation of NMI approval No S413, or may be interfaced to any other compatible NMI approved electronic calculator/indicator.

(*) Abbreviated model number.

For volume conversion to 15^{o}C, a temperature probe is fitted as close as practical to the flowmeter.

(vii) 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 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 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	NMI No 5/6B/95A	
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	(#)
Minimum pressure of the liquid, P_{min}	….. kPa	
Environmental class	class C	
Cyclic Volume	….. L/rev	
Type of liquid for which the system is verified	…..	

The minimum measured quantity (V_{min}) specified for the flowmeter is clearly visible on the indicating device, e.g. "Minimum Delivery 500 L", or it may be limited by the pre-set facility of a compatible NMI approved control system.

(#) Required for systems with flexible outlet pipework

1.4 Sealing Provision

No sealing is required for the flowmeter. Calibration adjustment is made via the calculator/indicator as described in the approval for the device.

1.5 Verification Provision

Provision is made for the application of a verification mark.

2. Description of Variant 1 approved on 26/02/04

Using certain other *PRIME 4* series flowmeters. The flowmeter may be supplied specifically for horizontal (Figure 1) or vertical operation. The correct position of the meter can be established with respect to the drain plug being at the lowest position and the pulse output sensor in a horizontal plane. The pattern uses a model *PRIME 4*-B-1-1-0-0 flowmeter; other approved flowmeters have model numbers as follows:

1st suffix:	May be 0, A, B, C, D or E
2nd suffix:	May be 0, 1 or 2
3rd suffix:	Must be 1
4th suffix:	May be 0, 1 or 2
5th suffix:	May be 0 or 1

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)

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:

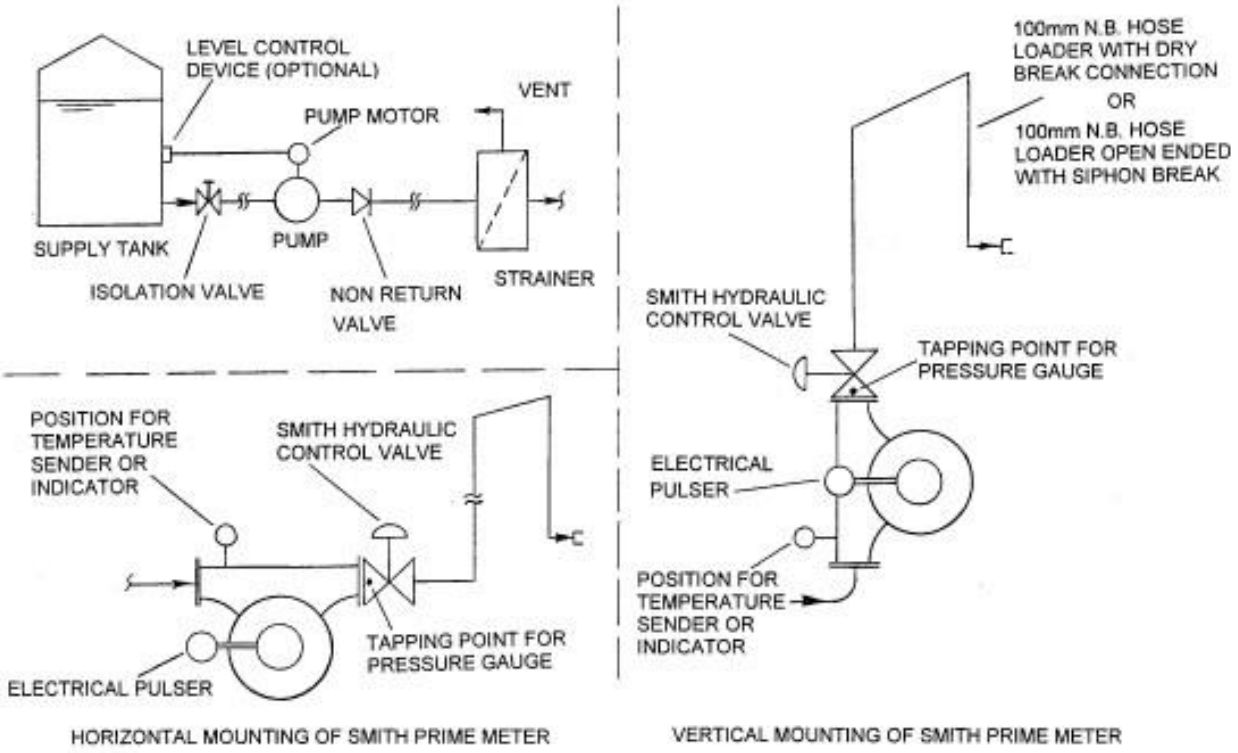
Elimination of Air or Gas

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)

Hose Dilation Test

The maximum permissible error for hose dilation is 1% of minimum measured quantity (V_{min}) for systems without a hose reel.

FIGURE 5/6B/95A – 1



Smith Meter Inc Model *PRIME 4* Loading Rack Flowmetering System

FIGURE 5/6B/95A – 3

Smith Meter Inc 100 mm Strainer/Gas Purger

FIGURE 5/6B/95A – 4

Smith Meter Inc model *PRIME 4*-B-1-1-0-0 100 mm Flowmeter

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