



Australian Government  
Department of Industry,  
Innovation and Science

**National  
Measurement  
Institute**

**Certificate of Approval  
NMI 5/6B/225**

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.

Satam Model ZT Helical Turbine Liquid-measuring System

submitted by      Australian Fluid Handling  
Factory 1, 25-27 Burns Road  
Altona    VIC    3018

**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 28/02/22, and then every 5 years thereafter.

**DOCUMENT HISTORY**

Rev	Reason/Details	Date
0	Pattern & variants1 approved – certificate issued	28/02/17

## CONDITIONS OF APPROVAL

### General

Instruments purporting to comply with this approval shall be marked with pattern approval number 'NMI 5/6B/225' 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 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*.



**Alex Winchester**

## TECHNICAL SCHEDULE No 5/6B/225

### 1. Description of Pattern

approved on 28/02/16

An SATAM bulk flowmetering system incorporating a SATAM 80mm Model ZT TLM3-150 Helical rotor Turbine Flow meter (Figure 1 and Table 1) with dual TD magnetic sensors (pick-up/pre amplifier element) for custody metering of refined petroleum products.

#### 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                     | (#1) |
| • Maximum flow rate ( $Q_{max}$ )              | 2500 L/min                |      |
| • Minimum flow rate ( $Q_{min}$ )              | 250 L/min                 |      |
| • Maximum pressure of the liquid ( $P_{max}$ ) | 1600 kPa                  |      |
| • Minimum pressure of the liquid ( $P_{min}$ ) | 100 kPa (nominal)         | (#2) |
| • Range of liquids viscosity                   | 0.4 to 20 mPa.s (at 20°C) |      |
| • Liquid temperature range                     | 0°C to 30°C               |      |
| • Ambient temperature range                    | -25°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.

#### 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 SATAM Model EC42/FS24 Strainer gas Eliminator (Figure 2).

**(v) Straightening Elements**

The meter is factory fitted with an inbuilt flow straightening and conditioning element. Additionally, one may choose to install 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 SATAM model ZT TLM3-150 80 mm 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**

The signal output from the measurement transducer is interfaced to an approved FMC-Smith Meter Inc AccuLoad III (Figure 4) as described in the documentation of approval NMI S413 or any other compatible (#) NMI-approved calculator/indicator.

(#) '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.

**(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. This is not applicable as all adjustments are via the flow computer (K-Factor), double password protected (1 password for general access and one for NMI purposes).

## 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/XXX
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 C
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 28/02/16

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

TABLE 1 ( Figure 1)

Meter Type	Diameter (mm)	Maximum Flow Rate ( $Q_{max}$ ) (L/min)	Minimum Delivery ( $V_{min}$ ) (L)
TLM3-30	80	500	50
TLM3-50	80	834	100
TLM3-70	80	1167	100
TLM3-110	80	1834	200
<b>TLM3-150</b>	<b>80</b>	<b>2500</b>	<b>200</b>
TLM4-70	100	1167	100
TLM4-110	100	1834	200
TLM4-150	100	2500	200
TLM4-200	100	3334	200

	100	5000	500
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Note: The flow rates must be at least a 10:1 ratio, maximum to minimum

### TEST PROCEDURE

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

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.

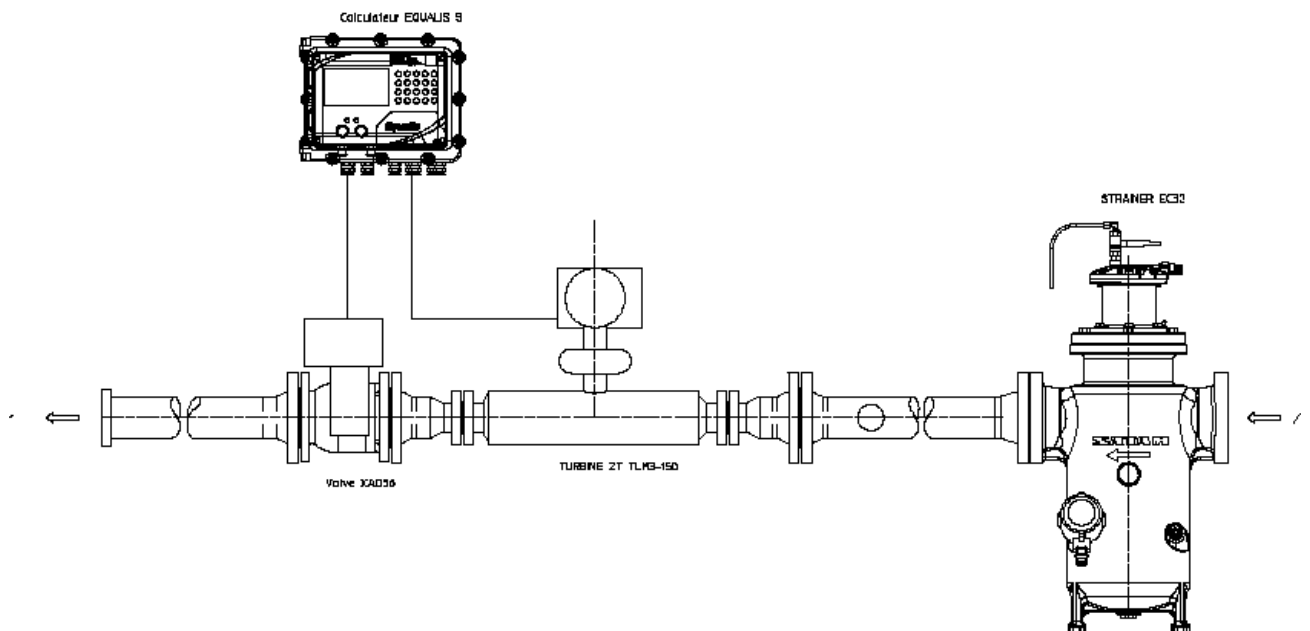
A suitable Test Procedure may be obtained from NMI

Instruments should be tested using a suitable test procedure.

### Maximum Permissible Errors

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

FIGURE 5/6B/225 – 1



Schematic drawing of a Satam **Helical turbine Flowmeter** Model ZT TLM3 – 150 Liquid-Measuring System. This approval Excludes Calculator/indicator model Equalis S.

FIGURE 5/6B/225 – 2



SATAM Model EC42/FS24 Strainer Air Eliminator

FIGURE 5/6B/225 – 3



Satam Model ZT TLM3 – 150 Turbine Meter



FIGURE 5/6B/225 – 4



Smith Meter Inc AccuLoad III Model ALIII-S Controller for Liquid-measuring Systems



Typical Smith Meter Inc AccuLoad III ALIII-Q Series Controller  
~ End of Document ~