Australian Government
National Measurement Institute
Bradfield Road, West Lindfield NSW 2070

Notification of Change
Certificate of Approval No 5/6B/91A
Change No 1

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

The following changes are made to the approval documentation for the

Daniel Model UMBT04 Bulk Flowmetering System

submitted by Emerson Process Management
471 Mountain Highway
Bayswater VIC 3153.

A. In Certificate of Approval No 5/6B/91A dated 19 March 2004;

1. 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 **2014**, and then every 5 years thereafter."

2. The FILING ADVICE should be amended by adding the following:

   "Notification of Change No 1 dated 14 December 2010"

B. Technical Schedule No 5/6B/91A dated 19 March 2004, the 1st sentence of the 1st paragraph of the TEST PROCEDURE should be amended to read:

   "… any relevant tests specified in **the Uniform Test Procedures** using the type of liquid ..."

Signed by a person authorised by the Chief Metrologist to exercise his powers under Regulation 60 of the *National Measurement Regulations 1999*.

5/6B/91A
19 March 2004

Australian Government

National Standards Commission

12 Lyonpark Road, North Ryde NSW 2113 Australia

Certificate of Approval

No 5/6B/91A

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

Daniel Model UMBT04 Bulk Flowmetering System

submitted by Emerson Process Management
(Fisher-Rosemount Pty Ltd)
471 Mountain Highway
Bayswater VIC 3153.

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/91.

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CONDITIONS OF APPROVAL

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

Instruments purporting to comply with this approval shall be marked NSC No 5/6B/91A 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 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 6 February 2004

- A Daniel model UMBT04 bulk flowmetering system.

Variant: approved 6 February 2004

1. A Daniel model UMBT03 bulk flowmetering system.

Technical Schedule No 5/6B/91A describes the pattern and variant 1.

FILING ADVICE

The documentation for this approval comprises:

Certificate of Approval No 5/6B/91A dated 19 March 2004
Technical Schedule No 5/6B/91A dated 19 March 2004 (incl. Test Procedure)
Figures 1 and 2 dated 19 March 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/91A

Pattern: Daniel Model UMBT04 Bulk Flowmetering System

Submittor: Emerson Process Management
(Fisher-Rosemount Pty Ltd)
471 Mountain Highway
Bayswater VIC 3153

1. Description of Pattern

A bulk flowmetering system incorporating a Daniel model UMBT04 (*) 100 mm turbine flowmeter interfaced to a Contrec model 1010A controller as described in the documentation of NSC approval No S313A or any other compatible Commission-approved calculator/indicator approved for metering petroleum products other than liquefied petroleum gas.

(*) Approved with both model option Meter Output/Temperature Range codes D or L (for normal or extended operating temperature, respectively) incorporating dual pick off sensors and dual output signal pre-amplifier.

The system is 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.

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}	4900 L/min	
• Minimum flow rate, Q_{min}	490 L/min	
• Dynamic viscosity range at 20°C	0.5 to 20 mPa.s	(#2)
• Temperature range of the liquid	-10°C to +50°C	(#3)
• Maximum pressure of the liquid, P_{max}	5102 kPa	
• Minimum pressure of the liquid, P_{min}	200 kPa	(#4)
• Accuracy class	0.5	

(#1) The calculator/indicator is set to indicate volume at least in 1 L increments.

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

(#3) Limited by the calculator/indicator volume conversion for temperature to 15°C facility.

(#4) Otherwise as specified for the gas elimination device.

1.2 Description of the Flowmetering System (Figure 1)

(i) Tank

A supply tank which may incorporate a detector for low liquid-level and prevent measurements when the low liquid-level is reached.

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(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 pump, a centrifugal pump, or a submersible turbine pump may be installed in a flooded suction configuration.

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

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

(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

To prevent any entrained air/gas entering the meter a Daniel model SC-30-4 air eliminator or equivalent is fitted as close as practical to the meter inlet.

It is recommended that a strainer (typical mesh size 40) is installed upstream of the air eliminator. Combined air eliminator/strainers may also be used.

(v) Flow Straighteners

The meter is installed between flow straightening pipes. The length of the flow straightening pipe upstream of the meter is approximately 10 times the pipe diameter, whereas the length of the flow straightening pipe downstream of the meter is approximately 5 pipe diameters. The upstream pipe incorporates flow straightening vanes.

(vi) Measurement Transducer

The measurement transducer is a Daniel model UMBT04 100 mm (4”) turbine flowmeter (Figure 2) 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 requiring a nominal 20 V DC power supply to produce a 0 to 5 V square wave output signal.

The nominal K-factor for the turbine meter is 6.29 pulses/litre.

The meter may be mounted horizontally or vertically. When mounted vertically, the straightening elements are also vertical.

The meter is required to be verified/certified using the liquid it is intended to measure. The calibration adjustment is made via the calculator/indicator

Provision is made in the pipework to measure the temperature and pressure at the flowmeter during calibration/verification/certification of the system.

(vii) Calculator/Indicator

The output from the dual signal preamplifier is interfaced to a Contrec model 1010 controller (as described in the documentation of NSC approval No S313A) or any other compatible Commission-approved calculator/indicator.

The indicator is set to display in units of volume.

Where the calculator/indicator is approved to display in volumetric units conforming to Table 53B (Generalised Products) of the ASTM-IP Petroleum Measurement Tables, the temperature sensing element is installed in the line directly after meter downstream flow straightener pipework.

(viii) Transfer Device

(a) A transfer device, such as a Daniel model V788B automatically-operated valve, or any other compatible positive shut-off component located downstream of the meter with no intermediate outlet, may be used to define the start and finish of volume measurement.

(b) Where the piping configuration downstream of the meter does not allow sufficient back pressure required by the gas elimination device, back pressure control can be provided by a Daniel model V760B (or equivalent) back pressure control valve with optional shut-off solenoid valve as an alternative to the unit described in (a) above.

(c) Alternatively, a Daniel model V770 differential vapour pressure control valve with optional shut-off solenoid valve as an alternative to the unit described in (a) above, is also acceptable. Such a device will require the vapour pressure reference connection to be located upstream of the flowmeter, typically in the head space of the air eliminator.

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

Provision is made for sealing the indicator/controller as described in its NSC approval documentation.

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/91A
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 operating pressure, P_{max}	….. kPa
Minimum operating pressure, P_{min}	….. kPa
Nominal K-factor	….. pulses/L
Type of liquid for which the system is verified	…..
Environmental class	C
Accuracy class	0.5

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

With a Daniel model UMBTO3 (*) 75 mm (3") turbine meter replacing the meter of the pattern for accuracy class 0.5 applications.

(*) Approved with both model option Meter Output/Temperature Range codes D or L (for normal or extended operating temperature, respectively) incorporating dual pick off sensors and dual output signal pre-amplifier.

The minimum and maximum flow rates are 265 L/min and 2650 L/min respectively. The minimum delivery is 500 L.

The nominal K-factor of the turbine meter is 12.58 pulses/litre.

For installations where free air may be present or there is a likelihood of moderate amounts of entrained air/gas entering the meter, a Daniel model SC-24-3 air eliminator shall be used.

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:

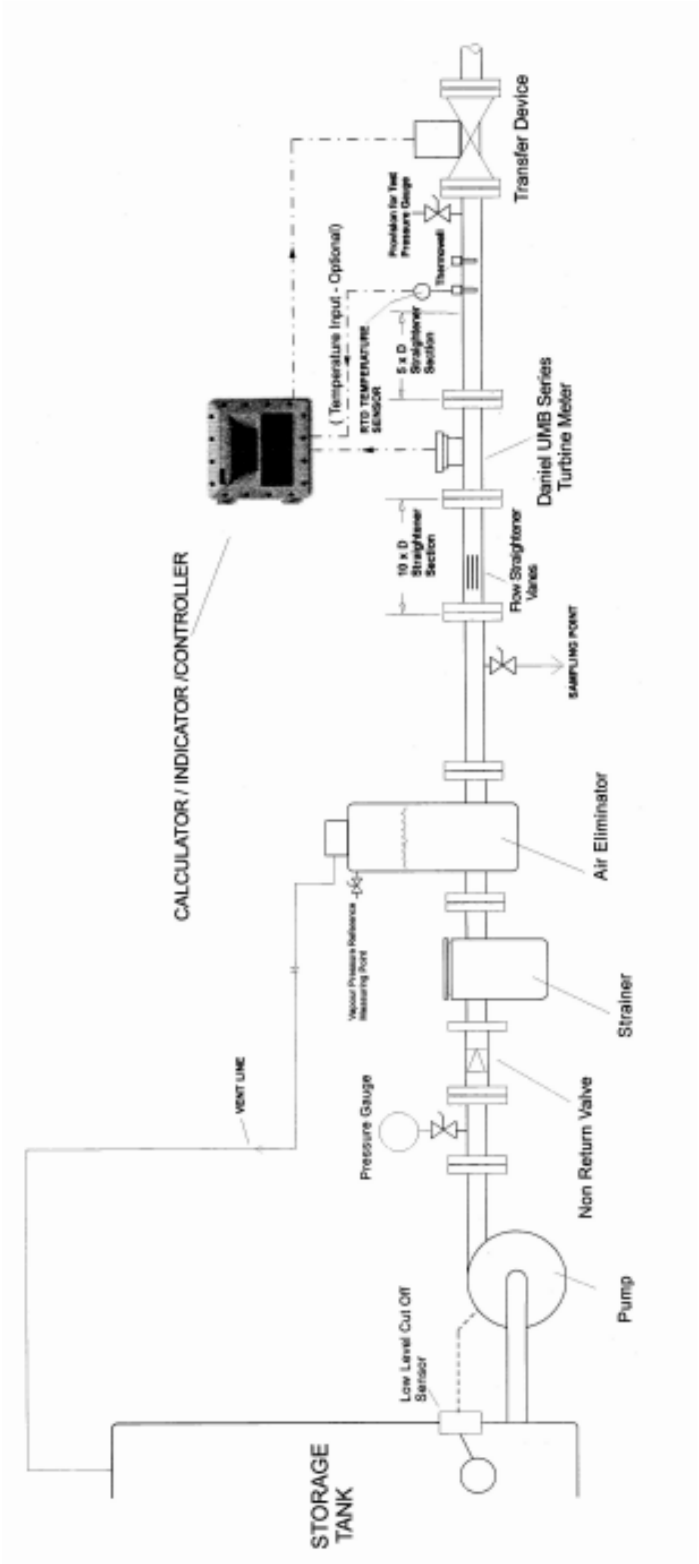
Elimination of Air or Gas

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

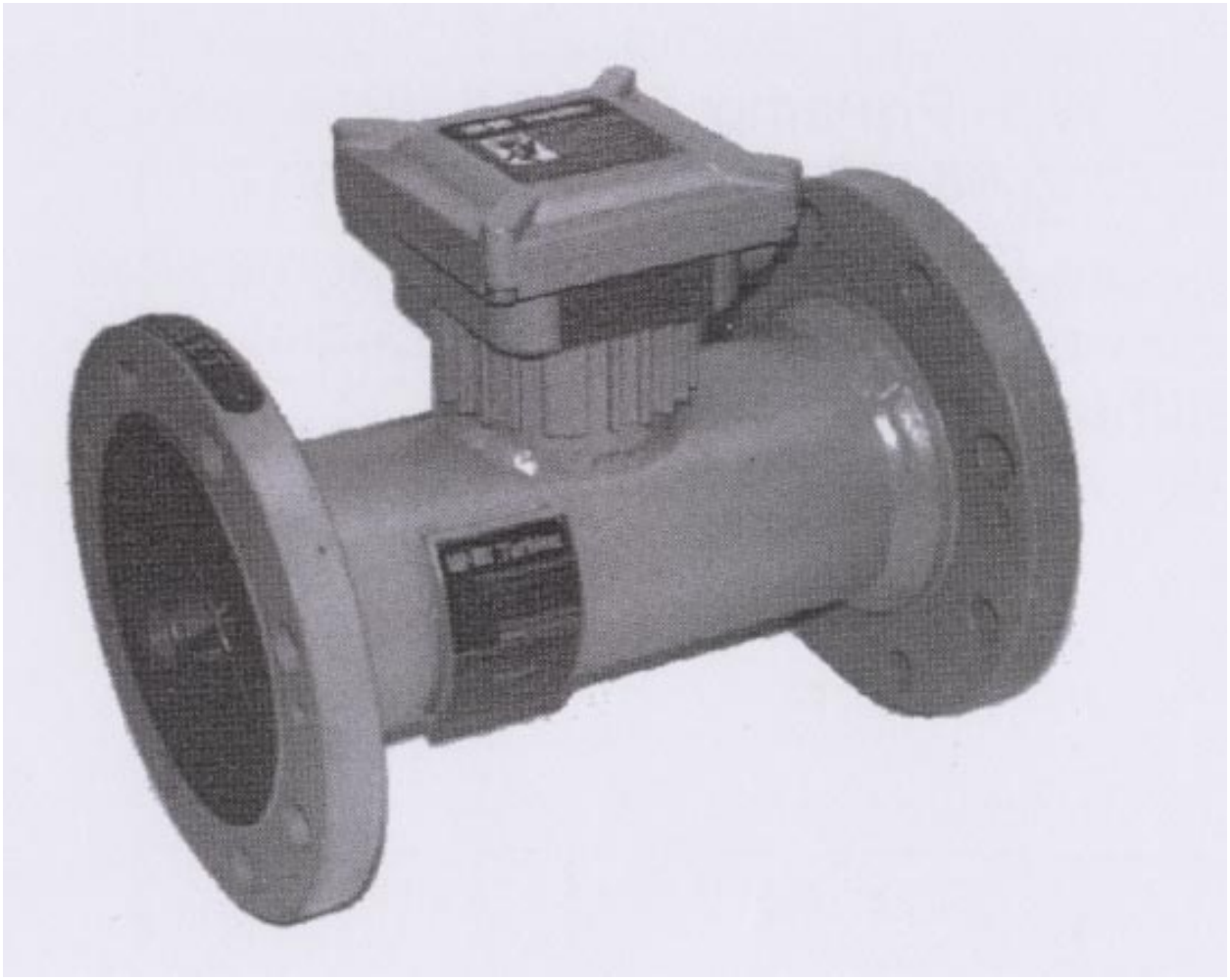
±1% for liquids having a dynamic viscosity exceeding 1 mPa.s (e.g. kerosene, distillate)

FIGURE 5/6B/91A – 1



Typical Daniel UMB Series Turbine Flowmetering System

FIGURE 5/6B/91A – 2



Typical Daniel Model UMB Series Turbine Flowmeter