5/6B/206
20 August 2010

Australian Government
National Measurement Institute

Bradfield Road, West Lindfield NSW 2070

Notification of Change
Certificate of Approval No 5/6B/206
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

FMC Smith Model LE3 Bulk Flowmetering System

submitted by Diamond Key International
110 Henderson Road
Rowville VIC 3178.

In Certificate of Approval No 5/6B/206 dated 8 February 2005;

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

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

   "Notification of Change No 1 dated 20 August 2010"

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

5/6B/206
8 February 2005

Australian Government

National Measurement Institute

12 Lyonpark Road, North Ryde NSW 2113

Certificate of Approval

No 5/6B/206

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

FMC Smith Model LE3 Bulk Flowmetering System

submitted by Diamond Key International
110 Henderson Road
Rowville VIC 3178.

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 becomes subject to review on 1 November 2009, and then every 5 years thereafter.

Instruments purporting to comply with this approval shall be marked with approval number 'NMI 5/6B/206' and only by persons authorised by the submittor.

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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.

The National Measurement Institute 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 20 October 2004

- An FMC Smith model LE3 bulk flowmetering system.

Technical Schedule No 5/6B/206 describes the pattern.

FILING ADVICE

The documentation for this approval comprises:

Certificate of Approval No 5/6B/206 dated 8 February 2005
Technical Schedule No 5/6B/206 dated 8 February 2005 (incl. Table 1 & Test Procedure)
Figures 1 to 4 dated 8 February 2005

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

TECHNICAL SCHEDULE No 5/6B/206

Pattern: FMC Smith Model LE3 Bulk Flowmetering System

Submittor: Diamond Key International
110 Henderson Road
Rowville VIC 3178

1. Description of Pattern

A fixed modular flowmetering system, incorporating an FMC Smith model LE3 positive displacement flowmeter (Figure 1) for metering the transfer of hydrocarbon condensate from a vehicle tanker to a receiving tank.

1.1 Field of Operation

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

• Minimum measured quantity, V_{min}	1000 L	(#1)
• Maximum flow rate, Q_{max}	1600 L/min	
• Minimum flow rate, Q_{min}	190 L/min	
• Maximum pressure of the liquid, P_{max}	1034 kPa	
• Minimum pressure of the liquid, P_{min}	120 kPa	(#2)
• Viscosity range at 20°C	0.6 to 10 mPa.s	
• Liquid density range at 15°C	714 to 804 kg/m^3	(#3)
• Liquid temperature range	-10 to 50°C	
• Ambient temperature range	-25 to 55°C	
• Accuracy class	0.5	

(#1) The calculator/indicator indicates the volume at least in 1 L increments.

(#2) As specified for effective operation of the gas elimination device.

(#3) The flowmeter is calibrated using nominal condensate in the range 750 to 760 kg/m^3.

1.2 System Configuration (Figure 1)

(i) Tank

A vehicle-mounted tank, which may comprise multi-compartments in which case the outlet from each compartment is manifolded to a common outlet. Each tank/compartment has provision for a vapour hose connection.

(ii) Transfer Point

The inlet of the flowmetering system incorporates an adjustable unloading-arm with an inlet coupling that connects to the common outlet of the delivery tank. The inlet coupling of the unloading-arm prevents loss of product during the connection and disconnection process.

(iii) Pump

A positive displacement type pump, or a self-priming gas handling centrifugal pump, with a filter/strainer at the inlet of the pump, is installed downstream of the unloading-arm.

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(iv) Non-return Valve

An isolation valve and a non-return valve are fitted downstream of the pump to isolate and prevent reverse flow of the liquid.

(v) Gas Elimination Device

The gas elimination device is installed downstream of the pump and immediately upstream of the flowmeter. The device comprises an Edward King model KLU1500 de-aerator incorporating an FMC Smith model DE-3 air release head (Figure 2).

The air release is connected to a vapour recovery pipeline, via a liquid sensing device and isolation valve. The isolation valve is open only during the unloading operation and when the fluid in the pipeline is 100% gas..

(vi) Measurement Transducer

An FMC Smith model LE3 positive displacement flowmeter (Figure 3) fitted with an FMC Smith model PPS pulse generator that provides a pulse output proportional to the volume throughput.

The flowmeter is adjusted (verified/certified) using condensate of nominal density.

Provision is made for inserting a thermometer and fitting a pressure gauge for the purpose of verifying the liquid temperature and pressure at the meter during the verification/ certification. The thermometer well and the pressure gauge may be fitted in the vicinity of the meter outlet. Alternatively, the thermometer well may be incorporated in the gas elimination device if the device is in close proximity of the meter inlet.

(vii) Calculator/Indicator

The signal output from the measurement transducer is interfaced to an approved FMC Smith AccuLoad III-X calculator/indicator as described in the documentation of approval NSC S413.

The metering of condensate from a vehicle tanker is authorised and identified using the DKI model RDI-II-G card-acceptor incorporating a built-in user prompt display (Figure 4). Once the delivery of condensate has been identified and authorised, the corresponding details of the condensate are used by the AccuLoad calculator/indicator to provide volume at 15ºC for the condensate measured.

A Rosemount model 65 Series resistance temperature detector (RTD) or any other compatible temperature transmitter is fitted in the vicinity of the flowmeter.

(viii) Flow Control

An FMC Smith model 210 digital valve is installed downstream of the measurement transducer and is interfaced to the AccuLoad calculator/indicator for controlling the flow transfer of product to the receiving storage tank.

Additional piping may be installed after the digital valve to allow the flowmeter to be verified, however such piping shall insure that flow cannot be diverted to other than the receiving tank.

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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 5/6B/206	
Manufacturer's identification mark or trade mark	…..	
Meter model	…..	
Serial number of the instrument	…..	
Year of manufacture	…..	(#1)
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	
Liquid density range	714 to 804 kg/m^3 at 15°C	
Environmental class	class C	

(#1) May be combined with the serial number.

The minimum measured quantity (V_{min}) is clearly visible on the indicating device, e.g. "Minimum Delivery 1000 L"; alternatively the pre-set of the AccuLoad calculator/indicator is programmed for deliveries not less then 1000 L.

1.4 Verification/Certification Provision

Provision is made for the application of a verification/certification mark.

1.5 Sealing Provision

Provision is made for sealing the following components:

(a) Access to the meter calibration mechanism; and

(b) The calculator/indicator.

The calibration adjustment (k-factors/meter factors) provided by any compatible approved calculator/indicator should be sealed as described in its approval documentation.

TEST PROCEDURE

Instruments should be tested in accordance any relevant tests specified in the Uniform Test Procedures 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 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.

The meter is required to be verified/certified using nominal condensate in the range 750 to 760 kg/$m^{3.}$

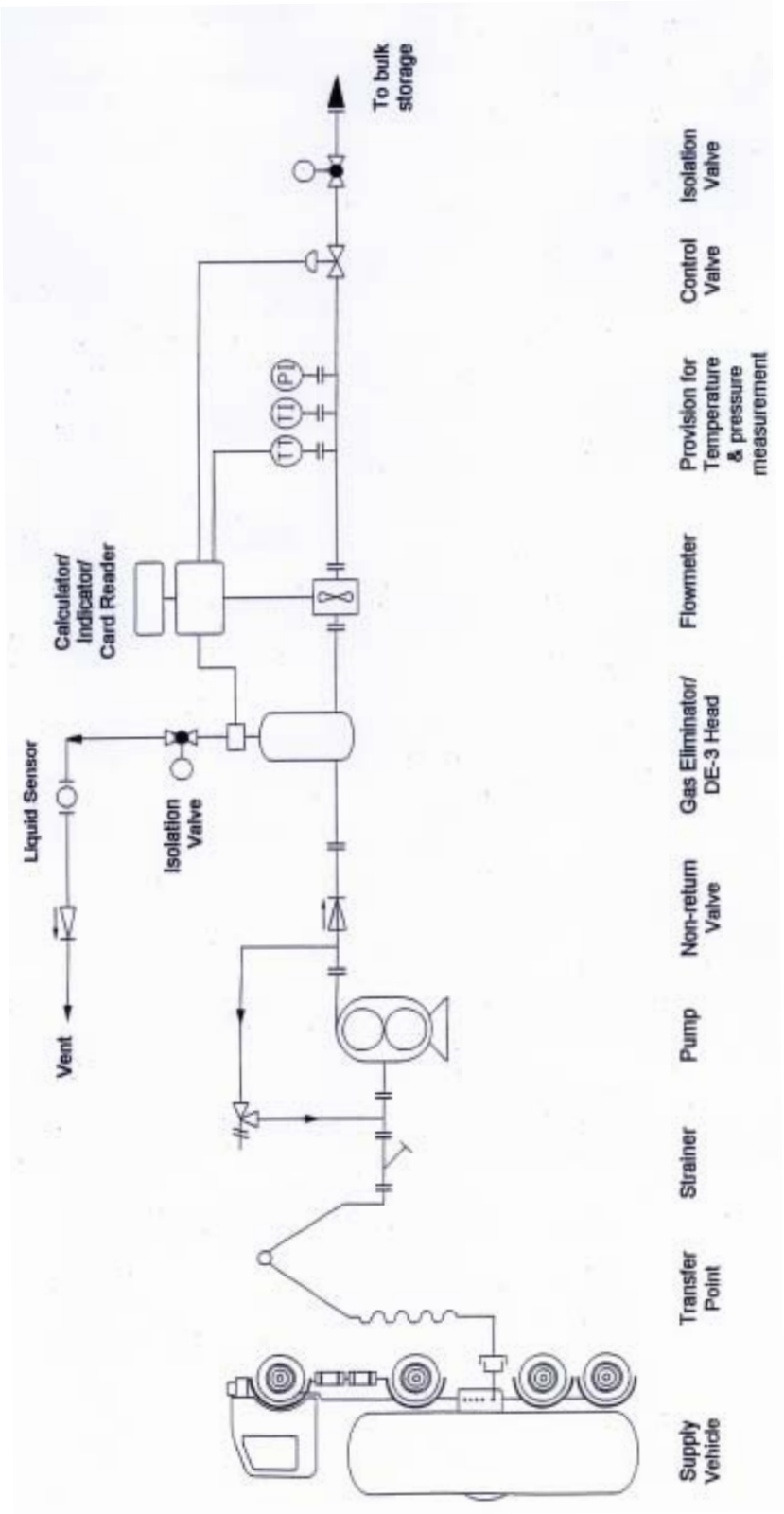
Elimination of Air or Gas

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 (petrol) and 1.0% for liquids having a dynamic viscosity exceeding 1 mPa.s (kerosene, distillate).

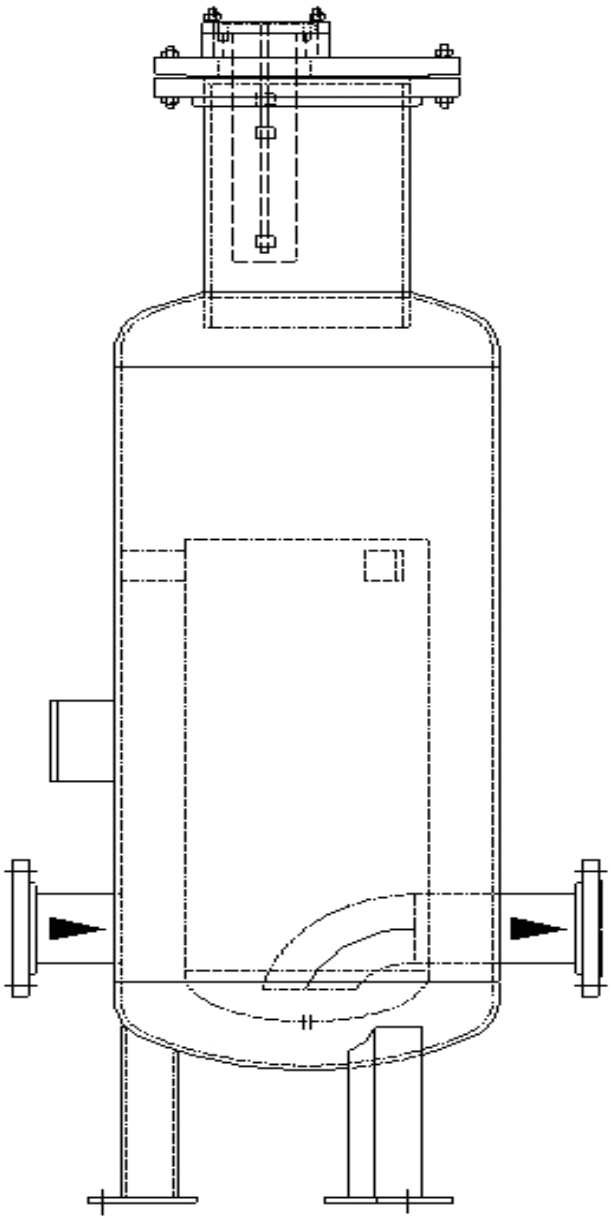
This test can be carried out by emptying the verified contents in the vehicle tanker and comparing against the volume measured by the flowmeter up to the point when the meter stops registering, i.e. when the contents in the vehicle tank have been emptied.

FIGURE 5/6B/206 – 1



Typical FMC Smith Unloading Flowmetering System

FIGURE 5/6B/206 – 2



Edward King Model KLU1500 De-aerator With an FMC Smith Model DE-3 Air Release Head

FIGURE 5/6B/206 – 3

FMC Smith Model LE3 Flowmeter With an FMC Smith Model PPS Pulse Generator

FIGURE 5/6B/206 – 4

DKI Model RDI-II-G Card-Acceptor