



Australian Government
**National Measurement
Institute**

Bradfield Road, West Lindfield NSW 2070

Cancellation
Certificate of Approval No 5/6B/87A

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

This is to certify that the approval for use for trade granted in respect of the

Smith Meter Inc Model K2GD Liquid-measuring System

submitted by Diamond Key International
 110 Henderson Road
 Rowville VIC 3178

has been cancelled in respect of new instruments as from 1 September 2009.

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

A handwritten signature in black ink, consisting of stylized cursive letters, positioned to the right of the signature text.



Australian Government
National Measurement
Institute

Bradfield Road, West Lindfield NSW 2070

Notification of Change
Certificate of Approval No 5/6B/87A
Change No 2

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

Smith Meter Inc Model K2GD Bulk Flowmetering System

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

- A. In Certificate of Approval 5/6B/87A dated 18 May 2004, the FILING
 ADVICE should be amended by adding the following:
 “Notification of Change No 1 dated 24 August 2006
 Notification of Change No 2 dated 10 May 2007”
- B. In Technical Schedule No 5/6B/87A dated 29 September 2003, clause
 1.2 (vii) Transfer Device should be amended by adding the following
 to the first paragraph:
 “The decoupling valve may incorporate a back pressure check valve.”

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

A handwritten signature in black ink, appearing to be 'J. G. T.', is written over the signature line.



Australian Government

National Standards Commission

12 Lyonpark Road, North Ryde NSW 2113 Australia

Certificate of Approval

No 5/6B/87A

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

Smith Meter Inc Model K2GD 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 October 2008, and then every 5 years thereafter.

Instruments purporting to comply with this approval shall be marked NSC No 5/6B/87A 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 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 26 September 2003

- A Smith Meter Inc model K2GD turbine bulk flowmetering system.

Variants: approved 26 September 2003

1. With a Smith Meter Inc model K2BD turbine flowmeter.
2. With a Smith Meter Inc model K2ED turbine flowmeter.

Technical Schedule No 5/6B/87A describes the pattern and variants 1 & 2.

Variants: approved 18 March 2004

3. With a Smith Meter Inc model K2BA turbine flowmeter.
4. With a Smith Meter Inc model K2BB turbine flowmeter.
5. With a Smith Meter Inc model K2GE turbine flowmeter.

Technical Schedule No 5/6B/87A Variation No 1 describes variants 3 to 5.

FILING ADVICE

Certificate of Approval No 5/6B/87A dated 29 September 2003 is superseded by this Certificate, and may be destroyed. The documentation for this approval now comprises:

Certificate of Approval No 5/6B/87A dated 18 May 2004

Technical Schedule No 5/6B/87A dated 29 September 2003 (incl. Test Procedure)

Technical Schedule No 5/6B/87A Variation No 1 dated 18 May 2004

Figures 1 to 3 dated 29 September 2003

Figure 4 dated 18 May 2004



TECHNICAL SCHEDULE No 5/6B/87A

Pattern: Smith Meter Inc Model K2GD Bulk Flowmetering System

Submittor: Diamond Key International
110 Henderson Road
Rowville VIC 3178

1. Description of Pattern

A bulk flowmetering system (Figure 1) incorporating a Smith Meter Inc model K2GD (*) 80 mm turbine flowmeter interfaced to a Commission-approved Smith Meter Inc AccuLoad III ALIII series calculator/indicator designed predominantly to control the loading/transfer of petroleum products other than LPG. The calculator/indicator is programmed with the calibration factor(s) applicable for the liquid used to verify/certify the meter(s).

(*) Abbreviated model number – the full model number may have additional alphanumeric characters, e.g. K2GD***3C**, where “3” refers to dual pickup coils/dual amplifiers and “C” refers to the integral ‘Strate Plate’ (refer clause 1.2 (v)), and the other additional characters relate to non-metrological features such as flange types.

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}	2650 L/min	
• Minimum flow rate, Q_{min}	265 L/min	
• Maximum pressure of the liquid, P_{max}	1965 kPa	
• Minimum pressure of the liquid, P_{min}	200 kPa	(#2)
• Dynamic viscosity range at 20°C	0.5 to 20 mPa.s	(#3)
• 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	-25°C	
• Accuracy class	0.5	

(#1) When the calculator/indicator is set to indicate volume in 0.1 L increments.

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

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

1.2 System Description

(i) Tank

A supply tank with an outlet pipe diameter not less than the pump inlet. The tank may incorporate a device for detecting low liquid level to prevent vapour/gas entering the pump.

(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 which 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 is fitted between the pump and the flowmeter to prevent reverse flow of the liquid.

(iv) Gas Elimination Device

A 100 mm (4 inch) Smith Meter Inc model S4-1-ST-R2 gas extractor with an integral strainer assembly, or any other equivalent gas elimination device, is fitted as close as practical to the meter inlet (Figure 2). A 100 x 80 mm reducer is fitted between the gas extractor and the inlet flow conditioner of the flowmeter.

(v) Measurement Transducer

A Smith Meter Inc model K2GD 80 mm turbine flowmeter (Figure 3) with accuracy class 0.3 has dual pickup coils for producing an electrical output signal proportional to volume throughput.

The signal is connected to a Smith Meter Inc model PA-6 preamplifier that conditions the signal and provides a pulse output for a compatible Commission-approved calculator/indicator. The preamplifier requires an input voltage in the range 8 to 29 volts DC and produces a corresponding pulse output depending on the supply voltage and the applied load. The preamplifier provides a pulse output equal to 0.5, 1 or 2 times the input signal.

The meter is mounted horizontally and incorporates an integral 'Strate Plate' for conditioning the flow profile.

The cyclic volume of the flowmeter is 0.86 L and the nominal k-factor for the flowmeter is 13.9 pulses/litre.

(vi) Calculator/Indicator

The dual pulse output from the meter preamplifier is interfaced to a Smith Meter Inc AccuLoad III ALIII series calculator/indicator as described in Supplementary Certificate S413, or may be interfaced to any other compatible Commission-approved electronic calculator/indicator approved for non-interruptible systems.

For temperature converted volume to 15°C, a temperature probe is fitted downstream of the flowmeter.

Provision is made in the pipework for a thermometer well and provision for measurement of pressure at the flowmeter during calibration/verification/certification of the system.

(vii) Transfer Device

A transfer device, such as a Smith Meter Inc model 210 automatically-operated control valve, or any other compatible positive shut-off valve located downstream of the meter, or a decoupling valve fitted to the end of a loading arm, with no intermediate outlet, may be used to define the start and finish of volume measurement.

The transfer device may also be designed for controlling 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.

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

The flowmeter is not required to be sealed.

The calibration adjustment provided by the compatible Commission-approved calculator/indicator should be sealed 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/87A
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)
Nominal k-factor	..... pulses/L
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 200 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 Variants

2.1 Variant 1

A Smith Meter Inc model K2BD(*) 80 mm turbine flowmeter with accuracy class 0.3 for maximum and minimum flow rates of 2460 L/min and 230 L/min, respectively. The turbine flowmeter requires flow conditioners comprising a 10-pipe diameter upstream assembly with in-line straightening vane insert and a 5-pipe diameter downstream section. The pipe diameter is required to be the same diameter as the turbine flowmeter.

(*) Abbreviated model number – the full model numbers may have additional alphanumeric characters, e.g. K2BD***3*** where "3" refers to dual pickup coils/dual amplifiers and the other additional characters relate to non-metrological features such as flange types.

2.2 Variant 2

A Smith Meter Inc model K2ED(#) 80 mm turbine flowmeter with accuracy class 0.3 for maximum and minimum flow rates of 2650 L/min and 265 L/min, respectively. The turbine flowmeter has a Smith Meter Inc model K211C 'Strate Plate' flow conditioner fitted to the inlet of the flowmeter.

(#) Abbreviated model number – the full model numbers may have additional alphanumeric characters, e.g. K2ED*****3C******-K211C**, where "3" refers to dual pickup coils/dual amplifiers and "C" refers to the need for a 'Strate Plate' (refer clause 1.2 (v)), "**K211C**" refers to the model of 'Strate Plate' used, and the other additional characters relate to non-metrological features such as flange types.

TEST PROCEDURE

Instruments should be tested in accordance with NSC Test Procedure 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 NSC 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:

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).

TECHNICAL SCHEDULE No 5/6B/87A
VARIATION No 1

Pattern: Smith Meter Inc Model K2GD Bulk Flowmetering System
Submittor: Diamond Key International
110 Henderson Road
Rowville VIC 3178

1. Description of Variants

1.1 Variant 3

A Smith Meter Inc model K2BA(*) 38 mm (1.5") turbine flowmeter (Figure 4) approved for maximum and minimum flow rates of 530 L/min and 50 L/min, respectively and for deliveries not less than 50 L or 500 times the scale interval of the volume indicator, whichever is the greater. The flowmeter is for use on applications such as the metering of fuel additives or systems for refuelling of locomotives. In the latter case, the transfer device is a Wiggins ZZ7 type decoupling valve or equivalent, fitted to the end of a loading arm.

The flowmeter requires flow conditioners upstream and downstream of the meter as described for Variant 1. A model S2-1-ST-40-R2 gas elimination device or similar Commission-approved device is fitted before the flow conditioner. A Smith Meter Inc model 200-60A-30A control valve or any other positive shut-off valve located downstream of the meter may be used to control the flow and/or define the transfer point.

1.2 Variant 4

A Smith Meter Inc model K2BB(*) 50 mm (2") turbine flowmeter which is similar to variant 3, however the maximum and minimum flow rates are 1060 L/min and 95 L/min, respectively, and this model is for deliveries not less than 100 L or 500 times the scale interval of the volume indicator, whichever is the greater. A model S3-1-ST-40-R2 gas elimination device or similar Commission-approved device is fitted before the flow conditioner.

(*) Abbreviated model number – the full model numbers may have additional alphanumeric characters, e.g. K2B****3*** where “3” refers to dual pickup coils/dual amplifiers and the other additional characters relate to non-metrological features such as flange types.

1.3 Variant 5

A Smith Meter Inc model K2GE(*) 100 mm (4") turbine flowmeter approved for maximum and minimum flow rates are 4500 L/min and 450 L/min, respectively, and this model is for deliveries not less than 1000 L or 1000 times the scale interval of the volume indicator, whichever is the greater.

The inlet of the flowmeter has an integral ‘Strate Plate’ for flow conditioning. A model S4-1-HC-40-R2 gas elimination device or similar Commission-approved device is fitted before the meter.

(*) Abbreviated model number – the full model numbers may have additional alphanumeric characters, e.g. K2GE***3C**, where “3” refers to dual pickup coils/dual amplifiers and “C” refers to the integral ‘Strate Plate’.



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The following change is made to the approval documentation for the

Smith Meter Inc Model K2GD Bulk Flowmetering System

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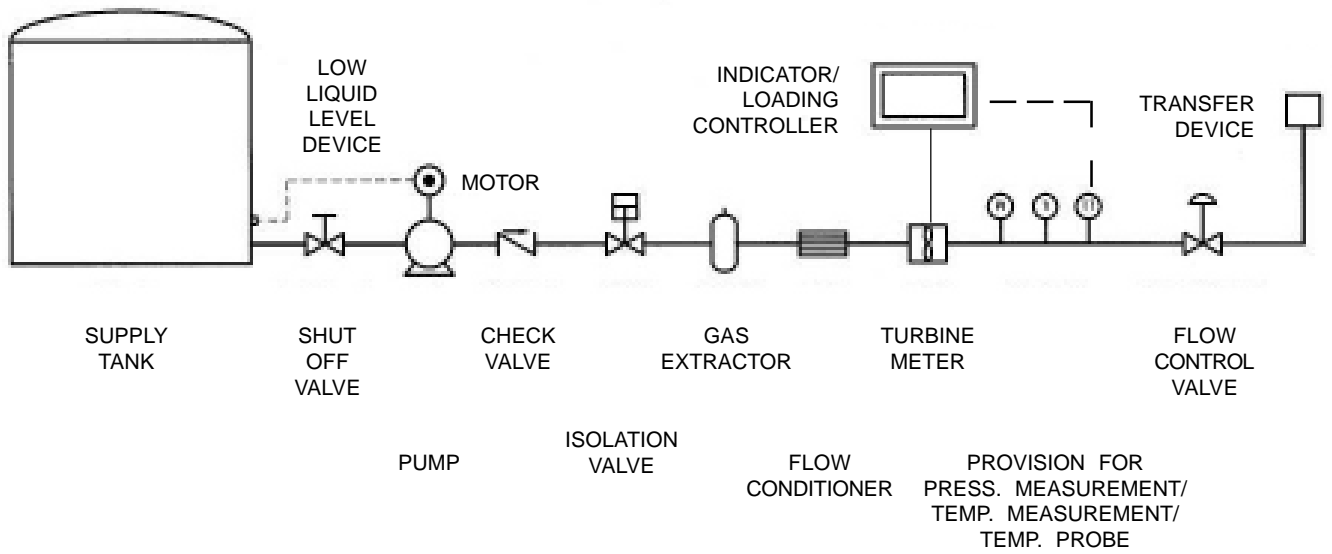
In Technical Schedule No 5/6B/87A dated 29 September 2003, in clause
1. Description of Pattern, the first sentence should be amended to read, in part:

**'... petroleum products other than LPG, including pure biodiesel and biodiesel/
distillate blends (to Australian government standard).'**

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

A handwritten signature in black ink, appearing to be 'J. G. T.', written in a cursive style.

FIGURE 5/6B/87A – 1



Typical Smith Meter Inc Turbine Bulk Flowmetering System

5/6B/87A
29 September 2003

FIGURE 5/6B/87A - 2



Smith Meter Inc Model S4-1-ST-R2 Gas Extractor With Integral Strainer

FIGURE 5/6B/87A – 3



Smith Meter Inc Model K2GD 80 mm Turbine Flowmeter

FIGURE 5/6B/87A – 4



Smith Meter Inc Model K2BA 38 mm Turbine Flowmeter