5/6B/87 7 November 2003



Australian Government

National Standards Commission

12 Lyonpark Road, North Ryde NSW 2113 Australia

Cancellation

Certificate of Approval No 5/6B/87

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

Smith Model K2CD Turbine Flowmetering System

submitted by Email Petroleum Systems (formerly Email Electronics) 88-94 Canterbury Road Kilsyth VIC 3137

has been cancelled in respect of new instruments as from 1 December 2003.

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.

5/6B/87 17 December 1996

National Standards Commission



Certificate of Approval

No 5/6B/87

Issued under Regulation 9 of the National Measurement (Patterns of Measuring Instruments) Regulations

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

Smith Model K2CD Turbine Flowmetering System

submitted by Email Petroleum Systems (formerly Email Electronics) 88-94 Canterbury Road Kilsyth VIC 3137.

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 May 1998, and every 5 years thereafter.

Instruments purporting to comply with this approval shall be marked NSC No 5/6B/87 and only by persons authorised by the submittor.

The Commission reserves the right to examine any instrument or component of an instrument purporting to comply with this approval.

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 106.

Auxiliary devices used with this instrument shall comply with the requirements of General Supplementary Certificate No S1/0/A.

DESCRIPTIVE ADVICE

Pattern: approved 22 April 1993

A Smith model K2CD turbine bulk flowmetering system.

Variant: approved 22 April 1993

1. Other models of Smith turbine flowmeters as listed in Table 1.

Technical Schedule No 5/6B/87 describes the pattern and variant 1.

Variants: approved 24 May 1995

2. As a pipeline flowmetering system.

3. With certain other models of 50 mm Smith turbine flowmeters.

Technical Schedule No 5/6B/87 Variation No 1 describes variants 2 and 3.

Variant: approved 27 August 1996

4. With certain other models of 38 mm Smith turbine flowmeters.

Technical Schedule No 5/6B/87 Variation No 2 describes variant 4.

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FILING ADVICE

Certificate of Approval No 5/6B/87 dated 29 December 1995 is superseded by this Certificate and may be destroyed.

The documentation for this approval now comprises:

Certificate of Approval No 5/6B/87 dated 17 December 1996 Technical Schedule No 5/6B/87 dated 1 December 1993 (incl. Table 1 & Test Procedure)

Technical Schedule No 5/6B/87 Variation No 1 dated 29 December 1995 Technical Schedule No 5/6B/87 Variation No 2 dated 17 December 1996 Figures 1 to 3 dated 1 December 1993 Figure 4 dated 29 December 1995

Signed and sealed by a person authorised under Regulation 9 of the National Measurement (Patterns of Measuring Instruments) Regulations to exercise the powers and functions of the Commission under this Regulation.

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National Standards Commission

TECHNICAL SCHEDULE No 5/6B/87

Pattern: Smith Model K2CD Turbine Flowmetering System.

Submittor: Email Electronics 88-94 Canterbury Road Kilsyth VIC 3137.

1. Description of Pattern

A bulk flowmetering system using a Smith model K2CD (#) turbine flowmeter of 80 mm nominal bore (Figure 1) and which is approved for use with liquids having a kinematic viscosity between 0.5 and 12.5 mm²/s.

The system is approved for use over a flow rate range from 227 L/min to 2270 L/min for normal operation. It may be used for short periods up to an extended maximum flow rate of 3030 L/min. The minimum quantity is 500 litres.

When the linearisation facility of the indicator/controller is NOT used, the minimum flow rate shall be not less than 700 L/min - refer also clause 1.1 (vii).

(#) The model number listed above is the basic model number only - the full model numbers may have a variety of additional alphanumeric characters, e.g. the full model number of the pattern is in the form Guardsman LB K2CD * ** *2 * where 'LB' designates ball bearing, and where '*' designate features not relevant to this approval.

1.1 Loading-rack Flowmetering System (Figure 2)

The system comprises:

(i) Tank

A supply tank.

(ii) Pump

A pump of either positive displacement or centrifugal type - in the latter case the pump is mounted lower than the minimum height of the liquid in the supply tank. The supply pipe from the tank has a continuous fall to the pump.

If the pump is not for the exclusive use of the flowmeter the flow rate through the meter must stay within the appropriate flow rate range for all combinations of alternative uses of the pump.

The system is constructed with the meter operating at sufficient back-pressure in, and immediately downstream of, the meter to minimise vaporisation.

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(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 full of liquid at all times.

(iv) Gas Purger/Strainer

A gas purger/strainer assembly fitted as close as practical to the meter inlet (Figure 2). The gas purger is approved on the condition that the pump is operated under a positive suction head.

The gas purger/strainer assembly may be modified for use as a strainer only where the tank has automatic alarming of low-liquid level, or has a float-operated shut-off valve in the pump supply, or has other means to prevent gas entering the system.

(v) Straightening Elements

Either:

- (a) The meter is installed between straightening elements (as specified in AS 2651-1983 for Liquid hydrocarbons - volumetric measurement by turbine meter systems) consisting of flow conditioners of at least 10 pipe diameters and 5 pipe diameters in length, installed respectively upstream and downstream of the meter. The upstream conditioner includes straightening vanes; or
- (b) A Smith model STRATE PLATE straightening element installed directly to the inlet of the meter (Figure 3). The straightening element must be aligned with the meter as per the manufacturer's instructions.

(vi) Meter

A Smith model K2CD (#) 80 mm turbine flowmeter (Figure 1) with single or dual pick-up coils for producing an electrical output signal.

The meter may be mounted horizontally or vertically (Figure 2). When mounted vertically, the straightening elements are also vertical.

Provision shall be made for fitting a pressure gauge downstream of the meter.

NOTE: (#) See clause 1.

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(vii) Indicating System

The output signal from the meter is interfaced via a preamplifier to any Commission-approved model of the Email Omega 2000 or 3000 series of bulk flowmetering indicator/controllers (as described in the documentation of NSC approval No S191), or any other Commission-approved electronic indicator/controller incorporating multi-point linearisation facility; the facility shall be able to linearise the calibration curve of the meter over not less than 3 points all of which are presettable within the flow rate range of the meter. The maximum effect of linearisation at each point shall be not less than $\pm 1\%$.

(viii) Transfer Device

A manually or automatically-operated control value is located downstream of the meter (with no intermediate outlet) and at or upstream of the transfer device, which is one of the following:

(i) Top-loading arrangement - the highest point of the pipework forms a weir at a fixed level from which the delivery pipe drains to the outlet for all configurations of the hose or loading arm whilst in operation. A syphon breaker is installed to ensure complete draining of the pipework downstream of the weir.

Alternatively, an anti-drain valve which retains a pressure of not less than 55 kPa may be installed at the delivery point of the pipework or hose; or

(ii) Bottom-loading arrangement - a dry-break coupling located at the delivery point of the pipework or hose.

1.2 Markings

Instruments are marked with the following data, together in the one location:

Manufacturer's name or markMeter model (#)Serial numberNSC approval numberNSC approval numberMaximum flow rateMinimum flow rateMinimum quantityMaximum operating pressureViscosity range or type of liquid for which the meter is verified

See clause 1.

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1.3 Sealing and Verification/Certification Provision

No sealing is required for the meter. Provision shall be made for sealing the indicator/controller as described in the approval documentation for the indicator/controller.

Provision is made for a verification/certification mark to be applied.

2. Description of Variants

2.1 Variant 1

Other models of Smith turbine meters as listed in Table 1.

The model number listed below is the basic model number only (refer clause 1.); the full model number of the pattern is in the form Guardsman LB K2CD * ** *2 * where 'LB' designates ball bearings, and where '*' designate features not relevant to this approval. An 'LJ' prefix designates journal bearings.

Meters are fitted with either ball or journal bearings; those with journal bearings shall only be mounted horizontally.

The meters are approved for use up to the maximum flow rates listed below; the 'extended maximum flow rate' may be used for short periods.

The meters are approved for use down to the minimum flow rates listed below when used with an electronic indicator/controller with a suitable linearisation facility; when such a facility is not used, the minimum flow rate shall be not less than 700 L/min except for those meters marked '#' in the Table below, where the minimum flow rate shall be not less than 900 L/min.

TABLE 1

MODEL	SIZE	BEARING	MAX. FLOW RATES	MIN. FLOW	MINIMUM
NUMBER	(Nominal)	TYPE	(Extended/Normal)	RATE	QUANTITY
	•			,	
3GL	80 mm	Ball	3030/2270 L/min	227 L/min	500 L
3GC	80 mm	Journal	3030/2460 L/min	246 L/min	500 L
K2BD	80 mm	Journal	3280/2460 L/min	246 L/min	500 L
K2CD	80 mm	Ball	3030/2270 L/min	227 L/min	500 L
K2ED	80 mm	Journal	3280/2460 L/min	246 L/min	500 L
4GL	100 mm	Ball	5045/3780 L/min	378 L/min	1000 L
4GC #	100 mm	Journal	5565/4540 L/min	454 L/min #	1000 L
K2BE #	100 mm	Journal	6000/4500 L/min	450 L/min #	1000 L
K2CE	100 mm	Ball	5045/3785 L/min	378 L/min	1000 L
K2EE #	100 mm	Journal	6000/4500 L/min	450 L/min #	1000 L

TEST PROCEDURE

Instruments should be tested in accordance with any tests included in the approval documentation for indicator, and in accordance with any relevant tests specified in the Inspector's Handbook.

Maximum Permissible Errors at Verification/Certification

The maximum permissible error applied during a verification test from normal flow rate to the minimum flow rate specified in the Certificate of Approval or Technical Schedule is $\pm 0.3\%$.

Where an instrument is fitted with a device to convert the indication of volume to volume at reference conditions, the maximum permissible error specified above is increased by 0.2%.

Reference conditions for petroleum liquids are specified in Australian Standard 2649 - 1983, *Petroleum Liquids and Gases - Measurement - Standard Reference Conditions.*

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VARIATION No 1

Pattern: Smith Model K2CD Turbine Flowmetering System.

Submittor: Email Electronics 88-94 Canterbury Road Kilsyth VIC 3137.

1 Description of Variants

1.1 Variant 2

As a pipeline flowmetering system (Figure 4) which is similar to the loading-rack system described for the pattern, but having the transfer device in the form of a positive shut-off component such as a manually or automatically-operated control valve located downstream of the meter with no intermediate outlet.

1.2 Variant 3

A bulk flowmetering system using other model Smith turbine flowmeters as listed below:

- Smith G series model K2BB (#) turbine flowmeter of 50 mm nominal bore and which is approved for use over a flow rate range from 106 L/min to 1060 L/min for normal operation. It may be used for short periods up to an extended maximum flow rate of 1415 L/min. The minimum quantity is 300 litres.
 - Smith GL series model K2CB (#) turbine flowmeter of 50 mm nominal bore and which is approved for use over a flow rate range from 95 L/min to 950 L/min for normal operation. It may be used for short periods up to an extended maximum flow rate of 1260 L/min. The minimum quantity is 300 litres.
- (#) The model number listed above is the basic model number only the full model numbers may have a variety of additional alphanumeric characters. Refer to Technical Schedule No 5/6B/87 dated 1 December 1993.

The meters may be used at the minimum flow rates listed above irrespective of whether or not a linearisation facility is used.

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These meters, which have the rotor mounted in tungsten carbide journal bearings, shall only be installed horizontally.

They shall not be used with the STRATE PLATE straightening element described for the pattern (Technical Schedule No 5/6B/87 dated 1 December 1993), but must be used with flow conditioners (as specified in AS 2651-1983 for *Liquid hydrocarbons - volumetric measurement by turbine meter systems*).

NOTIFICATION OF CHANGE

The following changes are made to Technical Schedule No 5/6B/87 dated 1 December 1993:

- A. In clause **1.1 Loading-rack Flowmetering System**, the text of subclauses (i) **Tank** and (ii) **Pump** are replaced by the following:
 - (i) Tank

A supply tank which may be situated either above or below ground.

(ii) Pump

The pump is fitted in a **suction head** (flooded suction) installation, i.e. below the liquid level in the supply tank (Figure 2).

Positive displacement type, centrifugal type, or submersible turbine type pumps may be fitted.

(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.)

If the pump is not for the exclusive use of the flowmeter the flow rate through the meter must stay within the appropriate flow rate range for all combinations of alternative uses of the pump.

The system is constructed with the meter operating at sufficient back-pressure in, and immediately downstream of, the meter to minimise vaporisation.

B. In clause 1.1 Loading-rack Flowmetering System, the text of subclause (iv) Gas Purger/Strainer is amended by deleting the 2nd sentence from the 1st paragraph.



National Standards Commission

TECHNICAL SCHEDULE No 5/6B/87

VARIATION No 2

Pattern: Smith Model K2CD Turbine Flowmetering System.

Submittor: Email Petroleum Systems (formerly Email Electronics) 88-94 Canterbury Road Kilsyth VIC 3137.

1 Description of Variant 4

A bulk flowmetering system using other model Smith turbine flowmeters as listed below:

- Smith G series model K2BA (#) turbine flowmeter of 38 mm nominal bore and which is approved for use over a flow rate range from 50 L/min to 530 L/min for normal operation. It may be used for short periods up to an extended maximum flow rate of 710 L/min. The minimum quantity is 100 litres.
- Smith GL series model K2CA (#) turbine flowmeter of 38 mm nominal bore and which is approved for use over a flow rate range from 50 L/min to 500 L/min for normal operation. It may be used for short periods up to an extended maximum flow rate of 645 L/min. The minimum quantity is 100 litres.
- (#) The model number listed above is the basic model number only the full model numbers may have a variety of additional alphanumeric characters. Refer to Technical Schedule No 5/6B/87 dated 1 December 1993.

The meters may be used at the minimum flow rates listed above irrespective of whether or not a linearisation facility is used.

These meters, which have the rotor mounted in tungsten carbide journal bearings, shall only be installed horizontally.

They shall not be used with the STRATE PLATE straightening element described for the pattern (Technical Schedule No 5/6B/87 dated 1 December 1993), but must be used with flow conditioners (as specified in AS 2651-1983 for Liquid hydrocarbons - volumetric measurement by turbine meter systems).



National Standards Commission Notification of Change Certificate of Approval No 5/6B/87 Change No 1

The following changes are made to the approval documentation for the

Smith Model K2CD Turbine Flowmetering System

submitted by Email Petroleum Systems (formerly Email Electronics) 88-94 Canterbury Road Kilsyth VIC 3137.

In Certificate of Approval No 5/6B/87 and its Technical Schedule Variation No 2, both dated 17 December 1996, and in Technical Schedule No 5/6B/87 dated 1 December 1993, and in Technical Schedule No 5/6B/87 Variation No 1 dated 29 December 1995, all references to the submittor should be amended to read;

Diamond Key International Pty Limited 110 Henderson Road Rowville VIC 3178.

Signed and sealed by a person authorised under Regulation 9 of the National Measurement (Patterns of Measuring Instruments) Regulations to exercise the powers and functions of the Commission under this Regulation.

Sinh

5/6B/87 5 June 2000



National Standards Commission

12 Lyonpark Road, North Ryde NSW

Notification of Change

Certificate of Approval No 5/6B/87

Change No 2

The following change is made to the approval documentation for the

Smith Model K2CD Turbine Flowmetering System

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

In Technical Schedule No 5/6B/87 dated 1 December 1994, the first sentence of clause **1**. **Description of Pattern** should be amended to read, in part:

"... having a kinematic viscosity between 0.5 and 12.5 mm²/s, *including a mixture of petrol and ethyl alcohol*."

Signed by a person authorised under Regulation 63 of the National Measurement Regulations 1999 to exercise the powers and functions of the Commission under this Regulation.

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FIGURE 5/6B/87 - 2



Typi Loading-rack Flowmetering Systems

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5/6B/87 1/12/93 FIGURE 5/6B/87 - 4



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Typical Smith Turbine Pipeline Flowmetering System