



Australian Government

**National Measurement
Institute**

12 Lyonpark Road, North Ryde NSW 2113

**Cancellation
Certificate of
Approval No 5/6B/55A**

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 Model E3 Bulk Flowmetering System

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

has been cancelled in respect of new instruments as from 1 April 2005.

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 the initials "JKT" with a large, stylized flourish extending downwards.



National Standards Commission

Certificate of Approval

No 5/6B/55A

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 E3 Bulk Flowmetering System

submitted by **Email Petroleum Systems**
(formerly Email Electronics)
now of
33 Wedgewood Drive
Hallam VIC 3803.



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 1997, and then every 5 years thereafter.

Instruments purporting to comply with this approval shall be marked NSC No 5/6B/55A 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 106.

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

DESCRIPTIVE ADVICE

Pattern: approved 28 September 1992

- A Smith model E3 bulk flowmetering system for use with liquids having a kinematic viscosity between 0.5 and 12.5 mm²/s.

Variants: approved 29 March 1996

1. As a loading-rack flowmetering system.
2. As a modular flowmetering system.
3. With certain other Smith flowmeters.
4. For use with liquids having a kinematic viscosity between 0.5 and 1450 mm²/s.
5. For use with bituminous products having a kinematic viscosity between 5 and 25 mm²/s.

Technical Schedule No 5/6B/55A describes the pattern and variants 1 to 5.

Variant: approved 12 November 1997

6. With a Smith D series flowmeter.

Technical Schedule No 5/6B/55A Variation No 1 describes variant 6.

FILING ADVICE

Certificate of Approval No 5/6B/55A dated 31 January 1994 is superseded by this Certificate, and may be destroyed.

The documentation for this approval now comprises:

Certificate of Approval No 5/6B/55A dated 5 March 1998

Technical Schedule No 5/6B/55A dated 31 January 1994 (incl. Table 1 & Test Procedure)

Technical Schedule No 5/6B/55A Variation No 1 dated 5 March 1998 (incl. Notification of Change)

Notification of Change No 1 dated 20 March 1995

Figures 1 to 5 dated 31 January 1994

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.

A handwritten signature in black ink, consisting of a large, stylized initial 'J' followed by a series of loops and a long horizontal stroke extending to the right.



National Standards Commission

TECHNICAL SCHEDULE No 5/6B/55A

Pattern: Smith Model E3 Bulk Flowmetering System.

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



1. Description of Pattern

A bulk flowmetering system using a Smith model E3 flowmeter 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 for a flow rate range of 380 to 1600 L/min for normal operation, but may be used for short periods up to an extended maximum flow rate of 1900 L/min.

The minimum quantity is 500 litres.

1.1 Pipeline Flowmetering System (Figure 1)

(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.

(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) Meter

A Smith model E3 flowmeter (Figure 2). Provision shall be made for a pressure gauge to be connected downstream of the meter.

(vi) Indicating System

Any of the following assemblies:

- (a) A Veeder-Root 1624 series or 7887 series zero start indicator with or without (d).
- (b) A Veeder-Root 7085 series or 7890 series zero-start indicator (Figure 2) with ticket printer with or without (d).
- (c) A Smith model 343-30 or Veeder-Root 7889 series preset counter (Figure 2) with a Smith preset-counter-operated outlet control valve; a pressure relief pipe may be fitted between the valve and the gas purger/strainer. The preset counter is marked PRESET NOT IN USE FOR TRADE.
- (d) A Commission-approved Smith model ATC or model ATG mechanical volume conversion for temperature device, as described in the documentation of NSC approvals Nos S146A and S147A, respectively.
- (e) A rigid extension drive from the meter to the indicator and ticket printer.
- (f) A Smith model SS1 flow controller (NSC No S190).
- (g) Any compatible Commission-approved pulse generator, electronic bulk flowmeter controller/indicator and flow control valve.

NOTE: Where systems include a pulse generator and electronic indicator, the pulse generator shall be driven directly from the output shaft of the meter; it shall not be driven via a mechanical indicator nor via reduction gear trains.

The use of a right-angled drive would be considered as direct as long as the drive consists of two bevel gears with a 1:1 ratio and provided the right-angled drive is before the drive to any mechanical indicator.

Where the pulse generator is not driven directly, any electronic indicator connected to it shall be marked NOT IN USE FOR TRADE.

(vii) Transfer Device

A 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 Markings

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

Manufacturer's name or mark	
Meter model	
Serial number	
NSC approval number	5/6B/55A
Maximum flow rate L/min
Minimum flow rate L/min
Minimum quantity L
Type of liquid for which the meter is verified #
Maximum operating pressure kPa

May be located separately, e.g. on a metal tag sealed to the instrument.

1.3 Sealing and Verification/Certification Provision

Provision is made for sealing the calibration device of the meter. Provision is also made for a verification/certification mark to be applied.

2. Description of Variants**2.1 Variant 1**

As a loading-rack flowmetering system (Figure 3) which is similar to the pipeline system except that the control valve is installed 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.

2.2 Variant 2

As a modular flowmetering system (Figure 4) which is similar to the pipeline and loading-rack systems, except that it is a module of metering components in its own assembly rather than built into another structure. It may be portable, including being vehicle-mounted.

The system consists of a gas purger/strainer, a meter and a transfer device. It may contain the pump, together with a pressure control valve (if necessary), and a hose reel; in the latter case, the transfer device is in the form of either a nozzle or dry-break coupling at the end of a flexible hose.

The pump is located lower than the minimum height of the liquid in the supply tank. A non-return valve is located between the pump and the meter, or the components and piping are arranged to keep the system full of liquid at all times.

Any nozzle used shall have an integral outlet control valve. If fitted with an integral anti-drain valve, the valve shall be immediately before the outlet control valve. A separate anti-drain valve may be fitted to the nozzle end of the hose if an integral anti-drain valve is not part of the nozzle. The anti-drain valve retaining pressure shall be not less than 55 kPa.

2.3 Variant 3

A bulk flowmetering system using any Smith flowmeter listed in Table 1. Figure 5 shows a model SD-30.

2.4 Variant 4

For use with liquids having a kinematic viscosity between 12.5 and 1450 mm²/s.

2.5 Variant 5

For use with bituminous products at temperatures between 170 and 210°C, having a kinematic viscosity between 5 and 25 mm²/s. Instruments are used with a Commission-approved Smith model ATC or model ATG mechanical volume conversion for temperature device and any of the mechanical indicators as described for the pattern; alternatively, any compatible Commission-approved pulse generator and electronic bulk flowmeter controller/indicator. (NOTE: The pulse generator and the volume conversion facility of the indicator MUST be Commission-approved for the temperature range specified above.)

TABLE 1

Meter Series	Models Included	Inlet Size (mm)	Flow Rate		Minimum Quantity (L)
			Maximum (#)	Minimum (L/min)	
C	C2	50	475	(570) 57	200
D	D3, SD-30, SD-30-DI, SD3-SI	75	1200	(1500) 300	300
		75	1200	(1500) 300	300
E	E3*, SE-** E4*, *E-**	75	1600	(1900) 380	500
		100	1600	(2250) 450	500
F	F4, F4-V1, SF-**, *F-**	100	2250	(2750) 550	1000
		100	2250	(2750) 550	1000
G	G6, G6-V1	150	3750	(4600) 920	1000
H	H8	200	6100	(n/a) 1220	1500
J	J10, JA10 JB10	250	9150	(n/a) 1830	2000
		250	12400	(n/a) 2480	2500
K	K12	300	19000	(n/a) 3800	4000
M	M16	400	33000	(n/a) 6600	6000

NOTE: In addition to the above, the series descriptor may appear, together with the nominal size in inches, with additional alpha descriptors (*).

(#) The value given in brackets () for maximum flow rate is the extended value for use over short periods only.

TEST PROCEDURE

Instruments should be tested in accordance with the Inspector's Handbook using the product with which they will be used and which is marked on the data plate. Tests should be conducted in conjunction with any tests specified in the approval documentation for any indicator and/or conversion device, etc. used.

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 registered 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*.

1. Meter Tests for Bitumen, Lube Oil, or other products of similar viscosity

The following is the recommended test procedure for the verification of meters used for measuring bituminous products, and requires a verified weighbridge.

Notes:

- (a) The density of the metered product may vary due to the amount of additives introduced and a density value (mass/unit volume) at 15°C of the product being used for test should be obtained before testing commences. Conversion factors for registered volume to volume at 15°C are available from the Commission.
- (b) The procedure does not take into account the closeness of a suitable weighbridge; should the weighbridge not be in the vicinity of the meter or filling point, then either an allowance must be made for fuel used or, preferably, the tanker's fuel tanks should be topped up before each weighing, either at the terminal or near the weighbridge. This provides a constant value for the tare weight of the tanker at all weighings.
- (c) The method of measurement indicated above introduces additional uncertainties which may be of a similar order to the **maximum permissible error for repeatability** when the scale interval is **approximately** equal to a weight equivalent to more than 0.1% of the test volume delivered. These uncertainties need to be considered when assessing the performance of the meter under test.
- (d) The weighbridge shall have been calibrated not more than six weeks before testing the meter, with particular attention paid to points in the loading curve approximately equal to the tare of the tanker, tare plus one test delivery from the meter and tare plus two test deliveries. A scale interval should be used which is as small as possible, preferably equal to a weight equivalent to less than 0.1% of the test volume of product delivered.

Test Method

- (i) Determine the tare weight of the tanker.

- (ii) Make a delivery into the tanker of approximately 40% of its maximum capacity at its nominal flow rate, noting:
- Average product temperature (t);
 - Average flow rate;
 - Converted registered volume at completion of the delivery (V_{r_c}); and
 - Un-converted registered volume at completion of the delivery (V_{r_u}).

- (iii) Weigh the tanker and record the gross weight. The weight of the volume delivered is equal to the net weight. The volume at 15°C ($V_{d_{15}}$) is found from the net weight using Table 56 of the ASTM-IP Tables and the density at 15°C.

The volume delivered (V_{d_t}) at the product temperature (t) is found from the volume at 15°C by using volume conversion factors available from the Commission.

- (iv) Repeat steps (ii) and (iii) and, where the flow rate varies in use by more than $\pm 10\%$ of nominal, repeat twice at the maximum and minimum flow rates.
- (v) The error for the converted volume (e_c) is found as follows:

$$e_c = \frac{V_{r_c} - V_{d_{15}}}{V_{d_{15}}} \times 100\%$$

The error for the unconverted volume (e_u) is found as follows:

$$e_u = \frac{V_{r_u} - V_{d_t}}{V_{d_t}} \times 100\%$$

TECHNICAL SCHEDULE No 5/6B/55A
VARIATION No 1

Pattern: Smith Model E3 Bulk Flowmetering System.

Submittor: Email Petroleum Systems
33 Wedgewood Drive
Hallam VIC 3803.



1. Description of Variant 6

Using a Smith D series flowmeter (Variant 3) which is approved for use with a minimum flowrate of 130 L/min.

NOTIFICATION OF CHANGE

In Technical Schedule No 5/6B/55A dated 31 January 1994 and Notification of Change No 1 dated 20 March 1995, all references to the submittor should be amended to read:

Email Petroleum Systems
33 Wedgewood Drive
Hallam VIC 3803.

National Standards Commission



NOTIFICATION OF CHANGE

CERTIFICATE OF APPROVAL No 5/6B/55A

CHANGE No 1

The following change is made to the approval documentation for the

Smith Model E3 Bulk Flowmetering System

submitted by **Email Electronics**
88-94 Canterbury Road
Kilsyth VIC 3137.



In Technical Schedule No 5/6B/55A dated 31 January 1994, subclause (ii) Pump of clause 1.1 Pipeline Flowmetering System is replaced by the following:

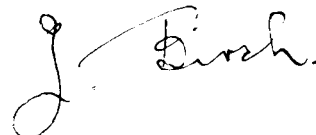
- (ii) The pump may be fitted in either a suction lift or suction head (flooded suction) installation, i.e. either above or below (Figure 1) the liquid level in the supply tank, depending on the type of pump used.

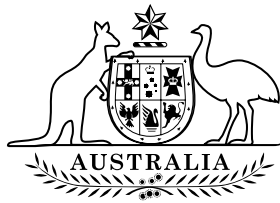
Positive displacement type pumps may be fitted in either suction lift or suction head installations.

Centrifugal type pumps shall be fitted in suction head installations.

Submersible turbine type pumps may also be used, either alone or in systems which incorporate centrifugal type pumps fitted in suction lift installations.

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.





National Standards Commission
Notification of Change
Certificate of Approval No 5/6B/55A
Change No 2

The following change is made to the approval documentation for the

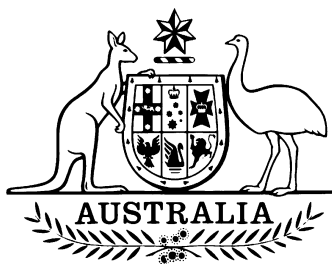
Smith Model E3 Bulk Flowmetering System

submitted by Email Petroleum Systems
(formerly Email Electronics)
now of
33 Wedgewood Drive
Hallam VIC 3137.

In Certificate of Approval No 5/6B/55A and its Technical Schedule Variation No 1, both dated 5 March 1998, and in Technical Schedule No 5/6B/55A dated 31 January 1994 and in Notification of Change No 1 dated 20 March 1995, all references to the submitter 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.



National Standards Commission

12 Lyonpark Road, North Ryde NSW

Notification of Change

Certificate of Approval No 5/6B/55A

Change No 3

The following change is made to the approval documentation for the

Smith Model E3 Bulk Flowmetering System

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

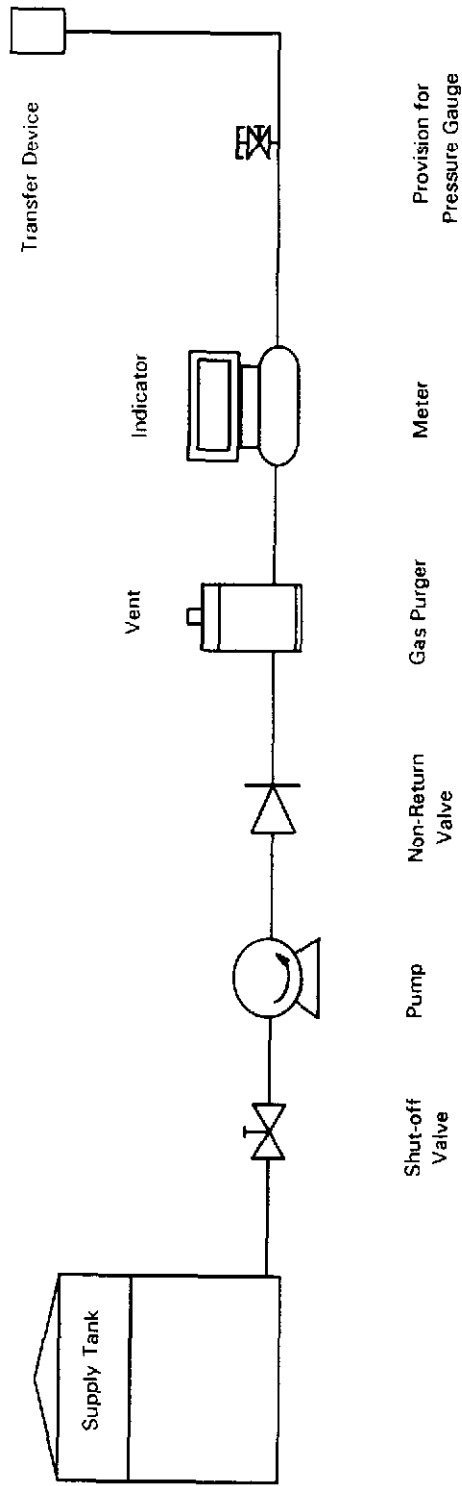
In Technical Schedule No 5/6B/55A dated 31 January 1994, the first sentence of clause 1. **Description of Pattern** should be amended to read, in part:

*“... 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.

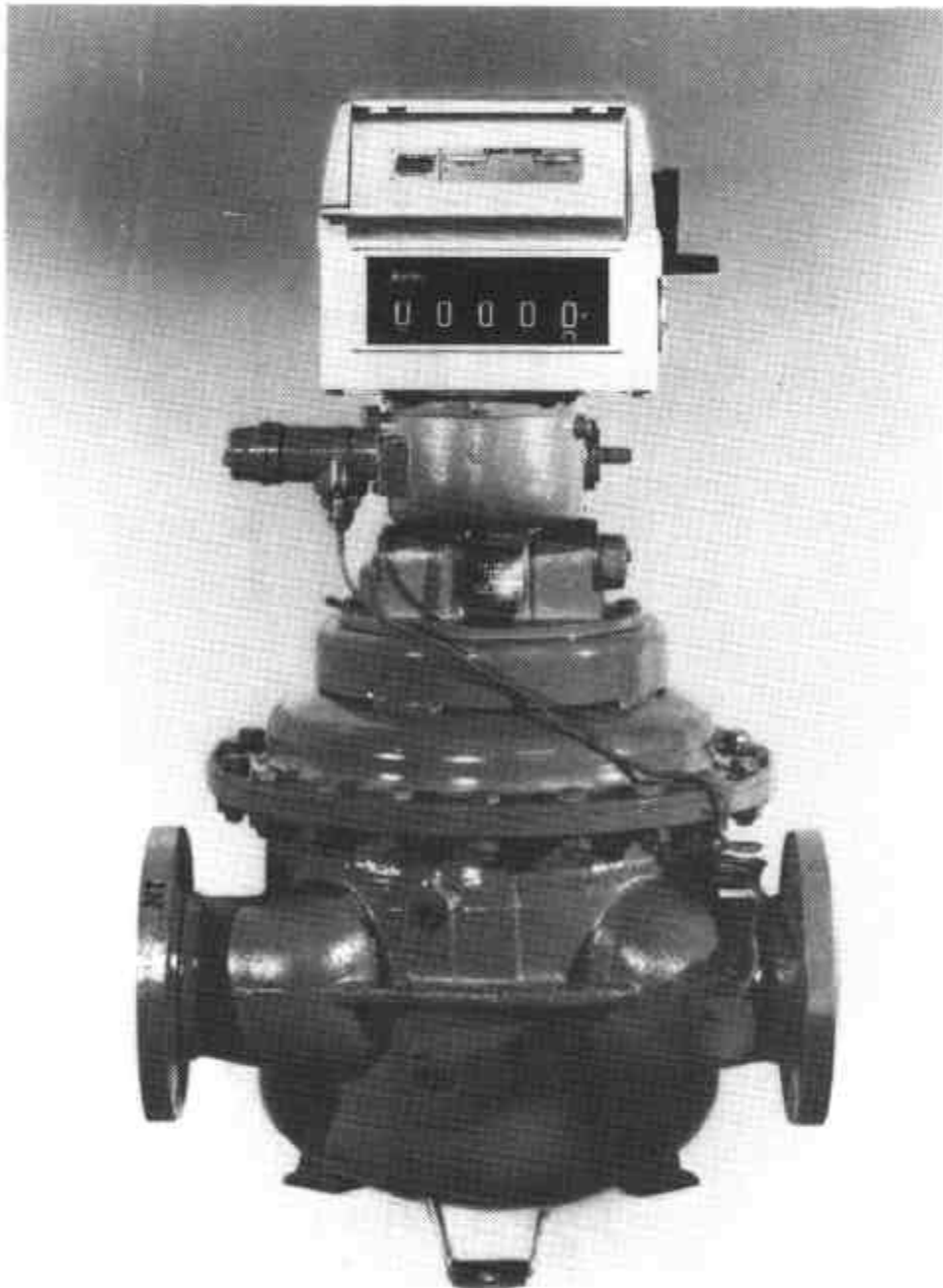
A handwritten signature in black ink, appearing to read 'J. Bennett', is written in a cursive style.

FIGURE 5/6B/55A - 1



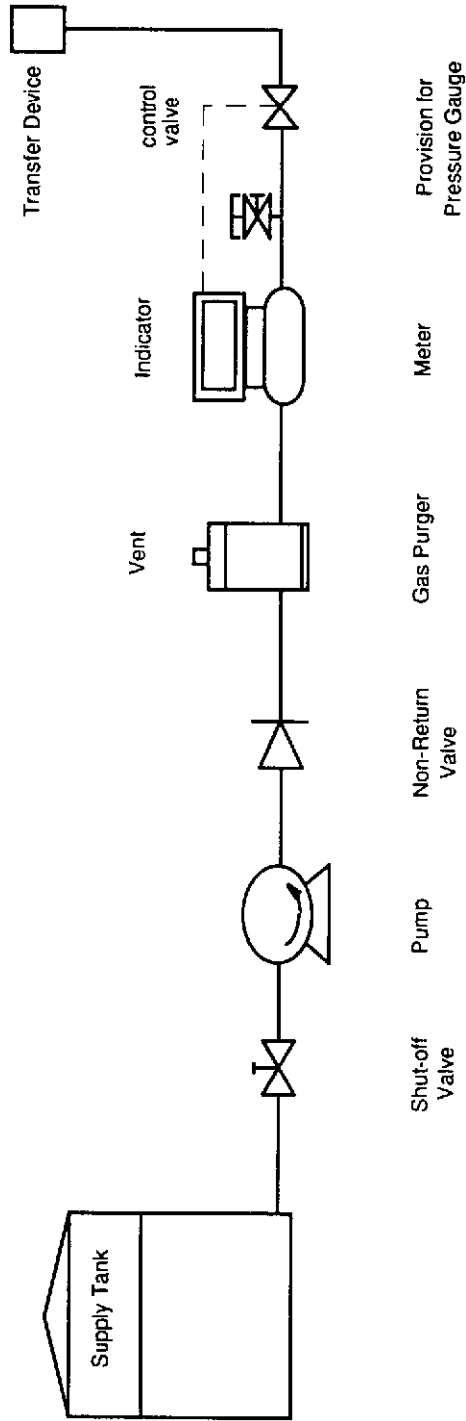
Typical Pipeline Flowmetering System

FIGURE 5/6B/55A - 2



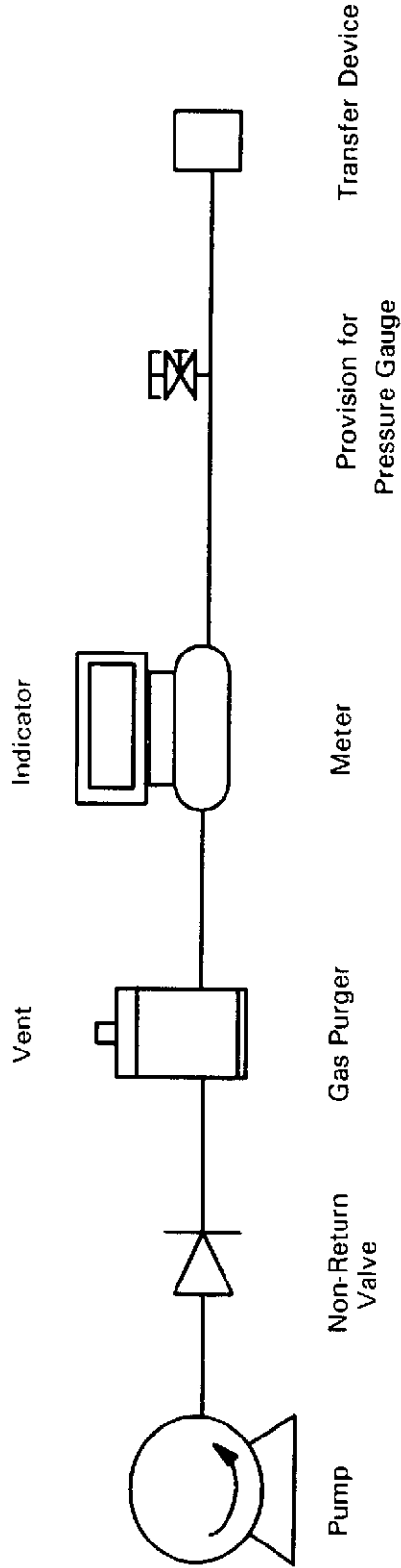
Smith Model E3 Flowmeter

FIGURE 5/6B/55A - 3



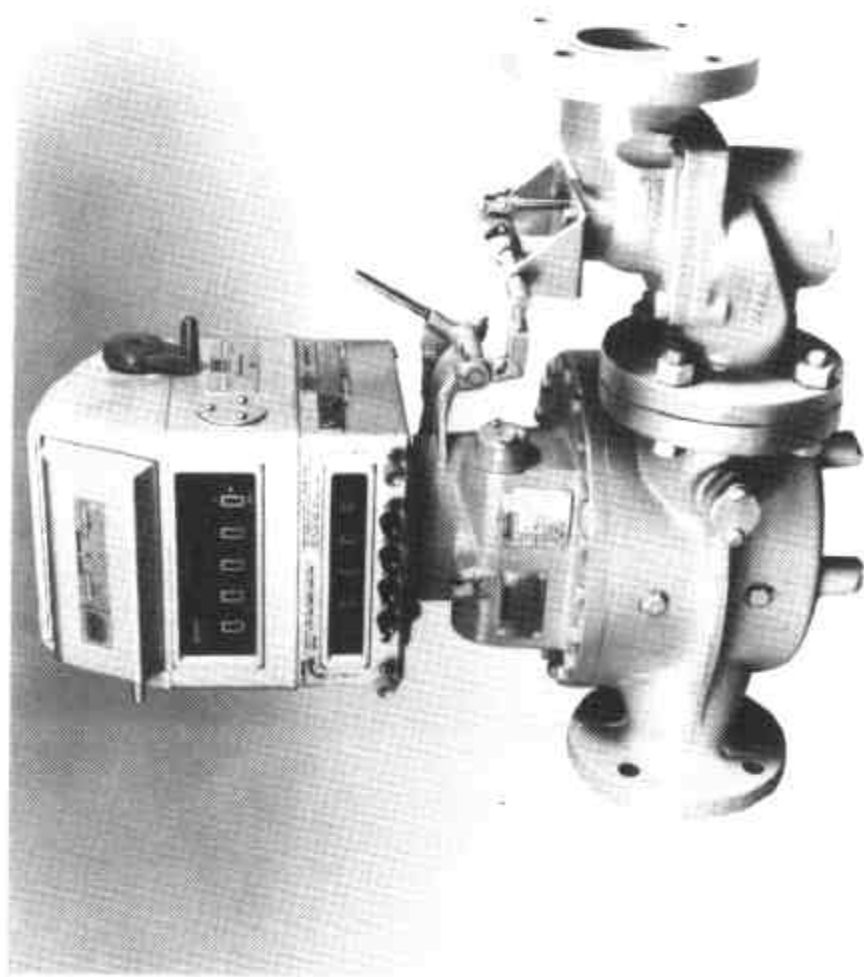
Typical Loading-rack Flowmetering System

FIGURE 5/6B/55A - 4



Typical Modular Flowmetering System

FIGURE 5/6B/55A - 5



Smith Model SD-30 Flowmeter