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CERTIFICATE OF APPROVAL No 5/6B/43

VARIATION No 1

This is to certify that the following modification of the patterns of the

Epex Flowmeter M5 (Anti-hose-dilation)

approved in Certificate No 5/6B/43 dated 7 December 1976

submitted by Engineering Products Pty Ltd, 418 Burnley Street, Burnley, Victoria, 3121,

has been approved under the Weights and Measures (Patterns of Instruments) Regulations as being suitable for use for trade.

Date of Approval: 4 April 1977

The approved modification, described in Technical Schedule No 5/6B/43 - Variation No 1 and in drawings and specifications lodged with the Commission, provides for an in-line non-return valve with integral pressure-relief valve.

The approval is subject to review on or after 1 December 1981.

All instruments conforming to this approval shall be marked with the approval number "NSC No 5/6B/43".

Signed

Executive

N.S.W. 2113 NATSTANCOM SYDNEY 888 3922

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submitted by Engineering Products Pty Ltd, 418 Burnley Street, Burnley, Victoria, 3121,

have been approved under the Weights and Measures (Patterns of Instruments) Regulations as being suitable for use for trade.

Date of Approval: 10 November 1976

The patterns are described in Technical Schedule No 5/6B/43, and in drawings J specifications lodged with the Commission.

The approval is subject to review on or after 1 December 1981.

All instruments conforming to this approval shall be marked with the approval number "NSC No 5/6B/43".

Approval is granted on condition that:

- The maximum flow rate is a flow rate between 130 and 230 ^l/min; the minimum flow rate is 20% of the maximum flow rate.
- 2. The pump suction operates under a positive liquid head.
- 3. The viscosity of the liquid measured is between 0,6 and 4 mPa.s. The liquid (commercial or tecnnical name) for which the flowmeter is calibrated is nominated on the instrument data plate.

Signed

Executive Officer



NATIONAL STANDARDS COMMISSION

TECHNICAL SCHEDULE No 5/6B/43

Pattern: Epex Flowmeter M5 (Anti-hose Dilation)

Submittor: Engineering Products Pty Ltd, 418 Burnley Street, Burnley, Victoria, 3121.

Date of Approval: 10 November 1976

Conditions of Approval:

- 1. The maximum flow rate is to be a flow rate between 130 and 230 ℓ/\min ; the minimum flow rate is 20% of the maximum flow rate.
- 2. The pump suction is to operate under a positive liquid head.
- 3. The viscosity of the liquid measured is between 0,6 and 4 mPa.s. The liquid (commercial or technical name) for which the flowmeter is calibrated is nominated on the instrument data plate.

All instruments conforming to this approval shall be marked "NSC No 5/6B/43".

Introduction:

The flowmater (see Figure 1) is a vehicle-mounted instrument for the delivery of heating oil and kerosenes. It comprises a flooded-suction measuring system fitted with devices intended to minimise the effect of hose dilation on the measurement. The devices comprise either electrically or mechanically operated controls to lock the ticket-printer reset handle is conjunction with a non-return valve with integral pressure-relief valve set to close at a pressure of about 55 kPa.

In the first case, an electrical solenoid unlocks the ticket-printer reset handle only when the pressure in the hose is less than 90 kPa. As a result, at the start of a delivery zero must be printed on the ticket before the pump is started and at the end of a delivery the quantity delivered can only be printed after the pump is stopped and after the pressure in the hose has fallen to below 90 kPa due to the liquid in the hose flowing back to the supply tank through the pressure-relief valve and the meter.

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In the second case, a shield attached to the manually operated pump by-pass valve allows the ticket-printer reset handle to be operated only when the pump by-pass is fully open, that is, when the pump pressure is less than 130 kPa. This, in conjunction with the integral pressure-relief valve, ensures that the difference in hose pressure between when the delivery starts and when it finishes is not more than 130 kPa.

In both cases, due to backlash in the meter and ticket printer, and rounding error when a ticket is printed, the quantity of liquid indicated as moving through the meter in the forward direction when the pressure in the hose builds up to full-flow pressure at the start of a delivery will be more than the quantity subtracted when the delivery is finished and the pressure in the hose falls. This causes an additional non flow-dependent error.*

Description:

The flowmeter (see Figure 1) comprises the following:

- 1. Positive displacement pump mounted on the assembly at a point lower than the minimum height of the liquid in the supply tank. The supply pipe from the tank slopes downward to the pump.
- 2. Liquid Controls E.1-42100 gas separator (see Figure 2).
- 3. Liquid Controls M5 meter (see Figure 2).
- 4. Indicator and ticket printer (see Figure 2), which comprise a Veeder-Root Model 1558 indicator (UK) or 169100 or 169200 (USA) and Model KE 1630 ticket printer modified for single-handle reset by fitting a chain drive, and modified by fitting a solenoid to prevent the reset handle from being operated until the solenoid is energised. The ticket printer has 1-litre increments. The indicator is marked "this indicator not in use for trade". The printer advances to a higher indicated quantity when the drive shaft from the meter rotates in one direction and subtracts to indicate a lesser quantity when rotation is in the reverse direction.
- 5. Solenoid reset-locking mechanism (see Figure 3), unlocks the reset mechanism when energised.

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^{*} If the hose is unwound before the pump is started and before zero is printed the pressure of the liquid in the hose may fall to 0 kPa, causing an additional non flow-dependent error.

- 6. Non-return value with integral pressure-relief value and adjustable pressure switch (see Figure 4). The pressure-relief value is set to close when the pressure retained in the hose is 50 ± 10 kPa. The pressure switch is set so that it is open and the ticket-printer reset mechanism is locked whenever the pressure in the hose is above 90 kPa.
- 7. Hose up to 60 m of 32-mm bore Barfell industrial hose or Nylex PR 15410285 hose mounted on a hose reel.
- 8. Anti-drain valve (see Figure 5) an anti-drain valve and swivel coupling is fitted on the end of the hose. The antidrain valve retains a pressure of not less than 55 kPa.
- 9. Nozzle any nozzle fitted with an integral anti-drain valve which retains a pressure of not less than 5 kPa and which is located downstream of the main nozzle valve.
- Pressure gauge either permanently fitted to monitor hose pressure or fitted only when the instrument is tested by the Weights and Measures Authority.
- 11. Marking an instrument data plate sealed to the instrument is marked:
 - (a) "approved for ...x...", x being the specific liquid for which the instrument is verified*,
 - (b) "approved for maximum 60-m by 32-mm hose".
- * The approval for the following liquids is based upon the liquid having a viscosity within the range specified for temperatures of 5°C to 40°C, taking into account the variations in the viscosity of each product which occur with the output from a single refinery or between different refineries and at different times throughout each year:

Liquid	Permitted viscosity range
Kerosenes, white spirits and aviation turbine fuels ²	0,6 to 2,2 mPa.s
Heating oil	0,8 to 4,0 mPa.s

- Note: ¹ A known trade abbreviation of the name of the liquid is acceptable.
 - ² The instrument may be marked "kerosenes" or "kerosene, white spirits and aviation turbine fuel".

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- 12. Sealing each of the following parts of the system is sealed with a lead stamping plug or a sealing wire, the ends of which are terminated beneath a fixed lead-plug seal:
 - (a) the meter and indicator;
 - (b) the adjustable pressure switch; and
 - (c) the instrument data plate.

The approval includes -

- a manually operated pump by-pass valve with a shield (see Figures 6, 7 and 8) which prevents the ticket-printer reset handle from being used until the manual pump by-pass is fully open. This replaces the adjustable pressure switch in the non-return valve and the solenoid in the ticket printer;
- 2. the flowmeter as a fixed installation.

Special Tests:

The instrument should be tested with the liquid for which it will be used and which is marked on the instrument data plate.

- Pressure Settings a pressure gauge is provided to monitor hose pressure:
 - (a) integral pressure-relief valve and anti-drain valve: start the pump and, with the nozzle open, stop the pump pressure gauge should indicate 50 ± 10 kPa;
 - (b) pressure switch (as applicable):
 - (i) with the pump running and the nozzle closed, close the supply valve which is between the supply tank and the pump;
 - (ii) stop the pump;
 - (iii) gradually reduce the hose pressure by allowing liquid to drain from the nozzle or drain back through the supply valve;
 - (iv) the ticket-printer reset handle should only unlock at a hose pressure of less than 90 kPa;
 - (c) hose pressure with manual pump by-pass valve open (as applicable): with the pump running and the nozzle closed, open the manual pump by-pass valve — the pressure gauge should indicate less than 130 kPa.

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2. Non flow-dependent Error -

- (a) Hose dilation and meter and ticket printer backlash* this test should start with the pump stopped and the hose fully wound on to its reel:
 - (i) Insert a ticket and print zero.
 - (ii) Fully unwind the hose from its reel, start the pump motor and, after allowing sufficient time for the full pressure to be obtained, stop the pump motor, in the case of the instrument with a solenoid reset-locking mechanism, or open the manual pump by-pass value if it is fitted.
 - (iii) The quantity then printed on the ticket is the error caused by hose dilation and meter and ticket-printer backlash, plus some rounding error. Although not in use for trade, the reading remaining on the indicator is the error caused by the hose dilation and meter and indicator backlash without the rounding error.
- (b) Rounding error of up to 1 increment, that is, 1 litre, due to the operation of the ticket printer which, when printing, advances the printing wheels to print the next higher whole number.

The sum of the above non flow-dependent errors, that is, the quantity remaining on the indicator plus 1-litre rounding error, should not exceed 2 ℓ_{*} .

The minimum delivery for which the relative error from all sources would not exceed 1,5% is 175 litres.

^{*} The test should be repeated (say, three times); the highest reading should not be more than 1 litre.



NATIONAL STANDARDS COMMISSION

TECHNICAL SCHEDULE No 5/6B/43

VARIATION No 1

Pattern: Epex Flowmeter M5 (Anti-nose-dilation)

Submittor: Engineering Products Pty Ltd, 418 Burnley Street, Burnley, Victoria, 3121.

Date of Approval of Variation: 4 April 1977

The modification described in this Schedule applies to the patterns described in Technical Schedule No 5/6B/43 dated 7 December 1976.

All instruments conforming to this approval shall be marked "NSC No 5/6B/43".

Description:

The approved modification provides for an in-line non-return valve with integral pressure-relief valve to be fitted on the instrument when a manually operated pump by-pass valve is fitted (see Figure 9).



Epex Flowmeter Model M5 with Solenoid Anti-hose Dilation Device

FIGURE 5/6B/43 - 1



Epex M5 Flowmeter with Solenoid Anti-hose Dilation Device (Note: The ends of sealing wire should terminate beneath a fixed lead-plug seal)





Anti-drain Valve and Swivel Coupling - Schematic Diagram HOSE HOSE SWIVEL FIGURE 5/68/43 - 5 -ANTI-DRAIN VALVE NOZZLE





Manually Operated Pump By-pass Valve and Shield over Ticket Printer Reset Knob - Schematic Diagram



Epex Flowmeter Model M5 with Manually Operated Pump By-pass Valve and Shield over the Ticket Printer Reset Knob

FIGURE 5/6B/43 - 8



In-line Non-return Valve - Schematic Drawing 12/5/77