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# CERTIFICATE OF APPROVAL No 5/6H/9

This Certificate replaces Certificate No 5/6H/9 dated 24 March 1978, which is hereby cancelled.

This is to certify that the patterns of the

Liquip Flowmeter with Neptune 38-mm Meter

submitted by Liquid Handling Equipment Pty Ltd,
216 Railway Terrace,
Guildford, New South Wales, 2161.

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

Date of Approval: 23 May 1978

The patterns are described in Technical Schedule No 5/6H/9, and in drawings and specifications lodged with the Commission.

The approval is subject to review on or after 1 September 1980.

All instruments conforming to this approval shall be marked with the approval number "NSC No 5/6H/9".

Approval is granted on condition that:

1. The maximum flow rate is a flow rate between 100 and 220 litres per minute; the minimum flow rate is 20% of the maximum flow rate achievable with a particular instrument.
2. The pump suction operates under a positive liquid head.
3. The liquids measured are limited to petroleum products of viscosities between 0,4 and 8,3 mPa.s.
4. The maximum system pressure is limited to 600 kPa.
5. The liquid (commercial or technical name) for which the instrument is verified is nominated on the instrument data plate.

Signed

Acting Executive Officer

12/6/78

# NATIONAL STANDARDS COMMISSION

## TECHNICAL SCHEDULE No 5/6H/9

Pattern: Liquip Flowmeter with Neptune 38-mm Meter

Submittor: Liquid Handling Equipment Pty Ltd,
216 Railway Terrace,
Guildford, New South Wales, 2161.

Date of Approval: 23 May 1978.
This Technical Schedule replaces Technical Schedule No 5/6H/9 dated 24 March 1978 which is hereby cancelled.*

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3. The liquids measured are limited to petroleum products of viscosities between 0,4 and 8,3 mPa.s.
4. The maximum system pressure is limited to 600 kPa.
5. The liquid (commercial or technical name) for which the instrument is verified is nominated on the instrument data plate.

All instruments conforming to this approval shall be marked "NSC No 5/6H/9".

Description:

The pattern (see Figure 1) is a vehicle-mounted instrument for the delivery of liquid petroleum of viscosity between 0,4 and 8,3 mPa.s at a maximum flow rate of 220 litres per minute and a maximum system pressure at no flow of up to 600 kPa.

The flowmeter comprises the following:

1. Positive displacement pump mounted on the assembly at a point lower than than the minimum height of the liquid in the supply tank. The supply pipe from the tank to the pump has a continuous fall to the pump. The pump by-pass is set so that

*Note: Figures 5/6H/9 - 1 to 4 and Table 1 of the Technical Schedule should be retained as they form part of this Technical

the maximum no-flow system pressure is up to 600 kPa. Provision is made for a pressure gauge to be connected between the pump and the gas purger.

2. Neptune gas purger incorporating a strainer and float-operated vent valve (see Figure 2).

3. Neptune 38-mm Type 4 meter (see Figure 2).

4. Neptune Type 443 zero-start single-handle reset indicator and ticket printer (see Figure 2). The ticket printer has 1-litre increments and the indicator has a scale interval of 1 litre; the first element is marked with ten scale-mark lines numbered from 0 to 9. The aperture through which the first element is viewed is widened in the direction of travel.

5. Non-return valve.

6. Hose - any type, bore or length may be used provided that the minimum delivery, determined from Table 1 and marked on the instrument's data plate for reference by the Weights and Measures Authority, is acceptable to that Authority taking into account the usage of the instrument.

7. Anti-drain valve (see Figure 3) - an anti-drain valve, or anti-drain valve and swivel coupling, is fitted on the end of the hose. The anti-drain valve retains a pressure of not less than 55 kPa.

8. 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.

9. Marking - instrument data plate sealed to the instrument marked*:

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* 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 within the output from a single refinery or between different refineries, at different times throughout the years.

| Liquid[1] | Permitted viscosity range |
|---|---|
| Petrol | 0,4 to 0,7 mPa.s |
| Kerosene[2] | 0,6 to 2,2 mPa.s |
| Heating oil | 1,1 to 4,0 mPa.s |
| Diesel fuel | 1,7 to 8,3 mPa.s |

Note: [1] A known trade abbreviation of the name of the liquid is acceptable.

[2] Kerosene includes white spirits and aviation turbine fuel.

(a) (i) "approved for petrol only"; or
(ii) "approved for kerosene and heating oil only"; or
(iii)"approved for heating oil and diesel fuel only; and

(b) "maximum no-flow pressure...x...kPa", x being the maximum system pressure when the nozzle is closed; and

(c) "minimum delivery...y...litres", y being the minimum delivery determined from Table 1.

10. Sealing -

(a) the indicator and ticket printer and meter, by passing a sealing wire through the drilled heads of two of the set screws securing the top cover of the meter to the casing, through the drilled heads of the set screws securing the indicator to the meter, through a drilled lug on the front face of the indicator, through the drilled head of a set screw securing the top cover on the indicator, and terminating the ends beneath a lead stamping plug (see Figure 2);

(b) the instrument data plate, by attaching it by a lead stamping plug or by threading the indicator sealing wire through a hole in the data plate. The data plate may also be secured by a set screw to prevent it vibrating, thus breaking the sealing wire.

The approval includes a Neptune 441 zero-start indicator with scale interval of 1 litre; the first element is marked with ten scale-mark lines numbered from 0 to 9 (see Figure 4). The aperture through which the first element is viewed is widened in the direction of travel.

Special Tests:

The instrument should be tested with one or more of the liquids for which it will be used and which are marked on the data plate. The maximum flow rate at which the instrument is able to be tested should be the maximum flow rate marked on the instrument data plate. The minimum delivery for which the relative error from all sources would not exceed 1,5% is marked on the instrument data plate.

Hose Dilation

Weights and Measures inspectors should check that the maximum hose dilation, which may be determined by the method described below, is not more than the value permitted for the minimum delivery marked on the instrument data plate (Table 1 refers):

(a) With the pump operating, open and close the nozzle, then with the nozzle closed check that the no-flow system pressure is within 20 kPa of the maximum no-flow system pressure marked on the instrument data plate.

(b) With the pump stopped and the hose fully wound on its reel, open the nozzle to reduce the pressure in the hose to the anti-drain valve retaining pressure of about 55 kPa. Then fully unwind the hose from the reel, zero the indicator, start the pump and, after allowing not less than 30 seconds for the hose to fully dilate, and with the pump still running, read the quantity on the indicator. This quantity is equal to the maximum hose dilation.

2. Gas Purging

The effect of gas on the quantity delivered should not exceed 1,0% of the minimum delivery marked on the instrument data plate when a delivery is interrupted due to the supply tank running dry, and the delivery is continued by, for example, changing supply tanks. To test gas purging it will be necessary to allow the supply tank to empty during a test delivery, to stop the pump, and to refill or change the supply tank to allow the delivery into the proving measure to be completed.

3. Non-flow-dependent Errors

The non-flow-dependent errors are up to:

(i) 1-litre rounding error for the ticket printer with 1-litre increments;

(ii) 0,2-litre reading error for the indicator which has the first element indicating by 1-litre scale intervals;

(iii) ...w...-litre gas-purging error, w being 1% of the minimum delivery marked on the instrument data plate;

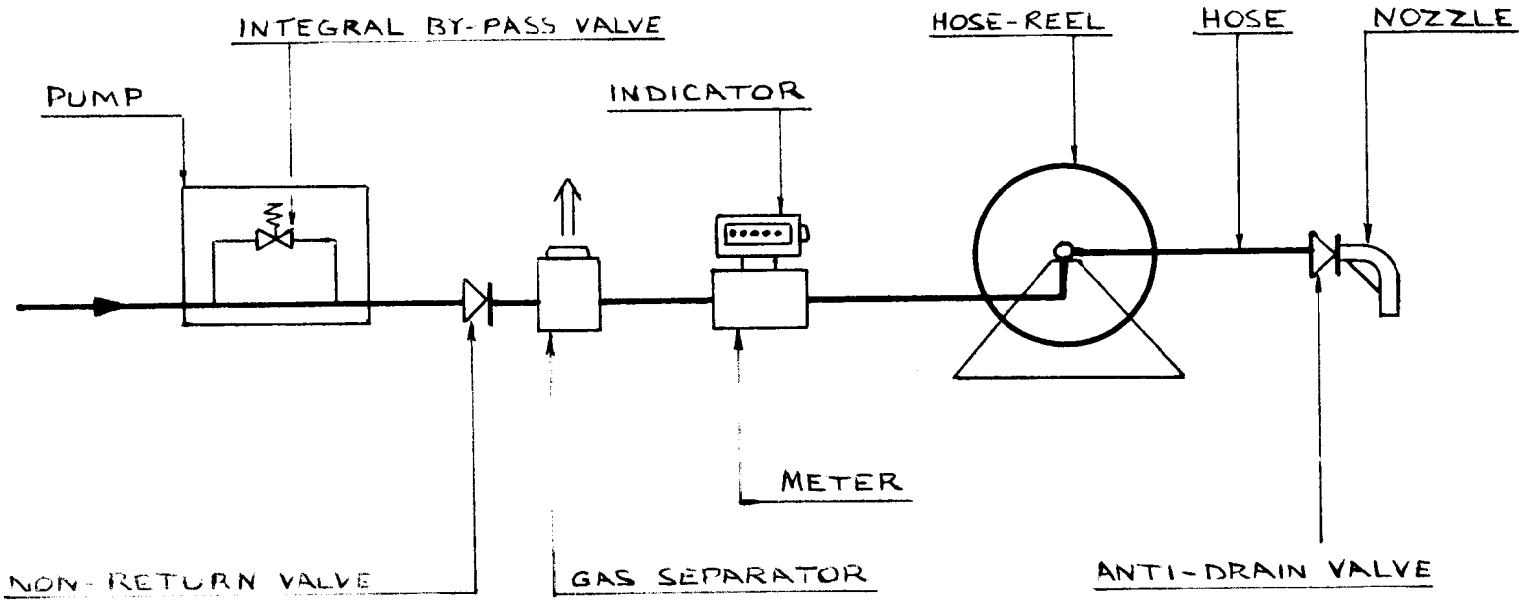
(iv) ...z...-litre hose dilation, z being the maximum value of hose dilation for which the instrument is verified - see Table 1.

**Flow Rate:**

If the pump has an alternative outlet for unmeasured liquid, check that the valve or valves are arranged so that only one outlet may be open at any one time - that is, only the measured outlet or only the unmeasured outlet; no intermediate position which allows both outlets to be open is permitted.

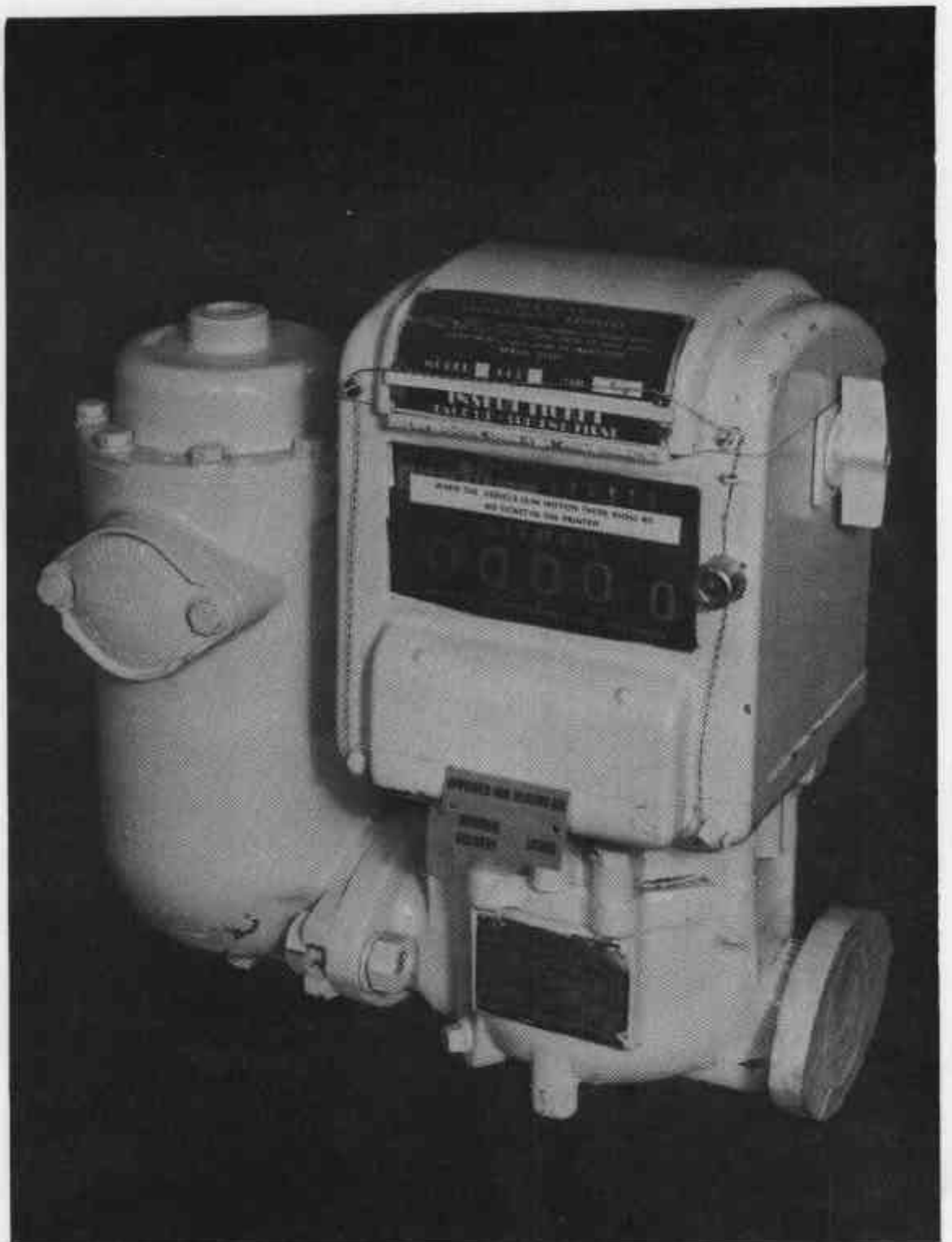
TABLE 1

| Minimum delivery marked on instrument data plate | Maximum hose dilation | |
|---|---|---|
| | Indicator only fitted | Indicator and printer fitted |
| ℓ | ℓ | ℓ |
| 50 | 0,3 | - |
| 100 | 0,8 | 0 |
| 150 | 1,3 | 0,5 |
| 200 | 1,8 | 1,0 |
| 250 | 2,3 | 1,5 |
| 300 | 2,8 | 2,0 |
| 350 | 3,2 | 2,5 |
| 400 | 3,8 | 3,0 |
| 450 | 4,3 | 3,5 |
| 500 | 4,8 | 4,0 |




Liquid Controls Neptune Flowmeter — Schematic Diagram

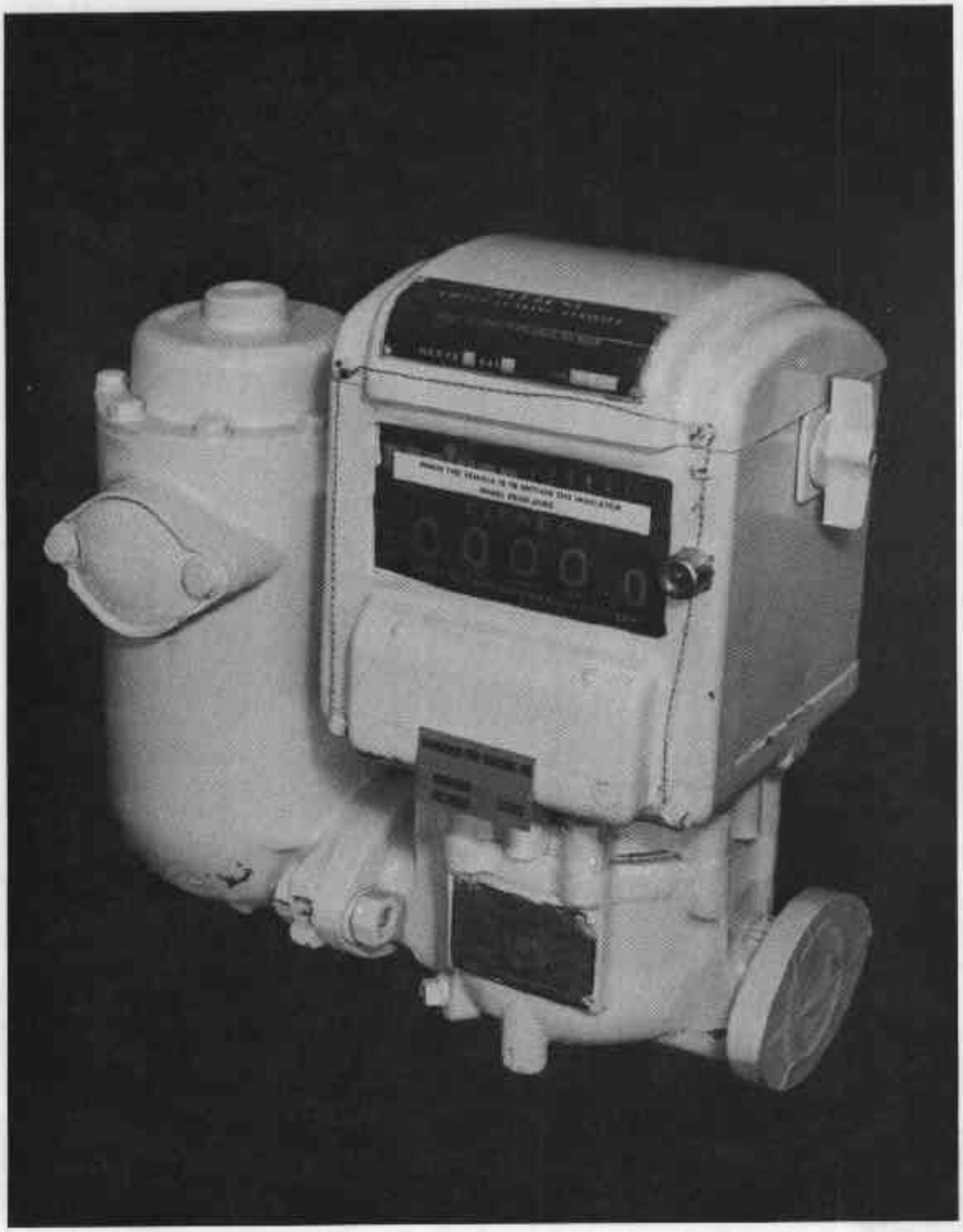
FIGURE 5/6H/9 - 2



Neptune Meter with Type 443 Indicator and
Ticket Printer

24/3/78

Anti-drain Valve with Swivel Coupling



Neptune Meter with Type 441 Indicator

24/3/78