NATIONAL STANDARDS COMMISSION

WEIGHTS & MEASURES (PATTERNS OF INSTRUMENTS) REGULATIONS

REGULATION 9

SUPPLEMENTARY CERTIFICATE OF APPROVAL No S146

This is to certify that an approval has been granted by the Commission that the pattern of the

Smith Model ATC Temperature Compensator For Liquid Measuring Systems

submitted by Kelvinator Australia Pty Ltd
Petroleum Equipment Division
29 Anzac Highway
Keswick, South Australia, 5035

is suitable for use for trade, when connected to any Commission-approved Smith flowmeter.

The approval is subject to review on or after 1/4/88.

Instruments incorporating a temperature compensator purporting to comply with this approval shall be marked NSC No S146 in addition to the approval number of the instrument.

Conditions of Approval

1. The maximum speed of the meter is 275 r/min.
2. The compensator shall only be connected to a meter measuring petroleum products other than liquefied gases.
3. The compensator should be used over the temperature range -15°C to +65°C.

   When used over other temperature ranges, the compensator must be tested at approximately 6-monthly intervals and the results forwarded to the Commission.
4. When the compensator is used with liquids with density between 580 and 610 kg/m^3, it must be tested at approximately 6-monthly intervals and the results forwarded to the Commission.

Signed

Executive Director

Descriptive Advice

Pattern: approved 17/2/83

. A Smith model ATC temperature compensator for use with liquid measuring systems.

Technical Schedule No S146 dated 28/3/83 describes the pattern.

Filing Advice

The documentation for this approval comprises:

Certificate of Approval No S146 dated 28/3/83
Technical Schedule No S146 dated 28/3/83
Test Procedure No S146 dated 28/3/83
Figures 1 to 4 dated 28/3/83.

28/3/83

NATIONAL STANDARDS COMMISSION

TECHNICAL SCHEDULE No S146

Pattern: Smith Model ATC Temperature Compensator For Liquid Measuring Systems.

Submittor: Kelvinator Australia Pty Ltd
Petroleum Equipment Division
29 Anzac Highway
Keswick, South Australia, 5035.

1. Description of Pattern

1.1

The model ATG temperature compensator (Figures 1 to 3) consists of a double overriding clutch type calibrator in conjunction with a bulb and bellows type thermal system, to automatically correct the gross metered volume for a change in product temperature, back to a base temperature of 15°C. The product coefficient of expansion (C of E) is set by pinning the eccentric arm in the calibrator (see Figure 3); the greater the eccentricity the greater the overdrive (correction) in the calibrator.

Each temperature compensator is drilled for a specific C of E and can only be used for a product which has that C of E value.

The range of densities for which this model should be used is 610 to 1075 kg/m^3; the compensator may only be used for liquids with density between 580 and 610 kg/m^3 in accordance with Condition of Approval No 4.

The compensator should be used over the temperature range -15°C to +65°C; it may be used over other temperature ranges only in accordance with Condition of Approval No 3.

1.2 Sealing

1.2.1

The temperature compensator is sealed to the meter body as shown in Figure 4 or by a similar method.

1.2.2

The meter calibrator dial housing, the calibrator housing, and the bellows spring load assembly are sealed as shown in Figure 4 or by a similar method.

1.2.3

A data plate containing all the relevant markings (see 1.3) is sealed to the calibrator.

1.3 Marking

As the compensator is unable to carry a plate large enough to contain all the required markings, a data plate is sealed to the calibrator.

This data plate is marked with the following:

Manufacturer's name or mark	
Model number	
Serial number	
NSC approval number	NSC No S146
Maximum operating speed	275 r/min
Bulb temperature range in the form	min ...°C max ...°C
Density for which compensator is set	.....kg/m^3
Type and density of liquid being metered	... ... kg/m^3
Compensated base temperature	15°C

In addition, the reading face is marked with the compensated base temperature of 15°C.

TEST PROCEDURE No S146

The following test procedure should be carried out in conjunction with any test procedures in the Technical Schedule for the instrument to which the pattern is connected, as appropriate.

If possible, tests should be conducted for at least two liquid temperatures, one in the lower 30% of the range and the other in the upper half of the range.

The temperature compensator should be installed with provision for fitting, either permanently or during testing, an uncompensated indicator. Hence, using the compensated and uncompensated indications, the meter errors and temperature compensated errors may be determined separately.

2. Meter Test Without Temperature Compensation

Maximum Permissible Error $\pm$0.3% of the delivered volume.

(i) Carry out at least 3 runs into the prover at the normal flow rate at which the meter is used.

(ii) Repeat the above test at the minimum flow rate of the meter.

3. Meter Test With Temperature Compensation

Maximum Permissible Error $\pm$(0.5% + 0.02% per °C difference from 15°C) of the delivered volume.

(i) Carry out at least 3 runs into the prover at the normal flow rate. Read the temperature at the meter. Reduce the prover volume indication to its equivalent volume at 15°C using the temperature indicated at the meter and the appropriate table for the density of the liquid for which the meter temperature compensator is set.* Compare the calculated volume with the meter indicated volume.

These temperature compensator tests should include not less than 3 tests at any flow rate.

The above tests may be either gravimetric, volumetric, or by master meter.

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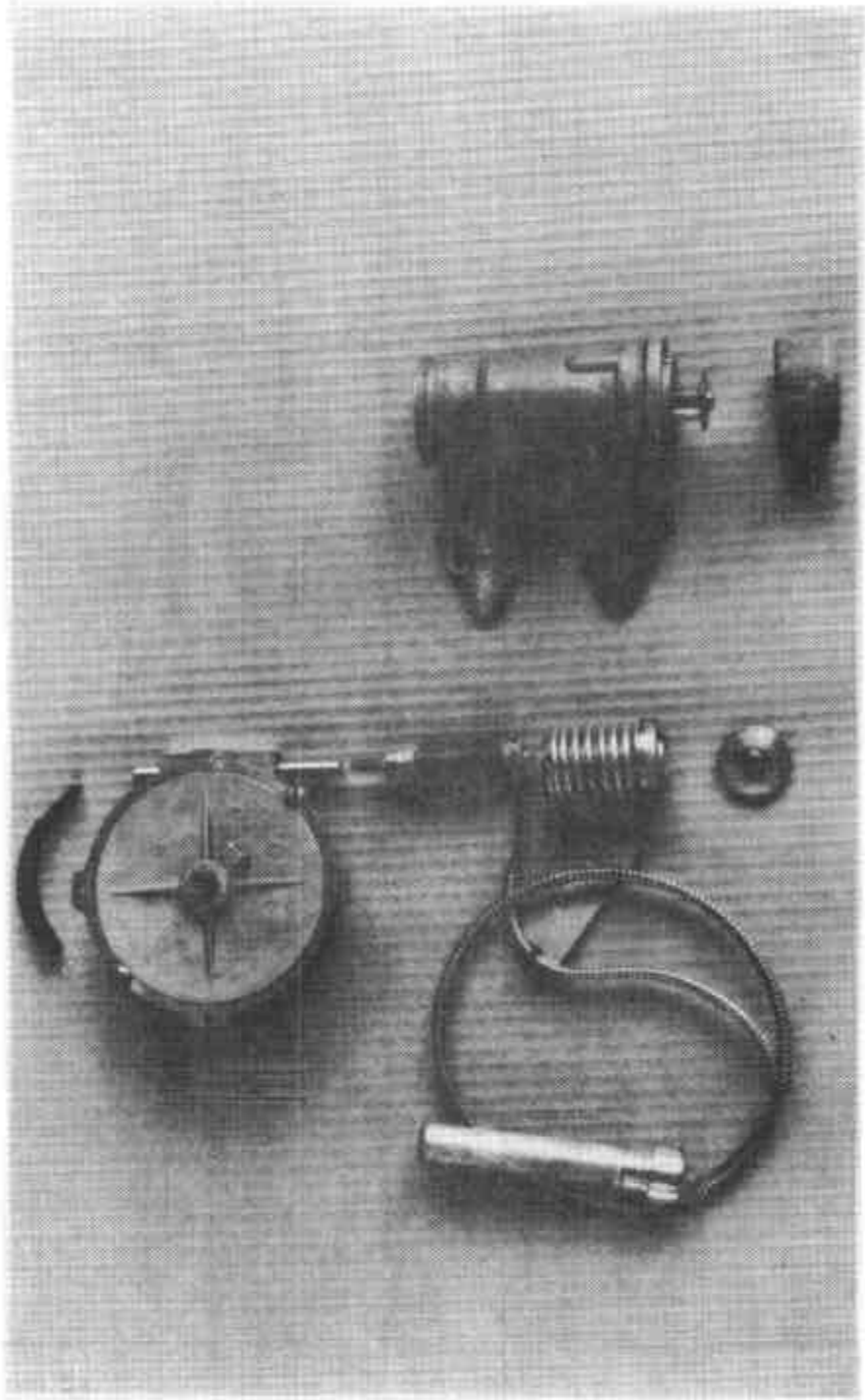
* API Standard 2540, Tables 54A, 54B and 54C for liquids with densities from 610.0 to 1076.0 kg/m^3 at 15°C.

FIGURE 5146 - 1



Smith Model ATC Temperature Compensator
Main Assembly And Temperature Bulb

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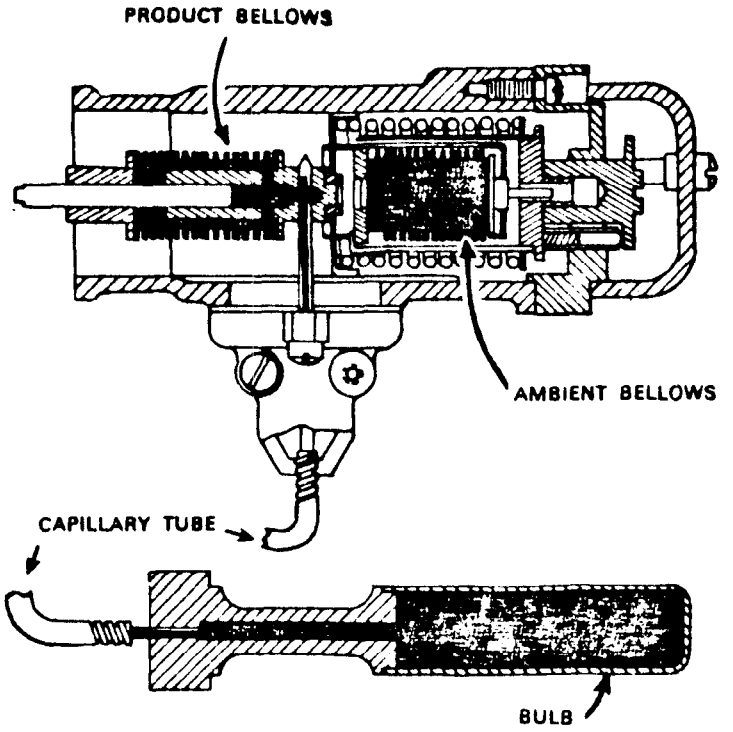
FIGURE S146 - 2



Schematic Of Model ATC

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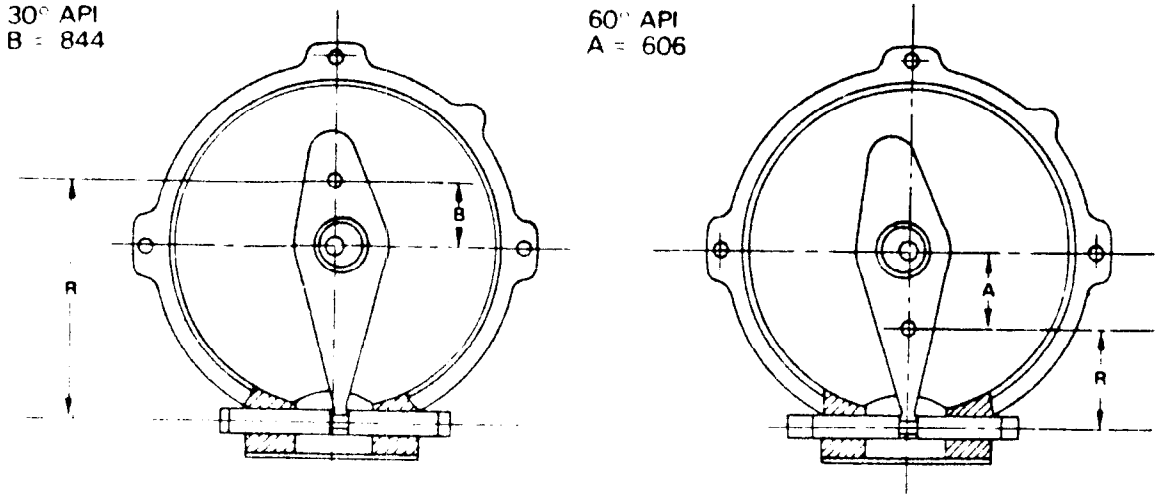
FIGURE S146 - 3



ATC Calibrator Drilling Dimensions

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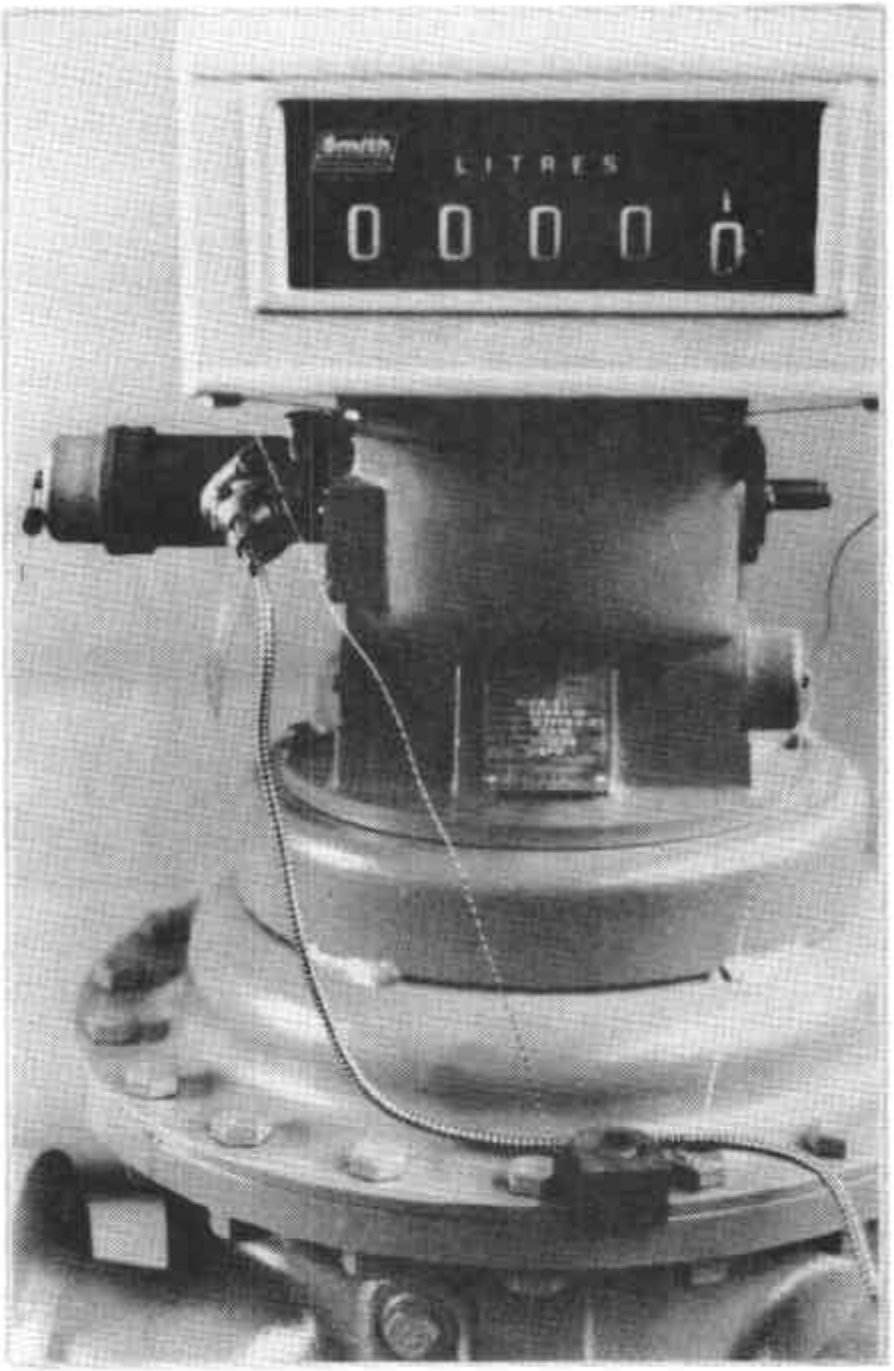
FIGURE S146 - 4



Sealing Of Temperature Compensator
And Compensator Calibrator

28/3/83