



Australian Government
National Measurement
Institute

Bradfield Road, West Lindfield NSW 2070

Cancellation
Supplementary Certificate of Approval No S170B

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

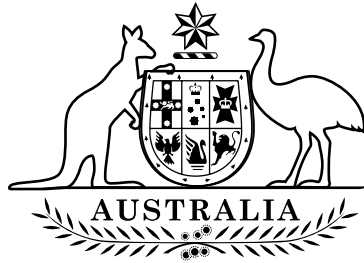
Acme Model 6000 Calculator/Indicator for Liquid-measuring Systems

submitted by Acme Fluid Handling Pty Ltd
 32 Greens Road
 Dandenong VIC 3175.

has been cancelled in respect of new instruments as from 1 September 2007.

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 'J. G. T.', is written over a dotted line.



National Standards Commission

Supplementary Certificate of Approval

No S170B

Issued under Regulation 63
of the
National Measurement Regulations 1999

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

Acme Model 6000 Calculator/Indicator for Liquid-measuring Systems

submitted by Acme Fluid Handling Pty Ltd
 32 Greens Road
 Dandenong VIC 3175.

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.

This Certificate is issued upon completion of a review of NSC approval No S170A.

CONDITIONS OF APPROVAL

This approval becomes subject to review on 1 August 2004, and then every 5 years thereafter.

Instruments purporting to comply with this approval shall be marked NSC No S170B and only by persons authorised by the submittor.

Instruments incorporating a component purporting to comply with this approval shall be marked NSC No S170B in addition to the approval number of the instrument.

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.

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

DESCRIPTIVE ADVICE

Pattern: approved 13 July 1999

- An Acme model 6000 calculator/indicator for liquid-measuring systems.

Variant: approved 13 July 1999

1. With the volume conversion for temperature facility enabled.

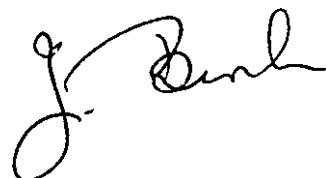
Technical Schedule No S170B describes the pattern and variant 1.

FILING ADVICE

The documentation for this approval comprises:

Supplementary Certificate of Approval No S170B dated 10 January 2000
Technical Schedule No S170B dated 10 January 2000 (incl. Test
Procedure)
Figures 1 and 2 dated 10 January 2000

Signed and sealed 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.



TECHNICAL SCHEDULE No S170B

Pattern: Acme Model 6000 Calculator/Indicator for Liquid-measuring Systems.

Submitter: Acme Fluid Handling Pty Ltd
32 Greens Road
Dandenong VIC 3175.

1. Description of Pattern

An Acme model 6000 calculator/indicator (Figure 1) for use in liquid-measuring systems incorporating Commission-approved measurement transducers approved for accuracy classes 0.5 and 1.0. The calculator/indicator incorporates the following facilities that can be enabled:

- linearity correction;
- batch pre-set; and
- temperature conversion (variant 1).

The calculator/indicator has two output sockets for the connection of auxiliary devices such as printer(s), and/or a computer for retrieving data from the indicator.

1.1 Display

The calculator/indicator has a liquid crystal display. A display check function can be initiated by pressing the TEST button, which causes all segments to turn on and then after 5 seconds the indication will return to the last volume delivered.

- (i) Volume (resettable) programmable in 0.1 L or 1 L increments as follows:
99999.9 in 0.1 L increments rolling over to whole litres and incrementing in 1 L increments to a maximum reading of 999999 L.
- (ii) Totaliser: 999999 in 1 L or 10 L increments.

1.2 Set-up Functions

The following functions are accessed by pressing the calibration switch situated at the back of the indicator and concealed by a cover fixed by a sealed screw.

- Density setting
- Reset of totals
- k-factor
- Linearity factors
- Temperature calibration (variant 1)
- Temperature conversion product selection (variant 1)
- Vehicle identification number

1.3 Linearity Correction Facility

The k-factor can be set within the range 0.0001 to 50,000 pulses/litre (p/L). When the linearity correction facility is enabled up to 10 k-factors can be entered as a function of frequency in the range 0 to 2.5 kHz generated by the measurement transducer.

1.4 Batch Pre-set Facility

The batch pre-set can be changed by first pressing the DISPLAY button; the word PRESET will appear on the calculator/indicator followed by the current stored pre-set value. While the stored value is being displayed press the PRESET button; the calculator/indicator is now in edit mode and the pre-set value can be changed. Once the desired pre-set value is entered, press the DISPLAY button to exit the edit mode. The calculator/indicator will display the word SET indicating that the batch pre-set has changed. The maximum pre-set value is 99999.9 in 0.1 litre increments or 999999 in 1 litre increments.

The pre-set value is not for trade use.

1.5 Printer

The calculator/indicator may be connected to an Epson model TM 295 printer, for providing the delivery details and the manually-entered density for which the conversion device is set. If printer option is enabled and printer runs out of paper, "error 24" is displayed.

1.6 Power Supply

The instrument operates with either 11.5 or 28.5 volts DC supply. The indication is retained on power failure. The totaliser value is stored in the non-volatile memory. When power is restored if connected, the printer will automatically print the last delivered volume.

1.7 Checking Facilities

The calculator/indicator accepts and checks the dual output signal from a measurement transducer and displays "error 13" when a fault is detected. Also, it checks the range of temperature and density, in which case "error 12" is displayed when a fault is detected.

1.8 Pulse Generator

The calculator/indicator is approved for use with an Acme model EPU 200 pulse generator or an Acme model VTM 150 turbine meter as described in the documentation of NSC approvals Nos S189B and 10/2/6, respectively, or any other compatible Commission-approved measurement transducer.

1.9 Verification/Certification

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

1.10 Sealing Provision

Provision is made for the calibration adjustments to be sealed by means of a cover fixed by a sealed screw at the rear of the indicator (Figure 2).

1.11 Markings

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

Manufacturer's name or mark	Acme Fluid Handling
Model number
Serial number
Accuracy class
Approval number	NSC No S170B
Year of manufacture
Maximum temperature of the liquid	T_{max} *
Minimum temperature of the liquid	T_{min} *
Operating (air) temperature range	-10 to 50°C

When the temperature conversion device (variant 1) is activated, the indicator reading face shall be marked "Reference temperature 15°C" or "Litres at 15°C".

* Required for anhydrous ammonia (refer to variant 1).

2. Description of Variant 1

With the electronic volume conversion for temperature facility enabled to convert the measured volume to volume at 15°C (or mass for anhydrous ammonia) for the following products:

- Liquefied petroleum gas with a density between 0.500 and 0.600 kg/L at 15°C in steps of 0.005 kg/L, based on ASTM-IP-API Petroleum Measurement Tables, metric editions, Table 54 for LPG. The liquid temperature range is -10 to 50°C.
- Generalised products with a density range from 0.660 to 1.076 kg/L at 15°C, in steps of 0.001 kg/L, based on ASTM-IP-API Petroleum Measurement Tables, metric editions, Table 54B for Generalised products. The liquid temperature range is -10 to 50°C.

- Anhydrous ammonia with a density of 0.6175 kg/L at 15°C. The indicator can be configured to indicate in volume (L) or mass (kg). The liquid temperature range is 0 to 40°C. The volume conversion factors for temperature and the density applicable to the measurement are given in Tables 1 and 2.

The indicator is also equipped for using a coefficient of expansion in the range 0.000486 to 0.001674/°C, based on ASTM-IP-API Petroleum Measurement Tables, metric editions, Table 54C.

A printer is required for this variant to print the set density if the density can be changed by the operator via the front panel. Where the instrument is set-up so that the set density is sealed, a printer is not mandatory.

TEST PROCEDURE

Instruments should be tested in accordance with any tests included in the approval documentation for the system in which the pattern is fitted, and in accordance with any relevant tests specified in the Inspector's Handbook.

The maximum permissible errors applicable are those specified below and those specified for the flowmetering system in which the pattern is fitted, as stated in the approval documentation for the system.

For checking the linearity correction facility, refer to the operating manual.

Recommended Procedure For Systems With Volume Conversion Facility Enabled.

1. Carry out not less than three deliveries.
2. Record the displayed volume at 15°C (converted volume), and provided that the DISPLAY feature has been enabled, use the DISPLAY button to view and record the following:
 - volume at operating conditions (i.e. the unconverted volume);
 - density setting; and
 - average temperature of the liquid.
3. Use the appropriate volume conversion for temperature tables and apply the conversion factor to the displayed unconverted volume to obtain the calculated converted volume.
4. Check that the density setting is within ± 0.001 kg/L of the density measured by a reference hydrometer for accuracy class 0.5 applications, and ± 0.002 kg/L for class 1.0 applications.

5. Check that the displayed average temperature of liquid is within $\pm 0.5^{\circ}\text{C}$ of the temperature measured by a reference thermometer (applicable to both accuracy class 0.5 and class 1.0 applications).
6. Check that the converted volume displayed by the calculator/indicator is within $\pm 0.4\%$ for accuracy class 1.0 applications, and $\pm 0.2\%$ for class 0.5 applications, of the calculated converted volume.

TABLE 1 — ANHYDROUS AMMONIA
Conversion Factors to 15°C

Degrees C	0	0.2	0.4	0.6	0.8
0	1.0341	1.0336	1.0332	1.0327	1.0323
1	1.0318	1.0314	1.0309	1.0305	1.0301
2	1.0296	1.0292	1.0287	1.0283	1.0278
3	1.0274	1.0269	1.0265	1.0260	1.0256
4	1.0252	1.0247	1.0243	1.0238	1.0234
5	1.0229	1.0225	1.0220	1.0216	1.0211
6	1.0207	1.0202	1.0197	1.0193	1.0188
7	1.0184	1.0179	1.0175	1.0170	1.0166
8	1.0161	1.0157	1.0152	1.0148	1.0143
9	1.0138	1.0134	1.0129	1.0125	1.0120
10	1.0116	1.0111	1.0106	1.0102	1.0097
11	1.0093	1.0088	1.0083	1.0079	1.0074
12	1.0070	1.0065	1.0060	1.0056	1.0051
13	1.0047	1.0042	1.0037	1.0033	1.0028
14	1.0023	1.0019	1.0014	1.0009	1.0005
15	1.0000	0.9995	0.9991	0.9986	0.9981
16	0.9977	0.9972	0.9967	0.9963	0.9958
17	0.9953	0.9948	0.9944	0.9939	0.9934
18	0.9930	0.9925	0.9920	0.9915	0.9911
19	0.9906	0.9901	0.9896	0.9892	0.9887
20	0.9882	0.9877	0.9873	0.9868	0.9863
21	0.9858	0.9853	0.9849	0.9844	0.9839
22	0.9834	0.9829	0.9825	0.9820	0.9815
23	0.9810	0.9805	0.9801	0.9796	0.9791
24	0.9786	0.9781	0.9776	0.9771	0.9767
25	0.9762	0.9757	0.9752	0.9747	0.9742
26	0.9737	0.9732	0.9728	0.9723	0.9718
27	0.9713	0.9708	0.9703	0.9698	0.9693
28	0.9688	0.9683	0.9678	0.9673	0.9668
29	0.9664	0.9659	0.9654	0.9649	0.9644
30	0.9639	0.9634	0.9629	0.9624	0.9619
31	0.9614	0.9609	0.9604	0.9599	0.9594
32	0.9589	0.9584	0.9579	0.9574	0.9569
33	0.9563	0.9558	0.9553	0.9548	0.9543
34	0.9538	0.9533	0.9528	0.9523	0.9518
35	0.9513	0.9508	0.9503	0.9497	0.9492
36	0.9487	0.9482	0.9477	0.9472	0.9467
37	0.9461	0.9456	0.9451	0.9446	0.9441
38	0.9436	0.9430	0.9425	0.9420	0.9415
39	0.9410	0.9404	0.9399	0.9394	0.9389
40	0.9384				

TABLE 2 — ANHYDROUS AMMONIA
Density in kg/m³

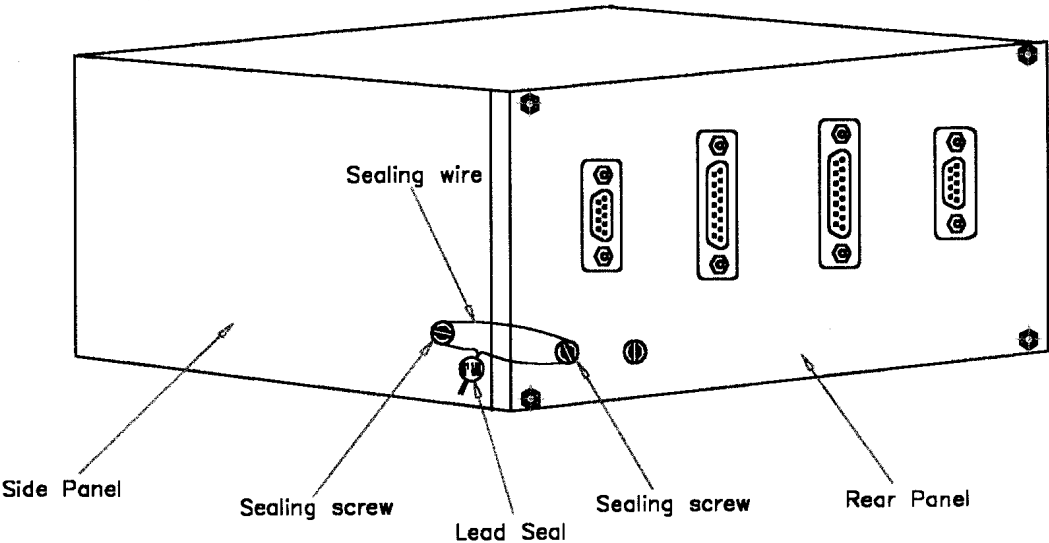
Degrees C	0	0.2	0.4	0.6	0.8
0	638.6	638.3	638.0	637.7	637.5
1	637.2	636.9	636.7	636.4	636.1
2	635.8	635.6	635.3	635.0	634.7
3	634.5	634.2	633.9	633.6	633.3
4	633.1	632.8	632.5	632.2	632.0
5	631.7	631.4	631.1	630.9	630.6
6	630.3	630.0	629.7	629.5	629.2
7	628.9	628.6	628.3	628.1	627.8
8	627.5	627.2	626.9	626.7	626.4
9	626.1	625.8	625.5	625.2	625.0
10	624.7	624.4	624.1	623.8	623.5
11	623.3	623.0	622.7	622.4	622.1
12	621.8	621.6	621.3	621.0	620.7
13	620.4	620.1	619.8	619.6	619.3
14	619.0	618.7	618.4	618.1	617.8
15	617.5	617.3	617.0	616.7	616.4
16	616.1	615.8	615.5	615.2	614.9
17	614.6	614.4	614.1	613.8	613.5
18	613.2	612.9	612.6	612.3	612.0
19	611.7	611.4	611.1	610.8	610.6
20	610.3	610.0	609.7	609.4	609.1
21	608.8	608.5	608.2	607.9	607.6
22	607.3	607.0	606.7	606.4	606.1
23	605.8	605.5	605.2	604.9	604.6
24	604.3	604.0	603.7	603.4	603.1
25	602.8	602.5	602.2	601.9	601.6
26	601.3	601.0	600.7	600.4	600.1
27	599.8	599.5	599.2	598.9	598.6
28	598.3	598.0	597.7	597.4	597.1
29	596.8	596.5	596.1	595.8	595.5
30	595.2	594.9	594.6	594.3	594.0
31	593.7	593.4	593.1	592.8	592.4
32	592.1	591.8	591.5	591.2	590.9
33	590.6	590.3	590.0	589.6	589.3
34	589.0	588.7	588.4	588.1	587.8
35	587.4	587.1	586.8	586.5	586.2
36	585.9	585.6	585.2	584.9	584.6
37	584.3	584.0	583.6	583.3	583.0
38	582.7	582.4	582.0	581.7	581.4
39	581.1	580.8	580.4	580.1	579.8
40	579.5				

FIGURE S170B - 1



Acme Model 6000 Calculator/Indicator

FIGURE S170B - 2



Typical Sealing Method