

# National Standards Commission



## General Certificate of Approval No 9/0/B

Issued under Regulation 9  
of the  
National Measurement (Patterns of Instruments) Regulations

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

Vehicle Tanks of Capacities 0.5 to 105 kilolitres.

This Certificate is issued upon completion of a review of NSC approval No 9/0/A.

Signed and sealed by a person authorised under Regulation 9 of the National Measurement (Patterns of Instruments) Regulations to exercise the powers and functions of the Commission under this Regulation.

A handwritten signature in dark ink, appearing to read "J. Birch".

### CONDITIONS OF APPROVAL

This approval is subject to review on or after 1/2/95.

Instruments purporting to comply with this approval shall be marked NSC No 9/0/B.

It is the responsibility of the person presenting instruments for verification to ensure that all instruments marked with this approval number are constructed in accordance with this Certificate of Approval and its Technical Schedule. Failure to comply with this Condition may attract penalties under Section 19B of the National Measurement Act.

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

### DESCRIPTIVE ADVICE

Pattern: approved 22/1/90

- A measuring instrument in the form of a tank or a compartment of a tank of a capacity from 0.5 kilolitres to 105 kilolitres and fitted to or forming part of a vehicle.

Technical Schedule No 9/0/B describes the pattern.

### FILING ADVICE

The documentation for this approval comprises:

General Certificate of Approval No 9/0/B dated 21/5/90  
Technical Schedule No 9/0/B dated 21/5/90 (Incl. Test Procedure)  
Figures 1 to 5 dated 21/5/90



# National Standards Commission

## TECHNICAL SCHEDULE No 9/0/B

### 1. Description of Pattern

The pattern is a measuring instrument in the form of a non-pressurised tank or compartment of a tank, of a capacity from 0.5 kilolitres to 105 kilolitres, fitted to or forming part of a vehicle, and which incorporates either a capacity mark or a dipstick as a measure for the volume of the contents.

#### 1.1 Tank Design

##### 1.1.1 Rigidity

- (i) The vehicle tank shall be constructed and supported in such a way that it is rigid and free from deformation under normal conditions of transport and use.
- (ii) Where a vehicle tank is divided into two or more compartments, the capacity of any compartment shall not vary by more than 0.25 scale interval if any adjacent compartment is empty or full.

##### 1.1.2 Inspection Opening and Cover

Every tank shall have an inspection opening of sufficient size to facilitate examination of the inside of the tank. When the cover of the inspection opening is fitted with a diptube or dipstick guide which is not centrally located in the cover, it shall only be possible to fit the cover in the opening in one position.

##### 1.1.3 Internal Venting

- (i) Every tank shall be provided with effective venting to prevent the formation of vapour pockets under all conditions of levelling which can be reasonably anticipated.
- (ii) The top of the fill pipe, and the internal skirt surrounding the inspection opening shall each be vented into the tank by a hole of at least 10 mm diameter.
- (iii) The diptube or dipstick guide shall be vented from its uppermost extremity over not less than 90% of its length by a continuous slot or a series of overlapping slots not less than 6 mm wide.
- (iv) Baffle plates shall be so constructed as to prevent the trapping of vapour or liquid.

##### 1.1.4 Sump

No sump shall be permitted to project above the bottom of the tank, except that a retaining weir is permitted for tanks intended only for aviation fuel.

## **1.2 Piping Design**

### **1.2.1 Tanks with Manifold**

Where a vehicle tank with two or more compartments is constructed to discharge through a manifold common to two or more compartments, means shall be provided to ensure that either:

- (i) Liquid can flow through the outlet pipe from only one compartment at a time, and that flow of liquid from one compartment to another is automatically prevented; or that
- (ii) All compartments connected to a common manifold discharge simultaneously.

### **1.2.2 Tanks without Manifolds**

Where a vehicle tank with two or more compartments is not constructed to discharge through a manifold in accordance with clause 1.2.1, the following notice in letters not less than 4 mm high shall be affixed adjacent to the discharge valve:

"THIS VEHICLE TANK IS NOT APPROVED AS A MEASURING  
INSTRUMENT FOR DISCHARGE THROUGH A MANIFOLD"

### **1.2.3 Outlet Pipe**

The outlet pipe shall be sloped to the discharge valve at a gradient of not less than 1 in 30 to a horizontal plane to ensure complete drainage of the measured quantity when the vehicle is standing unladen on a level surface.

## **1.3 Calibration**

### **1.3.1 Maximum Permissible Error at Verification/Certification**

The maximum permissible error applicable to vehicle tanks provided with a dipstick is  $\pm 0.5$  scale interval for each scale mark on the dipstick.

The maximum permissible error applicable to tanks provided with a capacity mark is  $\pm 0.2\%$  of the indicated volume (refer clause 1.5).

### **1.3.2 Exclusion of Unmeasured Liquid**

Where an aviation fuel tank is constructed so that a quantity of liquid is retained by a weir after a complete delivery, the calibration shall exclude that quantity.

### **1.3.3 Effect of Internal Valve**

Where a compartment of a tank (except a rail tank or bitumen tank) is fitted with an Internal valve as well as an external valve on the discharge end of the outlet pipe, the compartment shall be calibrated with the Internal valve OPEN, and shall carry a notice to that effect. (refer clause 4.2 Notices)

For rail tanks and bitumen tanks with an Internal valve only or an Internal valve and an external valve on the discharge end of the outlet pipe, the tanks shall be calibrated with the Internal valve CLOSED, and shall carry a notice to that effect. (refer clause 4.2 Notices)

## **1.4 Dipstick**

### **1.4.1 General**

The measuring device shall be such that correct and reproducible readings are obtained by the following procedure.

- (i) The dipstick shall initially be clean and dry. Allow sufficient time for the surface of the liquid to settle before inserting the dipstick. The dipstick shall then be gently inserted vertically in its prescribed position, special care being taken during the last 10 mm of movement to prevent ripples.
- (ii) After reaching its correct lowest position as prescribed above, and while still vertical, the dipstick shall be gently but promptly removed from the liquid.
- (iii) The position of the line of demarcation between the wet and dry parts of the dipstick shall then be read.

### **1.4.2 Design**

- (i) The dipstick shall be of rigid construction and made of metal of solid, hollow or T-shape cross-section.
- (ii) The bottom of a bottom-datum dipstick (Figure 1) shall be fitted with a solid rigid foot with a bearing area not less than the area bounded by straight lines joining the extremities of the dipstick cross-section.
- (iii) A top-datum dipstick (Figure 2) shall be rigidly fitted with a cross-piece with its bottom surface at right angles to the dipstick.

#### 1.4.2 Graduation Requirements

- (i) The dipstick shall be graduated for use with one compartment only.
- (ii) The scale spacing shall be not less than 3 mm.
- (iii) The arrangement and numbering of scale marks shall comply with NSC Document 105. (Typical examples are given in Figure 3)
- (iv) The scale interval shall be no greater than that given in the following Table.

MAXIMUM SCALE INTERVALS FOR DIPSTICKS

Capacity of Tank	Max Scale Interval
1 kL and under	5 litres
Over 1 kL but not over 2.5 kL	10 litres
Over 2.5 kL but not over 5 kL	20 litres
Over 5 kL but not over 12 kL	50 litres
Over 12 kL but not over 25 kL	100 litres
Over 25 kL but not over 50 kL	200 litres
Over 50 kL but not over 105 kL	500 litres

- (v) Where a tank is designed for dispensing the full load, but may be required to measure the returns (i.e. the quantity accumulated from the walls of the tank) the dipstick may be exempt from scale graduation marks between 10% and 75% of maximum capacity.
- (vi) Where a tank is designed for dispensing the full load, that is, not requiring the use of a dipstick for measurement of any contents remaining after a delivery, a top-datum dipstick may be exempt from scale graduation marks below 75% of maximum capacity.

#### 1.4.3 Marking

- (i) The dipstick shall be marked with the serial number of the vehicle tank and the compartment (if any) with which it is to be used.
- (ii) A bottom-datum dipstick, when constructed to be removed from the diptube when not in use, shall have a clearly scribed mark passing around it, corresponding with the top of the diptube when the foot of the dipstick rests on the dip plate.
- (iii) A bottom-datum dipstick shall have a scribed line on one of its ungraduated sides equal to 150 mm  $\pm$  1 mm from the bottom of the dipstick, and shall have "REF 150 mm" legibly inscribed adjacent to the line (Figure 1).

- (iv) A top-datum dipstick shall have a scribed line on one of its ungraduated sides, equal to 150 mm  $\pm 1$  mm from the bottom surface of the cross-piece, and shall have "REF 150 mm" legibly inscribed adjacent to the line (Figure 2).

#### 1.4.4 Meniscus Effect

The dipstick shall be surface-treated such that the line of demarcation between the wet and dry parts of the dipstick corresponds with the volume of contents within the maximum permissible error ( $\pm 0.5$  scale interval) for all liquids intended to be measured.

#### 1.4.5 Dipstick Guide

The dipstick guide shall be located so that the dipstick passes through the centroid of the compartment of the tank.

- (i) Tanks with a bottom-datum dipstick shall have a diptube of not less than 70 mm and not more than 100 mm internal diameter.
- (ii) The guide on which a top-datum dipstick rests shall be parallel to the longitudinal axis of the tank; the guide shall prevent the dipstick from deviating more than 1 in 20 (approximately  $3^\circ$ ) from the line perpendicular to the longitudinal axis of the tank when the dipstick is in the measuring position.
- (iii) There shall be nothing in the diptube likely to obstruct the dipstick.
- (iv) The axis of the diptube or guide shall be within 25 mm of the point determined from Figure 4, and shall be perpendicular to the longitudinal axis of the tank.
- (v) Where a tank is so constructed that the dipstick may be accidentally inserted in the fill-pipe, either the diptube opening or a securely fixed plate adjacent to the diptube, shall be marked DIP in letters not less than 10 mm high raised not less than 1 mm above the surface.

#### 1.4.6 Dip Plate

A tank with a bottom-datum dipstick shall have a dip plate securely fixed to or forming part of the tank bottom such that correct and reproducible dipstick readings are ensured. The dip plate shall:

- (i) Cover the projected area of the diptube;
- (ii) Be  $90^\circ$  to the axis of the diptube, such that the difference between measurements from a plane at the top of the diptube and  $90^\circ$  to any part of the dip plate shall not exceed 1 mm; and
- (iii) Be not less than 5 mm thick and mounted such that the draining of the contents is not inhibited.

## **1.5 Capacity Marks**

Tanks which are not provided with a dipstick may have their capacity determined by a capacity mark located inside the neck of each inspection opening. The capacity mark shall be located within 25 mm of the point determined from Figure 4 (labelled "DIPTUBE"), and shall be parallel to the longitudinal axis of the tank.

### **1.5.1 Design**

The capacity mark shall consist of a clearly visible line not less than 100 mm in length.

### **1.5.2 Marking**

The capacity of the tank shall be marked adjacent to the capacity mark in letters and numerals not less than 10 mm high.

## **1.6 Tank Markings**

### **1.6.1 Nameplate**

Every vehicle tank shall have a nameplate bearing a verification stamping plug, the tank number, the approval number NSC No 9/0/B, and the manufacturer's name, riveted or welded to the tank in a position visible to a person standing on ground level. The tank number shall be not less than 10 mm high and the remaining letters and numbers not less than 4 mm high.

### **1.6.2 Notices**

(i) Every vehicle tank shall have the following notice:

"WARNING – REPAIRS OR ALTERATIONS TO PIPING, MANIFOLDS  
OR VALVES MUST NOT BE MADE WITHOUT PRIOR  
OBLITERATION OF VERIFICATION AND DATE STAMPS."

(ii) Every vehicle tank which is fitted with an internal valve shall bear one of the following notices in accordance with clause 3.1.3:

"THIS TANK IS CALIBRATED WITH THE INTERNAL VALVE OPEN" or

"THIS TANK IS CALIBRATED WITH THE INTERNAL VALVE CLOSED"

(iii) The notices shall have letters not less than 4 mm high and be securely fixed adjacent to the outlet valves and clearly visible to a person attending an outlet valve.



### 1.6.3 Numbering

Where a vehicle tank is divided into two or more compartments:

- (i) Each compartment shall be numbered from front to rear on the body of the compartment adjacent to each inspection opening;
- (ii) Where the dip tube is attached to the inspection cover, the cover shall also be marked with the compartment number; and
- (iii) Each external valve shall be marked with the compartment number.

The numbers shall comprise welded digits not less than 15 mm high and raised not less than 1 mm above the surface, or engraved digits not less than 10 mm high on a securely fixed plate.

### TEST PROCEDURE

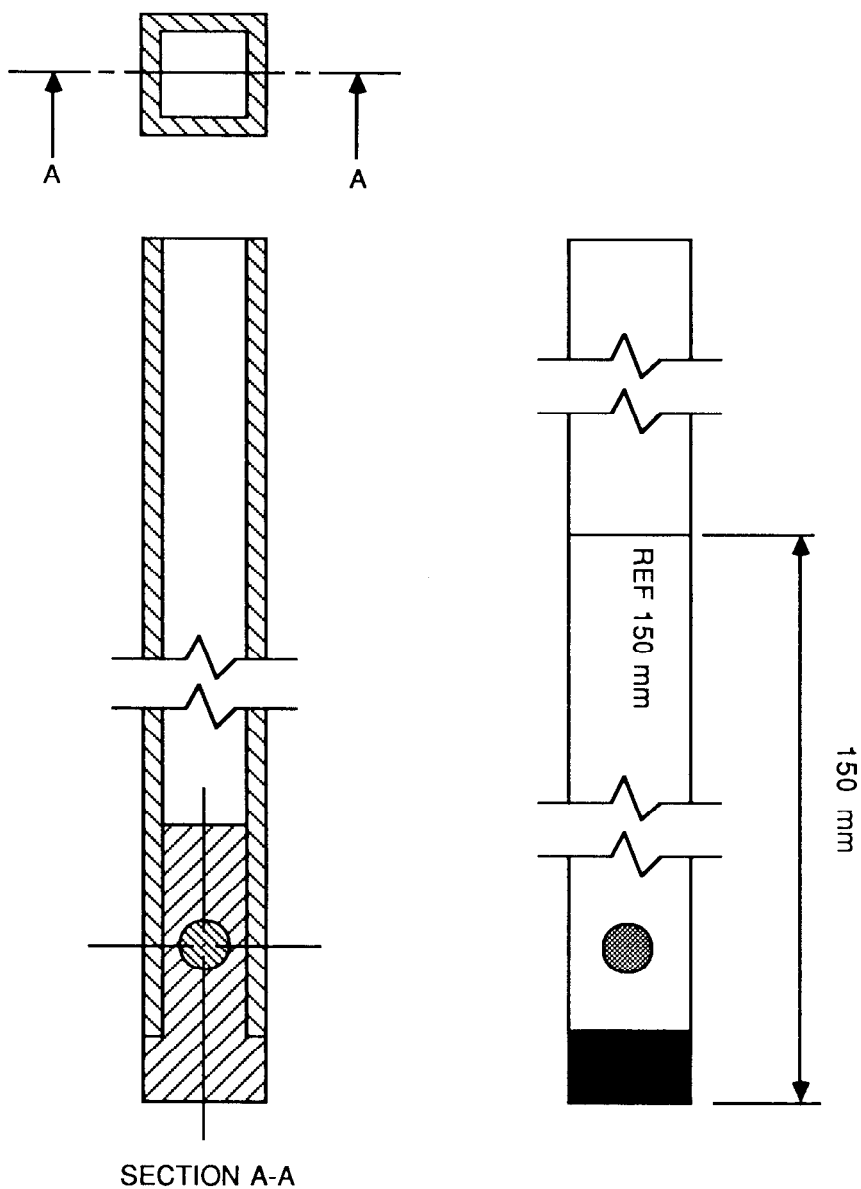
Instruments should be tested in accordance with any relevant tests specified in the Inspector's Handbook.

#### **Maximum Permissible Error at Verification/Certification**

The maximum permissible error applicable to tanks provided with a dipstick is  $\pm 0.5$  scale interval for each scale mark on the dipstick.

The maximum permissible error applicable to tanks provided with a capacity mark is  $\pm 0.2\%$  of the indicated volume.

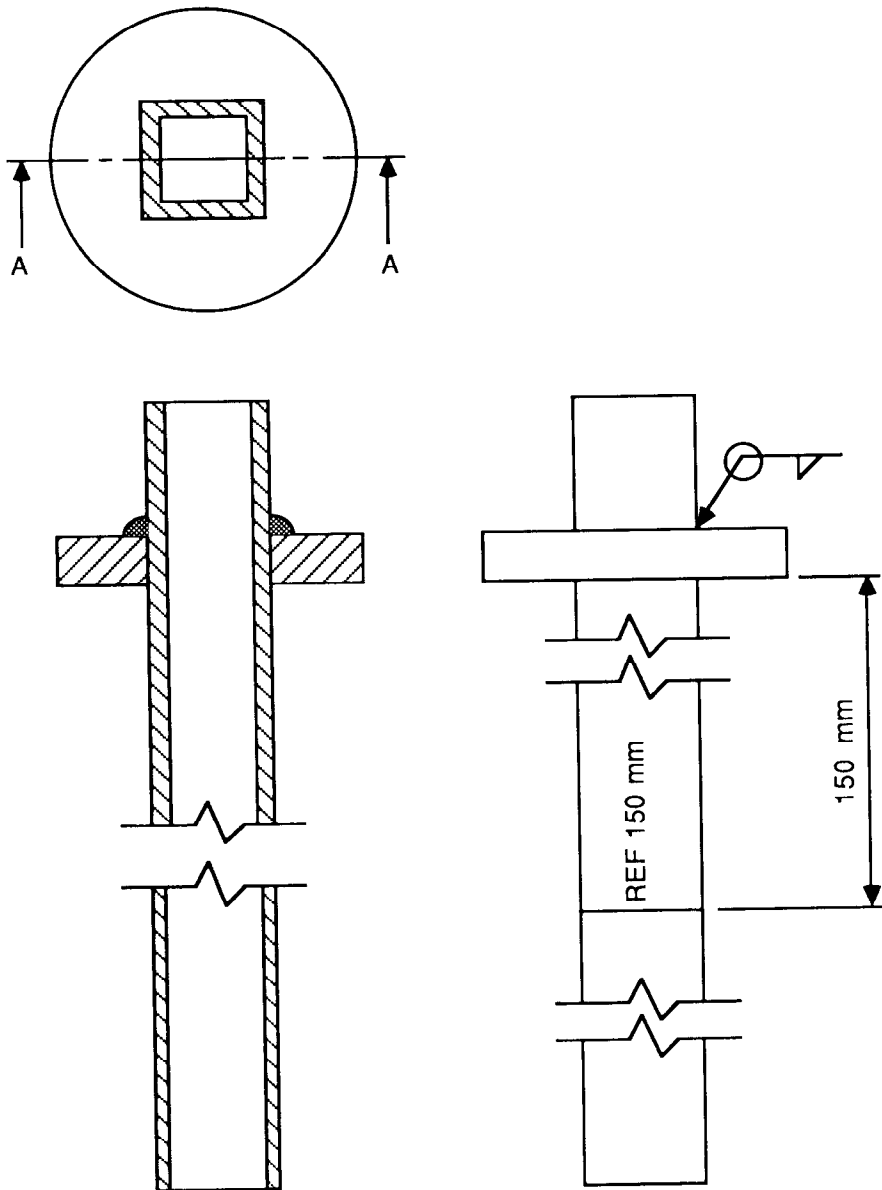
Figure 9/0/B - 1



Typical Bottom-datum Dipstick

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Figure 9/0/B - 2

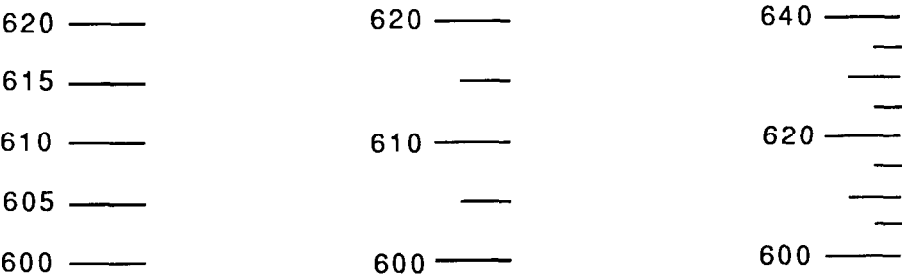


SECTION A-A

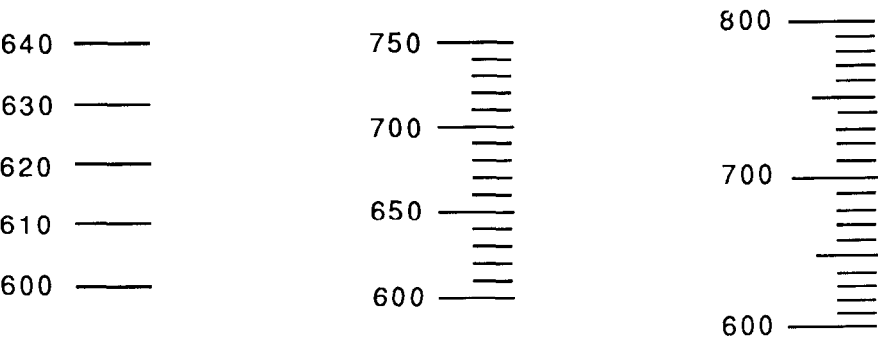
Typical Top-datum Dipstick

Figure 9/0/B - 3

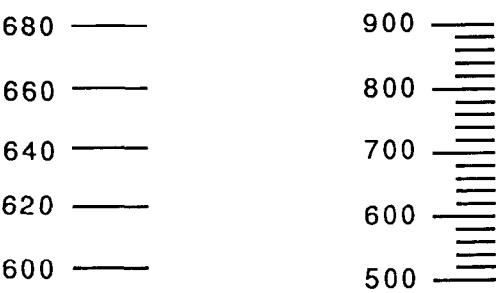
5 LITRE GRADUATIONS



10 LITRE GRADUATIONS

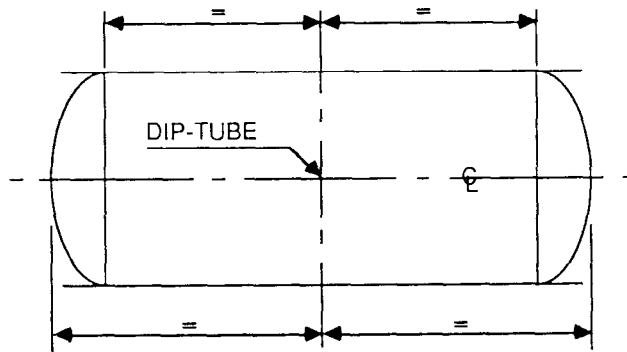


20 LITRE GRADUATIONS

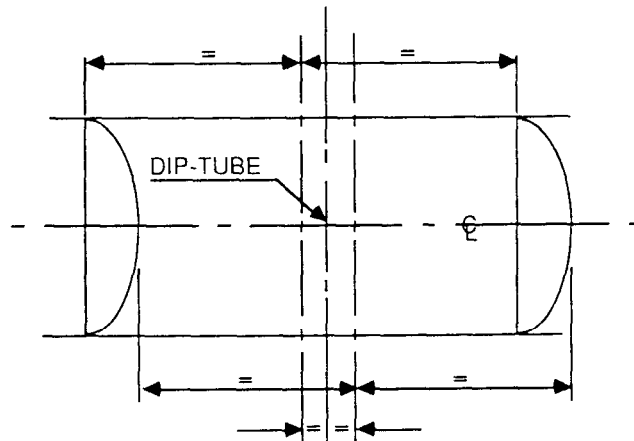


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Figure 9/0/B - 4



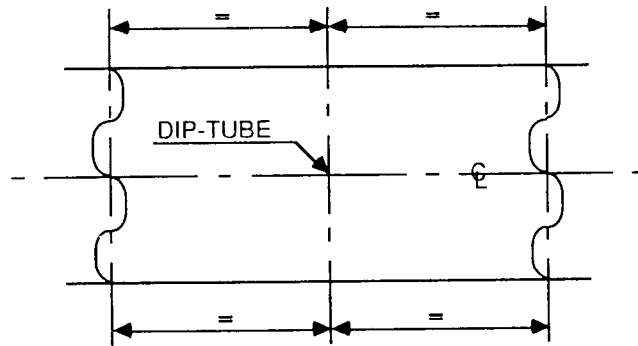
Symmetrical  
(horizontal cross-section through mid-height)



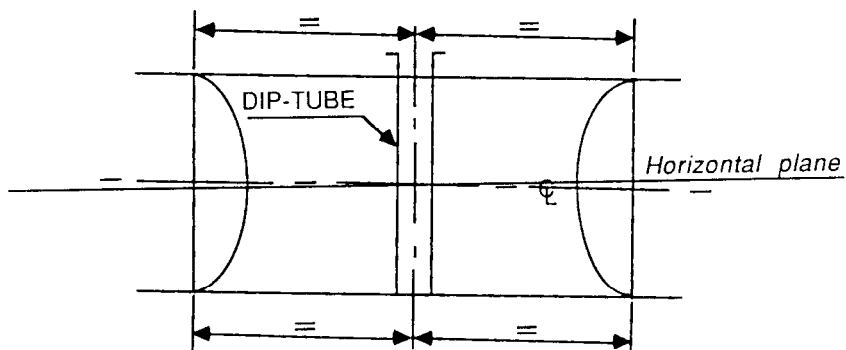
Non-symmetrical  
(horizontal cross-section through mid-height)

Location of Dip tube (or Capacity Mark) in Vehicle Tanks

Figure 9/0/B - 5



Corrugated  
(horizontal cross-section through mid-height)



Symmetrical (tilted)  
(vertical cross-section through centre of tank)

Location of Dip-tube (or Capacity Mark) in Vehicle Tanks