

British Standard

## Testing corrosion inhibiting, engine coolant concentrate ('antifreeze')

Part 1. Methods of test for determination of physical and chemical properties

### Section 1.3 Determination of freezing point

Essais du liquide de refroidissement anti-rouille du moteur (antigel)

Partie 1. Méthodes d'essai de détermination des propriétés physiques et chimiques

Section 1.3 Détermination du point de congélation

Prüfung von korrosionshemmendem Kühlmittelkonzentrat für Motoren (Frostschutzmittel)

Teil 1. Prüfverfahren zur Bestimmung der physikalischen und chemischen Eigenschaften

Abschnitt 1.3 Bestimmung des Gefrierpunkts

**NOTE.** It is recommended that this Section be read in conjunction with the information given in the 'General introduction', published separately as BS 5117 : Part 0.

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## 1 Scope

This Section of BS 5117 describes a method for the determination of the freezing point of solutions of engine coolant concentrate.

**NOTE 1.** The engine coolant concentrate is referred to hereafter as 'the product'.

**NOTE 2.** The method as described is intended for the determination of the freezing point of solutions prepared from the product as supplied but the procedure may be adapted for solutions obtained from engine cooling systems, test rigs, etc.

**NOTE 3.** The titles of the publications referred to in this standard are listed on the inside back page.

**Compliance with a British Standard does not of itself confer immunity from legal obligations.**

## 2 Principle

A test portion is cooled under specified conditions; a cooling graph is plotted from which is obtained the freezing point.

### 3 Reagents

**3.1 General.** The reagents used shall be of a recognized analytical grade. Water complying with BS 3978 shall be used throughout.

**3.2 Propan-2-ol.**

**3.3 Solid carbon dioxide.**

### 4 Apparatus

**4.1 General.** The apparatus described in 4.2 to 4.8 is required. The items described in 4.4 to 4.7 are shown in figure 1.

**4.2 One-mark volumetric flask,** of 100 mL capacity, complying with class A of BS 1792.

**4.3 Burette,** of 50 mL capacity, complying with class A of BS 846.

**4.4 Cooling bath,** consisting of a Dewar flask, capacity approximately 2 L, firmly mounted in a close fitting container and containing a pad of glass wool.

**4.5 Test portion holder,** consisting of an unevacuated, unsilvered Dewar flask, capacity 200 mL, fitted with a stopper through which are bored three holes. The central hole accommodates the thermometer (4.6), and the side holes permit the passage of the stirrer (4.7) and the seeding wire (4.8). The latter hole, 6 mm to 7 mm in diameter, is closed with a stopper when not in use.

**4.6 Thermometer,** designated A10C/100, complying with BS 593, mounted so that the tip of the bulb is about 10 mm from the base of the test portion holder (4.5).

**4.7 Vertically agitated stirrer,** mechanically operated, made of stainless steel wire 1.6 mm diameter, having five coils spaced so as to remain totally immersed in the test portion during the determination. Its action is such that it just clears the base of the test portion holder (4.5) at the bottom of its vertical stroke.

**4.8 Seeding wire,** made of stainless steel, by means of which small quantities of frozen test solution may be introduced into the test portion during the determination.

### 5 Sampling of the product and preparation of test solution

#### 5.1 Sampling

Take a representative sample of not less than 500 mL, preferably from previously unopened containers in which the product is normally offered for sale\*. Place the sample

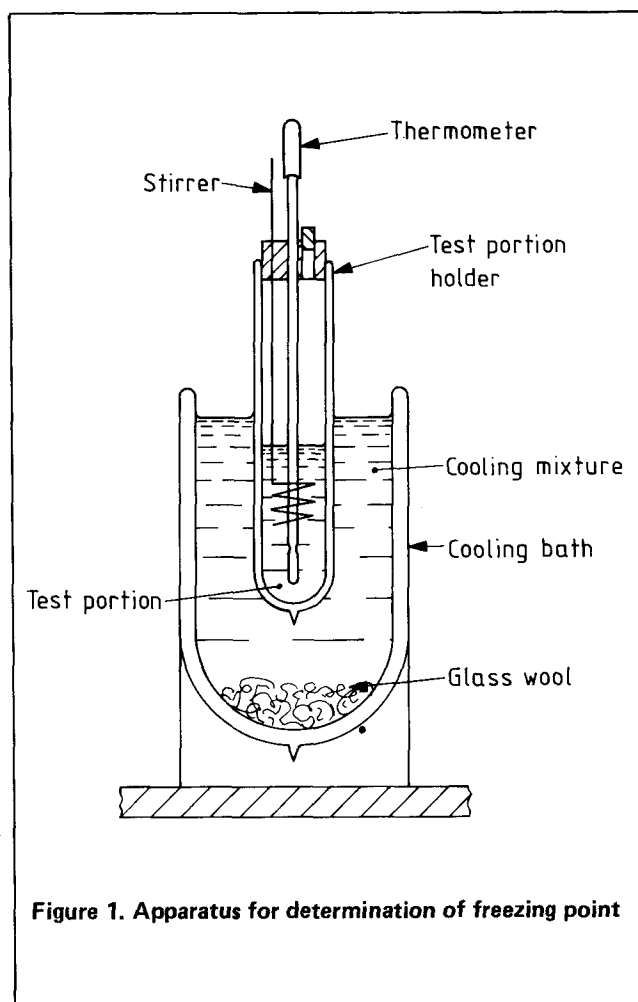


Figure 1. Apparatus for determination of freezing point

in clean, dry, stoppered glass bottles of a dark colour. Agitate all containers before sampling to ensure homogeneity of the contents. Where a batch of containers is to be sampled, it is essential that the number of containers sampled is not less than the cube root of the number of containers in the batch. Prepare the final sample by taking equal portions from each container sampled and mix them together thoroughly. Take care to ensure that any method used for sealing the sample does not cause contamination.

NOTE. A series of different tests may be carried out by using separate portions taken from one sample.

#### 5.2 Preparation of test solution

Prepare the test solution at 50 % (V/V) concentration, or as otherwise specified, as follows.

Using the burette (4.3) measure accurately the required volume of the sample into the one-mark volumetric flask (4.2) and make up to the mark with water. Stopper the flask and invert it several times to mix the solution.

\*See A.2 of BS 5117 : Part 0 : 1985 and clauses 4 and 5 of BS 3195 : Part 1 : 1978, for further guidance on sampling procedures and equipment.