BS 5117 : Section 1.4 : 1985

UDC 661.17 :621.43–715.4 :620.197.3

British Standard

Testing corrosion inhibiting, engine coolant concentrate ('antifeeze')

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

Section 1.4 Determination of foaming characteristics

Essais du liquide de refroidissement anti-rouille du moteur (antigel)
Partie 1. Méthodes d'essai de détermination des propriétés physiques et chimiques
Section 1.4 Détermination des propriétés de moussage

Prüfung von korrosionshemmendem Kühlmittelkonzentrat für Motoren (Frostschutzmittel)
Teil 1. Prüfverfahren zur Bestimmung der physikalischen und chemischen Eigenschaften
Abschnitt 1.4 Bestimmung der Schäumeeigneschaften

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.

Contents

1 Scope

This Section of BS 5117 describes a method for determination of foaming characteristics 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 foaming characteristics 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.

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2 Principle

A test portion is aerated under specified conditions and the volume of the foam produced and the time taken for the foam to collapse is measured.

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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 *Chromic-sulphuric acid mixture* or *suitable surfactant solution.* *

3.3 *Acetone.*

3.4 *Clean compressed air,* capable of being supplied at a rate of 1000 ± 50 mL/min.

4 Apparatus

4.1 *General.* The apparatus described in **4.2** to **4.11** is required. The items described in **4.4** to **4.9** are shown in figure 1.

4.2 *One-mark volumetric flask,* of 500 mL capacity, complying with class A of BS 1792.

4.3 *Burette,* of 100 mL capacity, complying with class A of BS 846.

4.4 *Measuring cylinder,* of 500 mL capacity, internal diameter 40 mm to 50 mm, made of heat resistant glass.

4.5 *Glass beaker,* of 5000 mL capacity.

4.6 *Gas distribution tube,* consisting of a tube, length 300 mm, fitted with a domed sintered glass bulb having an effective area equivalent to a flat plate of 20 mm diameter and maximum pore diameter 40 μm to 50 μm.†

4.7 *Three-way stopcock,* with inlet connected to the air supply and one outlet connected to the gas distribution tube (**4.6**) and the other vented to the atmosphere.

4.8 *Electric hot plate,* approximately 750 W.

4.9 *Thermometer,* designated F150C/76, complying with BS 593.

4.10 *A means of controlling the air flowrate at* 1000 ± 50 mL/min.

4.11 *Stopwatch,* reading to an accuracy of ± 0.2 s.

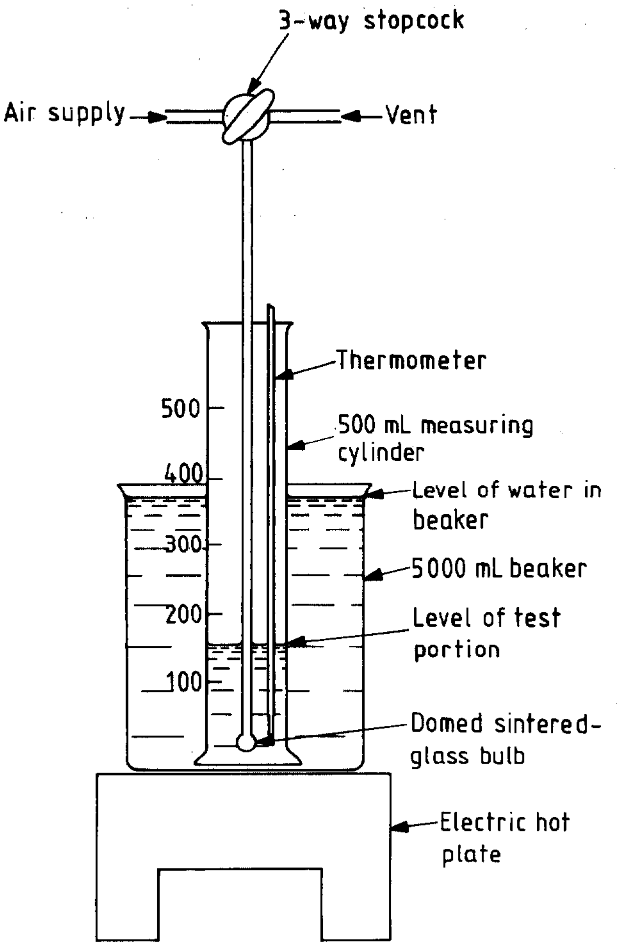

Figure 1. Apparatus for determination of foaming characteristics

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*Decon 90 has been found suitable.

†A 'Sintaglas' gas distribution tube No. GFD-750-050C, manufactured by A. Gallenkamp and Company Limited, has been found suitable.

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 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 $33\frac{1}{3}$ % (*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.

6 Procedure

Before carrying out the determination, thoroughly clean the measuring cylinder (**4.4**) and the gas distribution tube (**4.6**) successively with water, the chromic-sulphuric acid mixture or surfactant solution (**3.2**), water and acetone (**3.3**) alternately applying suction and pressure to the tube to ensure that the pores of the domed sintered glass bulb are thoroughly flushed with each liquid in turn. Dry the equipment in a current of clean air and rinse well with water.

Pour sufficient water into the beaker (**4.5**) to immerse the measuring cylinder (**4.4**) to above the 350 mL mark. Transfer 145 mL of the test solution (**5.2**) to the measuring cylinder and raise its temperature to 90 ± 2 °C by means of the electric hot plate (**4.8**). Immerse the gas distribution tube (**4.6**) so that the sintered glass bulb is at the bottom of the cylinder. Record the apparent volume of the test portion in the cylinder and pass in air (**3.4**) at a rate of 1000 ± 50 mL/min. Record the apparent combined volume of the foam and test portion after 5 min aeration, simultaneously shut off the air supply and vent the inlet tube to atmosphere by means of the three-way stopcock (**4.7**) and record the time, to an accuracy of ± 0.2 s, for the foam to collapse to the first appearance of an 'eye' on the surface of the test portion.

Carry out the entire procedure, including cleaning, in triplicate using a further test portion each time.

7 Expression of results

7.1 Volume of foam

The volume of foam produced, in mL, is given by the formula:

$$V_2 - V_1$$

where

V_1 is the apparent volume of the test portion with the distribution tube inserted (in mL);

V_2 is the apparent combined volume of the test portion and foam after aeration (in mL).

Report the result as the arithmetic mean of the three individual values determined.

7.2 Break time

The break time, expressed in seconds, is the time, after aeration, for the foam to collapse to the first appearance of an 'eye' on the surface of the test portion.

Report the result as the arithmetic mean of the three individual values determined.

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*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.

Publications referred to

BS 593	Laboratory thermometers
BS 846	Specification for burettes
BS 1792	Specification for one-mark volumetric flasks
BS 3978	Water for laboratory use
BS 3195	Methods for sampling petroleum products Part 1 Liquid hydrocarbons : manual sampling
BS 5117	Testing corrosion inhibiting, engine coolant concentrate ('antifreeze') Part 0 General introduction

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The Committees responsible for this British Standard are shown in Part 0.

The following BSI references relate to the work on this standard:
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Amendments issued since publication

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