

British Standard Methods of test for paints

Addendum No. 1. Notes for guidance on the operation of artificial weathering apparatus to BS 3900 : Part F3 : 1971

Méthodes d'essai des peintures

Additif no. 1. Guide au fonctionnement des appareils d'altération artificielle
conformes à la norme BS 3900 : Partie F3 : 1971

Prüfverfahren für Anstrichstoffe

Nachtrag Nr. 1. Hinweise zum Betrieb von Einrichtungen für künstliche
Bewitterung nach BS 3900 : Teil F3 : 1971

FOREWORD

This Addendum has been prepared as a result of several years' experience of testing paints by the method described in BS 3900 : Part F3 and, especially, of maintaining the test apparatus in running order. Special thanks in this connection are due to the Materials Quality Assurance Directorate of the Ministry of Defence.

1. INTRODUCTION

The purpose of this Addendum is to assist operators in setting up the apparatus, maintaining it correctly and locating faults. It should be read in conjunction with the instructions issued by the suppliers of the apparatus.

2. SITING OF THE APPARATUS

The apparatus should be housed in a room or building with an ample supply of clean air and free from draughts. The room should be adequately ventilated and kept at a suitable temperature (see clause 6 of Part F3).

3. INITIAL SETTING UP

3.1 Arc lamps. It has been found that even small air leaks in the lamp assembly can substantially affect the energy output and distribution, increasing the visible and decreasing the ultra-violet output, giving a reddish brown discoloration of the lamp glass.

3.1.1 Lamp glasses. Examine the glass cylinders carefully; if the edges are badly chipped, the glass cylinder should be discarded. Slight chipping or uneven edges can be remedied by carefully grinding the edges on a smooth flat glass plate, using moistened 400 grade carborundum powder. Ensure that the glass cylinder is rotated continuously during grinding as otherwise the unevenness may be aggravated.

A 0.025 mm shim may be used to check the flatness of the edges. Stand the cylinder on a flat bed. Check that the planes of the top and bottom ends are parallel and at right angles to the axis of the cylinder using a suitable precision spirit level.

Run the shim round the edges of the glass in contact with the flat bed to check for evenness.

3.1.2 Lamp plates. The top and bottom plates should be free from warping as burnt or uneven plates give rise to air leaks.

3.1.3 Carbon rods. Uncored carbons should be used in the d.c. lamp. Check each carbon for straightness by rolling it carefully on a flat glass plate. Discard any carbon that is not essentially straight.

The lower carbon should be fixed in the lower plate so as to protrude 65 mm to 75 mm above the base. Care should be taken that the carbon is firmly fixed, otherwise it may slip and the upper carbon may arc on to the base plate.

The upper carbon should be mounted so that it can move freely in a vertical direction.

Unless the upper and lower carbons are co-axial, arcing will occur at the sides and the carbons will burn unevenly. When operating, the arc rotates round the ends of the carbons so that, in a well adjusted lamp, the ends remain essentially even.

The position of the lamp in relation to the panel galleries in the drum is important and may be checked before fitting the glass cylinder by adjusting the height of the lamp assembly so that the centre of the arc is approximately 25 mm above the centre of the panels on the upper gallery. Fit the glass cylinder, switch on the lamp and, after approximately 1 h, check that the power consumed is within the specified limits (see clause 5(3) of Part F3).

Fluctuations in the voltage of the mains electricity supply can affect the energy output of the lamp. If these are found to exceed the nominal $\pm 6\%$ (i.e. from electricity board checks or independent laboratory checks), a voltage stabilizer should be fitted.

3.2 Water supply. It is essential to check periodically the purity of the water used against the requirements in clause 5(4) of Part F3. Unsatisfactory results have in many cases been traced to impurities exceeding the specified limits. In particular, silica at a level of as little as 0.5 mg/kg has been found to inhibit chalking, while a similar amount of copper can give rise to discoloration (see note to 5.3).

If water is obtained by bulk delivery, e.g. road tanker, it is strongly recommended that a spare, clean storage

tank be used to store the new supply pending the results of analysis. Attention is drawn to the requirements of clause 5(4) of Part F3 regarding the necessity of using only inert materials in contact with water supplies.

De-ionized water in particular has been found to give trouble, arising from a tendency for silica to pass through the ion-exchange unit without being detected by the conductivity meter. For this reason, only water produced by a distillation process is acceptable.

It is recommended that a simple filter pad made of polyethylene terephthalate fibre be inserted into the supply line just before the water gauge. This helps to remove dirt and algal fouling, the latter being a common contaminant. The pad should be inspected daily and replaced when necessary. The use of opaque materials for the water supply system will almost completely prevent algal growth.

3.3 Water jets. Careful examination is essential to see that the nozzles are clean and free from obstruction. Some plastics nozzles tend to craze in time and stainless steel nozzles are preferred.

3.4 Air supply. It is recommended that suitable filters to remove oil, water and other impurities be fitted in the air supply lines. They should be frequently emptied and cleaned.

3.5 Water spray. Check that the correct air atomizing pressure is being used. The operation of the jets should also be checked to ensure that a uniform pattern of fine water droplets is deposited on both top and bottom panels in the galleries. The rate of water consumption at each jet should be checked by fixing a wide-mouthed piece of tubing over the jet and passing the other end into a measuring cylinder. Check the collected volume of water at 1 min intervals, over a period of several minutes, and adjust the supply feed as necessary.

3.6 Drum. The air temperature inside the drum measured during the wet phase should preferably be $36 \pm 3^\circ\text{C}$. This may be maintained by carefully adjusting the height of the lid of the drum and checking the temperature with a suitable temperature recorder inserted through a hole in the lid at a position farthest from the lamp. Attention is drawn to the ambient temperature requirements specified in clause 6 of Part F3. Adjustments to bring the internal temperature of the drum within the above limits may include lagging the drum, or providing cooling devices for the room air intake if the ambient room temperature cannot otherwise be maintained.

Check that the drum revolves at a speed of one revolution in 20 min.

3.7 Ventilating fan. If louvered, position the fan assembly so that the air stream strikes the drum at the point nearest the lamp.

4. MAINTENANCE

During the shutdown period of 1 h each day, it is

essential to renew the carbons and to clean the lamp glasses thoroughly. Clean the lamp plates by brushing all dust carefully into a collecting tray. Remove any residues from the base of the drum. Check that the edges of the glass cylinder are still smooth and that the top carbon is moving freely. Align the carbons as described in 3.1.3.

It has been found useful to replace the glass cylinder in a position such that it has been rotated approximately 45° from its previous position as this helps to maintain an even seating. The lettering etched on the cylinder forms a useful guide in rotating the cylinder. Atmospheric dust tends to collect in the ventilating fan, which therefore needs to be frequently cleaned out.

The shutdown period should be arranged at such a time that the above operations can be carried out, panels removed and new panels inserted as required and that adequate time is allowed after re-starting the apparatus to check that all the necessary functions of the lamp, water supply, etc. are operating satisfactorily before the end of the working day.

5. TRACING FAULTS

5.1 Lamps. Failure of the lamp to relight is sometimes due to poor alignment of the glass cylinder between the top and bottom plates, leading to sticking of the carbons. Switch off the power supply and check the points described in 3.1.

Darkening of the interior of the lamp cylinder is mainly caused by air-leaks through gaps between the lamp cylinder ends and the plates. Check for signs of wear or damage and, if necessary, regrind the ends of the cylinder as described in 3.1.

Sticking of the upper carbons is sometimes due to oversized carbons being fitted: they should be checked for easy fitting in the stirrup and free movement.

5.2 Water sprays. Check for any signs of blockage if the water spray pattern is not satisfactory. Carefully clean the nozzle and examine the water line filter for signs of contamination. Re-check the rate of water consumption as described in 3.5.

5.3 Unusual discoloration on test panels. Unusual discoloration may be due to a contaminated water supply. Check the purity as described in 3.2.

NOTE. Copper and iron have on occasions been detected in stains on exposed panels; supply tanks and feed lines should be carefully examined to see that corrosion products are not present. Green algal deposits are sometimes found in the tubing beyond the filter pad of polyethylene terephthalate fibre. In these cases, it is necessary to dismantle, clean and sterilize the equipment. Attention is drawn to the possibility of algal growth on flowmeters giving rise to inaccurate measurements.

Dirt collecting in the ventilating fan can occasionally break free and soil panels (See clause 4).

Contaminated air lines can also lead to discoloration; the air filters should be checked and, if faulty, they should be replaced.

This British Standard, having been prepared under the Pigments, Paints and Varnishes Standards Committee, was published under the authority of the Executive Board on 30 November 1978.

© British Standards Institution, 1978

ISBN 0 580 10573 3

The following BSI references relate to the work on this standard:

Committee reference PVC/40 Draft for comment 77/52862