British Standard

BRITISH STANDARD

BS 7295-2: 1990

Incorporating Amendment No. 1

Fusion bonded epoxy coated carbon steel bars for the reinforcement of concrete —

Part 2: Specification for coatings

Committees responsible for this British Standard

The preparation of this British Standard was entrusted by the Iron and Steel Standards Policy Committee (ISM/-) to Technical Committee ISM/9, upon which the following bodies were represented:

British Cement Association
British Independent Steel Producers' Association
British Precast Concrete Federation Ltd.
British Reinforcement Manufacturers' Association
British Steel Industry
British Steel Industry (Wire Section)
Concrete Society
County Surveyors' Society
Department of the Environment (Property Services Agency)
Department of Transport
Electricity Supply Industry in England and Wales
Fabric Reinforcement Development Association
Federation of Civil Engineering Contractors
High Yield Bar Development Association
Institution of Structural Engineers
UK Certification Authority Reinforcing Steels

The following bodies were also represented in the drafting of the standard, through subcommittees and panels:

Department of the Environment (Building Research Establishment)
Institution of Civil Engineers

This British Standard, having been prepared under the direction of the Iron and Steel Standards Policy Committee, was published under the authority of the Board of BSI and comes into effect on
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The following BSI references relate to the work on this standard:
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Amendments issued since publication

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Contents

Foreword

This Part of BS 7295 has been prepared under the direction of the Iron and Steel Standards Policy Committee.

This Part specifies requirements for the coatings for the coated bars specified in BS 7295-1. Test methods for verifying the requirements are given in Appendix A.

A British Standard does not purport to include all the necessary provisions of a contract. Users of British Standards are responsible for their correct application.

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Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, pages 1 to 4, an inside back cover and a back cover.

This standard has been updated (see copyright date) and may have had amendments incorporated. This will be indicated in the amendment table on the inside front cover.

1 Scope

This Part of BS 7295 specifies requirements for coatings to be used on coated bars complying with BS 7295-1 based on a series of test methods given in Appendix A.

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

2 Definitions

For the purposes of this Part of BS 7295 the definitions in BS 7295-1 apply.

3 Material

3.1 Coatings

Coatings shall be of thermosetting epoxy powder coating material, and the composition of the coating material shall be mainly epoxy resin, curing agent and pigments.

3.2 Patching material

Patching material shall be a two-part epoxy resin coating compatible with the fusion bonded epoxy coating.

4 Requirements for coating

4.1 Visual appearance

When inspected in accordance with **A.3** the coating shall not have any irregularities such as lumps or dents.

4.2 Adhesion

The remaining ratio of the square sections obtained in accordance with **A.4** shall be equal to or more than 90 %.

4.3 Impact strength

When tested in accordance with **A.5** the coating shall not shatter, crack, peel or rise at any portion other than the point where the tup nose hits.

4.4 Abrasion resistance

The mass loss of the coating shall be less than or equal to 40 mg after being tested in accordance with **A.6**.

4.5 Hardness

When determined in accordance with BS 5411-6 applying a force of 0.196 N, the Knoop hardness of the coating on a flat steel plate complying with BS 4360, grade 55C shall exceed 16 HK 0.025.

4.6 Corrosion resistance

When tested in accordance with **A.7** the coating on a bar sample shall not exhibit blistering or rust.

4.7 Chemical resistance

When tested in accordance with **A.8** the coating on a bar sample shall not exhibit softening, swelling or blistering.

4.8 Cathodic disbonding of coating

When tested in accordance with BS 3900-F11, the coating shall not visibly disbond for more than a 5 mm radius from the site of the holiday.

5 Requirements for patching materials

5.1 Adhesion

The remaining ratio of the square sections obtained in accordance with **A.4** shall be equal to or more than 90 %.

5.2 Corrosion resistance

When tested as described in **A.7** the patched coating on a bar sample shall not exhibit blistering or rust.

5.3 Chemical resistance

When tested in accordance with **A.8** the patched coating on a bar sample shall not exhibit softening, swelling or blistering.

Appendix A Test methods for coatings

A.1 Samples

Test samples shall be inspected by holiday detection to ensure they are defect free.

A.2 Test pieces

A.2.1 For methods **A.3** to **A.5**, prepare a test piece from a 50 mm × 300 mm × 6 mm BS 4360 grade 55C steel plate.

For method **A.6**, prepare a test piece suitable for use on the abrasion test apparatus used. Prepare the surface of the test piece by blast cleaning to give a uniformly textured surface.

Coat the test piece by the charged particle spray method in accordance with the requirements for the coating material to a thickness of 200 ± 50 μm.

Where patching material is being assessed, apply the patching material with a brush onto the coated test piece to a thickness of 130 μm to 300 μm.

Measure the coating thickness in accordance with BS 3900-C5. The measurements shall be at three locations selected at random about 20 mm from the edges of the test piece.

A.2.2 For methods **A.7** to **A.8**, prepare the test piece from a 20 mm coated bar at least 200 mm long complying with BS 7295-1.

Where patching material is being assessed, apply the patching material with a brush onto the coated test piece to a thickness of 100 μm to 300 μm.

A.3 Visual inspection

Examine the coating on the test piece under well lit conditions for any lumps or dents.

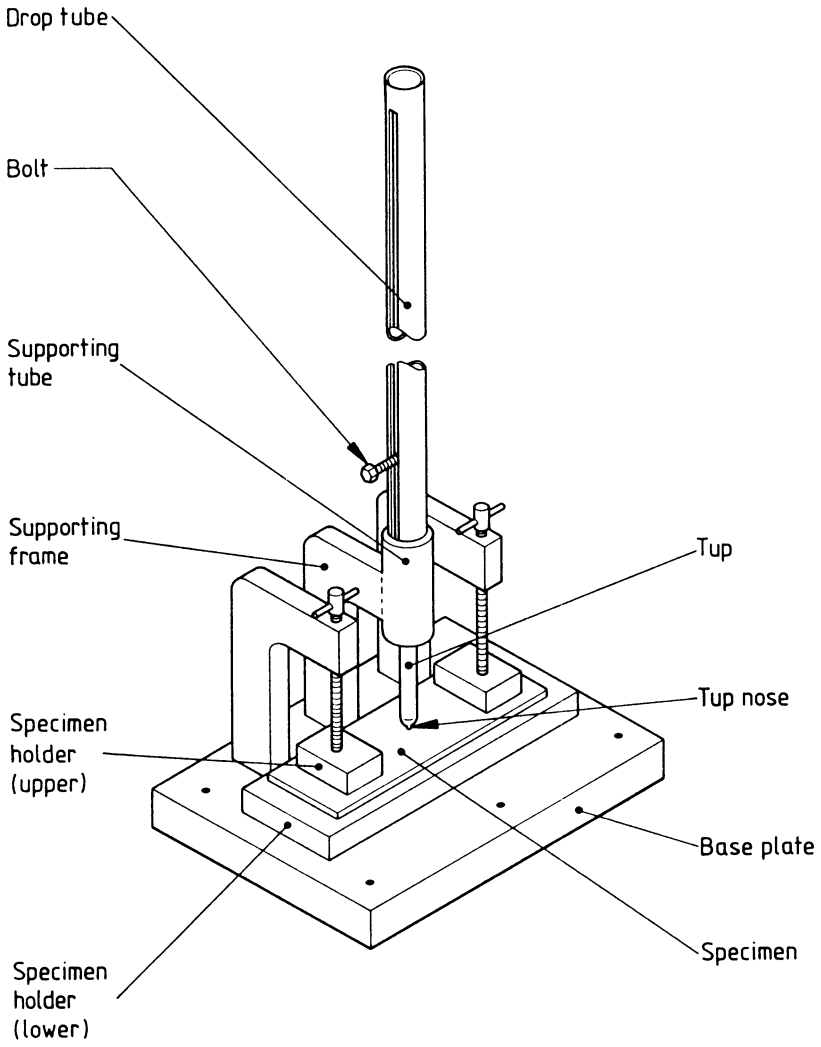

Figure 1 — Drop type impact test device for coatings

A.4 Adhesion of the coating

A.4.1 *Apparatus*

Use a cutting knife and a cutting guide in accordance with BS 3900-E6.

A.4.2 *Method*

Perform the test at a temperature of 20 ± 2 °C. Make two sets of six incisions crossing at right angles in 2 mm spacing which reach the bare steel plate forming 25 square sections in total on the test piece. Press a pressure sensitive adhesive cellophane tape tightly onto the test piece. Pull off instantly.

Count the number of sections on which the coating remains.

Perform the test on three test pieces.

A.5 Impact strength of coatings

A.5.1 *Apparatus*

Use a drop type impact test apparatus as illustrated in Figure 1.

Use a tup which has a fixed weight of 1.8 kg and a head which terminates in an hemispherical 16 mm diameter nose.

Use a dropping tube 1.5 m long, scaled at 1 cm intervals, the zero point of which can be adjusted.

A.5.2 *Method*

Perform the test at a temperature of 20 ± 2 °C. Fix the test piece on the holder of the impact test apparatus with the coated surface facing upwards. Drop the tup from the height such that the impact energy becomes 10 N·m.

Remove the test piece from the holder and inspect all areas, except the portion hit directly by the tup nose, for shattering, cracking, peeling and raising.

Perform the test on three test pieces.

A.6 Abrasion resistance

A.6.1 *Apparatus*

A chemical balance having a sensitivity of less than 1 mg and an abrasion tester compatible with the powder used.

A.6.2 *Method*

Hold the test piece at a temperature of 20 ± 2 °C and a humidity of 50 ± 5 % for 24 h or more before the test.

Carry out the test under these conditions or immediately after removal from these conditions.

Clean the test piece using a detergent and weigh to an accuracy of 1 mg on the chemical balance.

Fix the test piece on the rotary disc of the abrasion tester, coated surface upward.

Dress the circumference of the wearing ring with a diamond dresser, fit the ring into the fitting axis and fasten with screws.

Apply a load of 500 g to the test piece slowly through the abrasion wheel.

Set the dust suction arm over the test piece and adjust the distance between the test piece and the suction hole to 3 mm.

Start the abrasion tester and dust suction.

Stop the tester and the dust suction after 1 000 revolutions of the revolving disk.

Remove the test piece, wipe with a clean rag and weigh the test piece to an accuracy of 1 mg on the chemical balance.

Calculate the abrasion loss due to the test as the difference between the mass of test piece before and after the test.

Perform the test on three test pieces.

A.7 Corrosion resistance

A.7.1 *Apparatus*

Use a salt spray apparatus complying with BS 3900-F4.

A.7.2 *Method*

Carry out the test in accordance with BS 3900-F4 for 1 000 h.

Clean the test piece with water and leave for 2 h at room temperature. Inspect for rust, blistering and peeling on the surface.

Carry out the test on three test pieces.

A.8 Chemical resistance

A.8.1 *Apparatus*

Use a beaker made of glass or plastic with a height of 150 mm and a minimum diameter of 100 mm. Cover the beaker with a polyethylene sheet.

A.8.2 *Test solution*

Use the following separately:

a) calcium chloride solution, $c(CaCl_2)$ = 3 mol/L;

b) sodium hydroxide solution, $c(NaOH)$ = 3 mol/L;

c) saturated calcium hydroxide solution.

A.8.3 *Method*

Soak one test piece in each test container. Fix the test piece with a support at the centre of the container. Immerse half the height of the test piece in the test solution. Replenish the solution with water to maintain a constant level during the test.

Perform the test at a temperature of 20 ± 2 °C for between 1 000 h and 1 100 h.

Clean the test piece with water and leave for 2 h at ambient temperature. Inspect the exposed portion and the soaked portion for blistering, softening and swelling.

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Publication(s) referred to

BS 3900, *Methods of test for paints.*

BS 3900-C5, *Determination of film thickness.*

BS 3900-E10, *Pull-off test for adhesion.*

BS 3900-F4, *Resistance to continuous salt spray.*

BS 3900-F10, *Determination of resistance to cathodic disbonding of coatings for use in marine environments.*

BS 3900-F11, *Determination of resistance to cathodic disbonding of coatings for use on land-based buried structures.*

BS 4360, *Specification for weldable structural steels.*

BS 5411, *Methods of test for metallic and related coatings.*

BS 5411-6, *Vickers and Knoop microhardness tests.*

BS 7295, *Fusion bonded epoxy coated carbon steel bars for the reinforcement of concrete.*

BS 7295-1, *Specification for coated bars.*

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