

GENERAL SPECIFICATION FOR CIVIL ENGINEERING WORKS

1992 Edition

CORRIGENDUM No. 1/2004 (March)

VOLUME 1

CONTENTS OF VOLUME 1

SECTION 1

(a) SECTION 1

Add the following after Clause 1.1.7 under Appendix 1.1:

- 1.1.8 European Standard adopted as British Standard (BS EN)
- 1.1.9 BS EN ISO

SECTION 1

GENERAL

(b) Appendix 1.1,
Clause 1.1.1

Replace BS 12 : 1989 **by** BS 12 : 1996

(c) Appendix 1.1,
Clause 1.1.1

Delete:

- | | |
|-----------------------|--|
| BS 3019: Part 1: 1984 | Specification for TIG welding of aluminium, magnesium and their alloys |
| BS 3571: Part 1: 1985 | Specification for MIG welding of aluminium and aluminium alloys |

(d) Appendix 1.1,
Clause 1.1.1

Delete [the amendment promulgated under Corrigendum No. 3/2001 (November)]:

- | | |
|-------------------------|---|
| BS EN 287: Part 1: 1992 | Approval testing of welders for fusion welding Steels |
|-------------------------|---|

(e) Appendix 1.1,
Clause 1.1.1

Add the following new standard between BS 6700: 1987 and BS 6920:

- | | |
|-----------------------|--|
| BS 6779: Part 1: 1998 | Highway parapets for bridges and other structures.
Specification for vehicle containment parapets of metal construction |
|-----------------------|--|

(f) Appendix 1.1,
New Clauses 1.1.8
and 1.1.9

Add the following new clause after Clause 1.1.7:

1.1.8 EUROPEAN STANDARD ADOPTED AS BRITISH STANDARD (BS EN)

- | | |
|-------------------------|---|
| BS EN 287: Part 1: 1992 | Approval testing of welders for fusion welding Steels |
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BS EN 485: Part 1: 1994	Aluminium and aluminium alloys. Sheet, strip and plate. Technical conditions for inspection and delivery
BS EN 485: Part 2: 1995	Aluminium and aluminium alloys. Sheet, strip and plate. Mechanical properties
BS EN 485: Part 3: 2003	Aluminium and aluminium alloys. Sheet, strip and plate. Tolerances on dimensions and form for hot-rolled products
BS EN 571: Part 1: 1997	Non-destructive testing. Penetrant testing. General principles
BS EN 755: Part 1: 1997	Aluminium and aluminium alloys. Extruded rod/bar, tube and profiles. Technical conditions for inspection and delivery
BS EN 755: Part 2: 1997	Aluminium and aluminium alloys. Extruded rod/bar, tube and profiles. Mechanical properties
BS EN 755: Part 3: 1996	Aluminium and aluminium alloys. Extruded rod/bar, tube and profiles. Round bars, tolerances on dimensions and form
BS EN 755: Part 4: 1996	Aluminium and aluminium alloys. Extruded rod/bar, tube and profiles. Square bars, tolerances on dimensions and form
BS EN 755: Part 5: 1996	Aluminium and aluminium alloys. Extruded rod/bar, tube and profiles. Rectangular bars, tolerances on dimensions and form
BS EN 970: 1997	Non-destructive examination of fusion welds. Visual examination
BS EN 1011: Part 4: 2000	Welding. Recommendations for welding of metallic materials. Arc welding of aluminium and aluminium alloys
BS EN 1714: 1998	Non-destructive examination of welded joints. Ultrasonic examination of welded joints
BS EN 10002: Part 1: 2001	Tensile testing of metallic materials. Method of test at ambient temperature
BS EN 10045: Part 1: 1990	Charpy impact test on metallic materials. Test method (V- and U- notches)
BS EN 12373: Part 1: 2001	Aluminium and aluminium alloys. Anodizing. Method for specifying decorative and protective anodic oxidation coatings on aluminium

1.1.9 BS EN ISO

BS EN ISO 3506: Part 1: 1998	Mechanical properties of corrosion-resistant stainless-steel fasteners. Bolts, screw and studs
BS EN ISO 3506: Part 2: 1998	Mechanical properties of corrosion-resistant stainless-steel fasteners. Nuts
BS EN ISO 9934: Part 1: 2001	Non-destructive testing. Magnetic particle testing. General principles

VOLUME 3

CONTENTS OF VOLUME 3

(f) SECTION 20,
Clause 20.41

SECTION 20

PART 3: VEHICULAR PARAPETS

Replace the clause title by the following:

Grout for holding down bolts

(g) SECTION 20,
New Clause
Heading and New
Clauses 20.45A,
20.45B, 20.45C,
20.45D, 20.45E,
20.45F and 20.45G

Add the following new heading and new clauses after Clause 20.45:

TESTING

20.45A	Batch: Vehicular parapets
20.45B	Samples: Vehicular parapets for testing
20.45C	Testing: Vehicular parapets
20.45D	Testing: Parapets materials
20.45E	Testing: Fasteners
20.45F	Testing: Welded components of vehicular parapets
20.45G	Testing: Metal vehicular parapet posts

SECTION 20

BRIDGEWORKS

PART 3: VEHICULAR PARAPETS

(h) PART 3:
VEHICULAR
PARAPETS

Replace the whole Part 3 by the following:

PART 3: VEHICULAR PARAPETS

MATERIALS

Vehicular parapets 20.39 (1) Vehicular parapets shall be of the types stated in the Contract.

(2) Steel for vehicular parapets, including welding, shall comply with Section 18 except Clauses 18.89 to 18.91 and Clauses 18.93 to 18.99. The requirements for testing of materials and welded components shall follow Clauses 20.45A to 20.45G.

(3) Protective treatment to steel for vehicular parapets shall comply with Section 18 and shall be applied after welding, drilling and cutting are complete.

(4) Aluminium for vehicular parapets shall comply with the following or equivalent approved by the Engineer:

Wrought aluminium and
aluminium alloys for
general engineering
purposes
- plate, sheet and strip : BS EN 485
- rivet, bolt and screw
stock : BS 1473
- bars, extruded round
tubes and sections : BS EN 755.

(5) Aluminium shall be anodised to Grade AA 25 in accordance with BS EN 12373 Part 1 or equivalent approved by the Engineer.

(6) Welding of aluminium for vehicular parapets shall comply with BS EN 1011 Part 4 or equivalent approved by the Engineer.

(7) Stainless steel bolts, nuts and washers for vehicular parapets shall be grade A4-80 and shall comply with BS EN ISO 3506 Part 1 and Part 2 or equivalent approved by the Engineer.

<i>Holding down bolts for vehicular parapets</i>	20.40	Holding down bolts for vehicular parapets shall be a proprietary type approved by the Engineer.
<i>Grout for holding down bolts</i>	20.41	Grout for holding down bolts for vehicular parapets shall be polyester resin based grout and shall be a proprietary type approved by the Engineer. Epoxy resin based grout shall not be used.

SUBMISSIONS

<i>Samples of materials for vehicular parapets</i>	20.42	Samples of the proposed posts and rails for vehicular parapets shall be submitted to the Engineer at least 14 days before installation of the parapets starts.
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STORAGE OF MATERIALS

Storage of vehicular parapets	20.43	Vehicular parapets shall be stored off the ground on level supports and in a manner which will not result in damage or deformation to the parapets or in contamination of the parapets.
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INSTALLATION OF VEHICULAR PARAPETS

Installation of vehicular parapets	20.44	(1) Vehicular parapets shall be installed to a smooth alignment and with the posts vertical. (2) Grouting shall be carried out by setting the vehicular parapets in position and grouting the gap between the vehicular parapets and the structure. Vehicular parapets shall be held in position until connections and fixings are complete and until the fixings have gained sufficient strength.
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TOLERANCES

Tolerances: vehicular parapets	20.45	Vehicular parapets shall be within 10 mm of the specified position and height.
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TESTING

Batch: Vehicular parapets	20.45A	(1) A batch of vehicular parapets is the amount of parapet materials stated in the Contract and which is completed or delivered to the Site at any one time. (2) The Contractor shall submit to the Engineer a list of the parts of vehicular parapets included in each batch at least 7 days before testing starts.
Samples: Vehicular parapets for testing	20.45B	(1) Samples shall be selected from positions which in the opinion of the Engineer are representative of the batch as a whole. (2) The Engineer shall inform the Contractor of the samples selected for testing at least 3 days before testing starts.
Testing: Vehicular parapets	20.45C	(1) The relevant tests stated in Clauses 20.45D to 20.45G shall be carried out on each batch of vehicular parapets. (2) The Contractor shall inform the Engineer at least 7 days before tests are carried out.

Testing: Parapets Materials	20.45D	<p>(1) The tensile test and Charpy impact test of materials for vehicular parapets shall be carried out in accordance with BS EN 10002 Part 1 and BS EN 10045 Part 1 respectively or equivalent approved by the Engineer. The frequency of tests and results of material tests shall conform to BS 6779 Part 1, Table 3 for steel parapets and Table 4 for aluminium parapets.</p> <p>(2) Quality grading of vehicular parapet material shall be carried out which has not been tested for quality grades by the manufacturer. Quality grading shall be carried out in accordance with BS 5400: Part 6 as appropriate.</p>
Testing: Fasteners	20.45E	<p>(1) The tensile test of stainless steel fasteners for vehicular parapets shall be carried out in accordance with BS EN ISO 3506 Part 1 and Part 2 or equivalent approved by the Engineer.</p>
Testing: Welded components of Vehicular parapets	20.45F	<p>(1) Inspection and testing of welds for components of vehicular parapets on each batch shall be carried out after cleaning and before application of hot-dip galvanising and other protective treatment. De-burring, dressing, grinding, machining and peening shall be carried out after the visual inspection for cracks, surface pores and joint fit-up and before other inspections and tests are carried out.</p> <p>(2) All welds shall be visually inspected and 10 % of welds for vehicular parapets shall be visually examined in accordance with the techniques in BS EN 970 or equivalent approved by the Engineer. Non-destructive testing shall be carried out on a proportion of welds after visual inspection.</p> <p>(3) Non-destructive testing of welds for components of vehicular parapets shall comply with the following: -</p> <ul style="list-style-type: none">(a) For the components of vehicular parapets which are butt welded or fillet welded with nominal leg length greater than 12mm, 10% of welds for each type of components shall be examined by ultrasonic testing in accordance with BS EN 1714 or equivalent approved by the Engineer.(b) 10% of the welds other than sub-clause 20.45F(3)(a) shall be tested as follows:<ul style="list-style-type: none">- Magnetic particle flaw detection to joints in steel parapet in accordance with BS EN ISO 9934 Part 1 or equivalent approved by the Engineer or

- Liquid penetrant method to welds in aluminium parapet in accordance with BS EN 571 Part 1 or equivalent approved by the Engineer.

(4) The compliance criteria for welds to be inspected, examined and tested shall be in accordance with BS 6779 Part 1 Clauses 9.4.3.1.2 to 9.4.3.1.4. For the butt welds to be tested the individual pores shall also be less than 2.5mm diameter and the localized pores shall be less than 3% by the area. The width of defect of buried slag shall be less than 1.5mm. Linear groups of inclusions are acceptable provided that adjacent groups shall be separated by a distance of at least 4 times and 6 times the length of longest defect for parent metal thickness less than 20mm and larger than 20mm respectively.

(5) If non-conformities are found as stated in sub-clause 20.45F(4), the test shall be carried out on additional samples from the batch. The number of additional tests shall be twice the number of original tests.

(6) The batch shall be considered as not complying with the compliance criteria for the test if the result of any additional test does not comply with the compliance criteria for the test.

(7) If the whole batch is not in compliance, the Contractor may propose to carry out 100% testing on the batch at his own costs.

(8) If the result of every additional test complies with the compliance criteria for the test, only those parts the samples from which have failed in the original tests shall be considered as not complying with the compliance criteria for the test.

(9) Welds for vehicular parapets which have been fabricated and tested by non-destructive testing at the fabricator's works shall be visually inspected for cracks when the vehicular parapets are delivered to the Site. If welding quality of the vehicular parapets is in doubt, 5% of the welds shall be tested by magnetic particle flaw detection in accordance with BS EN ISO 9934 Part 1 or equivalent approved by the Engineer. The surface protection of vehicular parapets shall be made good to the satisfaction of the Engineer after the tests.

(10) Visual examination and testing shall be carried out by a testing consultant approved by the Engineer.

Testing:
Metal vehicular
parapet posts

20.45G (1) Destructive static testing of metal vehicular parapet posts on each batch shall be carried out in accordance with the procedures stated in Annex E of BS 6779 Part 1. The frequency of destructive testing shall be as follows:

<u>No. of posts per batch</u>	<u>No. of posts to be tested per batch</u>
<150	1 (The Engineer may waive this testing requirements if satisfactory tests within 3 months are provided)
150-300	1
> 300	1 for each 300 posts or remaining part thereof

(2) The results of test on post shall comply with the following criteria:

- (a) The post shall sustain a moment of 1.05 times its theoretical moment of resistance (product of nominal yield stress and plastic modulus) at its critical section without failure.
- (b) The material thickness, effective weld throat sizes and external dimensions of the post shall be within the tolerances.

(3) In the event that any of the acceptance criteria as stated in sub-clause 20.45G(2) are not met, further two posts shall be selected from the same batch of posts and tested. If any further test fails to meet the acceptance criteria, the whole batch shall be rejected.

Standards Unit
Civil Engineering Department
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