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ARAB ENGINEERING BUREAUS

## 4 ARCHITECTURAL METAL WORK

### 4.1 GENERAL

#### 4.1.1 Scope

- 1 This Part provides specification for miscellaneous types of metal work not included elsewhere.
- 2 Related Sections and Parts are as follows:

This Section

Part 1 ..... General  
Part 2 ..... Material Types and Finishes  
Part 6 ..... Workmanship

Section 1 General  
Section 13 Masonry  
Section 16 Structural Metalwork

#### 4.1.2 References

- 1 The following standards are referred to in this Part:

BS 729.....Specification for hot dip galvanized coatings on iron and steel articles (ISO 1461 Hot dip galvanized coatings on fabricated iron and steel articles — Specifications and test methods)

BS 970.....Specification for wrought steels for mechanical and allied engineering purposes; (ISO 683-1 Heat-treatable steels, alloy steels and free-cutting steels — Part 1: Non-alloy steels for quenching and tempering; ISO 683-2 Heat-treatable steels, alloy steels and free-cutting steels — Part 2: Alloy steels for quenching and tempering; ISO 683-3 Heat-treatable steels, alloy steels and free-cutting steels — Part 3: Case-hardening steels; ISO 683-4 Heat-treatable steels, alloy steels and free-cutting steels — Part 4: Free-cutting steels; ISO 683-5 Heat treatable steels, alloy steels and free-cutting steels — Part 5: Nitriding steels; EN 10250-4: Open die steel forgings for general engineering purposes - Stainless steels; EN 10095 Heat resisting steels and nickel alloys; BS PD 970 Wrought steels for mechanical and allied engineering purposes. Requirements for carbon, carbon manganese and alloy hot worked or cold finished steels; EN 10089 Hot rolled steels for quenched and tempered springs. Technical delivery conditions; EN 10277 Bright steel products. Technical delivery conditions; EN 10278 Dimensions and tolerances of bright steel products; EN 10088-1 Stainless steels - List of stainless steels; EN 10088-3 Stainless steels - Technical delivery conditions for semi-finished products, bars, rods, wire, sections and bright products of corrosion resisting steels for general purposes;)

BS 1387.....Specification for screwed and socketed steel tubes and tubulars and for plain end steel tubes suitable for welding or for screwing to BS 21 pipe threads; (EN 10255 Non-alloy steel tubes suitable for welding and threading. Technical delivery conditions)

- BS 1471.....Specification for wrought aluminium and aluminium alloys for general engineering purposes - drawn tube; (EN 515 Aluminium and aluminium alloys. Wrought products. Temper designations; EN 573-3 Aluminium and aluminium alloys. Chemical composition and form of wrought products - Chemical composition and form of products; EN 754-1 Aluminium and aluminium alloys. Cold drawn rod/bar and tube - Technical conditions for inspection and delivery; EN 754-2 Aluminium and aluminium alloys. Cold drawn rod/bar and tube - Mechanical properties; EN 754-7 Aluminium and aluminium alloys. Cold drawn rod/bar and tube - Seamless tubes, tolerances on dimensions and form; EN 754-8 Aluminium and aluminium alloys. Cold drawn rod/bar and tube - Porthole tubes, tolerances on dimensions and form)
- BS 1473.....Specification for wrought aluminium and aluminium alloys for general engineering purposes - rivet, bolt and screw stock; (Related CEN standards for the specification for wrought aluminium and aluminium alloys)
- BS 1474.....Specification for wrought aluminium and aluminium alloys for general engineering purposes - bars, extruded round tube and sections; (EN 515 Aluminium and aluminium alloys - Wrought products - Temper designations; EN 573 Aluminium and aluminium alloys - Chemical composition and form of wrought products; EN 755 Aluminium and aluminium alloys - Extruded rod/bar, tube and profiles; EN 12020 Aluminium and aluminium alloys - Extruded precision profiles in alloys EN AW-6060 and EN AW-6063)
- BS 1490.....Specification for aluminium and aluminium alloy ingots and castings for general engineering purposes; (EN 1559-1 Founding. Technical conditions of delivery – General; EN 1559-4 Founding. Technical conditions of delivery - Additional requirements for aluminium alloy castings; EN 1676 Aluminium and aluminium alloys. Alloyed ingots for remelting. Specifications; EN 1706 Aluminium and aluminium alloys. Castings. Chemical composition and mechanical properties)
- BS 1615.....Method for specifying anodic oxidation coatings on aluminium and its alloys; (ISO 7599 Anodizing of aluminium and its alloys — Method for specifying decorative and protective anodic oxidation coatings on aluminium)
- BS 2997.....Specification for aluminium rainwater goods (BS 8530 Traditional-style half round, beaded half round, Victorian ogee and moulded ogee aluminium rainwater systems. Specification)
- BS 4360.....Specification for weldable structural steels; (EN 10025-1 Hot rolled products of structural steels - General technical delivery conditions; EN 10025-3 Hot rolled products of structural steels - Technical delivery conditions for normalized/normalized rolled weldable fine grain structural steels; EN 10025-4 Hot rolled products of structural steels - Technical delivery conditions for thermomechanical rolled weldable fine grain structural steels; EN 10025-5 Hot rolled products of structural steels - Technical delivery conditions for structural steels with improved atmospheric corrosion resistance; EN 10210-1 Hot finished structural hollow sections of non-alloy and fine grain steels - Technical delivery requirements; BS 7668 Weldable structural steels. Hot finished structural hollow sections in weather resistant steels. Specification)

- BS 6180.....Barriers in and about buildings. Code of practice  
 BS 6323.....Specification for seamless and welded steel tubes for automobile, mechanical and general engineering purposes; (EN 10297-1 Seamless circular steel tubes for mechanical and general engineering purposes. Technical delivery conditions - Non-alloy and alloy steel tubes; EN 10305-1 Steel tubes for precision applications. Technical delivery conditions - Seamless cold drawn tubes; EN 10305-2 Steel tubes for precision applications. Technical delivery conditions - Welded cold drawn tubes; EN 10305-3 Steel tubes for precision applications. Technical delivery conditions - Welded cold sized tubes; EN 10305-4 Steel tubes for precision applications. Technical delivery conditions - Seamless cold drawn tubes for hydraulic and pneumatic power systems; EN 10305-5 Steel tubes for precision applications. Technical delivery - Welded cold sized square and rectangular tubes; EN 10305-6 Steel tubes for precision applications. Technical delivery conditions - Welded cold drawn tubes for hydraulic and pneumatic power systems; EN 10296-1 Welded circular steel tubes for mechanical and general engineering purposes. Technical delivery conditions - Non-alloy and alloy steel tubes; EN 10296-2 Welded circular steel tubes for mechanical and general engineering purposes. Technical delivery conditions - Stainless steel)

## 4.2 HANDRAILS AND BALUSTERS

### 4.2.1 General Requirements

- 1 Protective handrails and balusters shall be 1100 mm high and shall comply with the provisions of BS 6180 for Building.
- 2 Handrails and balusters shall be manufactured from material complying with the relevant provisions of the appropriate British Standard, as set out in Table 4.1.

Table 4.1  
 Materials for Handrails and Balusters

Material	Handrails				Balusters			
	Solid		Tubular		Solid		Tubular	
	BS	Grade	BS	Grade	BS	Grade	BS	Grade
Mild Steel	4360 - -	43A	1387 or 6323 Pt 2	- HFW2	4360	43A	1387 or 6323 Pt 2	HFW2
Stainless Steel	970 Pt 2	316S3 1	6323 Pt 8	LW17K M	970 Pt 1	316S3 1	6323 Pt 8	LW17K M
Aluminium	1474	6082	1474 or 1471	6082	1490	LM6	1474 or 1471	6082

- 3 After manufacture, mild steel and aluminium balusters shall be hot dip galvanized or anodised, as appropriate, in accordance with BS 729 or BS 1615, Grade AA25.

#### **4.2.2 Expansion**

- 1 Expansion joints shall be provided in horizontal members where required by design.
- 2 Expansion joints shall also be provided where the handrail or balustrade coincides with an expansion joint in the structure to which it is fixed.
- 3 Expansion joints shall be as detailed in the Project Documentation.

#### **4.2.3 Fitting and Fixing**

- 1 Mortises in concrete or blockwork to receive handrails and balustrades are to be formed as follows:
  - (a) with a minimum distance of 50 mm between the outer edge of the mortise and the outer edge of the concrete or blockwork excluding any finishing materials.
  - (b) to the same shape as the handrail or balustrades allowing for a minimum clearance all round of 13 mm, e.g., a 51 mm diameter hole for a 25 mm diameter standard.
  - (c) to allow a minimum fixed depth of 100 mm in the concrete or blockwork excluding any finishing material.
- 2 Mortises are to be thoroughly cleaned and wetted and made good with Class M5 mortar in accordance with Part 2 of Section 13, well compacted around the member being fixed
- 3 The handrail or balustrades should be securely located in position, true to line and level until the fixings have attained full strength.
- 4 Handrails and balustrades are not to be fixed to concrete or blockwork by means of screw fastenings. Drilled bolt anchorages and similar dry fixings may only be used with the approval of the Engineer and shall comply with the relevant provisions of BS 1473.
- 5 After installation handrails and balustrades are not to be used as strutting or supports for other work and shall be wrapped with polythene sheet or similar, securely taped to protect the finished work until completion.

### **4.3 DOWNPIPES AND GUTTERS**

#### **4.3.1 General Requirements**

- 1 Aluminium rainwater items such as gutters, downpipes and outlets shall comply with the relevant provisions of BS 2997.
- 2 Rainwater items made of materials other than aluminium shall be as specified in the Project Documentation.

### **4.4 FINISHES**

#### **4.4.1 General Requirements**

- 1 Finishes for metals covered in this Part shall be as detailed in Part 2 of this Section unless described otherwise.

**END OF PART**