

## ■ VOLUME 3 — FABRICATION

*(Expanded – BS EN 1090-2:2018 + Eurocode 3 + UKCA)*

*(All organization names replaced with XXXXXX)*

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### 1. GENERAL FABRICATION REQUIREMENTS

#### 1.1 Compliance with Standards

All fabrication activities shall comply with:

- **BS EN 1090-2:2018** – Execution of steel structures
- **BS EN ISO 3834** – Welding quality requirements
- **BS EN ISO 14731** – Welding coordination
- **BS EN ISO 9013** – Thermal cutting
- **BS EN ISO 8501 / 8503** – Surface preparation
- **BS EN ISO 13920** – General tolerances
- **BS EN ISO 5817** – Weld quality levels

Fabrication shall be carried out in a controlled workshop environment unless otherwise approved.

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#### 1.2 Fabrication Documentation

Before fabrication begins, the Contractor shall submit:

- Fabrication drawings
- Assembly drawings
- Cutting lists
- Bolt schedules
- Welding Procedure Specifications (WPS)
- Procedure Qualification Records (WPQR)
- Welder qualifications
- Inspection and Test Plans (ITP)
- Method statements

No fabrication shall begin until documentation is approved.

### **1.3 Fabrication Environment**

Fabrication shall be carried out:

- In a dry, enclosed workshop
- With adequate lighting
- With controlled humidity where required
- With proper ventilation for welding and cutting
- With calibrated equipment

Outdoor fabrication is not permitted except for approved site welding.

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## **2. IDENTIFICATION & MARKING**

### **2.1 Component Identification**

Each fabricated component shall be marked with:

- Unique identification number
- Drawing reference
- Steel grade
- Heat number (EXC3–EXC4)

Marking shall remain visible until final coating.

### **2.2 Marking Methods**

Acceptable marking methods:

- Low-stress stamping
- Paint markers
- Metal tags
- Barcode labels

Unacceptable methods:

- Hard stamping causing indentations
  - Grinding marks
  - Deep punching
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## **3. HANDLING, STORAGE & PROTECTION**

### 3.1 Handling

Components shall be handled:

- Using certified lifting equipment
- With slings that do not damage edges
- With spreader beams for long members
- Without dragging on the ground

### 3.2 Storage

Steel components shall be stored:

- On timber bearers
- Off the ground
- Protected from water pooling
- With adequate ventilation

### 3.3 Protection

During storage and fabrication:

- Hollow sections shall be capped
- Plates shall be stacked to avoid distortion
- Painted surfaces shall be protected from abrasion

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## 4. CUTTING OPERATIONS

### 4.1 General Requirements

Cutting shall be performed using:

- Mechanical cutting (shearing, sawing)
- Thermal cutting (oxy-fuel, plasma, laser)

All cutting shall comply with **BS EN ISO 9013**.

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### 4.2 Mechanical Cutting

Mechanical cutting shall:

- Produce clean edges
- Avoid excessive burrs
- Avoid deformation of thin plates

- Maintain dimensional tolerances

Saw cutting is preferred for precision components.

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## 4.3 Thermal Cutting

Thermal cutting shall:

- Produce edges free from cracks
- Avoid excessive heat-affected zones
- Maintain straightness and squareness

### Quality Classes (BS EN ISO 9013)

- EXC1–EXC2 → Quality Class 4
- EXC3–EXC4 → Quality Class 3

### Post-Cutting Requirements

- Remove slag
  - Grind edges where required
  - Inspect for cracks
  - Perform MT/PT for EXC3–EXC4
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## 5. FORMING OPERATIONS

### 5.1 Cold Forming

Cold forming shall comply with:

- **BS EN 1090-2 Clause 6.5**
- Minimum internal bend radius per steel grade
- No cracking or surface tearing

Cold-formed components shall be stress-relieved where required.

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### 5.2 Hot Forming

Hot forming shall:

- Be performed above 580°C
- Avoid overheating
- Be followed by controlled cooling

- Not alter mechanical properties
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### 5.3 Straightening

Straightening shall be performed:

- Using mechanical presses
- Using controlled heating (max 650°C)
- Without causing local buckling

Flame straightening shall be performed only by qualified personnel.

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## 6. DRILLING & HOLE MAKING

### 6.1 General Requirements

Hole making shall comply with:

- **BS EN 1090-2 Table 11**
  - **BS EN ISO 273** (hole tolerances)
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### 6.2 Drilling

Drilled holes shall:

- Be perpendicular to the surface
  - Have smooth internal surfaces
  - Be free from burrs
  - Maintain diameter tolerance of +0.3 mm / -0.0 mm
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### 6.3 Punching

Punching is permitted only for:

- EXC1
- EXC2 (thin plates ≤ 12 mm)

Punching is **not permitted** for EXC3–EXC4.

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### 6.4 Reaming

Reaming is required for:

- Slip-resistant connections
  - EXC3–EXC4
  - Precision-fit bolts
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## 7. COPING & NOTCHING

### 7.1 General

Coping shall:

- Avoid sharp corners
- Maintain minimum radius of 10 mm
- Avoid stress concentrations

### 7.2 Grinding

Ground surfaces shall:

- Be smooth
  - Free from gouges
  - Maintain original thickness
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## 8. ASSEMBLY & FIT-UP

### 8.1 General Requirements

Assembly shall comply with:

- **BS EN 1090-2 Annex D** (tolerances)
- Approved fabrication drawings

### 8.2 Fit-Up Requirements

Fit-up shall:

- Ensure proper alignment
  - Maintain root gaps per WPS
  - Avoid excessive force or hammering
  - Use temporary bolts or clamps
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### 8.3 Tack Welding

Tack welds shall:

- Be performed by qualified welders
  - Be incorporated into final welds
  - Be removed if defective
  - Not cause distortion
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## **8.4 Temporary Bracing**

Temporary bracing shall:

- Ensure stability during assembly
  - Be removed after final welding
  - Not damage the steel
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## **9. DIMENSIONAL CONTROL**

### **9.1 Inspection Frequency**

Dimensional checks shall be performed:

- After cutting
- After forming
- After assembly
- Before welding
- After welding
- Before coating

### **9.2 Measuring Equipment**

Equipment shall be:

- Calibrated
  - Suitable for required accuracy
  - Maintained in good condition
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## **10. MACHINING OPERATIONS**

### **10.1 Machined Surfaces**

Machined surfaces shall:

- Meet flatness requirements

- Meet roughness requirements
- Be free from tool marks

## 10.2 Base Plates

Base plates shall:

- Be machined to tolerance
  - Have flatness per **BS EN 1090-2 Table 14**
  - Have holes accurately positioned
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## 11. EDGE PREPARATION

### 11.1 General

Edges shall be prepared for:

- Welding
- Coating
- Galvanizing

### 11.2 Requirements

Edges shall:

- Be free from burrs
  - Have smooth transitions
  - Avoid notches
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## 12. TEMPORARY WORKS

### 12.1 General

Temporary works shall:

- Ensure stability
- Be designed by competent engineers
- Be removed after final welding

### 12.2 Types of Temporary Works

- Temporary stiffeners
- Lifting lugs
- Assembly jigs

- Bracing frames