VOLUME 7 — SURFACE PREPARATION & CORROSION PROTECTION

(Expanded – BS EN ISO 12944 + BS EN ISO 8501 + BS EN ISO 1461 + BS EN 1090-2)

(All organization names replaced with XXXXXX)

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1. GENERAL REQUIREMENTS

1.1 Scope

This section defines the requirements for:

- Surface preparation
- Cleaning
- Blast cleaning
- Galvanizing
- Thermal metal spraying
- Painting systems
- Inspection and testing
- Repair of damaged coatings

All corrosion protection works shall comply with:

- **BS EN ISO 12944** – Paint systems for corrosion protection
- **BS EN ISO 8501 / 8502 / 8503** – Surface preparation
- **BS EN ISO 1461** – Hot-dip galvanizing
- **BS EN ISO 2063** – Thermal metal spraying
- **BS EN 1090-2:2018** – Execution of steel structures

1.2 Environmental Conditions

Surface preparation and coating shall not be performed when:

- Relative humidity > 85%
- Steel temperature < 3°C above dew point
- Ambient temperature < 5°C
- Surfaces are wet, frosted, or contaminated
- Wind or dust levels are excessive

The Contractor shall monitor:

- Ambient temperature
- Steel temperature
- Relative humidity
- Dew point

Records shall be kept for EXC3–EXC4.

1.3 Responsibilities

The Contractor shall:

- Provide all equipment and materials
- Ensure proper surface preparation
- Apply coatings per manufacturer instructions
- Protect coated surfaces during erection
- Repair all coating damage
- Maintain coating records

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2. SURFACE PREPARATION

2.1 General Requirements

All steel surfaces shall be:

- Clean
- Dry
- Free from oil, grease, dust, rust, mill scale, and contaminants

Surface preparation shall comply with:

- **ISO 8501-1** – Visual cleanliness
- **ISO 8502** – Contamination testing
- **ISO 8503** – Surface profile

2.2 Cleaning Methods

2.2.1 Solvent Cleaning

Shall comply with **ISO 8504-3**.

Removes:

- Oil
- Grease
- Salts
- Organic contaminants

Solvents shall not leave residues.

2.2.2 Mechanical Cleaning

Includes:

- Wire brushing
- Power tools
- Needle guns
- Grinding

Mechanical cleaning shall achieve:

- **St 2** (minimum)
- **St 3** (preferred for EXC2–EXC4)

2.2.3 Abrasive Blast Cleaning

Shall comply with:

- **ISO 8501-1**
- **ISO 8503-2**

Required grades:

Execution Class	Minimum Blast Grade
EXC1	Sa 2
EXC2	Sa 2½
EXC3	Sa 2½
EXC4	Sa 3

Surface profile shall be:

- 40–75 µm depending on coating system

2.3 Surface Contamination Testing

Testing shall comply with:

- **ISO 8502-3** – Dust
- **ISO 8502-6/9** – Soluble salts
- **ISO 8502-4** – Oil and grease

Maximum salt contamination:

- **≤ 20 mg/m²** (chlorides)

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3. HOT-DIP GALVANIZING

3.1 Standards

Galvanizing shall comply with:

- **BS EN ISO 1461** – Hot-dip galvanized coatings
- **BS EN ISO 14713-1/2** – Corrosion protection guidance

3.2 Galvanizing Requirements

Galvanizing shall:

- Be performed after fabrication
- Achieve minimum coating thickness per ISO 1461
- Be continuous and free from bare spots
- Not contain excessive runs or lumps

Typical coating thickness:

- 70–100 µm depending on steel thickness

3.3 Venting & Drainage

Hollow sections shall have:

- Adequate vent holes
- Adequate drainage holes
- Smooth internal surfaces

Incorrect venting may cause:

- Explosions

- Incomplete coating
- Trapped zinc

3.4 Post-Galvanizing Inspection

Inspection shall include:

- Coating thickness (magnetic gauge)
- Adhesion
- Continuity
- Visual defects

3.5 Repair of Galvanized Coatings

Repairs shall comply with **ISO 1461 Clause 6**.

Acceptable repair methods:

- Zinc-rich paint
- Zinc thermal spray
- Soldering

Minimum repair thickness:

- 100 µm

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4. THERMAL METAL SPRAYING

4.1 Standards

Thermal spraying shall comply with:

- **BS EN ISO 2063-1/2**

4.2 Application Requirements

Thermal spray coating shall:

- Be applied to Sa 3 blast-cleaned steel
- Use zinc, aluminum, or alloy wire
- Achieve minimum 100–150 µm thickness
- Be sealed with approved sealer

4.3 Advantages

- Superior corrosion resistance
- No risk of hydrogen embrittlement
- Suitable for large structures

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5. PAINT SYSTEMS (ISO 12944)

5.1 Corrosivity Categories

Category	Environment	Examples
C1	Very low	Heated interiors
C2	Low	Rural areas
C3	Medium	Urban areas
C4	High	Industrial/coastal
C5	Very high	Offshore, chemical plants

5.2 Paint System Types

- Epoxy primers
- Zinc-rich primers
- Polyurethane topcoats
- Acrylic coatings
- Intumescent fire coatings

5.3 Minimum Coating Thickness

Typical systems:

C3 Environment

- Zinc-rich primer (60 µm)
- Epoxy midcoat (120 µm)
- PU topcoat (60 µm)
  Total: 240 µm

C4 Environment

- Zinc-rich primer (80 µm)
- Epoxy midcoat (160 µm)
- PU topcoat (80 µm)
  Total: 320 µm

C5 Environment

- Zinc-rich primer (100 µm)
- Epoxy midcoat (200 µm)
- PU topcoat (100 µm)
  Total: 400 µm

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6. INSPECTION & TESTING

6.1 Inspection Items

- Surface cleanliness
- Surface profile
- Coating thickness
- Adhesion
- Holiday testing (for immersion service)
- Dry film thickness (DFT)

6.2 Testing Standards

- **ISO 2808** – DFT
- **ISO 4624** – Adhesion
- **ISO 8502** – Contamination
- **ISO 8503** – Surface profile

6.3 Inspection Frequency

Execution Class	Inspection Level
EXC1	Basic

Execution Class	Inspection Level
EXC2	Standard
EXC3	Enhanced
EXC4	Full inspection

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7. REPAIR OF DAMAGED COATINGS

7.1 Causes of Damage

- Transport
- Handling
- Welding spatter
- Bolting
- Site cutting
- Impact

7.2 Repair Methods

- Abrasive cleaning
- Zinc-rich paint
- Epoxy patching
- Thermal spray repair
- Re-galvanizing (rare)

7.3 Acceptance Criteria

Repairs shall:

- Match surrounding coating
- Achieve required DFT
- Be smooth and continuous
- Be inspected and approved

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8. PROTECTION DURING STORAGE & ERECTION

8.1 Protection from Weather

- Use waterproof covers
- Avoid condensation
- Provide ventilation

8.2 Protection from Damage

- Use padded slings
- Avoid dragging
- Protect edges

8.3 Protection from Contamination

- Avoid oil, grease, cement, chemicals
- Clean immediately if contaminated