



Badrakh Energy LLC
Zuuvch-Ovoo Uranium Project
H376521

Specification
Mechanical Engineering
Painting and Protective Coatings Specification

Specification

Painting and Protective Coatings Specification

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1. Introduction

1.1 Purpose

- 1.1.1 This specification defines the minimum requirements for the supply, application, materials of use and workmanship of surface protection to structural steelwork, platework, pipework, structural concrete, equipment, and mechanical components, both in shop and on-site, including surface preparation and testing.
- 1.1.2 In order to protect a metal or concrete surface from corrosion or degradation the paint film needs to insulate the surface from the environment and for this purpose it should be firmly adhered to the surface, be sufficiently resistant to the environment, be of such a thickness that it can resist the permeation of the environment through it, have a suitable inhibiting effect on the surface to retard corrosion locally and have adequate mechanical and physical properties to resist loads or stresses acting upon it. Hence a painting specification must include the type of paint to be used as well as the method of application and the preparation of the surface.
- 1.1.3 Quality assurance and control systems also must be specified so that the application of the paint system can be verified in order to produce the desired properties.
- 1.1.4 Painting is a highly specialised activity, involving extended time scales to cover surface preparation, handling and drying times, and delays caused by inclement weather conditions.
- 1.1.5 In general, painting is the final process of a project and in order to prevent costly delays, good planning is essential as well as the use of fully trained painting staff and qualified inspectors.
- 1.1.6 The equipment should be designed to have a minimum operating life of 25 years. This assumes that, even with the on-set of corrosion, the equipment will remain in a safe and operable condition after 25 years of service.

1.2 Definitions

- 1.2.1 For the purposes of this document, the following definitions shall apply:

Table 1-1: Definitions Table

Term	Definition
Approved	Approved in writing by the Client's representative
Code	A standard that has been adopted by governmental bodies or that is cited in a contractual agreement and has the force of law
Client	Badrakh Energy LLC
Contractor or Supplier	Original Equipment Manufacturer (OEM), Supplier, Fabricator, Contractor or any person appointed in writing by the Client to supply, prepare surfaces and apply surface protection to relevant surfaces. The term Contractor has the same meaning as applied to the term Sub-Supplier or Sub-contractor



Term	Definition
Client's Representative	The Party(s) charged with the responsibility of acting for and on behalf of the Client, in a technical capacity
Site	The geographical location and geometry of the land upon which the plant
Specification	The document that prescribes the precise requirements with which the product or service must conform

1.3 Abbreviations

1.3.1 The following abbreviations have been used:

Table 1-2: Acronyms and Abbreviations Table

Item	Description
ASTM	American Society of Testing and Materials
AWS	American Welding Society
CS	Coating System
CSMEIPP	Structural, Mechanical, Piping and Platework
DFT	Dry Film Thickness
GA's	General Arrangements
GOST	State Standards (Gosudarstvennyy Standart)
ISO	International Organization of Standardization
MDR	Manufacturing Data Records
NACE	National Association of Corrosion Engineers
QCP	Quality Control Plan
QVR	Quality Verification Record
SI	Standard International
SS	Stainless Steel

2. Applicable Documents

2.1 General

2.1.1 Before any painting or coating work commences (whether in on the vendors premises or on-site), the Contractor is required to engage with the Client's Representative as well as the designated coating inspector to ensure alignment of painting and coating requirements as per the applicable approved systems. Through this engagement, the inspector's authority and responsibilities will be clearly established, including their role in inspecting and verifying the quality of all painting and coating work performed by the Contractor.

2.1.2 The requirements of ISO 12944 shall apply as a minimum to all painting and coating application activities. Supplementary requirements are given in this document.

- 2.1.3 If there is any discrepancy between the various requirements, the more stringent requirement will apply. The Contractor is to notify the Client's Representative of any such discrepancies before proceeding with the work.
- 2.1.4 The Contractor shall comply with the requirements of all laws, codes, regulations, ordinances, and statutes of the local, state and national bodies having jurisdiction over the site where the equipment is to be installed.
- 2.1.5 In the event of conflict between the reference codes and standards, drawings, specifications, and/or the purchase order, a written clarification shall be obtained from the Client's Representative before proceeding with the work.

2.2 Reference Documentation

This document is to be read in conjunction with project documents stated below in Table 2-1.

Table 2-1: Project Standards and Specifications Table

Specification	Description
H376512-8000-130-078-0001	Quality Management System Requirements for Suppliers and Contractors - Specification
H376512-8000-230-210-0001	Structural Design Criteria
H376512-8000-240-242-0001	Standard Mechanical Specification for Packaged Equipment
H376512-8000-240-242-0003	Mechanical Insulation and Cladding Specification
H376512-8000-250-242-0001	Piping Isolation Specification
H376512-8000-250-242-0002	Piping Insulation and Tracing Specification
H376512-8000-250-242-0003	Manual Valve and Special Piping Items Specification
H376512-8000-250-216-0005	Standard Specification - Piping Material Class Index
H376512-8000-260-242-0001	E&I Requirements for Packaged Plants and Equipment
H376512-8000-260-216-0008	E&I Preferred Suppliers List
H376512-8000-200-242-0001	Site Climatic Conditions Specification

2.3 Statutory Requirements

- 2.3.1 The painting and protective coating of all equipment, piping and structures shall comply with all relevant provincial and national government Acts, By-laws and Regulations of Mongolia.
- 2.3.2 In the absence of Mongolian Standards, the Standards issued by international organisations mentioned in this document shall apply.
- 2.3.3 The latest editions of standards shall be applied, unless otherwise specified.
- 2.3.4 The following order of precedence shall be applied regarding the design standards appropriate for this project where applicable:
- Mongolian Codes, standards and legislation
 - Project specifications or datasheets

- Relevant standards from other countries with approval from the Client's Representative.

2.3.5 The Contractor and Suppliers shall always have available on site a copy of the latest editions of the afore mentioned legislation, including all revisions and amendments.

2.4 Codes, Regulations and Standards

Surface preparation and painting shall be in accordance with the latest issue including amendments of the following standards listed in Table 2-2.

Table 2-2: Project Standards

Document Number	Description
American	
ASTM A123	Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
ASTM A153	Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware
ASTM D4285	Standard Test Method for Indicating Oil or Water in Compressed Air
ASTM D4541	Standard Test Method for Pull-off Strength of coatings using Portable Adhesive Testers
ASTM D6386	Standard Practice for Preparation of Zinc (Hot-Dip Galvanized) Coated Iron and Steel Product and Hardware Surfaces for Painting
ASTM A780	Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings
ASTM D-3359	Standard Test Methods for Rating Adhesion by Tape Test
International	
ISO 19840	Paints and varnishes — Corrosion protection of steel structures by protective paint systems — Measurement of, and acceptance criteria for, the thickness of dry films on rough surfaces
ISO 13076	Paints and Varnishes – Lighting and Procedure for Visual Assessments of Coatings
ISO 2808	Paints and varnishes – Determination of film thickness
ISO 8501	Preparation of steel substrates before application of paints and related products – Visual assessment of surface cleanliness
ISO 8501-1	Preparation of steel substrates before application of paints and related products – Visual assessment of surface cleanliness Part 1: Rust grades and preparation grades of uncoated steel substrates and of steel substrates after overall removal of previous coatings
ISO 8502-3	Preparation of steel substrates before application of paints and related products - tests for the assessment of surface cleanliness Part 3: Assessment of dust on steel surfaces prepared for painting
ISO 8502-6	Preparation of steel substrates before application of paints and related products – Tests for the assessment of surface cleanliness. Part 6: Extraction of soluble contaminants for analysis – The Bresle method
ISO 1461	Hot dip galvanised coatings on fabricated iron and steel articles – specifications and test methods

Document Number	Description
ISO 12944	Paints and varnishes – Corrosion protection of steel structures by protective paint systems
ISO 12944-2	Paints and varnishes – Corrosion protection of steel structures by protective paint systems Part 2: Classification of environments
ISO 12944-4	Paints and varnishes – Corrosion protection of steel structures by protective paint systems – Part 4: Types of surfaces and surface preparation
ISO 12944-5	Paints and varnishes – Corrosion protection of steel structures by protective paint systems – Part 5: Protective paint systems
ISO 23779	Shot blasting machinery — Safety and environmental requirements
ISO 14122-3	Safety of machinery — Permanent means of access to machinery — Part 3: Stairs, stepladders and guard-rails
NACE RP0188	Discontinuity (Holiday) Testing of New Protective Coatings on Conductive Substrates
British	
BS 3900	Test methods for paints, varnishes, and related coatings

3. Surface Preparation

3.1 General

- 3.1.1 Surface preparation of steelwork before painting must comply with ISO 12944 (All parts) standards, using the methods specified in the relevant Coating System. Each method must meet the minimum standards outlined. The Contractor is responsible for ensuring that the chosen method and finish are sufficient to guarantee the adhesion of the selected paint system, considering the specific application conditions and service environment. Special attention should be given to areas around welds to ensure all slag and fluid residues are thoroughly removed.
- 3.1.2 If the surface preparation results in a bare metal surface, a primer coat must be applied within 4 hours of completing the preparation to prevent any contamination or oxidation.
- 3.1.3 Absence of soluble salts prior to blasting should be confirmed using the Bresle patch test in accordance with ISO 8502-6. The allowable limit shall be according to paint supplier's specification. Chloride levels should not exceed 1 – 2 µg/cm² and soluble ferrous ion levels shall not exceed 10 µg/cm².
- 3.1.4 For concrete surfaces the surface must be free of all foreign material, all sharp protrusions and shuttering marks must be smoothed by surface grinding. All surface materials such as oils, grease and grimes must be removed. Any cracks in the concrete surface must at this stage be grinded to a V groove and filled with an epoxy mastic. Expansion material must be raked out and cleaned in order for the acid proofing to be applied.
- 3.1.5 For concrete surfaces exposed to 90-98% sulphuric acid a steel float concrete finish is required. And for concrete surfaces exposed to <90% sulphuric acid a wood concrete float finish is required.



3.2 Methods of Surface Preparation

3.2.1 Solvent Washing

- 3.2.1.1 All contaminants such as grease, oil, dirt, loose scale, and dust must be removed using a liquid solvent or an alkaline solution in accordance with ISO 12944-4 and ISO 8502-6.
- 3.2.1.2 Any loose or flaking material should be manually brushed off using wire brushes. After washing, the surface must be thoroughly dried immediately using clean rags or compressed air to prevent any moisture retention.

3.2.2 Hand and Power Tool Cleaning

- 3.2.2.1 All weld slag and splatter shall be removed by chipping or grinding prior to blast cleaning. All sharp edges, gouge marks and rough welds shall be rounded or ground to a minimum 3 mm radius, unless otherwise noted.
- 3.2.2.2 Unpainted surfaces should be treated with power impact tools to achieve a Grade Sa Sa2½ finish as per ISO 8501. In areas where power tools cannot reach, hand tools should be used to achieve the same Grade Sa Sa2½ finish, unless otherwise noted.
- 3.2.2.3 For touch-up work, modifications or on-site fabrication to take place on previously painted surfaces, any paint that has been damaged by heat, smoke, or mechanical impact must be removed. The exposed surface should be prepared as detailed in this Specification, with the edges of the remaining paint film feathered off. The area to be overcoated with fresh paint should be wet sanded to ensure proper adhesion.

3.2.3 Abrasive Blast Cleaning

- 3.2.3.1 To prevent flash rusting, blast cleaning shall not be performed on cold or wet steel.
- 3.2.3.2 Mineral blast media shall be new, non-recycled. Steel grit may be recycled provided it is screened to ensure correct mesh size and tested for salt and oil contamination. All grit must be angular and of minimum size to ensure adequate anchor pattern. Steel shot shall not be used for preparing surfaces for coating.
- 3.2.3.3 Upon completion, blast products and dust should be removed from surfaces using compressed air or vacuum cleaning. The air quality for compressed air used in blasting and final clean-up must meet the specifications required for spray application of paint.
- 3.2.3.4 Refer to ISO 23779 for abrasive shot blast cleaning environmental requirements.

4. Surface Cleanliness

- 4.1. Blasting and painting compressors should undergo a Blotter test in accordance with ASTM D4285 or equivalent standard prior to each shift to verify cleanliness.
- 4.2. The blast profile shall be measured in accordance with ISO 8501.
- 4.3. No coating shall be applied to any surface containing traces of grit, grease, oil, loose rust, mill scale, surface contaminants (i.e., dust) or corrosion products of any kind.
- 4.4. The following requirements shall apply prior to coating application:

- All traces of oil, grease and other contaminants shall be washed by a method acceptable to the coating manufacturer from the surface and the surface dried prior to painting
- All surfaces to which coating is applied shall be free of moisture
- If the blast cleaned surface changes colour, or rust bloom begins to form, the surface shall be re-blasted
- Absence of blasting dust residual should be tested via tape test according to ISO 8502-3, minimum level 2 acceptance.

5. Painting and Protective Coating Systems and Classifications

5.1. Coating System Classification for the different plant corrosive conditions:

- Coating System 1 (CS1) – Corrosive Environment C3
- Coating System 2 (CS2) – High Corrosive Environment C4
- Coating System 3 (CS3) – Very High Corrosive Environment C5
- Coating System 4 (CS4) – Very High Corrosive Environment CX-Wet/Corrosive-Chemical Fume Conditions
- Coating System 5 (CS5) – Very High Corrosive Environment CX-Chemical
- Coating System 6 (CS6) – OEM Coating System Improvement
- Coating System 7 (CS7) – High Temperature Applications (100°C to 200°C)
- Coating System 8 (CS8) – High Temperature Applications (200°C to 400°C)
- Coating System 9 (CS9) – High Temperature Applications Up to 640°C
- Coating System 10 (CS10) – Tank Internals Chemical Slurry (Abrasive) Ceramic-Filled Lining
- Coating System 11 (CS11) – Tank Internals Chemical Slurry (Abrasive) Flake-Filled Epoxy Lining
- Coating System 12 (CS12) – Tank Internals – Mildly Abrasive Slurry (Ph Range 3 To 11)
- Coating System 13 (CS13) – Tank Internals – Mildly Abrasive Slurry (Ph Range 5 To 9)
- Coating System 14 (CS14) – Tank Internals – Potable Water
- Coating System 15 (CS15) – Tanks – Diesel or Petroleum Storage
- Coating System 16 (CS16) – Additional application to ensure correct DFT
- Coating System 17 (CS17) – Acid Proofing of Concrete – 90-98% Sulphuric Acid
- Coating System 18 (CS18) – Acid Proofing of Concrete – 30-90% Sulphuric Acid
- Coating System 19 (CS19) – Acid Proofing of Concrete – <30% Sulphuric Acid.

- 5.2. The Coating Systems detailed in Section 5 is based on the requirements of the internationally recognised coating standard ISO 12944. All environments are as described in ISO 12944-2:2017, and all coating proposals are based on ISO 12944-5:2019.
- 5.3. Different coating systems were developed to ensure maximal corrosion protection in accordance with operating conditions is indicated in Table 5-1. The Dry Film Thickness (DFT), measured in microns is detailed in ISO 2808. Refer to the Paint Colour Specification, in Appendix A, for the respective colours of the coatings systems.
- 5.4. Please note that these coating proposals are based on the requirements of the internationally recognised coating standard ISO 12944. All environments are as described in ISO 12944-2:2017, and all coating proposals are based on ISO 12944-5:2019 in order to provide a medium (7 to 15 year) durable life expectancy.
- 5.5. All OEM equipment suppliers are to submit their paint and coating specifications to the Client's Representative for approval prior to commencement of coating.

Table 5-1: Painting and Protective Coating Systems

Coating System Number	Surface Preparation	Primer Coat			Final Coat			Total Minimum DFT (microns)
		Description	No. of Coats	Nominal DFT (microns)	Description	No. of Coats	Nominal DFT (microns)	
CS1	SSPS-SP 10 / Sa 2 ½	Carboguard 880 MIO	2	80	Carbothane 137 HS	1	40	120
CS2	SSPS-SP 10 / Sa 2 ½	Carboguard 890	2	130	Carbothane 137 HS	1	50	180
CS3	SSPS-SP 10 / Sa 2 ½	Carboguard 920-S *	3	150	Carboguard 890	2	100	250
CS4	SSPS-SP 10 / Sa 2 ½	Carboguard 920-S *	4	175	Carboguard 920-S	4	175	350
CS5	SSPS-SP 10 / Sa 2 ½	Phenoline 921 *	4	175	Phenoline 921	4	175	350
CS6	SSPS-SP 10 / Sa 2 ½	Rustbond Penetration Sealer	1	30	Additional Two Coats to OEM Specification "applicable to area condition"	5	Additional 200 DFT (Max)	230
CS7	SSPS-SP 10 / Sa 2 ½	Thermaline 400	2	125	Thermaline 1248	1	30	155
CS8	SSPS-SP 10 / Sa 2 ½	Carbozinc 11	1	50	Thermaline 4631	1	30	80
CS9	SSPS-SP 10 / Sa 2 ½	Thermaline Heatshield	2	90	Thermaline Heatshield	2	90	180
CS10	SSPS-SP 10 / Sa 2 ½	CAR 300	6	300	CAR 300	6	300	600
CS11	SSPS-SP 10 / Sa 2 ½	Phenoline Tank Shield	12	600	Phenoline Tank Shield	12	600	1200

Coating System Number	Surface Preparation	Primer Coat			Final Coat			Total Minimum DFT (microns)
		Description	No. of Coats	Nominal DFT (microns)	Description	No. of Coats	Nominal DFT (microns)	
CS12	SSPS-SP 10 / Sa 2 ½	Phenoline Tank Shield	6	310	Phenoline Tank Shield	6	310	620
CS13	SSPS-SP 10 / Sa 2 ½	Carboguard 890 GF	6	300	Carboguard 890 GF	6	300	600
CS14	SSPS-SP 10 / Sa 2 ½	Carboguard 891	2	125	Carboguard 891	2	125	250
CS15	SSPS-SP 10 / Sa 2 ½	Phenoline 385	2	125	Phenoline 385	2	125	250
CS16	SSPS-SP 10 / Sa 2 ½	Carboguard545	1	50	Additional Two Coats to OEM Specification "applicable to area condition"	5	Additional 200 DFT (Max)	250 Max
CS17		N/A		N/A	Rhepanol membrane		TBC	TBC
CS18		N/A		N/A	Corroline NE/R – S1		TBC	TBC
CS19		N/A		N/A	Ucrete (Polyurethane) Oxydur PTB		TBC	TBC

Notes:

- Equipment will generally be stored at moderate and atmospheric temperatures for prolonged periods before installation
- Remove all oil, grease and soluble salts by washing with Carboclean 250 or approved equivalent and rinsing with potable water
- Refer to paint manufacturer's specification and data sheet with regards to minimum and maximum surface finishes. Unless otherwise stated, the dry abrasive blast to near white metal in accordance with Sa2½ of the International Standard ISO 8501-1 to obtain a surface profile of 40 to 80 microns unless otherwise noted
- Refer to paint manufacturer's specification and data sheet with regards to minimum and maximum relative humidity, temperature range during coating application and curing Coating Systems detailed in Section 0, is based on the requirements of the internationally recognised coating standard ISO 12944. All environments are described in ISO 12944-2, and all coating proposals are based on ISO 12944-5

5.6. Equivalent Produce Guidelines

5.7. Carboline products referenced in this specification is included in Table 5-2, is a list of alternative products to the paints and coatings listed in Table 5-1.

Table 5-2: Approved Equivalent Products

Carboline Product	Coating Type	International	Jotun	Sigma PPG
Carboguard 880	Epoxy (high solids)	Intergard 251	Penguard Express MIO	SigmaCover 630
Carbothane 137HS	Polyurethane	Interthane 990	Hardtop Flexi	SigmaDur 550 H
Carboguard 890	Epoxy mastic	Interseal 670HS	Penguard Universal and Jotamastic 90	SigmaCover 630
Carboguard 920-S	Epoxy (high build)	Interzone 954	Jotamastic 90 GF	Sigma Shield 880 Primer and Finish
Phenoline 921	Epoxy lining	Interzone 954GF	Tankguard Storage and Jotamastic 90 GF	PhenGuard 985
Rustbond Penetrating Sealer	Epoxy sealer	Interseal 670HS	Jotacote F60 (at 50 DFT)	SigmaCover 630
Thermaline 400	Heat-resistant silicone	Interbond 2340UPC	Jotacote F60	SigmaTherm 230
Thermaline 1248	Heat-resistant silicone	Intertherm 875	Solvalitt Alu and Solvalitt	SigmaTherm 540
Carbozinc 11	Inorganic zinc primer	Interzinc 22	Resist 86	Sigmazinc 158
Thermaline 4631	Heat-resistant epoxy	Interthem 50	Solvalitt Alu and Solvalitt	SigmaTherm 540
Thermaline Heatshield	Insulative coating	Interbond 1202UPC	Jotatemp 1000	Hi-Temp 1027
CAR 300	Acrylic	N/E	Tankguard Type III	SigmaCover 703
Phenoline Tank Shield	Epoxy lining	Interline 850/Interline 984	Tankguard Storage and Marathon XHB	SigmaCover 703
Carboguard 890GF	Epoxy mastic (glass-flake reinforced)	Interzone 954GF	Jotamastic 90 GF	SigmaGuard 880 GF
Carboguard 891	Epoxy	Interline 850	Proguard and Tankguard 412	NovaGuard 650
Carboguard 545	Epoxy primer	Intergard 269	Jotacote F60	SigmaGuard 720

Refer to the Supplier Datasheet for the Coating application, equivalent thickness and durability requirements.

6. Structural, Piping and Mechanical

6.1 General

This section covers the supply and application of painting and protective coatings systems as displayed in Table 6-1 is applicable unless otherwise stated on drawings.

Table 6-1: Structural, Plate, and Mechanical – Category Description

System Number	Category Description	Material Element
	Environment	
CS1	Corrosive environment C3 dry/benign plant areas C3 is a medium corrosive environment, typically found in urban or light industrial environments with low pollution and minimal chemical exposure. Indoors: sheltered locations with occasional moisture. Outdoors: areas with high humidity but minimal air pollution	Structural steel, platework, piping externals including fire systems, handrailing, steel mech, fasteners, sheeting and mechanical components
CS2	High corrosive environment C4 high humidity/very mild chemical fumes (Dry and Wet areas). Found in industrial areas and coastal zones with moderate salinity. Indoors: chemical plants. Outdoors: areas with frequent condensation and mild chemical exposure	Structural steel, platework, piping externals including fire systems, handrailing, steel mech, fasteners, sheeting and mechanical components
CS3	Very high corrosive environment C5 (Dry and Wet areas). Common in aggressive industrial zones and coastal areas with high salinity. Indoors: buildings with high humidity and aggressive atmospheres. Outdoors: industrial areas exposed to the environment	Structural steel, platework, piping externals including fire systems, handrailing, steel mech, fasteners, sheeting and mechanical components
CS4	High corrosive environment CX Areas where continuous wet and corrosive conditions are experienced. Possible chemical fumes. (Dry and Wet areas) Indoors: facilities with exhaust gases, chemical vapors, and wet processes. Outdoors: industrial zones with acidic rain, exhaust fallout, or chemical mist	Structural steel, platework, piping externals including fire systems, handrailing, steel mech, fasteners, sheeting and mechanical components
CS5	High corrosive environment CX – Chemical. Areas exposed to mainly acidic fumes with a possibility of splash and spillage (Dry areas and Wet areas) May involve continuous wetting, high temperatures, and aggressive chemical vapors	Structural steel, platework, piping externals including fire systems, handrailing, steel mech, fasteners, sheeting and mechanical components
CS6	As per OEM classification (Dry areas and Wet areas)	Mechanical components, valve externals, motors, pumps, gearboxes, control valves, in-line instruments, etc. (Manufacture Standards)
CS7	High temperature application (100°C to 200°C) General plant exposure and/or areas exposed to mainly acidic fumes operating at high temperatures (Dry and Wet areas). This environment combines elevated temperatures with exposure to acidic fumes, both indoors and outdoors. Common in chemical plants, refineries, and high-temperature processing zones. Materials must withstand thermal cycling, acidic corrosion, and moisture ingress	Structural steel, platework, piping externals including fire systems, handrailing, Steel Mech, fasteners, sheeting and mechanical components

System Number	Category Description	Material Element
	Environment	
CS8	High temperature application (200°C to 400°C) General plant exposure – continuous operation (Dry and Wet areas) Environments where components are exposed to elevated temperatures. Common in boiler rooms, furnaces, or near heat-generating equipment. Materials must resist thermal expansion, oxidation, and loss of mechanical integrity	Structural steel, platework, piping externals including fire systems, handrailing, Steel Mech, fasteners, sheeting and mechanical components.
CS9	High temperature application (Up to 640°C) General plant exposure – continuous operation (Dry and Wet areas) Environments where components are exposed to elevated temperatures. Common in boiler rooms, furnaces, or near heat-generating equipment. Materials must resist thermal expansion, oxidation, and loss of mechanical integrity	Structural steel, platework, piping externals including fire systems, handrailing, Steel Mech, fasteners, sheeting and mechanical components
CS10	Abrasive slurry containing chemicals (Dry and Wet areas) Found in mineral processing, slurry pipelines, or mixing tanks. These areas involve continuous contact with abrasive solids suspended in liquid, often with corrosive chemicals. Ceramic-Filled liners must withstand mechanical erosion, impact, and chemical attack	Platework, mechanical, piping, including fire systems
CS11	Abrasive slurry containing chemicals (Dry and Wet areas) Found in mineral processing, slurry pipelines, or mixing tanks. These areas involve continuous contact with abrasive solids suspended in liquid, often with corrosive chemicals. Flake-Filled epoxy liners must withstand mechanical erosion, impact, and chemical attack	Platework, mechanical, piping including fire systems
CS12	Mildly abrasive slurry containing chemicals (Dry and Wet areas) with pH range 3-11 This environment involves contact with slurry mixtures that contain fine abrasive particles and chemical additives common in mineral processing, chemical dosing tanks, or wastewater pre-treatment. Materials must resist surface wear, chemical degradation, and potential pH fluctuations	Platework, mechanical, piping, including fire systems
CS13	Mildly abrasive slurry containing mild solution chemicals (Dry and Wet areas) with pH range 5-9 This environment involves slurry mixtures with fine particulates and diluted chemical solutions common in early-stage processing, sediment transport, or low-concentration chemical dosing. Materials must resist gradual surface wear and mild chemical corrosion	Platework, mechanical, piping, including fire systems
CS14	Potable water (Dry and Wet areas)	Platework, piping, including fire systems

System Number	Category Description	
	Environment	Material Element
CS15	Diesel or petroleum storage (Dry and Wet areas)	Platework, piping including fire systems
CS16	Areas where continuous wet and corrosive conditions are experienced. Similar to CX environments. This environment involves constant exposure to moisture and aggressive corrosive agents common in wastewater treatment zones, coastal installations, or chemical processing areas. Surfaces are rarely dry, and corrosion risk is amplified by stagnant water, acidic runoff, or salt-laden humidity. Materials must be highly resistant to long-term chemical degradation, microbial attack, and coating breakdown.	Hot Dip Galvanised (HDG) bolts, nuts and washers, galvanised sheet metal, profiled plates, any Structural steel members used as permanent decking for concrete floors (QC decking or similar). Refer to Table 5-2 for the relevant paint application
CS17	Acid Proofing of Concrete – 90-98% Sulphuric Acid	Concrete Surfaces
CS18	Acid Proofing of Concrete – 30-90% Sulphuric Acid	Concrete Surfaces
CS19	Acid Proofing of Concrete – <30% Sulphuric Acid	Concrete Surfaces

- 6.1.1 Refer to Table 5-1 and Table 5-2 for the relevant Painting and Protective Coating Systems and their equivalents respectively.
- 6.1.2 For CS6 the manufacturer's standard coating system needs to be equivalent or superior to that specified in this specification.
- 6.1.3 The electrical and instrumentation panels must adhere to the Manufacturer's Standard as corresponding with CS6. If the panels are stainless steel, then the panel will require a coating as per the Project Paint Colour Specification, Appendix A. The handrailing is carbon steel and stainless steel as per the steel standard for the handrailing, ISO 14122-3, hence handrailing will only require coating as per the Project Paint Colour Specification, Appendix A.
- 6.1.4 Grating will be FRP in chemically abrasive areas, specified as per drawings. In all other areas, grating is HDG as per the Structural Design Criteria, H376512-0100-230-210-0001.
- 6.1.5 Rubber lining of equipment, steelwork, platework, chutes and bins and piping is as specified on the drawings and is as per the Manufacturers Standard. Storage and preservation requirements to be applied to ensure UV protection.
- 6.1.6 Buried piping on site is specified as HDPE, unless otherwise stated, hence no corrosion protection is required.
- 6.1.7 All steel pipes, couplings, joints, flanges, bolts and nuts buried below ground level to be wrapped with Denso SS prime, Denso mastic and Denso HT tape as per manufacturer's specification.
- 6.1.8 Steel embedded in concrete is to be primed with Masonry Paint or Epoxy based paint, as per this specification.

6.1.9 Where fire retard coatings are applicable, the system will be specified in the drawings.

6.1.10 The concrete that is to be coated for acid proof has to have the following requirements. The concrete should have a minimum strength of 25MPa and a minimum slope of 1.5% towards all drains and sumps. The concrete floors shall cure for 30 days before coating.

6.2 Surfaces Not to be Painted

6.2.1 The following surfaces must not be painted:

- Surfaces which must be in direct contact with concrete, grout, mortar
- Raised faces of flanges, unless required for internal corrosion protection
- Steel surfaces requiring field welding
- Underside of base plates where grouted
- Shop contact surfaces
- Grounding/Earthing points
- Austenitic stainless steels, including Grade 316 stainless steel, marine grade aluminium, duplex stainless steels Grade 2205, and nickel alloys.
- Aluminium surfaces
- Brass
- Bronze
- Copper
- Faying surfaces on field connections to be high strength bolted must be blanked off during shop painting to prevent accumulation of oil, paint, lacquer, or other coatings
- Machine finished or similar surfaces that should not be painted but which require protection must be protected with a coating of rust inhibitive petrolatum.

6.2.2 Components not to be painted must be removed prior to painting or protected as required.

6.2.3 Unless noted otherwise, the Contractor must not paint moving parts of operating units, mechanical and electrical parts, such as valve and damper operators, linkages, sensing devices, motor, and fan shafts.

7. Typical Coating System for Facilities

The typical coating system to be applied in the various facilities are summarised in

Table 7-1: Coating System as per Facility

FBS Number	Facility Name	Coating System
0000	Uranium Treatment Plant	CS 5
0200	Ponds and Sorption Units	
0210 and 0220	Sorption unit train 1 and 2	CS 5
0230	Common Systems for sorption units	CS 5
0240	Pregnant Solution Ponds	CS 4
0250	Barren Solution Ponds	CS 4
0260	Effluent Decantation Ponds	CS 4
0270	RVR Pond	CS 4
0280	Silt Treatment Plant	CS 10
0300	Elution Units	
0310 and 0320	Elution and denitration unit train 1 and 2	CS 5
0330	Common Systems for Elution units	CS 5
0400	Back-end Wet Units	
0420	Iron Precipitation	CS 5
0440	Uranium Precipitation	CS 5
0460	Uranium Filtration	CS 5
0500	Back-end Dry Units	
0520	Uranium Drying & Offgas Treatment	CS 5 and 7*
0540	Uranium Calcination & Offgas Treatment	CS 7
0560	Uranium Concentrate Packaging	CS 8
0600	Regent Preparation	CS 5
0700	Utilities	
0710	Compressed Air Units	CS 8
0720	Industrial Water Treatment Unit	CS 16
0725	Industrial Water Distribution	CS 16
0730	Demin And Potable Water Plant	CS 14
0750	Water Chiller Unit	CS 2
0760	Backup Generators	CS 2
0770	Utility Diesel Boiler and Heat Pump	CS 2
1000	Acid Production Plant	CS 6
2000	Industrial Site Supporting Units	CS 5
2300	Final Product Shipment	CS 3
2400	Firefighting Infrastructures	CS 3
2500	Liquid Effluent	CS 5



FBS Number	Facility Name	Coating System
2600	Services	
2660	Fuel Storage	CS 15
2670	Light Vehicle and Trucks Fuel Distribution	CS 15

* CS7 is for high heat equipment such as the calciner and spin flash dryer

defines the protective coating systems assigned to each facility within the project. The coating system numbers correspond to detailed specifications in Section 5, which outlines the primer, and coating requirements in Table 5-1. The allocation of coating systems is based on material type, service environment, and exposure conditions.

8. Workmanship

- 8.1. Corrosion protection work shall strictly be performed by experienced and skilled workers. They shall be always supervised by a NACE qualified level 2 coating inspector and shall be fully conversant with the requirements of this Specification.
- 8.2. Should a disagreement over quality issues occur, the Client's Representative should act as arbiter and supply written confirmation of acceptance or rejection.
- 8.3. Where workmanship or coating application does meet the requirements stipulated, the Contractor is liable to make the relevant alterations.

9. Measuring and Coating Equipment

- 9.1. The Contractor shall have a blast profile gauge, wet film comb and dry film thickness gauge at the shop/site at all times. The Contractor shall also have at the shop/site, instrumentation to measure wet bulb, dry bulb temperatures, substrate temperature and method to calculate relative humidity.
- 9.2. Calibration of the dry film thickness instrument shall be in accordance with ISO 2808 Method 6A.
- 9.3. When approved the instrument may be calibrated, using a smooth flat reference disc supplied by the instrument manufacturer. In such cases a correction factor of minus 25 µm shall be applied to all readings to make allowance for the abrasive blast profile.
- 9.4. All test equipment shall have current calibration certification.
- 9.5. Brushes for the application of coatings shall be of a type that will enable correct application.
- 9.6. Paint-rollers for the application of coatings shall be of a type which will enable correct application and not incur roller hair contamination.
- 9.7. Spray equipment shall be commensurate with high quality work, shall be capable of atomising the material and shall be equipped with suitable pressure regulators and

gauges. Air caps, needles and nozzles shall be of the types recommended by the coating manufacturer.

- 9.8. All spray-painting equipment shall be fitted with operational and suitable oil and moisture traps, and air shall be free of salinity.
- 9.9. Blast equipment: effective oil and water separators shall be utilised on all airlines used for abrasive blast cleaning. The separators shall be of the "cartridge" type.
- 9.10. A low-speed power mixer, which does not induce air into the coating being mixed, shall be utilised.

10. Coating Materials

- 10.1. Coating materials shall only be approved materials as detailed in the relevant system.
- 10.2. Coating materials from different manufacturers shall not be mixed in the same coating system.
- 10.3. The coating manufacturer shall supply all coatings. The contractor shall obtain a copy of the coating batch certificate, data sheet and MSDS, from the coatings manufacturer prior to using the material.
- 10.4. Types and quantities of all thinners, solvents and reducers shall be as recommended by the coating manufacturer.
- 10.5. The coating manufacturer's recommended shelf life and other storage requirements shall be complied with.
- 10.6. Materials in the shop:
- Coatings to be used for the contract shall be segregated from all other materials in the shop

Materials on site:

- No coatings other than the materials utilised in the relevant Systems shall be stored on the site
- The Contractor shall ensure that the colours selected in the coating System shall be distinctly different, to ensure total obliteration of the previous coat
- The colour of the finishing coat shall be as specified by the Engineer
- Light grey primers shall not be utilised over abrasive blast cleaned surfaces unless approved.

11. Coating Application

11.1 Mixing

- 11.1.1 All material shall be thoroughly mixed for a minimum of five minutes by means of a power-driven mixer.



- 11.1.2 The induction time recommended by the coating manufacturer shall be observed.
- 11.1.3 The Contractor shall ensure that all paints are mixed in accordance with the manufacturer's instructions. No partial paint kits shall be mixed.
- 11.1.4 During application containers shall be agitated often enough to keep pigments in suspension.
- 11.1.5 Note that Carbozinc 11 (or an approved equivalent) must be continuously agitated during application to avoid zinc settlement.

11.2 Coatings

- 11.2.1 All surfaces shall be coated as specified. Surfaces, which do not require coating, shall be suitably protected.
- 11.2.2 Special attention shall be given to cracks, crevices and edges to ensure complete coverage and paint thickness.
- 11.2.3 All surfaces to be coated shall be raised 500 mm off the floor. Trestles shall be fitted with timber on bearing surfaces to ensure no metal-to-metal contact of blast cleaned surfaces with the trestles.
- 11.2.4 The primer shall be applied as soon as possible after the blast cleaning operation, but within 4 hours. In a high humidity environment painting shall commence directly after blasting.
- 11.2.5 On pre-coated surfaces all traces of soluble salts and other corrosive airborne contaminants shall be removed with potable water and surfaces shall be allowed to dry prior to further paint application.

11.3 Application

- 11.3.1 Unless otherwise specified, all coatings shall be spray applied.
- 11.3.2 Stripe coating applied via brush should be used on corners, bolts, welds, and other difficult areas to ensure adequate coverage before and or after coating.
- 11.3.3 In instances where spray application is considered not to be possible, practical or feasible, this must be brought to the attention of the Client's Representative.
- 11.3.4 All coatings shall be evenly applied to form a smooth, continuous, unbroken coating free from sags, runs, mud cracking and other defects.
- 11.3.5 All application work shall be carried out in strict accordance with the recommendations and instructions given in the most current Product Data Sheet. This includes required climatic conditions, blast profiles, overcoating times, application equipment and methods to be utilised and pertinent requirements not listed in this specification.
- 11.3.6 Corrosion protection, material control and handling, stacking, storage (and temp control), shelf-life should be issued by the OEM in their submission as part of their Operations and Maintenance Manuals (preservation and storage.)

- 11.3.7 Steel to be embedded in concrete shall be blast cleaned and primed with primer as specified in section 6.1.8 before being embedded.
- 11.3.8 Where surfaces are to be welded, no paint shall be applied within a reasonable distance of the weld (50 mm), unless otherwise stated.
- 11.3.9 Patch repair to the primer and intermediate coats and the application of the final coat shall be carried out after erection of the steel and not before erection unless otherwise instructed by the Client.
- 11.3.10 The Contractor shall apply the full painting system specified on the bearing surfaces of walkways before the gratings or relevant floor sections are put in place.
- 11.3.11 No coated items shall be dispatched until they have been inspected and cleared and a certificate issued that the work has been carried out according to the Approved QCP specification and the Manufacturer's requirements of the DFT for the respective coating layers.
- 11.3.12 Painting in high wind conditions shall be avoided.

12. Handling

- 12.1. Care shall be taken not to damage any steelwork, equipment, platework and piping during the on- and offloading process.
- 12.2. Sufficient dunnage and protection measures shall be provided to protect items during transport.
- 12.3. All coated components shall be handled using soft slings.
- 12.4. All coated components to be transported shall be loaded with support blocks, packing between pieces and tight lashings to avoid chafing.
- 12.5. Items shall be stacked using timber packings or other approved means to avoid coating-to-coating contact. Sufficient bearing area of packing shall be used to avoid damage to coating.
- 12.6. Weather conditions.
- 12.7. Coatings shall not be applied under the following conditions:
- When the surface may become damaged by rain, airborne dust, fog, mist or condensation
 - When substrate surface temperatures are less than 3°C from the dew point or exceeds 50°C, unless the paint is specifically formulated for high-temperature application
 - If the air temperature is below 5°C or if the steel surface temperature is below 2°C
 - When it is anticipated that these conditions will prevail during the drying period, suitable enclosures shall be provided to protect the surfaces

- When the ambient air temperature or the steel temperature is outside the coating manufacturer's recommended range
- When the relative humidity exceeds 60%. For internal tank linings, a dehumidifier should be used to maintain the humidity within the tank below 50% during paint application. Minimum and maximum allowable relative humidity during coating and curing of paint should be strictly in accordance with suppliers' specifications
- Painting should be avoided in high winds and should be stopped if excessive drift to adjacent surfaces, 'dry spray' film defects, or wind-blown dust contamination of the wet paint occurs.

- 12.8. The Contractor or Supplier must complete the Manufacturer's Weather Conditions form/ checklist addressing the appropriate weather conditions for painting works to commence, before Surface Preparation and or Coating begins.

13. Repairs

- 13.1. After erection, welding and lining-up of steelwork or equipment, all transit and erection damage shall be patch repaired by brush application on site.
- 13.2. Remove all oil, grease and soluble salts by washing with Carboclean 250 or an Approved equivalent and then rinsing with potable water to a water break-free surface. Remove all loose rust, rust scale and loose or flaking paint by scraping with flat scrapers followed by wire brushing of the rusty areas to sand blasting profile St2 as per ISO 8501-1:1988 followed by sandpapering the existing paint down to bare metal at the point of exposure with medium (80-grit) sandpaper to feather sharp edges of the surrounding good paintwork by a minimum of 20 mm. Remove chalking and any mill scale if present.
- 13.3. Remove dust before commencing with the Primer. The patch primer used shall be in accordance with the requirements of the relevant coating system. On completion of applying the primer coat and when completely dry washed down using a scrubbing brush and copious quantities of potable water. The surfaces shall then be allowed to dry. DFT reading to be taken and recorded to confirm compliance before commencing with the topcoat patch application. The topcoat used shall be in accordance with the requirements of the relevant coating system.
- 13.4. Upon completion of the patchwork and the drying of the coats, DFT reading to be taken and recorded to confirm compliance.

14. Inspection and Testing

Inspection by the Contractor shall be 100% of all items at all phases of the coating system and not as per sample sizes of batches.

Valid calibration certificates must be provided for testing instruments.

Testing procedure must follow BS 3900.

14.1 Visual Inspection

- 14.1.1 Visual inspection for paint film defects shall be performed after each coat is applied. All paint defects including pinholes, holidays, dry spray, unclosed film and sags shall be corrected before the next full coat is applied.
- 14.1.2 For critical applications in acid service, low voltage wet sponge holiday testing according to NACE RP0188 should be performed.
- 14.1.3 Visual inspections should comply with ISO 13076.

14.2 Dry Film Thickness

- 14.2.1 The nominal DFT is given for each coat in the relevant coating System. Acceptance there of shall be in accordance with ISO 19840 Section 9.
- 14.2.2 Where excessive film thickness can be detrimental to the integrity of the coating, the manufacturer's recommended maximum thickness shall apply to all paint systems.
- 14.2.3 All deficient film thicknesses shall be rectified to the approval of the Client Representative at the Contractor's expense.
- 14.2.4 Actual readings and not averages shall be recorded. The Contractor shall take approximately 10 readings per square meter to ensure coating thickness compliance with specification.
- 14.2.5 Actual readings taken at each location shall be recorded, and an overall average of the total readings shall be documented.

15. Safety

- 15.1. The paints used in protective coatings are highly flammable and contains toxic compounds.
- 15.2. The working area used for shop or site painting must have adequate ventilation.
- 15.3. All personnel entering these work areas must wear all necessary personal protective equipment.
- 15.4. Appropriate fire fighting equipment shall be present near the working area.
- 15.5. All painting materials on site shall be stored in designated areas in storage facilities that meet the storage requirements of the paint manufacturer and the safety requirements of the specific site.

16. Quality Assurance and Control

16.1 General

- 16.1.1 The Contractor to prepare and submit for review a fully developed QCP and painting procedure to cover all aspects of fabrication and site paintwork. The QCP and procedure shall be in accordance with the requirements stipulated in the contract specifications and/or the Technical Specifications.



- 16.1.2 Quality Management of an organisation is an integral process to ensure a systematic, structured and consistent approach is taken to execute the scope of work.
- 16.1.3 Contractors and Suppliers shall conform to the requirements of the Quality Management Systems Requirements for Suppliers and Contractors - Specification H376512-8000-130-078-0001 for the Zuuvch-Ovoo Uranium project.
- 16.1.4 The Contractor and Suppliers shall be responsible for all Quality Management activities necessary to ensure that their output/deliverables conform to the defined requirements.
- 16.1.5 The Contractor and Suppliers shall ensure that all the Sub-contractors/Sub-Suppliers also confirm to the requirements of this specification.
- 16.1.6 The Contractor shall ensure that all MDRs (draft or final) are available at the premises of sub-contractors/suppliers/sub-consultants of the manufactured equipment at the time of final inspection to facilitate a review of applicable QVRs for the manufactured component or sub-component.
- 16.1.7 The Contractor shall ensure that they have obtained and reviewed final inspection and test records/and/or material release certificate for all material and plant before incorporating such items into the works.
- 16.1.8 A copy of the signed final inspection release certificate shall be issued with the shipped equipment or material to the delivery destination; no delivery will be accepted at the delivery destination without the signed inspection release certificate.
- 16.1.9 The final MDR shall be reviewed and accepted for completeness, and the final inspection release certificate shall be included in the MDR.
- 16.1.10 Once completed, the MDR shall be issued for final review by the package discipline engineer and the quality manager/representative for acceptance and approval.



Appendix A : Paint Colour Specification

A.1 General Notes

- A.1.1 All colour codes specified in this document are generally in accordance with GOST 12.4.026-2015 AND GOST 14202-69.
- A.1.2 Section A.2 provides the piping colour coding requirements for various fluid services.
- A.1.3 Section A.3 provides the colour coding requirements for plant equipment and steelworks.

A.2 Pipeline Colour Banding and Identification

- A.2.1 Bands will be self-adhesive high performance laminated polyester, (i.e.: Brady B-7541 or approved equivalent).
- A.2.2 Colour bands as specified in **Table 16-1** are to be applied at all junctions, service appliances, bulkheads, wall penetrations, flanged connections, both sides of valves, pump suction and discharge ends as well as any other place where identification is regarded necessary. This excludes control valves, which will be painted according to the manufacturer's colour specification and to at least the project paint specification or higher.
- A.2.3 Colour bands to be 50 mm wide wrapped around pipe diameter.
- A.2.4 The maximum distance between colour bands shall be 6m. Pipe band colour specified applies both to the band to be wrapped around the pipe diameter and the base colour of the pipe descriptor label. The background colour of all adhesive label descriptors shall be white.
- A.2.5 Labels and colour bands to include ISO 20560 symbols and hazard pictograms where applicable.
- A.2.6 Add direction of flow and label description to ducting.



Table 16-1: Piping Colour Coding Requirements

Fluid Service Code	Description	Pipe Label Descriptor	Base Colour	First Colour Band	Second Colour Band	Third Colour Band	Label Descriptor Text Colour
Air/Gas							
ACO	Off Gas	Off-Gas	Sky Blue (RAL 5015)	Signal Red (RAL 3001)			White
AIN	Instrument or Compressed Air	Instrument Air	Sky Blue (RAL 5015)	Pure Green (RAL 6037)			White
ANG	Nitrogen Gas	Nitrogen	Sky Blue (RAL 5015)	Luminous Yellow (RAL 1026)			White
Fuel Oil							
ODF	Fuel Oil Diesel	Diesel	Copper Brown (RAL 8004)	Signal Red (RAL 3001)			White
OGF	Gasoline	Gasoline	Copper Brown (RAL 8004)	Signal Red (RAL 3001)			White
Process Fluids							
PAB	Acidified Barren Solution	Acidic Solution	Bright Orange Red (RAL 2008)	Luminous Yellow (RAL 1026)			White
PBA	Barren Solution	Acidic Solution	Bright Orange Red (RAL 2008)	Luminous Yellow (RAL 1026)			White
PBR	Barren Resin	Acidic Slurry	Bright Orange Red (RAL 2008)	Luminous Yellow (RAL 1026)			White
PEL	Eluate Solution/ Eluate	Acidic Solution	Bright Orange Red (RAL 2008)	Luminous Yellow (RAL 1026)			White
PER	Eluted Resin	Acidic Slurry	Bright Orange Red (RAL 2008)	Luminous Yellow (RAL 1026)			White



Fluid Service Code	Description	Pipe Label Descriptor	Base Colour	First Colour Band	Second Colour Band	Third Colour Band	Label Descriptor Text Colour
PLR	Loaded Resin	Acidic Slurry	Bright Orange Red (RAL 2008)	Luminous Yellow (RAL 1026)			White
PSL	Pregnant Solution	Acidic Solution	Bright Orange Red (RAL 2008)	Luminous Yellow (RAL 1026)			White
PUO	Uranium Precipitate Thickener Underflow	Neutral slurry	Copper Brown (RAL 8004)	Luminous Yellow (RAL 1026)			White
PYC	Yellow Cake Pulp	Neutral Pulp	Telegrey 1 (RAL 7045)	Luminous Yellow (RAL 1026)			White
TAL	Tailings/Effluents	Effluents	Copper Brown (RAL 8004)	Luminous Yellow (RAL 1026)			White
Reagents							
RAH	Reagent – Ammonium Hydroxide	Acid	Bright Orange Red (RAL 2008)	Luminous Yellow (RAL 1026)			White
RAN	Reagent – Ammonium Nitrate	Acid	Bright Orange Red (RAL 2008)	Luminous Yellow (RAL 1026)			White
RFL	Reagent – Flocculant	Flocculant	Copper Brown (RAL 8004)	Luminous Yellow (RAL 1026)			White
RSC	Reagent – Sulfuric Acid	Acid	Bright Orange Red (RAL 2008)	Luminous Yellow (RAL 1026)			White
Water							
WBB	Blowdown	Water	Pure Green (RAL 6037)	Luminous Yellow (RAL 1026)			White
WBR	Brine	Water	Pure Green (RAL 6037)	Luminous Yellow (RAL 1026)			White
WCO	Condensate	Water	Pure Green (RAL 6037)	Luminous Yellow (RAL 1026)			White



Fluid Service Code	Description	Pipe Label Descriptor	Base Colour	First Colour Band	Second Colour Band	Third Colour Band	Label Descriptor Text Colour
WCR	Cooling Water Return	Water	Pure Green (RAL 6037)	Luminous Yellow (RAL 1026)			White
WCS	Cooling Water Supply	Water	Pure Green (RAL 6037)	Luminous Yellow (RAL 1026)			White
WDB	Demineralized Backwash Water	Water	Pure Green (RAL 6037)	Luminous Yellow (RAL 1026)			White
WDM	Demineralized Water	Water	Pure Green (RAL 6037)	Luminous Yellow (RAL 1026)			White
WFW	Firewater	Water	Signal Red (RAL 3001)				White
WHO	Hot water	Water	Pure Green (RAL 6037)				White
WPO	Potable Water	Water	Pure Green (RAL 6037)				White
WPR	Process/Industrial water	Water	Pure Green (RAL 6037)	Luminous Yellow (RAL 1026)			White
WRW	Raw Water/Ground Water	Water	Pure Green (RAL 6037)	Luminous Yellow (RAL 1026)			White

A.3 Equipment Colour Coding Requirements

The following Equipment Colour Coding Requirements have been used:

Table 16-2: Equipment Colour Coding Requirements

Equipment	Colour in All Other Areas
Mechanical Equipment	Client to specify
Workshop Machinery	Client to specify
Moving Parts	Client to specify
Machinery Guards	Client to specify
Air Receivers	Client to specify
Cranes	Client to specify
Hoist Rails and Crawl Beams	Client to specify
Structural Steelwork	Wine Red (RAL 3005)
Bins and Chutes	Blue (RAL 5000)
Minor Electrical Equipment	Client to specify
MV Switchgear	Light Grey (RAL 7035)
LV Switchgear	Dark Grey (RAL 7032) Orange (RAL 2000)
Switchgear, 110 VDC	Light Blue (RAL 5015)
Emergency power	Signal Red (RAL 3001)
Transformers, Medium Voltage	Light Grey (RAL 7035)
Transformers, Low Voltage	Dark Grey (RAL 7032)
MV Cables	Red (Outer Sheath)
LV Cables, control cables	Black (Outer Sheath)
LV Motors	Leaf Green (RAL 6002)
VSD panels (Free-standing)	Vendor Standard
UPS	Vendor Standard
Wiring Junction boxes (Non-hazardous)	Gray
Wiring Junction boxes (Hazardous locations)	Black
Emergency diesel generators	Vendor standard
Cat ladders	Traffic Yellow (RAL 1023)
Handrails	Traffic Yellow (RAL 1023) and Wine Red (RAL 3005)
Stair landings	Wine Red (RAL 3005)
Stanchions, Kickplates	Wine Red (RAL 3005)
Fencing	Medium Grey (RAL 000 55 00)
Radio-Active Equipment	Client to specify
Fire Pumps	Signal Red (RAL 3001)
Valves	Client to Specify



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Specification
Mechanical Engineering
Painting and Protective Coatings Specification