Project Employer's Requirements IN-PPV-0433

APMT PER#002
MATERIALS

PART B
STRUCTURAL STEEL & COATINGS

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APPENDICES

APPENDIX I **[NOT USED]**
APPENDIX II **GLOSSARY**

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DATA REPORT REVISION REGISTER

Revision	Date	Changes	Prepared	Approved
DRAFT A	08 February 2021	Draft issue	ARN	SEG
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02B.1 GENERAL MATERIAL CONSIDERATIONS

02B.1.1 General

02B.1.1.1 All Materials used in the Works shall be new unless approved otherwise by the Engineer.

02B.1.1.2 The Contractor may propose the use of recycled products where it deems appropriate, provided that there is no detrimental impact to the performance or durability of the Works.

02B.1.1.3 All Materials used in the Works shall be sampled and tested in accordance with the relevant codes and standards, and as specified in the Employer's Requirements.

02B.1.1.4 In case of any conflict between the relevant codes and standards and the Employer's Requirements, the most onerous criteria shall apply.

02B.1.1.5 All Materials shall be stored and handled in accordance with instructions and directions of the manufacturer (where relevant), and always in such a way to prevent damage and/or deterioration of the materials.

02B.1.2 Hazardous Materials

02B.1.2.1 The use of hazardous materials shall be avoided wherever possible, and minimised to the maximum possible extents.

02B.1.2.2 All hazardous materials shall be clearly identified and the relevant material data sheets shall be included in the Project Data Book (as specified in PER #001 Part B "*Documents on Completion*").

02B.1.3 Applicable Codes

02B.1.3.1 This PER is based on Indian Standards and Eurocode standards including but not limited to those listed below; Indian Standards shall generally take precedence unless specifically referenced otherwise in this Employer's Requirements or directed by the Engineer:

a) IS 228: Methods for chemical analysis of steel

b) IS 800: General construction in steel – Code of practice

c) IS 808: Dimensions for hot rolled steel beam, column, channel and angle sections

d) IS 816: Code of practice for use of metal arc welding for general construction in mild steel

e) IS 817: Code of practice for training and testing of metal arc welders

f) IS 819: Code of practice for resistance spot welding for light assemblies in mild steel

g) IS 1024: Code of practice for use of welding in bridges and structures subject to dynamic loading

h) IS 1079: Hot-rolled carbon steel sheet and strip

i) IS 1261: Code of practice for seam welding in mild steel

j) IS 1323: Code of practice for oxy-acetylene welding for structural work in mild steel

k) IS 1367: Technical supply conditions for threaded steel fasteners

l) IS 1730: Dimensions for steel plates, sheets, strips and flats for general engineering purposes

m) IS 2629: Recommended practice for hot-dip galvanizing of iron and steel

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n) IS 2602: Hot rolled medium and high tensile structural steel

o) IS 2879: Mild steel for metal arc welding electrodes

p) IS 3757: Specification for high strength structural bolts

q) IS 4759: Hot-dip zinc coatings on structural steel and other allied products

r) IS 6745: Method for determination of mass of zinc coating on zinc coated iron and steel articles

s) IS 7307: Approval tests for welding procedures

t) IS 7310: Approval tests for welders working to approved welding procedures

u) IS 7318: Approval tests for welders when welding procedure approval is not required

v) IS 8910: General technical delivery requirements for steel and steel products

w) IS 9595: Metal-arc welding for carbon and carbon manganese steels – Recommendations

x) IS 13805: General standard for qualification and certification of non-destructive testing personnel – Specification

y) IS 3711 / EN ISO 377: Steel and steel products: Location and preparation of samples and test pieces for mechanical testing.

z) IS 1608 / EN ISO 6892: Metallic materials. Tensile testing.

aa) EN ISO 544: Welding consumables - Technical delivery conditions for welding filler materials - Type of product, dimensions, tolerances and markings.

bb) EN ISO 2409: Paints and varnishes. Cross-cut test.

cc) EN ISO 3452: Non-destructive testing. Penetrant testing.

dd) EN ISO 4136: Destructive tests on welds in metallic materials. Transverse tensile test.

ee) EN ISO 4624: Paints and varnishes. Pull off test for adhesion.

ff) EN ISO 5173: Destructive tests on welds in metallic materials. Bend tests.

gg) EN ISO 5817: Welding. Fusion-welded joints in steel, nickel, titanium and their alloys (beam welding excluded). Quality levels for imperfections.

hh) EN ISO 6520: Welding and allied processes. Classification of geometric imperfections in metallic materials. Fusion welding.

ii) EN ISO 6947: Welding and allied processes. Welding positions.

jj) EN ISO 8501: Preparation of steel substrates before application of paints and related products. Visual assessment of surface cleanliness.

kk) EN ISO 8503: Preparation of steel substrates before application of paints and related products. Surface roughness characteristics of blast-cleaned steel substrate.

ll) EN ISO 9606: Qualification testing of welders. Fusion welding.

mm) EN 10204: Metallic Products. Types of Inspection Documents.

nn) EN ISO 10675: Non-destructive testing of welds. Acceptance levels for radiographic testing.

oo) EN ISO 10893: Non-destructive testing of steel tubes.

pp) EN ISO 11666: Non-destructive testing of welds. Ultrasonic testing. Acceptance levels.

qq) EN ISO 12944: Paints and varnishes. Corrosion protection of steel structures by protective paint systems.

rr) EN ISO 13920: Welding. General tolerances for welded constructions. Dimensions

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for lengths and angles. shape and position

ss) EN ISO 15607: Specification and qualification of welding procedures for metallic materials. General rules.

tt) EN ISO 15609: Specification and qualification of welding procedures for metallic materials. Welding procedure specification.

uu) EN ISO 15614: Specification and qualification of welding procedures for metallic materials. Welding procedure test.

vv) EN ISO 17635: Non-destructive testing of welds. General rules for materials.

ww) EN ISO 17636: Non-destructive testing of welds. Radiographic testing.

xx) EN ISO 17638: Non-destructive testing of welds. Magnetic particle testing.

yy) EN ISO 17640: Non-destructive testing of welds. Ultrasonic testing. Techniques, testing levels, and assessment.

zz) EN ISO 19232: Non-destructive testing. Image quality of radiographs.

02B.2 SCOPE OF WORKS

02B.2.1.1 This document specifies the minimum requirements related to:

(a) Structural steel for access walkways, deck extension and other structural purposes

(b) Sacrificial pile casings

(c) Light columns

(d) Steel for hand rails, cable trays, cable ladders and other non-structural purposes

(e) Bolts, anchors, ferrules, etc.

(f) Coatings for all of the above

02B.2.1.2 This document shall be read always in conjunction with PER #001 "*General*" (all parts), PER#002 "*Materials*" (relevant parts) and PER #005 "*Quay Design*" (relevant parts) plus other PER documents as referenced herein.

02B.3 MATERIAL SPECIFICATION

02B.3.1 Carbon Steel

02B.3.1.1 Steel for structural steel works shall comply with the minimum standards defined in Table 02B.1, including dimensional properties, tolerances and rolling margins. Review Point

Table 02B.1 - Steel for Structural Steelwork

Item	Standards	Material Grade
Structural steelwork	IS 2062, IS 800, IS 808	E250-BR
Structural steelwork hollow section	IS 2062, IS 800, IS 4923	E250-BR
Brackets, padeyes and other fixtures	IS 2062, IS 800, IS 808	E275-BR

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Item	Standards	Material Grade
Sacrificial pile casings	IS 2062, IS 800	E250-BR

02B.3.1.2 The surface conditions of steel for fabrication shall be in accordance with the following standards: Review Point

(a) Steel surfaces when used shall not be more heavily pitted or rusted than Grade C of EN ISO 8501-1.

02B.3.1.3 Tests shall be performed or manufacturer's test certificates provided for quality control of all steels to be used in the Works. These tests shall include but not be limited to the following:

(a) Geometry measurements i.e. thickness, roundness, etc.

(b) Chemical analysis

(c) Tensile tests

(d) Impact tests e.g. Charpy impact test

(e) Bend tests

(f) Flattening tests

(g) Equotip hardness testing

(h) Weld tests

02B.3.2 Stainless Steel

02B.3.2.1 Metals for ladders, fixtures, fittings and cast in items shall comply with the standards defined in Table 02B.2. Review Point

Table 02B.2 - Metals for Fixtures, Fittings and Cast In Items

Item	Standard	Material Grade
Stainless steel	EN 10088	Grade 316 S33 En 1.4436
Stainless steel bolts	EN ISO 3506	Grade 316 A4-80 En 1.4439

02B.4 DELIVERABLES

02B.4.1 Submissions from the Contractor

02B.4.1.1 The following minimum information and documents shall be submitted to the Engineer for review at least six weeks in advance of steel fabrication for the Works: Hold Point

(a) Details of test certificates for chemical composition and mechanical properties of the steel in order to demonstrate compliance with the Employer's Requirements, and EN 10204.

(b) Method statement for the safe procurement, transport, placing and fixing of steel members giving details of the proposed plant, equipment, methods, products and personnel.

(c) Sampling and testing plan for the radiographic and/or other non-destructive tests on material, welds and workmanship of the completed elements and provide results films.

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(d) Inspection and test plan, including hold points for inspection and approvals.

(e) Report showing initial tests to demonstrate suitability of the steel for the intended application.

(f) Proposed sequence of construction indicating the position and necessity of in situ welds and splices, including details of expansion tolerances to demonstrate adequate movement accommodation.

(g) Outline contingency plans for adverse weather and marine conditions.

(h) Method statements for making good defects, including details of proposed materials.

02B.4.2 Delivery to Site

02B.4.2.1 The following documents are the minimum required to be submitted on delivery of raw materials to the Site: Review Point

(a) Mill certificate to EN 10204 (minimum certificate type 2.2 or better)

02B.5 BOLTS

02B.5.1 Bolted Connections

02B.5.1.1 The minimum plate thickness to be used in the Works shall be 6mm, unless detailed otherwise. The minimum bolt size shall be 16mm, unless detailed otherwise.

02B.5.1.2 Bolts, screws and nuts shall comply with the standards defined in Table 02B.3, unless detailed otherwise. Review Point

Table 02B.3- Steel Bolts, Nuts and Washers

Item	Standard	Material Grade
Nuts, bolts and washers for structural connections	IS 3757, IS 1367	Grade 8.8 - galvanized

02B.6 WELDING

02B.6.1 General

02B.6.1.1 Manual metal arc and semi-automatic welding of piles and steel framework shall conform to the relevant Indian Standards and/or Eurocodes.

02B.6.1.2 The Contractor shall engage an independent welding specialist company to qualify the Contractor's welders and to perform non-destructive testing. Non-destructive testing personnel shall be qualified and certified to a minimum of NDT level II in accordance with IS 13805 and/or EN ISO 9712 (or equivalent). The independent company's credentials shall be provided for the Engineer's review. Hold Point

02B.6.1.3 The fabrication facility or yard shall be protected from adverse weather, e.g. wind, rain, snow, draughts, etc. and shall be kept dry.

02B.6.1.4 The Contractor shall provide a detailed method statement for the Engineer's review. Hold Point The method statement shall include the following as a minimum:

(a) Welding bed preparation and fabrication.

(b) Joints surface preparation works as per section 02B.6.4 and jointing details.

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(c) Shop drawings that detail the above.

(d) Welders qualifications documents as per section 02B.6.3.

(e) Welding process and pre/post-heating requirements (if any).

(f) Non-destructive testing details.

(g) Health and safety requirements prior to, during and after welding, in particular for the offshore welding works (if any). Lifting operations including lifting plans shall be provided.

(h) Materials certificates & grades, including but not limited to parent metals and the filler material (electrodes) shall be referenced.

02B.6.1.5 All fillet welds shall be 6mm minimum.

02B.6.2 Consumables

02B.6.2.1 The filler material strength shall be equal to or exceed the parent metal strength.

02B.6.2.2 It is the Contractor's responsibility to ensure that all the consumables are stored and handled with care and in accordance with the relevant standards and/or the manufacturer/supplier's recommendations.

02B.6.2.3 Welding electrodes shall comply with IS 814, IS 5206, EN ISO 2560 or AWS A5.1 (or equivalent).

02B.6.2.4 Any consumable including electrodes as well as their packaging, which show signs of damage or deterioration, shall not be used.

02B.6.2.5 The material of all the consumables including temporary attachments, temporary backing plate, and electrodes shall be compatible with the parent metal.

02B.6.3 Welder Qualification

02B.6.3.1 Welders shall be qualified to IS 817 and/or EN ISO 9606 (or equivalent) and shall have a satisfactory record over the previous six months.

02B.6.3.2 The below documents as a minimum shall be provided by the Contractor and to the Engineer for review prior to the commencement of welding: Hold Point

(a) Welding procedure specification (WPS)

(b) Procedure qualification record (PQR)

(c) Welder performance qualification (WPQ)

(d) Welder satisfactory records & logbooks over the previous six months.

02B.6.3.3 Welder's certification and qualification shall be obtained in the presence of the Engineer.

02B.6.3.4 The weld run sequence shall be specified within the welding procedure specification.

02B.6.4 Joint & Surface Preparation

02B.6.4.1 The material surface in the joint area shall be dry and free from condensation, rust, paint, grease, scale and any other material that would adversely affect the quality of the welds. The joint preparation shall be carried out by mechanical or any other suitable methods and in accordance with EN ISO 9692 or equivalent. Inspection Point

02B.6.4.2 It is recommended that the zinc coating for the galvanized structures shall be removed with suitable methods at least (25-50 mm) from either side of the intended weld zone and on both sides of the piece. However, welding directly on zinc coated / galvanised structure may be permitted provided that it does not generate weld imperfections

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beyond the specified acceptance levels. In addition, parent metal that is covered with primer paint can be also welded provided that the welding quality remains within the specified acceptance levels and an overall assessment of the quality of the resultant weld shall be made in accordance with EN ISO 17652. A special welding procedure specification shall be produced for any such welding.

02B.6.4.3 Touch up paint & zinc coating repairs shall be conducted in accordance with the manufacturer's recommendations. A detailed method statement shall be provided for the Engineer's review. Hold Point

02B.6.4.4 Where the assembly method requires the use of temporary welded attachments or lugs, these shall be configured in such a way that they can be easily removed without damaging the parent metal. The surface of the parent metal shall be carefully ground after the removal of the temporary attachments.

02B.6.5 Weld Quality & Inspection

02B.6.5.1 All surfaces to be welded shall be inspected by the Engineer prior to commencement of welding. Inspection Point

02B.6.5.2 The Engineer shall conduct an inspection following the pipe / joint fit up, completion of root welding and prior to removal of the lugs, if used.

02B.6.5.3 The Contractor shall appoint an independent specialist testing organisation, who shall carry out compliance testing. The Contractor shall demonstrate to the Engineer the testing agency's satisfactory performance on other similar contracts before the commencement of testing. Review Point

02B.6.5.4 The independent testing agency shall undertake non-destructive testing (NDT) in accordance with the relevant IS, EN ISO or AWS standards as per the following: Review Point

Table 02B.4 – Weld Quality & Inspection

Temporary Welding, Reinforcement Welding	**Structural Welds including:** **Fillet Welds** **Butt Welds**
All welds shall be 100% visually tested (VT)	All welds shall be 100% visually tested (VT)
Supplementary NDT methods for critical lifts etc include: i. Dye penetrate (DP) ii. Magnetic particle (MT)	Supplementary NDT methods include: i. Dye penetrate (DP) ii. Magnetic Particle (MT)
	All butt welds shall be 100% ultrasonic tested (UT)
	Ten percent (10%) of the total butt-welded length shall also be non-destructively tested by radiographic test (RT)

02B.6.5.5 The NDT results reports shall be provided to the Engineer within 48 hours of completing the test. Review Point

02B.6.5.6 Repair of any failed joints shall be the Contractor's sole responsibility.

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02B.6.5.7 The Engineer may request further testing of the welded joints, if deemed necessary to demonstrate the integrity of the welds.

02B.7 COATINGS

02B.7.1 General

02B.7.1.1 Protective treatments shall be provided to all metallic items, other than stainless steel equipment, fittings and fixings. Review Point

02B.7.1.2 Contact between dissimilar metals such as stainless steel and carbon steel, galvanized steel members and aluminium surfaces or between galvanized and un-galvanized steel members shall be prevented by means of insulating washers and grommets.

02B.7.1.3 Contact between aluminium surfaces and concrete shall be similarly prevented.

02B.7.1.4 Any coating damaged in transportation to the Site, storage, handling or installation shall be repaired to the satisfaction of the Engineer. Inspection Point

02B.7.1.5 The protective treatment schedule in Table 02B.5 indicates the minimum requirements for protective treatment of steelwork and metalwork.

02B.7.1.6 Protective paint treatments shall provide a minimum life to first maintenance of 15 years in accordance with the recommendations of EN ISO 12944-5, unless stated otherwise.

Table 02B.5 - Protective Coating Requirements

Item	Time to First Maintenance (years)	Protective Treatment (Table Numbers refer to EN ISO 12944-5)
Structural and load-bearing steelwork	15	Galvanize to IS 4759 / EN 1461 plus C5-M to Table A.9
Non-structural steelwork	15	Galvanize to IS 4759 / EN 1461
Sacrificial pile casings	N/A	Not required

02B.7.2 Scope

02B.7.2.1 All ferrous (i.e. excepting stainless steel) equipment and components exposed to view or exposed to weather shall be painted and/ or hot-dip galvanized, in accordance with the Employer's Requirements and as shown on the Drawings. Inspection Point

02B.7.2.2 Black steel fixings or components shall not be used if suitable non-ferrous alternatives are available.

02B.7.3 Surface Preparation

02B.7.3.1 All steelwork to be coated shall be prepared after fabrication to: Inspection Point

(a) Cleanliness: ISO 8501-1 SA 2.5 (minimum)

(b) Roughness: ISO 8503 Grade Medium G (50-85 µm)

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02B.7.3.2 Weld splatter and heavy rust not readily removable by blasting shall be removed by mechanical means.

02B.7.3.3 All compressed air used in blast cleaning and blowing down after cleaning shall be free from oil, moisture and other contaminants.

02B.7.3.4 Blast-cleaning after fabrication shall occur, except when vacuum blasting occurs.

02B.7.3.5 The steel shall be cleaned of any traces of blast products on the surface and in pockets, pits, and corners by brushing with clean brushes, blowing of compressed air or vacuum cleaning.

02B.7.3.6 No blast cleaning shall be carried out on a surface which is less than 2°C above the dew point of the surrounding area.

02B.7.4 Coating Requirements

02B.7.4.1 Bollards and any other steel surfaces nominated to be coated shall be coated with:

(a) Minimum two coats of two-component, high solids, glass flake epoxy e.g. SigmaShield 460, PPG Amerlock 400 GFA or equivalent, to a minimum 400-micron DFT. Review Point

02B.7.4.2 Where more than one coat is applied to a surface, each coat shall, if possible, be of a different colour from the previous coat.

02B.7.4.3 The colour sequence and coating colours shall be notified to the Engineer.

02B.7.4.4 All coatings shall be applied to a uniform thickness free from runs and sags and shall be allowed to dry in accordance with the manufacturer's requirements.

02B.7.4.5 Coal tar epoxy paints shall not be used under any circumstances.

02B.7.4.6 Any areas of damaged coating shall be repaired to the satisfaction of the Engineer and in accordance with the manufacturer's specifications. Inspection Point

02B.7.4.7 An approved representative of the paint manufacturer shall be required to carry out monthly inspections of the work performed.

02B.7.4.8 The manufacturer's representative's recommendations as to quality of work performed, film builds and any other matters which may affect the performance of the finished work shall be implemented and adhered to in full. Review Point

02B.7.4.9 No painting shall be carried out when the temperature is below 5ºC or above 60ºC. No painting shall be carried out when the relative humidity is above 80%.

02B.7.4.10 When heating or ventilation is used to allow coating to proceed, care shall be taken to avoid any adverse effect on adjacent surfaces or work already done.

02B.7.4.11 Where structures are site-welded, the coating within 200 mm of the weld shall be applied after welding.

02B.7.4.12 The coating application shall be in strict accordance with the manufacturer's recommendations.

02B.7.4.13 Pre-treatment shall remove all grease and salts and other contaminants with a water-soluble detergent and high pressure fresh water wash.

02B.7.4.14 The coating shall conform with Table 02B.5.

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02B.7.5 Inspection of Coatings Inspection Point

02B.7.5.1 The finished coating shall generally be smooth, dense and uniform of texture and free from sharp protuberances or pin-holes.

02B.7.5.2 Excessive sags, dimpling or runs shall be remediated to the Engineer's satisfaction.

02B.7.5.3 Any coating damaged by subsequent processes or deteriorated to an extent such that performance of the coating is in doubt, as assessed by the Engineer, shall be removed and the surface cleaned to the original standard and recoated to provide the specified number of coats.

02B.7.5.4 The final coating thickness shall be checked with a calibrated thickness gauge.

02B.7.5.5 Areas where the thickness is less than specified shall be remediated to the Engineer's satisfaction. Areas of excess thickness shall also be remediated to the Engineer's satisfaction.

02B.7.5.6 The completed coating adhesion of 10% of the piles, selected by the Engineer, shall be checked with cross-cut adhesion tests in accordance with EN ISO 2409 at least seven days after the coating was completed.

02B.7.5.7 The adhesion of any coating shall not be worse than Adhesion Classification 2.

02B.7.5.8 On completion of testing, the test area shall be made good to the standard specified in the Employer's Requirements.

02B.7.5.9 Areas where the adhesion is defective shall be repaired and re-inspected.

02B.7.6 Galvanizing

02B.7.6.1 All steelwork, unless nominated in the Drawings and/ or the Contract Documents as being painted, shall be hot dip galvanized after fabrication and acid bath pickled in accordance with IS 4759 and IS 2629.

02B.7.6.2 The minimum galvanized thickness shall be 100 µm.

02B.7.6.3 Galvanized items include but are not limited to:

(a) Light tower hold down bolts

(b) Quick release hook holding down bolts

(c) Edge angles and anchors for pits and openings

(d) Other miscellaneous bolts and ferrules

02B.7.6.4 Galvanized items shall be straight and true after being galvanized.

02B.7.6.5 Any warped sections shall be replaced.

02B.7.6.6 All galvanized items shall exhibit a continuous uniform coating, clean and free from drops of spelter or sharp edges.

02B.7.6.7 Galvanized surfaces which have received only minor damage may be touched up using an approved two pack zinc-rich epoxy primer, at the discretion of the Engineer.

02B.7.6.8 Items which have been significantly damaged shall be re-galvanized. Inspection Point

02B.7.6.9 Threads of galvanized items shall make allowance for the thickness of galvanizing to avoid damaging the threads upon assembly.

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02B.8 MATERIAL SPECIFICATION

02B.8.1 General Conditions

02B.8.1.1 It is the Contractor's responsibility to ensure control of suitable materials and to ensure the supplier's recommendation on shelf life and storage are adhered to.

02B.8.1.2 The coating materials shall be delivered to the Site, in the original containers, with labels intact and with unbroken seals. Inspection Point

02B.8.1.3 The supplier's instructions shall be strictly followed with respect to storage, shelf life, mixing and thinning, as well as method of application and recommended time limits between coats.

02B.8.1.4 Paint shall not be thinned, except as recommended by the supplier, and only the recommended thinners or reducers shall be so used.

02B.8.1.5 Coating materials that have gelled or deteriorated during storage shall not be used.

02B.8.1.6 Zinc silicate primers shall always be mixed in a mechanically agitated pot which shall be kept not lower than the spray gun at all times. All such primers shall be premixed by mechanical agitators for a sufficient time to thoroughly mix pigment and to bring the material to a uniform consistency. Where pigment separation readily occurs, provision shall be made for continuous mixing during application.

02B.8.1.7 Epoxy-acrylic or urethane-acrylic topcoat shall be two-pack products formulated to provide either a high gloss or satin finish.

02B.8.1.8 The topcoat shall be suitable for recoating after extended periods of exposure to marine conditions without surface roughening.

02B.8.1.9 The specified top coat thickness shall be capable of fully obscuring the selected intermediate build coat colour.

02B.8.1.10 Epoxy based paint two pack products shall be formulated to provide the specified film build without sagging or running.

02B.8.1.11 Mastic coating materials (where detailed) shall comprise high-solids, high-build, two pack products specifically formulated to provide good adhesion onto hand / mechanically prepared steel substrates as well as onto first blast cleaned and other coatings, as specified.

02B.8.2 Coating Supply and Storage

02B.8.2.1 The Contractor shall submit the following details for each type of proposed coating to the Engineer for review: Hold Point

(a) Manufacturer: name and address

(b) Brand name and reference number

(c) Method of application

(d) Weight per litre (kg)

(e) Pack size (litres)

(f) Volume of solids

(g) Practical spreading rate (at minimum thickness, ignoring spillage, loss in tins and pipes)

(h) Full application instruction (including mixing ratios for two pack materials and dry mixing method for each type of paint)

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(i) Drying times; surface dry, hand dry and over-coating

(j) Temperature limits for painting

(k) Humidity limits for painting

(l) Cleaning solvent (or thinners)

(m) Shelf life requirements

(n) Hazard data sheets

(o) Manufacturer's recommendation on any other matter

02B.8.2.2 No coating shall be used in the Works until the same has been reviewed by the Engineer.

02B.8.2.3 Unless otherwise agreed by the Engineer, all components of a coating system shall be from the same manufacturer.

02B.8.2.4 Coatings shall be stored in strict accordance with the manufacturer's recommendations.

02B.8.2.5 Coatings shall be used in order of delivery.

02B.8.2.6 Coatings that have not been used within the 'shelf life' or within 12 months of the date of manufacture (whichever is the lesser), shall be replaced.

02B.8.3 Application

02B.8.3.1 The Contractor shall provide experienced supervision to apply coatings in strict accordance with the manufacturer's recommendations.

02B.8.3.2 Immediately before each coating application, the Contractor shall ensure that the substrate:

(a) meets the required preparation standard

(b) is free from harmful residues, including dust, grit and paint degradation products

(c) is free from detrimental contamination

(d) Is free from moisture that is detrimental to the coating being applied

02B.8.3.3 The coating system shall be applied in one of the following methods:

(a) Brush

(b) Airless spray

(c) Air pressure spray

02B.8.3.4 The intervals between successive coats shall be as recommended by the manufacturer, taking into account the conditions of application.

02B.8.3.5 Wet film thickness gauges shall be used by the Contractor to assess the required rate of application. Review Point

02B.8.3.6 The locations of work areas for surface preparation and paint application shall be sufficiently separated to avoid contamination.

02B.8.3.7 The finished system shall have an even and uniform appearance. Inspection Point

02B.8.3.8 No coating, except "weldable" grades of zinc-based holding primers, shall be applied within a minimum of 100 mm of edges / areas prepared for welding.

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02B.8.4 Testing

02B.8.4.1 The Engineer reserves the right to require the Contractor to perform such testing of coating materials as may be necessary to demonstrate that the material / coating quality is in accordance with the Employer's Requirements and the data sheets and is suitable fully, without reduction in performance or other detrimental effects, under the application in the prevailing condition.

02B.8.4.2 Qualities to be tested may include, but not be limited to, the following:

(a) volume solids

(b) viscosity

(c) pigment dispersion

(d) adhesion to substrate

(e) drying time

(f) cure time

(g) zinc percentage in dry film (zinc-rich primers only)

(h) glass flake percentage in dry film (glass flake container containing coatings only)

(i) percentage of epoxy resin in the dry film

02B.8.4.3 Test methods shall be in accordance with generally approved methods, and shall be carried out under the prevailing conditions that reflect environmental and application conditions.

02B.8.4.4 Any batch of materials found in any way inferior to the standards and the Employer's Requirements shall not be used on the Site.

02B.8.4.5 Testing may include validation of the adequacy of the curing of the coating. The test method and frequency shall be submitted by the Contractor to the Engineer for review and may involve solvent wiping, pencil hardness testing or other chemical or mechanical methods.

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APMT PER#006 MATERIALS
PART B: STRUCTURAL STEEL & COATINGS

APPENDIX I

[NOT USED]

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APMT PER#002 MATERIALS
PART B: STRUCTURAL STEEL & COATINGS

APPENDIX II

GLOSSARY

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GLOSSARY

Term / Abbreviation	Definition
MT	Magnetic Particle Test
NDT	Non Destructive Testing
PQR	Procedure Qualification Record
PT	Dye Penetrate Test
RT	Radiographic Test
UT	Ultrasonic Tested
VT	Visually Tested
WPQ	Welder Performance Qualification
WPS	Welder Procedure Specification

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