

BAE – Sheet Pile

Manufacturing Data Record

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SCOPE

This specification covers the minimum requirements for the selection, supply, application, workmanship, quality assurance and acceptance of steel, surface protection and equipment selection including:

- i) Steel sheet piling.

It is the intention of this specification to ensure all shop production is performed in a manner consistent with the highest possible industry standards.

ABBREVIATIONS

The abbreviations listed below, where used in this Specification, shall have the following meanings:

AS Australian Standard

ITP Inspection and Test Plan

WP Work Procedure

APPLICABLE DOCUMENTS

The current edition of the following documents shall form part of this Specification and shall apply wholly or partially as the case may be and as necessary for the performance of the Work under the Contract.

Standard Project Specifications

No.	Title
(TBA)	Fabrication and Erection of Structural Steel
(TBA)	Fabrication and Erection of Structural Steel for Marine Works

Standards

No.	Title
AS 4100	SAA Steel Structures
GB/T 1591	CAS High Strength Low Alloy Structural Steels
EN 10249	BSI Cold Formed Sheet Piling
GB/T 19805	CAS Welding Operator Qualification
AS1627	SAA Metal Finishing – Part 4
AS 3894	Shop Testing of Protective Coatings
AS 4497	Round Slings – Synthetic Fibre

PERFORMANCE OF WORK

General

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The Contractor shall be responsible for the quality of workmanship that shall be carried out in accordance with this Specification as well as applicable national, state and local government legislation including health and safety requirements.

Quality Management

The Contractor shall develop and implement a quality management system for the works in accordance with the Contract Quality requirements. The quality system shall be equivalent to AS/NZS/ISO 9002 'Quality Systems for Production and Installation'. The Contractor's Quality Plan and sample Inspection and Test Plan shall be submitted to the Client / Engineer for approval prior to the commencement of work.

The Contractor shall prepare Work Procedures and Inspection and Test Plans for each procedure including repairs. WPs and ITPs shall be submitted to the Client / Engineer for approval prior to the commencement of work.

The Contractor shall be responsible for the quality of all work and compliance with this Specification, the Contractor's WP's and ITPs and/or other references as agreed in writing by the Client / Engineer.

The Contractor shall advise the Client / Engineer of the time and place of all surface preparation and coating applications, twenty four (24) hours before commencement of any work. The Contractor shall make provisions for inspection of all surface preparation and coating applications by the Client / Engineer / 3rd Party. The Client / Engineer / 3rd Party shall advise of acceptance before commencement of coating applications after surface preparation. The Contractor shall incorporate this requirement into all ITPs.

Drawings

The Contractor shall ensure that shop drawings state all relevant dimensions, angles, tolerances and coating areas.

Supply of Labour, Materials and Equipment

The Contractor shall supply all materials, labour, consumables, safe storage facilities, equipment, inspection and safety equipment to perform the work scope in strict accordance with this Specification and the referenced standards.

Tools and Equipment

All tools and equipment shall be in a good and serviceable condition. Rolling, measurement and testing equipment shall be regularly maintained and calibrated according to the requirements of manufacturing or project whichever is the greater.

Health and Safety

Health and Safety instructions on the safe use of equipment and products, as printed on the Manufacturer's data sheets and such like, should be fully understood by the Contractor before any work is undertaken. All necessary protective equipment, clothing or measures shall be provided for each operator by the Contractor. All relevant material safety data sheets (MSDS) shall be submitted to the Company prior to commencement of work.

Supervision

It is the responsibility of the Contractor to provide supervision of his workers by personnel with satisfactory previous experience in the methods and materials being used. It is the responsibility of the Supervisor to assure performance of the

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works in accordance with the criteria established by this Specification in order that the finished work may be acceptable to the Company.

The supervisor must be able to competently use all equipment required for the performance of the work.

Shop Conditions

In planning, provision shall be made for accomplishing the work in spite of obstacles caused by weather and other local conditions. The Contractor shall be sufficiently familiar with conditions affecting manufacturing performance, in case special precautions are required.

QUALITY CONTROL AND INSPECTION

The Contractor shall complete the following with respect to quality control and inspection.

Steel Testing

The Contractor shall check each material inspection certificate supplied with the material for conformance with project requirements. One sample from each steel heat shall be mechanically and chemically tested for conformance to project requirements.

The test pieces shall be prepared in accordance with the Contractor's proposed Work Procedure and Inspection and Test Plan.

The preparation of Test Reference Panels shall be witnessed and stamped by the 3rd Party Inspection company, as meeting the specified Acceptance Criteria. The test pieces shall be retained by the Contractor and available to the Client / Engineer for use as quality references in the event of a dispute during, or on completion of the work scope.

Daily Reports

The Contractor shall maintain Quality Records in accordance with the Inspection & Testing Plan.

- i) Material Inspection Certificates;
- ii) Inspection Report - Material;
- iii) Inspection Report – Dimension;
- iv) Inspection Report – Coatings;
- v) Inspection Report – Marking & Packing.

Copies of all Quality Records shall be submitted to the Client / Engineer at the end of each week. The Engineer may reserve the right to request Quality Records at any time during the work program.

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MANUFACTURING PROCESS

The Contractor shall complete the following with respect to manufacturing, quality control and inspection.

Raw Material Inspection

Upon receipt of raw materials, the coils are placed in the designated pre-production inspection area while inspection certificates, material testing, visual and dimensional accuracy are confirmed. Materials which meet project specifications shall be marked and released for production with information recorded to “Inspection Report – Materials”. All non-conforming materials are clearly marked and transferred to quarantine storage area.

Materials released for production are marked with a unique marking system identifying them for exclusive use in production of the project.

Material Cutting

The steel coils are cut and trimmed to the correct width required to achieve finished product dimensions.

Rolling Machine Settings and Profile Dimension Approval

The rolling and forming tools are adjusted and set to meet drawing dimensions and angles. Prepared materials are loaded to the rolling line and the first section is rolled out. The dimensions of the first complete profile section are measured with corresponding adjustment made to the rolling and forming tools until all dimensions are within product specifications.

First Piece Approval

The profile dimensions of the first section are measured and recorded in document “Inspection Report – Dimension”. The section is cut to required length with the document “Inspection Report – Dimension” updated with measurement. With all sheet pile dimensions in conformance with product specifications, the rolling line enters full production.

Process Inspection

Each complete sheet pile section is measured using vernier callipers, tapes and gauges with results updated to “Inspection Report – Dimension”. Non-conforming parts are reviewed for rolling line adjustment, and product repair.

Product Repair

Where possible, products will be repaired to meet product specification with corresponding repairs recorded to “Inspection Report – Dimension”. Defective products beyond acceptable repair limits are rejected.

Forming Process Completion

Piles conforming to specification and dimension tolerances are checked for quantity. Once the final quantity is complete, piles are moved to fabrication.

Accessory Fabrication and Joining

Grip plates are cut to size with dimensions recorded in “Inspection Report – Dimension”, and fillet welded in position on the sheet pile. Welds are visually inspected and repaired where necessary with details recorded in “Inspection Report – Weld” and “Inspection Report – Weld Repair”. Once grip plates are, lifting

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holes are drilled through grip plate and sheet pile body with surfaces ground down to remove sharp edges and burrs.

COATING PROCESS

The Contractor shall complete the following with respect to coating application, quality control and inspection.

Supplier and Coating Selection

Contractors shall select the coating materials for the specified Coating System listed in the Approved Coating Section.

Coating System Selection

The coating system for each area or item is to be selected in accordance with the following table.

Area or item to be coated	Exposure	Extent	System
Sheet piles	External	All areas	HMS-S1

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Approved Coating System

The coating system specified in table below.

Coating System	Surface Preparation Method and Standard	Surface Temp (Min)	Coat 1 Generic Type	DFT (µm)	Surface Temp (Min)	Coat 2 Generic Type	DFT (µm)	Surface Temp (Min)	Coat 3 Generic Type	DFT (µm)	Surface Temp (Min)	Coat 4 Generic Type	DFT (µm)	Surface Temp (Min)	Total DFT (µm)
HMS-S1	Abrasive blast clean to AS1627.4 class 2.5	3°C above Dew Point	High Solids Epoxy	500	5°C	High Solids Epoxy	500	5°C	-	-	-	-	-	-	1000

Coating Products

Coating products to be applied listed below:

Generic Type	International Paints	
Ultra High / High Build/High Solids Modified Epoxy	Interzone 505 Colour: Off-White	1 st Coat
Ultra High / High Build/High Solids Modified Epoxy	Interzone 505 Colour: Grey	2 nd Coat

Note: Technical Data Sheets are included in the final Manufacturers Data Report (MDR).

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Project Name: BAE – Sheet pile cofferdam
Specification for Production, Coating and Packing
of Steel Sheet Piles

Doc. Number: NWPM-MPS-BAE-001
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Colour Schedule

Item for Colour Coding	Colour Name	Reference Number
Wharf/jetty piles and below deck structure, dolphins, above deck structure (Under coat)	Off-White	EGA870 (A) EGA885 (B)
Wharf/jetty piles and below deck structure, dolphins, above deck structure (Top coat)	Dark Grey	EGA873 (A) EGA885 (B)

Surface preparation

Approved Surface Preparation Methods

Abrasive blast cleaning using compressed air is the only acceptable surface preparation method. Other methods such as hand or power tool cleaning shall only be used with the approval of the Client / Engineer for small or repair areas. All blasting shall be undertaken under cover and not exposed to weather nor shall blasted items ready for painting be exposed to weather. Surface preparation shall be performed in accordance with AS 1627 to the required finish.

Conditions of Shop Abrasive Blasting

Shop blasting shall only be performed in a grit blasting chamber. The blasting facility shall be fitted with suitable equipment to ensure recycled abrasive material is cleaned of all detrimental foreign matter before use. Recycled grit shall be tested for contamination before each day's production.

Surface Profile

Grit abrasive medium shall be graded to ensure a consistent angular surface profile free of 'rogue peaks'. Surface profiles with a 'peened' finish shall be rejected and re-blasted to the conforming standard.

Surface profiles of 50 to 90 microns (average 70 microns) shall be consistently produced.

Inspection of Prepared Surfaces

The Contractor's nominated Quality Control representative shall inspect all abrasive blasted surfaces prior to the application of coatings.

Surface profiles of 65 to 90 microns (average 75 microns) shall be consistently produced.

Ambient and Process Conditions

Abrasive blast cleaning shall not commence unless the surface is dry and free from contaminates (oil, grease, weld flux etc).

Application shall not commence if the steel surface temperature 3°C above the dew point temperature.

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Application of coatings

Mixing of Coatings

Manufacturers mixing and thinning directions shall be strictly observed.

Use air driven power stirrers to mix liquid coating. Electric power tools can be an ignition source for solvent vapours.

Where required the coating shall be agitated during the application process.

Ambient Conditions

Coating shall not be applied when the relative humidity exceeds 85%, the steel surface temperature falls below 3°C above Dew Point.

Application Methods

The coating system shall be applied using airless spray. Rolling or brush application shall only be used under repair conditions.

Acceptance criteria & treatment of defective work

General

The Client / Engineer / 3rd Party shall randomly inspect the surface preparation or coating activities covered by this Specification. The field testing procedures detailed in this section shall be used by the Client / Engineer to establish compliance with the intention of this Specification. Other tests as determined by the Client / Engineer may be performed as required.

Surface Contaminants

The presence of soluble salts on the surface of freshly blasted steel shall be determined in accordance with AS3894.6 Method D. A positive result shall require high pressure fresh water washing of the affected surface and re-blasting.

Surfaces to be coated shall be tested for dust and spent abrasive by pressing a wide, clear adhesive tape onto the upper surfaces of suspect areas. Contaminants shall be clearly seen when the tape is removed and placed against a dark background. Affected surfaces shall be blown down using filtered compressed air and retested using the tape. If contamination is still present, the surfaces shall be high pressure fresh water washed until clean.

Surface Profile

Blasted steel with non-conforming profile values shall be re-blasted with suitably graded abrasive to ensure compliance with this Specification. The profile shape shall be angular and not 'peened'.

Wet Film Thickness (WFT)

The metal comb type WFT gauge shall be used frequently during the application of coatings. Contractors must be capable to calculating the % volume solids reduction for different thinning ratios. Low WFT shall be given an additional application of coating. High WFT (above 150% specified) shall, at the discretion of the Client / Engineer, require removal on curing, subject to testing for solvent entrapment, adhesive and cohesive strength values. Runs and slumps in wet coating shall be brushed out immediately.

Dry Film Thickness (DFT)

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DFT readings shall be taken using a magnetic induction or eddy current instrument in accordance with the requirements of AS 3894 Method B.

DFT readings shall only be taken on ‘touch dry’ and firm coating typical of the total coated ‘section’.

No single ‘spot measurement’ shall be less than the specified DFT. No single ‘spot measurement’ shall be above 150% of the specified DFT.

Low DFT coatings shall be build-coated within the required re-coat interval to the specified DFT. Aged or contaminated coatings shall be whip blasted or other specific pre treatment as specified by the Supplier, prior to build coating. Manual application versions of the specified coating shall be used as recommended by the coating manufacturer.

High DFT readings (above 150% of the specified DFT coat) shall be removed, subject to testing for solvent entrapment, adhesive and cohesive strength values.

Adhesion Testing

Daily adhesion testing of each coat within a system applied shall be performed by the Contractor’s Quality Control representative. The areas tested must be representative of the total coated section.

Coatings with unacceptable adhesion test results shall be removed and reinstated.

Coating adhesion inspection shall be carried out using the Elcometer 106 adhesion device in accordance with AS1580 Method 408.5. Minimum acceptable adhesion values shall be:

- i) Ultra High Build Epoxy 4 MPa (580 PSI)

The Contractor shall spot repair all areas subject to adhesion testing.

Holiday Detection

All coatings shall be tested using Elcometer High Voltage Detector device or similar. Test voltages and procedures shall be in accordance with ASTM D 5162 test method B – High Voltage Spark Testers. Defects such as pinholes, cracks, blisters, voids, foreign inclusions and rogue profile peaks shall be marked for repair and retested upon full cure of the repair coating.

Coating Repair Procedures

Coating repairs shall be performed in accordance with the original coating system. Spot abrasive blasting shall feather the surrounding intact coating by 50 mm to expose each coat in the Coating System. An additional 50 mm of sound surrounding coating shall be whip blasted to provide a key for subsequent over-coating. The total overlap shall be a minimum of 100 mm beyond the repair area. The Supplier’s specific repair procedures shall be adopted where the maximum recoat period has expired.

All repaired areas and repair procedures shall be recorded in the Contractor’s “Inspection Report – Holiday Test”.

MARKING & PACKING

The Contractor shall complete the following with respect to marking & packing.

Marking

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The sheet piles will be marked with depth measurements at 1 metre intervals from top to toe. Depth markings shall be decreased to 100mm intervals for the top 2 metres of the pile.

Packing

The piles will be stacked with suitable packing materials to avoid coating damage during shipping and transportation. The quantity of piles per stack will not exceed safe handling of the product, nor cause any deformation to the pile or damage to sheet pile coating. Each pile stack shall be fitted with 2 lifting slings supplied in accordance with AS4497.

DOCUMENTATION

The Contractor shall complete the following with respect to documentation.

Documentation

The Manufacturers Data Report shall include:

- i) Steel inspection certificates
- ii) Material testing reports
- iii) Works certificate of compliance
- iv) Sheet pile register
- v) Coating report
- vi) Coating holiday test report
- vii) Re-work reports
- viii) Photo report

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BAE – Sheet Pile

Manufacturing Data Record

Inspection & Testing Plan

Project Name: BAE – Sheet Pile Cofferdam
 Document Name: Inspection & testing plan
 of steel sheet piles

Document Number: NWPM-ITP-BAE-001
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SHEET PILE FORMING										
ITEM	WORK PROCESS	ACCEPTANCE CRITERIA	APPLICABLE STANDARD	INSPECTION		VRIFICATION ACTIVITY			RECORD	CLIENT SPEC
				METHOD	FREQUENCY	SUP	PUR	CLIENT		
1.0	STEEL COIL	COMPLIES WITH PURCHASE ORDER REQUIREMENTS	GB/T 1591	TEST	EACH DELIVERY	H	H	R	MATERIAL INSPECTION CERTIFICATE	
1.1	STEEL COIL	COMPLIES WITH MATERIAL INSPECTION CERTIFICATE	GB/T 1591	TEST	EACH HEAT NUMBER	H	H	R	LABORATORY TESTING DATA	60241100-PD-S001-Rev A
1.2	STEEL COIL	VISUAL INSPECTION	MPS-BAE-001	MEASURE	EACH COIL	I	W	R	INSPECTION REPORT - DIMENSION	SHOP DRAWING
2.0	CUTTING PROCESS	NIL DEFECTS	MPS-BAE-001	MEASURE	EACH STRIP	I	W	R	INSPECTION REPORT - DIMENSION	
2.1	FORMING & ROLLING	WIDTH, HEIGHT, ANGLES	MPS-BAE-001	MEASURE	EACH PROFILE	I	W	R	INSPECTION REPORT - DIMENSION	SHOP DRAWING
2.2	PILE CUTTING	CUT LENGTH	MPS-BAE-001	MEASURE	EACH PILE	I	W	R	INSPECTION REPORT - DIMENSION	SHOP DRAWING
3.0	GRIP PLATE CUTTING	DIMENSION INSPECTION	MPS-BAE-001	MEASURE	EACH PLATE	I	W	R	INSPECTION REPORT - DIMENSION	
3.1	GRIP PLATE WELDING	WPS	GB/T 19867	INSPECT	EACH PLATE	I	W	R	INSPECTION REPORT - WELD	SHOP DRAWING
3.2	LIFTING HOLES	VISUAL INSPECTION	MPS-BAE-001	MEASURE	EACH PILE	I	W	R	INSPECTION REPORT - DIMENSION	SHOP DRAWING
SHEET PILE COATING APPLICATION										
ITEM	WORK PROCESS	ACCEPTANCE CRITERIA	APPLICABLE STANDARD	INSPECTION		VERIFICATION ACTIVITY			RECORD	CLIENT SPEC
				METHOD	FREQUENCY	SUP	PUR / C SUP	CLIENT		
1.0	ATMOSPHERIC CONDITIONS CHECK	NO WORK COMMENCED BELOW DEW POINT AND WORK PROTECTED FROM UNFAVORABLE WEATHER CONDITIONS	ISO 8502	MEASURE	DAILY	H	W	R	INSPECTION REPORT - COATING	
2.0	ABRASIVE BLAST	Sa 2½ BLAST VISUAL COMPARISON	ISO 8501	VISUAL	EACH PILE	H	H	R	INSPECTION REPORT -	

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	CLEANING OF STEEL								COATING	
3.0	ABRASIVE BLAST PROFILE OF STEEL	TESTEX TAPE ATTACHED TO COATING INSPECTION REPORT	ISO 8503	VISUAL	EACH PILE	H	H	R	INSPECTION REPORT - COATING	
4.0	CLEAN ABRASIVE BLAST MATERIAL AND DUST FROM SURFACE	AREA CLEAN AND FREE OF DUST	ISO 8502	VISUAL	EACH PILE	W	W	R	INSPECTION REPORT - COATING	
5.0	APPLY SPRAY COAT TO ALL DESIGNATED AREAS	WFT CHECKED REGULARLY BY PAINTER	ISO 2808	VISUAL	EACH COAT	W	W	R	INSPECTION REPORT - COATING	
6.0	CURE TIME & RECOAT INTERVAL	COATING TO BE CURED ENOUGH TO ALLOW DFT CHECK	IINTERZONE 505 TDS	VISUAL	EACH COAT	H	H	R	INSPECTION REPORT - COATING	
7.0	ATMOSPHERIC CONDITIONS CHECK	NO WORK COMMENCED BELOW DEW POINT AND WORK PROTECTED FROM UNFAVORABLE WEATHER CONDITIONS	ISO 8502	MEASURE	DAILY	H	W	R	INSPECTION REPORT - COATING	
8.0	CLEAN DUST FROM SURFACE	AREA CLEAN AND FREE OF DUST	ISO 8502	VISUAL	EACH PILE	W	W	R	INSPECTION REPORT - COATING	
9.0	APPLY SPRAY COAT TO ALL DESIGNATED AREAS	WFT CHECKED REGULARLY BY PAINTER	ISO 2808	VISUAL	EACH COAT	W	W	R	INSPECTION REPORT - COATING	
10.0	CURE TIME & RECOAT INTERVAL	COATING TO BE CURED ENOUGH TO ALLOW DFT CHECK	IINTERZONE 505 TDS	VISUAL	EACH COAT	H	H	R	INSPECTION REPORT - COATING	
11.0	DRY FILM THICKNESS CHECK	NO SINGLE SPOT LESS THAN SPECIFIED DFT. NO SINGLE SPOT GREATER THAN 150% DFT	AS 3894	VISUAL	FINAL COAT	H	H	R	INSPECTION REPORT - COATING	

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12.0	PINHOLE TESTING	NO HOLIDAYS ON FINAL EXTERIOR COAT. HOLD UNTIL REPAIRS COMPLETE.	ASTM D 5162	INSPECT	FINAL COAT	H	H	R	INSPECTION REPORT - HOLIDAY TEST	
13.0	ADHESION TESTING	SPOT CHECKS ON FULLY CURED SURFACE TO BE AS SPECIFIED	ISO 4624	INSPECT	FINAL COAT	H	H	R	INSPECTION REPORT - COATING	MPS-BAE-001
SHEET PILE MARKING & PACKING										
ITEM	WORK PROCESS	ACCEPTANCE CRITERIA	APPLICABLE STANDARD	INSPECTION		VERIFICATION ACTIVITY			RECORD	CLIENT SPEC
				METHOD	FREQUENCY	SUP	PUR	CLIENT		
1.0	PILE MARKING	SPOT CHECKS ON COMPLETED DEPTH MEASUREMENTS	MPS-BAE-001	INSPECT	EACH PILE	H	W	R	INSPECTION REPORT – MARKING & PACKING	
2.0	PILE PACKING	PILE STACKS PACKED IN SUITABLE PACKING MATERIALS WITH LIFTING SLINGS FITTED	MPS-BAE-001 AS 4497	INSPECT	EACH PILE STACK	I	W	R	INSPECTION REPORT – MARKING & PACKING	
DOCUMENTATION										
ITEM	WORK PROCESS	ACCEPTANCE CRITERIA	APPLICABLE STANDARD	INSPECTION		VERIFICATION ACTIVITY			RECORD	CLIENT SPEC
				METHOD	FREQUENCY	SUP	PUR	CLIENT		
1.0	MANUFACTURERS DATA REPORT	RELEASE CERTIFICATE	MPS-BAE-001			H	H	H/R	RC & MDR	