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01. GENERAL

01.01 SCOPE OF WORK

General:

Responsibilities: Provide metal fixtures that are:

- Undamaged, plumb, level and straight
- Free of surface defects or distortions
- Finished as indicated on the Drawings and subject to sample approval

Selections:

Fixed platforms, walkways, stairways and ladders incorporating:

- Custom built steel platforms, walkways, stairs and ladders: Generally as detailed on the Drawings, complying with AS 1657

General fabricated steel work incorporating:

- Chain wire mesh enclosures: Extent of partitions and gates are shown on the Drawings
- Bollards to roads and pathways: In ground units, located where shown on the Drawings
- Custom built galvanised steel doors, partitions, benches & racks as detailed on the drawings

Miscellaneous proprietary metalwork incorporating:

- Items listed in the FITTINGS & FIXTURES SCHEDULE.

Deemed to be included:

General inclusions:

- Compliance with all statutory requirements
- Staging and temporary work
- Co-ordination with preceding and subsequent trades
- Supply and installation of all components, including all the materials, fixings, packers, accessories and work necessary to complete the project intent
- Enable installation of services and work by other trades

Total system:

General: The Contractor shall be entirely responsible for the design and construction of fabricated metalwork fixtures, (except for proprietary items), together with the supply of materials, workmanship and completion of work included in this trade section of the Specification, which may require consultation with other trades in complying with this intent.

Works required to be undertaken by other Trades:

General: The following works are to be carried out by other trades, but may require co-ordination with work included in this trade section of the Specification:

- Concrete superstructure
- Structural steel superstructure
- Partitions and linings
- Suspended ceilings
- Various floor finishes
- Joinery fixtures constructed from timber-based materials
- Building services

01.02 STANDARDS

General:

Access for maintenance: To AS 1657.

Design for access and mobility:

- General requirements – new building work: To AS 1428.1
- Tactile indicators: To AS 1428.4

Balustrades for Class 1 and Class 10 buildings: To BCA clause 3.9.2.

02. QUALITY

02.01 SUBMISSIONS, GENERALLY

Materials:

Stainless steel: For each batch of stainless steel supplied to the works, submit the certificate of compliance or test certificate specified in the applicable standard.

Execution:

Welding dissimilar metals: Submit the following details:

- Type and thickness of materials to be welded
- Proposed joint preparation and welding procedures
- Proposed filler metal
- Expected dilution (proportion of fused parent metal in the weld metal)

Fastenings to aluminium (including aluminium alloys): Stainless steel or aluminium.

Fabrication and installation:

- Methods for fixing metalwork to the building superstructure and framework
- Methods of finishing metalwork components

02.02 SHOP DRAWINGS

Description:

Shop drawings for the custom built items shall indicate:

- Details of fabrication and components, showing all dimensions and geometry associated with each metalwork element
- Details of finishing metalwork
- Information necessary for site assembly, including:
 - Type and location of anchors and other attachments to be fixed into the building structure
 - Accurate locations and full size details of machined slots, keyholes and other penetrations in frame extrusions for lifting and installing the units
 - Locations of visible heads of fastenings
- Hardware, fittings and accessories including and visible heads of fasteners.

02.03 SAMPLES

Sample installations:

Requirement: The first installed example of each type will be reviewed by the Architect to determine compliance with the Contract Documents. Upon endorsement each first installed example will become the "quality control example" for assessing compliance of subsequent installations.

Incorporation into the works: Accepted "quality control examples" in appropriate locations may form part of the completed works; otherwise remove all traces of the work including the making good to any damage.

02.04 WARRANTIES

Warranty:

Warranty class: Includes the provision for the cost of consequential damages.

Warranty periods:

- Generally: 05 years
- Corrosion protection of steelwork: 10 years
- Proprietary items: As provided by the manufacturer

02.05 INSPECTIONS

Witness points:

Notice: Give sufficient notice so that inspections by the Architect and other relevant parties may be made of the following:

- Site erected assemblies on completion of erection, before covering up by cladding and encasing
- Steel surfaces prepared for, and immediately before, site applied finishes

Hold points:

Requirement: Do not commence work until site measurements can be taken and/or submissions including shop drawings and/or samples and/or test results and/or inspections have been reviewed by the Architect and endorsed by them as being suitable for construction.

02.06 DISABLED PERSONS' REQUIREMENTS

Standard:

General: To AS 1428.1 and AS 1425.4; as applicable. Treat the advisory recommendations of the Standards as a minimum contractual requirement.

Description:

General: All steps and ramps are to contain features including:

- Continuous handrails over the length of the stair or ramp extending 300mm past the conclusion of the stair or ramp
- Handrails to be provided to comply with AS 1428.2 Section 7
- Landings provided on ramps at an interval of 6 metres (refer AS 1428.1 Section 6.9, 9.3 for stairs AS 1428.2 Section 8 for ramps)
- **step nosings: slip resistant nosing – contrast colour - Black**

02.07 PROTECTION

Pre-finishes:

General: Where components are pre-finished off-site (i.e. in the factory) they shall be supplied to site covered with a suitable temporary protective coating that will protect it from damage due to transporting, installation and following trades.

On-site finishes:

General: Where components are finished on-site and/or may be damaged from following trades they shall provided with suitable temporary protective covering that will protect it from damage due to subsequent building work. Provide for comment the details of temporary coverings prior to undertaking installation.

03. MATERIALS & COMPONENTS

03.01 PRODUCTS

Metals:

Performance: Provide metals suited to their required function, finish and method of fabrication, in sections of strength and stiffness adequate for their purpose.

Rivets:

General: Blind rivets where available in the required metal compatible with the parent metal.

Masonry anchors:

General: Proprietary types comprising screws or bolts in self-expanding sockets.

Masonry plugs:

General: Screws in purpose-made resilient plastic sockets.

Metals:

Performance: Use metals suited to their required function, finish and method of fabrication, in sections of strength and stiffness adequate for their purpose.

Dissimilar materials:

Requirement: Prevent direct contact between incompatible metals and between green hardwood or chemically treated timber and aluminium or coated steel, by either:

- Coating: Apply a suitable anti-corrosion low moisture transmission coating to contact surfaces; or
- Separation layer: Separate contact surfaces with a suitable electrolytic isolation separation layer

Separation layer: Heavy Duty Plasticised PVC Isolation tape:

- Thickness: 0.25mm
- Colour: Black

Guide to dissimilar metals: Use the Table 3.2 of AS 1562 as a guide to compatibility of metals.

Steel generally:

Sections:

- Tube: To AS 1163
- Bar Sections: To AS 3679.1
- Sheet: To AS 1595

Steel for powder coating and electroplating:

Materials:

- Electric resistance welded tube: To AS 1450 "bright"
- Cold rolled bar: To AS 1443 "bright"
- Cold rolled sheet: To AS 1595 – CA2S-E

Coated steel:

Materials:

- Galvanised tube: To AS 1163
- Zinc, zinc/iron or aluminium/zinc-coated sheet: To AS 1397
- Pre-painted sheet: To AS 2728
- Coating class for sheet: Class shall not be less than the recommendations of AS 1397 Appendix B

Stainless steel:

Components:

METALWORK

- Plate, sheet and strip: To ASTM A240M-05a commentary references 2.1 and 3.1
- Bars: To AS 2837
- Welded tube: To AS 1769

Aluminium and aluminium alloys:

Components:

- Bars: To AS 1865
- Extrusions: To AS 1866
- Drawn tube: To AS 1867
- Plate and sheets: To AS 1734

Fasteners:

Components:

- Bolts and screws: To AS 1111
- Hexagon nuts: To AS 1112
- Metal washers: To AS 1237
- Machine screws: To AS 1427
- Pressed nuts: To AS 1474
- Self-drilling screws: To AS 3566
- Socket cap screws: To AS 1420
- Socket head set screws: To AS 1421
- Exposed screw heads: Countersunk Philips or socket head unless otherwise specified, finishing flush in counter-sinking
- Masonry anchors: Patent corrosion resistant expansion type or chemical type of suitable manufacture unless otherwise specified
- Electroplating: To AS 1897
- Galvanising: To AS 1214

03.02 STAINLESS STEEL FINISHES

General:

Requirement: To prevent contamination of stainless steel finishes, when working with stainless steel material all machinery and tools shall be dedicated stainless steel equipment that has not been used for other metals, including ferrous metal and non-ferrous metals.

Samples:

General: Provide finishes to match the approved samples in terms of the mill grade and finish process.

Pre assembly:

Mechanically polished and brushed finishes: Apply grit faced belts or fibre brushes that achieve uni-directional approved finish with buffing as required to the following:

- Satin polish (#4): Surface to have a roughness co-efficient Ra of not more than Ra 0.5
- External surfaces shall in addition be electro polished to prevent "tea staining"

Post assembly pre-treatment:

Heat discolouration: Remove by pickling.

Welds: Grind excess material, brush, and polish to match the pre assembly finish.

Completion:

Cleaning: Clean and rinse to an acid free condition and allow to dry. Do not use carbon steel abrasives or materials containing chloride.

Protection: Secure packaging or strippable plastic sheet.

03.03 ALUMINIUM POWDER COATINGS

Aluminium finishes:

High performance powder coating: Powder coatings on aluminium surfaces shall have the following features:

- Proprietary item: Equivalent to DULUX Duratec LX
- Preparation and performance: The specification shall meet or exceed AS 3715, BS 6496 and AAMP 2604-98
- Warranty: 15 year film integrity and 10 years full colour and gloss integrity
- Gloss level: Matt, Satin or Gloss as scheduled
- Colour: As scheduled

Certification: A certificate shall be provided from the coating system application firm guaranteeing that the coating thickness supplied is equal or better than that as specified.

03.04 STEEL FINISHES

Powder coating:

Steel sections: Powder coatings on prepared steel surfaces shall have the following features:

- Preparation and performance: The specification shall meet or exceed AS 3715 and AAMP 2604-98
- Warranty: 15 year film integrity and 10 years full colour and gloss integrity
- Gloss level: Matt, Satin or Gloss as scheduled
- Colour: As scheduled

Preparation of galvanised steel: Clean by immersing in a suitable alkaline or acidic solution, apply a chromate or zinc phosphate chemical conversion coating, rinse and degas.

Painted corrosion protection of steel components:

Standard: Comply with the requirements of AS/NZS 2312.

Requirement: Where fabricated steelwork is to be protected by a painted corrosion protection system, the manufacturer's recommendations for preparation and application conditions shall be incorporated. Evidence of compliance shall be provided to the Architect.

Galvanised coatings:

General: Complete welding, cutting and drilling, and other fabrication before coating.

Galvanised coatings are not to be painted.

Coatings: Unless otherwise specified, zinc coatings shall be applied by the hot dip method as follows:

- Fabricated ferrous articles generally: To AS/NZS 4680 Table 1
- Ferrous wire: To AS 1650, Section 4, Type A
- Steel sheet: To AS 1397, coating class as specified for the particular item
- Threaded fasteners: To AS 1214

Signage: Powder coated finish to school signage – laser cut 10mm steel, with fixings – PC sum

Provide shop drawings of signage prior to manufacture, incorporate lighting as required

04. EXECUTION

04.01 CONSTRUCTION GENERALLY

Aluminium structures:

Standard: To AS/NZS 1664.1 or AS/NZS 1664.2.

Metals:

Performance: Provide metals so that they transmit the loads imposed and ensure the rigidity of the assembly without causing deflection or distortion of finished surfaces.

Incompatible metals: Separate using concealed layers of suitable materials in appropriate thicknesses.

Fasteners:

Performance: Provide non-galvanic corrosion fasteners.

Materials: Provide fasteners in materials of mechanical strength and corrosion resistance at least equal to that of the lowest resistant metal joined.

To aluminium and aluminium alloys: Provide aluminium alloy or non-magnetic stainless steel fixing devices only.

To stainless steel: Provide appropriate matching grade stainless steel materials only.

Fabrication:

Workshop: Fabricate and pre-assemble items in the workshop wherever practicable.

Edges and surfaces: Keep clean, neat and free from burrs and indentations. Remove sharp edges without excessive radiusing.

Tube bends: Form bends in tube without visibly deforming the cross section.

Colour finished work: Match colours of sheets, extrusions and heads of fasteners.

Thermal movement: Accommodate thermal movement in joints and fastenings.

Fabrication tolerances:

Structural work generally: $\pm 2\text{mm}$ from design dimensions.

Joints:

General: Fit joints to an accuracy appropriate to the class of work. Finish visible joints made by welding, brazing or soldering using grinding, buffing or other methods appropriate to the class of work, before further treatment.

Self-finished metals: Free of surface colour variations, after jointing.

Joints: Fit accurately to a fine hairline.

Joints in prefinished metalwork: Do not weld on site any pre-finished metalwork; use socket joints and the like, that provides an accurate fine hairline joint.

Marking:

General: Provide suitable and sufficient marks or other means for identifying each member of site-erected assemblies, and for their correct setting out, location, erection and connection.

Mark bolted connections to show the bolting category. Do not mark stainless steel by notching.

Splicing:

General: Unless otherwise approved or indicated on the Drawings, provide structural members in single lengths.

04.02 WELDING & BRAZING

General:

Quality: Provide finished welds which are free of surface and internal cracks, slag inclusion, and porosity.

Site welds: Avoid site welding wherever possible. If required locate site welds in positions for down hand welding.

Butt weld quality level: Not inferior to the appropriate level recommended in AS 1665 Appendix A.

Brazing:

General: Ensure brazed joints have sufficient lap to provide a mechanically sound joint. Do not use butt joints relying on the filler metal fillet only.

Filler metal: To match the parent metal.

04.03 STAINLESS STEEL FABRICATION

Welding stainless steel:

Certification of welders: To AS 1796.

Riveting:

General: Riveting may be used only to join stainless steel sheet or strip less than 1mm thick.

Drill (not punch) the rivet hole, and drive the rivet cold. On completion, clean and passivate the riveted assembly.

Soldering:

General: Do not solder stainless steel.

04.04 METAL FIXTURES

Description:

General: Provide metal fixtures noted on drawings as follows:

- Components and their location, indicative construction details, scribes and trims, materials, dimensions and thicknesses, and finishes shall be as detailed
- All dimensions noted on drawings shall be confirmed on site
- Finishes selections are noted in a Finishes schedule on the drawings
- Hardware and equipment

04.05 COMPLETION

Cleaning:

Temporary coatings: On or before completion of the works, or before joining up to other surfaces, remove all traces of temporary coatings used as a means of protection.

05. SELECTIONS

05.01 CUSTOM BUILT STEEL PLATFORMS, STAIRS & WALKWAYS

Fabrication:

Materials, design and construction: As detailed on the drawings and/or to comply with AS 1657.

Method: Welding.

Joints: Produce smooth unbroken surfaces at joints. Scribe the joints between posts and rails. Make end-to-end socket joints over an internal sleeve.

Bends: Make changes of direction in rails by evenly curved pipe bends.

Free ends: Seal the free ends of pipes with fabricated or purpose-made end caps.

Finish:

- Hot dip galvanised to Table 1 of AS/NZS 4680
- Painted as specified above

Fixing to structure:

General: Provide fabricated predrilled or purpose-made brackets or post bases, and attach the pipework to the building structure with fixings, including bolts into masonry anchors, and coach screws or bolts into timber, of metal compatible with the pipework.

Galvanizing:

General: Complete fabrication before galvanizing; otherwise use a sleeve and socket joint.

05.02 CUSTOM FABRICATED ITEMS

Description:

Extent: Where shown & detailed on the drawings

Finishes: Galvanised after fabrication, unless shown otherwise to AS 1657.

Shop drawings:

General: Provide full shop drawings for approval prior to commencing manufacture. Shop drawings shall show:

- All members, thickness and jointing methods
- Fixing methods to the structure
- Dimensions

Includes the following items, but not limited to;

- Metal frames for joinery items
- Sliding door frames

Fabrication:

Method: Fully welded construction, with all exposed welds ground smooth to an approved quality.

Finish:

External exposure: All items to be hot-dip galvanised after fabrication.

Internal use: All items to be prepared for paint or powdercoat finish as specified.

Installation:

General: Fix generally in accordance with the drawings.

Include all accessories proprietary end caps & adjustable feet.

05.03 CHAIN WIRE MESH ENCLOSURES

Description:

General: External and internal partitions and enclosures, consisting of chain wire fixed to a support system of galvanised steel tubular posts and rails with the necessary purpose made accessories, including bolted connections to top and bottom, together with tubular gates with locking device.

Standard:

General: To AS 1725.

Fencing wire products:

Standard: To AS 2423.

Wire Coating:

Type: Black PVC coated galvanized wire.

Lashing: Black coated wire to match chain wire mesh.

Chain wire:

Nominal mesh size: 40mm.

Posts & rails:

Nominal size: DN32 - light to AS 1074.

Attachment of rails to posts: Galvanised split fittings.

Post attachment: Each post is to be bolted to the overhead structures, with bracing to AS 1725 is not required.

Finish: Black Powdercoated

Gates:

Tube size: DN25 - light to AS 1074.

Locking device: Pad bolts with padlocks master keyed.

Hardware: Include fabrication of plates and brackets as required to mount hardware as specified in the DOOR & HARDWARE SCHEDULE.

05.04 BOLLARDS

Ground mounted bollards:

Size: 165mm I.D. x 5.4mm CHS galvanised steel tube 2100mm long.

Installation: Embed the bollard into mass concrete footing prior to installation of external paving. Set height so bollard projects 1.20 metres above paving level. Completely fill the bollard with concrete mix and finish concrete with a convex top.

Slab mounted bollards:

Size: 165mm I.D. x 5.4mm CHS galvanised steel tube with 250 x 250 x 16mm mild steel plate base plate (with four holes drilled for M16 masonry anchors); base plate welded to the bottom of the steel tube.

Installation: Use four 100mm long M16 masonry anchors to fix bollards to the slab. Completely fill the bollard with concrete mix and finish concrete with a convex top.

05.05 PROPRIETARY FIXTURES, GENERALLY

Installation:

General: Fix to wall using a concealed fixing method as recommended by the manufacturer.

Electrical: Direct wiring to fixtures shall be undertaken as part of the Electrical Services subcontract work.