AUSTROADS TECHNICAL SPECIFICATION ATS 5430
Fabrication of Aluminium Components

Austroads

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1. Scope

1.1 Austroads Technical Specification ATS 5430 sets out the requirements for the fabrication of Aluminium components for bridges, gantries, roadside furniture, poles and related structures. This includes the supply of materials, preparation of materials, assembly, welding, testing, inspection, packing, handling and delivery to the site.

1.2 ATS 5430 applies to the elements of structural Aluminium components that are designed in accordance with AS/NZS 1664.1

1.3 The Contractor must ensure that the Fabricator complies with this Specification. The Contractor may be the same entity as the Fabricator.

2. Referenced Documents

2.1 The following documents are referenced in this specification:

Australian/New Zealand Standards

AS 1100	Technical drawing (Parts as appropriate)
AS 1101.3	Graphical symbols for general engineering – Welding and non-destructive examination
AS 1231	Aluminium and aluminium alloys – Anodic oxidation coatings
AS 1874	Aluminium and aluminium alloys – Ingots and castings
AS 2177	Non-destructive testing – Radiography of welded butt joints in metal
AS 2205.5.1	Methods for destructive testing of welds in metal – Method 5.1: Macro metallographic test for cross-section examination
AS 2214.1	Structural steelwork — Qualification of personnel – Part 1: Welding supervisors and inspectors[1]
AS 2812	Welding, brazing and cutting of metals - Glossary of terms
AS ISO/IEC 17025	General requirements for the competence of testing and calibration laboratories
AS/NZS 1664.1	Aluminium structures – Limit state design
AS/NZS 1665	Welding of aluminium structures
AS/NZS 1734	Aluminium and aluminium alloys – Flat sheet, coiled sheet and plate
AS/NZS 1865	Aluminium and aluminium alloys – Drawn wire, rod, bar and strip
AS/NZS 1866	Aluminium and aluminium alloys – Extruded rod bar, solid and hollow shapes
AS/NZS 1867	Aluminium and aluminium alloys – Drawn tubes
AS/NZS ISO 18273	Welding consumables – Wire electrodes, wires and rods for welding of aluminium and aluminium alloys – Classification
AS/NZS ISO 9712	Non-destructive testing - Qualification and certification of NDT personnel

[1] *Note: AS 2214.1 'may also be used for other applications requiring prescribed standard in the theory and practice of welding'; this includes the welding of Aluminium.*

International Standards	
ISO 17640	Non-destructive testing of welds – Ultrasonic testing – Techniques, testing levels, and assessment
Austroads	
ATS 5420	Supply of Steel Fasteners

3. Definitions

3.1 The following definitions and/or abbreviations apply to this Specification.

APAS:	Australian Paint Approval Scheme
Aluminium:	Aluminium and/or aluminium alloys meeting the requirements of Clause 6.1.
Design Documentation:	The approved drawings and other documentation prepared by the Designer. This excludes shop detail documentation prepared by the Fabricator.
Designer:	The professional engineer or consultant, approved by the Principal, who is responsible for the design of the Aluminium components and/or structure and preparation of the Design Documentation.
Fabricator:	The company undertaking the fabrication of Aluminium components in accordance with this Specification.
ITP:	Inspection and Test Plan
NDT:	Non-Destructive Testing
PQR:	Procedure Qualification Record
Principal's Registration Scheme:	Any scheme for the prequalification, registration or approval of products, manufacturers, suppliers and/or Professional Engineers in operation in the jurisdiction where the Aluminium components are to be erected.
Robot Welder:	The welding process that uses both a robot welding machine and a qualified operator.
WPS:	Welding Procedure Specification

4. Quality System Requirements

General

4.1 The Fabricator must prepare and implement a Quality Plan that includes the documentation in Table 4.1 (where applicable to the fabrication).

Table 4.1: Quality Plan

Clause	Description of document
7.1	Procedures for fabrication
8.1	Details/procedures for welding
9.1	Procedures for inspection of welds
12.1	Procedures for transport, handling and storage

4.2 The Fabricator must submit a program showing the proposed sequence of operations for all Aluminium components, which must be identified by name and mark.

Prequalification or Registration of Fabricators

4.3 Where a Principal's Registration Scheme is in place for the fabrication of Aluminium components, the Fabricator must comply with that scheme for Aluminium components erected in that jurisdiction. In addition, the Fabricator must be prequalified or registered to the level specified in the tender documents (if applicable).

HOLD POINT 1	
Process Held	Commencement of fabrication
Submission Details	The Quality Plan, fabrication program and evidence of prequalification/registration (where applicable) must be provided to the Principal at least 10 working days prior to the commencement of fabrication.

Testing

4.4 All sampling and testing required by this Specification must be performed by a laboratory that:

a) is accredited for the test method to meet the requirements of AS ISO/IEC 17025; and

b) complies with the resource requirements for competent testing personnel and appropriate supervision as required by AS ISO/IEC 17025.

4.5 The laboratory's accreditation body must be a signatory to the International Laboratory Accreditation Cooperation Mutual Recognition Arrangement (ILAC MRA) for testing laboratories. The National Association of Testing Authorities (NATA) and International Accreditation New Zealand (IANZ) are signatories to the ILAC MRA.

4.6 All reporting requirements of the test method and material standard must be included in the test reports or test certificates and be expressed in English alphanumeric characters.

4.7 The Contractor must provide evidence that the laboratory meets the requirements of Clause 4.4.

5. Shop Detail Documentation

5.1 Unless specified otherwise in the Contract documents, the Fabricator is responsible for the preparation of shop detail documentation (including shop drawings) for the fabrication of all Aluminium components.

5.2 The shop detail documentation must:

a) accurately and completely transfer the information from the Design Documentation and this Specification; and

b) provide for the development of accurate, detailed dimensional information which allows for the accurate fit-up of Aluminium components during erection.

5.3 The details shown on the shop detail documentation must be consistent with the Design Documentation and must comply with all of the following:

a) The marking plan must show the location where each Aluminium component will be installed.

b) Drawings must conform to AS 1100 as appropriate.

c) Welding and cutting definitions must conform to AS 2812.

d) Welding symbols must conform to AS 1101.3.

e) The Design Documentation (including revision number), on which the shop detail documentation is based, must be identified.

f) That part of the shop drawings (if any), where the shop drawings depict a part of the Design Drawings, must be identified.

g) The Aluminium type and grade, and any required fabrication method or surface treatment must be identified.

h) Complete information regarding the location, type, size and extent of all welds must be clearly shown. Shop welds and field welds must be clearly distinguished.

i) Full details of weld category and level of quality assurance in accordance with Clause 1.6 and Appendix B of AS/NZS 1665 must be shown.

j) Each Aluminium component must be clearly identified with the identification marks shown on the Design Drawings. Each type of Aluminium component must be further identified to readily distinguish it from all other types.

k) For assemblies, all associated bolting, accessories and/or joining details, and details of all holes, including the method of sealing the holes, must be shown on the shop detail documentation.

5.4 All shop detail documentation must be identified by a numbering system allowing traceability throughout the duration of the work. Revisions must be uniquely identified and dated, with the scope of each revision clearly identified.

5.5 Where requests for information (RFIs) are issued as part of the process of producing shop detail documentation, a written record of inquiries and responses must be maintained.

5.6 The Contractor must ensure that a competent person certifies that the shop detail documentation complies with the requirements of this Specification. Unless specified otherwise in the Contract documents, the Designer is responsible for the review and approval of shop detail documentation, including any changes.

HOLD POINT 2	
Process Held	Commencement of fabrication
Submission Details	The shop detail documentation and certification must be submitted to the Principal at least 5 working days prior to the commencement of fabrication.

6. Materials

General

6.1 The specific Aluminium alloy designation and temper to be used in the component must comply with the Design Documentation. If nothing is specified in the Design Documentation, the Aluminium must comply with the standards listed in Table 6.1. If the component will be anodised in accordance with Clause 11, the Aluminium must be suitable for anodising.

Table 6.1: Applicable material standards

Product	Applicable Standard
Structural aluminium sheet and plates	AS/NZS 1734
Structural aluminium drawn wire, rod, bar and strip	AS/NZS 1865
Structural aluminium extruded rod, bar, solid and hollow shapes	AS/NZS 1866
Structural aluminium drawn tube	AS/NZS 1867
Aluminium castings	AS 1874

6.2 Aluminium, which is bent, damaged or corroded, must not be used.

6.3 The Aluminium must have a surface finish complying with the structural finish of the product standard specified in Clause 6.1. A structural finish is a standard mill finish that may contain die lines and handling defects, regarded as artefacts that are not required to be repaired. If a higher level of finish (such as an architectural finish) is required, this will be noted on the Design Documentation and must be shown on the shop detail documentation.

6.4 Where grinding of a surface defect is permitted, the resultant surface roughness must be as close as practicable to the surrounding areas and be free of scour marks.

6.5 Repair of defective Aluminium by welding and/or welding of pieces less than 300 mm or one diameter (whichever is greater) to make up the length of components is not permitted.

Testing of Materials

6.6 The Fabricator must submit the following information for the Aluminium materials used in the fabrication to the Principal:

a) material test certificates;

b) material testing results as appropriate; and

c) a location map showing where the material will be used.

6.7 The material test certificate must show Aluminium grade as per the applicable standard and any heat treatment condition, the full chemical composition and the mechanical properties of the material, including yield, tensile and elongation results.

6.8 If product testing, which is in addition to the materials test certificates, is required to verify the properties specified in Clause 6.7, the following sampling frequency applies:

a) the sampling regime specified in the product standard, applied to the delivered material;

b) a minimum of one sample for testing per size and grade; or

c) 2% of the material of the same size and grade.

HOLD POINT 3	
Process Held	Commencement of fabrication
Submission Details	The material test certificates and test reports must be submitted to the Principal at least 5 working days prior to the commencement of fabrication.

Traceability and Identification

6.9 The Fabricator must:

a) establish and maintain a comprehensive system of identification records;

b) ensure there is traceability between the material test certificates and the materials (including fasteners) being used in the product; and

c) ensure that any fabrication process does not adversely affect the material properties of the parent metal, particularly any heat treatment condition.

6.10 If requested, the Fabricator must demonstrate the method of traceability and provide copies of all relevant records to the Principal.

6.11 If traceability cannot be established, the material must be sampled independently and tested by a laboratory accredited for the appropriate testing in accordance with Clause 4. The results must show the full chemical composition and the mechanical testing results, including yield, tensile and elongation tests. The sampling rate and number of tests must be in accordance with Clause 6.8.

Fasteners

6.12 Unless specified otherwise in the Design Documentation, the fasteners must comply with ATS 5420.

6.13 The risk of galvanic corrosion due to contact between dissimilar materials (such as between Aluminium and steel) must be assessed by the Designer and if necessary, measures taken to prevent the occurrence of galvanic corrosion. All details of this assessment must be submitted with the certificate of compliance and shown on the As-built Drawings in accordance with Clause 13.1 and Clause 13.2 respectively.

6.14 The Contractor must submit evidence of compliance with ATS 5420 to the Principal prior to the installation of the fasteners.

HOLD POINT 4	
Process Held	Installation of fasteners
Submission Details	Refer ATS 5420.

7. Fabrication

General

7.1 At a minimum, the Quality Plan must include:

a) procedures for fabrication and erection;

b) system for identification of Aluminium components;

c) assembly procedures, including dimensional control and details of manufacturing jigs;

d) procedures for attachment of anchorages (where applicable);

e) cutting and edge preparation procedures; and

f) procedures for cambering, curving, bending and straightening (if applicable).

7.2 All Aluminium components must be fabricated in accordance with the AS/NZS 1664.1, AS/NZS 1665, this Specification and the approved Design Documentation. Unless specified otherwise in the Contract documents, the Principal is responsible for approval of the Design Documentation.

WITNESS POINT 1	
Process Witnessed	Commencement of fabrication
Notice Period	At least 5 working days of notice prior to the commencement of fabrication must be provided to the Principal.

Handling and Storage of Aluminium Components

7.3 All Aluminium, whether fabricated or not, must be handled, stored and transported in a manner that maintains its original condition and prevents damage to the material. It must:

a) be protected from contamination from materials which can cause weld porosity, such as paint, markers, oil or grease;

b) be stored in a dry area that does not have the potential for condensation;

c) be stored with an allowance for air flow between sheets to prevent condensation; and

d) not be stored in contact with steel.

7.4 Unless approved otherwise by the Principal, Aluminium fabrication work must be undertaken in dedicated areas which are separated from where carbon steel fabrication is undertaken.

7.5 Tools used to fabricate or assemble Aluminium components must be dedicated tools for Aluminium work. Tools previously used on steel must not be used for Aluminium work.

7.6 A sharp object or a lead pencil must not be used to mark Aluminium.

7.7 Before any marking out or other work is done, the Fabricator must make all plates flat and all bars and sections straight and free from twist so that, when assembled, adjacent surfaces will be in close contact throughout. The methods adopted for the above work must be such that the material is not damaged.

Cutting and Edge Preparation of Aluminium Components

7.8 All material must be cut to the required length as outlined by Clause 6.2 of AS/NZS 1664.1 and Clause 5.1.2 of AS/NZS 1665.

7.9 Surfaces produced by cutting must be representative of good workmanship, finished square (unless a bevelled edge is called for), true to the required dimensions and free from defects such as excessive roughness, which would impair the service performance or seriously interfere with subsequent fabrication and protective treatment.

7.10 Shearing must not be used for main plates, reinforcing plates, main gussets, splice plates, diaphragms, main components and bracing. Any distortions caused by shearing must be removed.

7.11 Grinding must not be used on surfaces prepared for welding.

7.12 Re-entrant corners must comply with clause 6.2(c) of AS/NZS 1664.1. When used, re-entrant corners must be rounded smoothly to a radius of not less than 10 mm.

7.13 Unless shown otherwise on the Drawings, all corners on exposed edges must be rounded to a minimum radius of 2 mm to remove sharp edges, except where such edges must subsequently be welded. Rolled and extruded edges need not be rounded, provided that the corners are not sharp.

7.14 Plasma-arc cutting must be carried out wherever possible by machines that are mechanically guided and moved at uniform speed. Hand cutting may only be used only for secondary cuts, hole preparation, repairs and other work where machine cutting is not possible.

7.15 Any cut surface to be incorporated in a weld must comply with AS/NZS 1665.

7.16 Pasma-arc cutting of plates, sections and other components with surfaces that will be used in the ‘as-cut’ condition must be carried out with procedures giving minimum reduction in properties at the cut surface. For heat-treatable aluminium alloys, 3 mm of material must be removed from plasma-arc cut edges by machining. Where the cut area is separated from the immediate weld area and is not part of the welded joint, plasma-arc cut edges of heat-treatable aluminium alloys may be used without machining.

Repairs

7.17 Cut surfaces may be planed or ground to obtain the specified surface roughness. Grinding marks must be parallel to the direction of the cut.

7.18 Grinding must not be used on surfaces that will be subsequently welded. Repairs must be carried out prior to any protective coating being applied.

Bending of Plate or Sheet

7.19 The bending procedure must be specific to the particular aluminium alloy, taking into account the suitability of the aluminium alloy and temper for bending. Prior to bending, any rough edges must be smoothed by grinding to reduce the chance of the material cracking or splitting.

7.20 Bending of plate or sheet must be carried out in a press brake with a round die to produce a straight bend. The surfaces of the die must be clean so that the plate will not be scratched or pick up contaminants.

7.21 There must be no distortion in the adjacent flat surfaces as a result of the bending process.

Rolling of Plate or Sheet

7.22 Prior to rolling, any rough edges must be smoothed by grinding to reduce the chance of the material cracking or splitting.

7.23 The surfaces of the rollers must be clean so that the plate will not be scratched or pick up contaminants.

Holes for Bolting

7.24 Unless specified otherwise, the diameters of holes for bolting must be not more than 1.6 mm larger than the diameters of the bolts shown on the Design Documentation.

7.25 Holes may be either drilled full-size or reamed to full-size after sub-drilling or sub-punching.

7.26 The following applies to sub-punched and sub-drilled holes:

a) The hole must be smaller in diameter than the nominal diameter of the bolts by 3 mm.

b) For sub-punched holes, the diameter of the die must not exceed the diameter of the punch by more than 1 mm, and the holes must be clean cut, without torn or ragged edges.

c) Sub-punched holes must not be used where the diameter of the hole is less than the thickness of the material.

7.27 The following applies to sub-punched and sub-drilled holes:

a) Reamed or drilled holes must be cylindrical and perpendicular to the face of the Aluminium component unless shown otherwise on the Drawings.

b) Reaming and drilling must be carried out by mechanical means.

c) All burrs must be removed and if necessary, assembled parts must be taken apart for removal of burrs or chips caused by drilling and reaming.

7.28 The following applies to holes for field connections:

a) Holes may be reamed or drilled with the Aluminium components assembled in the shop in their correct relative position.

b) If the shop assembly procedure is adopted, all adjoining main Aluminium components must be assembled before reaming or drilling is commenced. All joints and associated splice plates must be matchmarked before the structure is dismantled.

c) If the shop assembly procedure is not adopted, these connections may be sub-punched or sub-drilled and reamed or drilled from the solid to a hardened steel template not less than 25 mm thick, and all corresponding holes in the Aluminium components to which they connect must be reamed or drilled to the same template.

7.29 All matching holes in any contiguous group must register with each other so that a gauge or drift 2 mm less in diameter than the holes must pass freely through the assembled contact faces at right angles to them.

Tolerances

7.30 Unless specified otherwise in the Contract documents, the tolerances in Table 7.30 apply.

Table 7.30: Fabrication Tolerances

Application	Tolerance
Bridge Traffic Barrier and/or Balustrade:	
Length of rails and balustrade	± 2 mm
Height of posts	± 2 mm
Centre of holes	± 2 mm
Finished height of balustrade	± 2 mm
Bow in rail and balustrade	± 1 mm/m
Components other than Bridge Traffic Barrier and/or Balustrade:	± 2 mm

8. Welding

General

8.1 At a minimum, the Quality Plan must include:

a) inspection and test plans (ITP);

b) qualifications and identification of welders;

c) qualification of welding supervisors and inspectors;

d) system of identification of each welder's work;

e) a copy of the Welding Procedure Specification (WPS);

f) the corresponding Procedure Qualification Record (PQR);

g) macro test results, including a photograph at x1 or larger, for the welding personnel for each submitted WPS;

h) procedures and welding sequence for control of distortion;

i) welding wire batch certificate; and

j) a draft weld map to show where the WPS will be used.

8.2 All macro test reports must be NATA-endorsed.

8.3 The WPS must reflect the connection to be welded shown on the Drawings.

8.4 All welding must conform to AS/NZS 1665 and the additional requirements in this Clause 8. Unless specified otherwise in the Design Documentation, welding must be Category B

8.5 All weld spatter must be removed from the surface of the weld and the parent metal.

Welding Consumables

8.6 Welding consumables must:

a) conform to AS/NZS ISO 18273. Testing of welding consumables must comply with AS/NZS 1665;

b) be used in accordance with the manufacturer's recommendations and AS/NZS 1665; and

c) be certified, by a recognised authority complying with the requirements of AS/NZS 1665, that the classification and grade of the welding consumables are suitable for welding the Aluminium designation and temper nominated in the welding procedures.

Qualification of Welding Procedures

8.7 Each welding procedure must be qualified in accordance with one of the methods of Clause 4.1 of AS/NZS 1665, with any required testing carried out in accordance with Clause 4.2 of AS/NZS 1665.

WITNESS POINT 2	
Process	Welding and testing of each test piece and/assembly
Notification Period	At least 3 working days before the commencement of welding.

8.8 All relevant test results must be reported and a statement that the results comply with AS/NZS 1665 submitted to the Principal. Where non-destructive examination (RT or UT) is specified for a weld test plate, the testing personnel must hold appropriate certification complying with AS/NZS ISO 9712 (refer Clause 9.6) for the test carried out.

Welding Supervisor

8.9 Welding must be supervised by a Welding Supervisor who satisfies the requirements of AS/NZS 1665 Clause 4.5.2(a) to (g), or who holds a certificate as a Welding Supervisor in accordance with AS 2214.1. If the work is not carried out in Australia, the welding supervisor must satisfy the requirements of AS/NZS 1665 Clause 4.5.2(a) or holds a certificate as a Welding Supervisor in accordance with AS 2214.1.

8.10 The nominated welding supervisor must be physically present on the workshop floor or in the workshop office during all welding processes, including tack welding.

Welding Personnel

8.11 All welders must demonstrate their competence by welding a test piece to be qualified by testing in accordance with AS/NZS 1665 Clause 4.5.3.

8.12 Any welder who, during fabrication, repeatedly produces non-conforming welds must be required to be re-tested. Failure of the re-test must preclude such a welder from further similar welding on the works until the welder develops the required proven ability to produce welds complying with AS/NZS 1665.

Robot Welder

8.13 All welding undertaken by a robot welder must comply with the qualification requirement (a) of Clause 4.5.3 of AS/NZS 1665.

8.14 Individual operators of the robot welder must undertake the qualifications detailed in Clause 8.13.

8.15 The Principal reserves the right to withdraw approval of the robot welder if the welding does not conform to AS/NZS 1665.

Butt Welding Preparation

8.16 The Fabricator must ensure that the butt weld preparation has been assembled in accordance with the approved WPS, including bevel angle and root gap. If the joint does not comply with the details on the WPS, the Fabricator must either:

a) modify the bevel preparation so the joint complies with the WPS; or

b) develop and test a PQR with the new joint details, then qualify the necessary welding staff to the subsequent WPS in accordance with Clause 8.13.

WITNESS POINT 3	
Process	Butt welding
Notification Period	Notification that the butt weld preparation is complete must be provided to the Principal at 3 working days before the commencement of butt welding.

9. Completion and Inspection of Welds and Components

General

9.1 The Quality Plan must include:

a) procedures and program for the inspection of welds and completed Aluminium components;

b) methods of reporting results of the inspections; and

c) procedures for correction of any non-conforming welding or Aluminium components.

9.2 The levels of imperfection in fillet and butt welds must not exceed the limits specified in Table 6.1 of AS/NZS 1665.

9.3 Inspection of welds and Aluminium components must be carried out in accordance with the methods for visual inspection nominated in Clause 7.3 of AS/NZS 1665. Inspection reports must be provided for all Aluminium components and welds inspected. Where it is not specified in the Design Documentation, a minimum 5% of the butt welds must be tested by radiography, in accordance with AS 2177, or by ultrasonic testing, in accordance with ISO 17640.

9.4 Unless specified otherwise in the Contract documents, the Contractor must engage a qualified welding inspector who satisfies the requirements of Clause 7.2 of AS/NZS 1665 or who holds a certificate as a Welding Inspector in accordance with AS 2214.1, to carry out all welding inspection required under this Specification.

9.5 Inspections must be carried out:

a) when all adjacent welds are completed and are sufficiently cool to ensure that no further defects arise after inspection;

b) on any non-conforming weld that has been repaired;

c) after components are completed; and

d) prior to the application of any surface treatment.

9.6 If not specified in the Design Documentation, the Contractor must ensure that the shop detail documentation specifies details of the non-destructive examination of fabricated Aluminium components. This includes details of the welds or Aluminium components to be examined, the methods to be used and the extent of testing to be carried out. The NDE inspections must be performed by personnel holding Level 2 certification complying with AS/NZS ISO 9712, at the appropriate level. In Australia, the Australian Institute for Non-Destructive Testing (AINDT) is accredited to provide certification of NDT personnel to AS/NZS ISO 9712.

9.7 The Principal may arrange for a second or third party inspection of the welds. The Fabricator must ensure the welded items are positioned so they can be inspected; that is, stacking of items that restricts visibility of completed welds is not permitted. If the welding is not carried out in Australia, the Contractor bears any additional costs incurred by the Principal when undertaking an inspection that it would not have incurred if the welding had been carried out in Australia.

9.8 Any suspected welding defects must be tested with a suitable non-destructive test.

HOLD POINT 5	
Process Held	Removal of fabricated Aluminium components from the workshop and/or application of protective coating.
Submission Details	Notification that the completed welds are (or will be) ready for inspection must be provided to the Principal at 3 working days before the removal of the Aluminium components from the workshop and/or application of protective coating.

9.9 If the welding is not carried out in Australia, Hold Point 5 applies at least 5 working days before the Aluminium component is packaged for transportation to Australia.

Nonconforming Welds

9.10 If a nonconforming weld is detected following inspection, at least 2 additional welds (which are represented by the inspected weld) must be tested for every non-conforming weld.

9.11 All weld repairs must be re-inspected for conformity.

9.12 Repairs must be carried out prior to any protective coating being applied.

Weld Maps

9.13 Once the welding has been completed, the Fabricator must provide a weld map outlining the welding undertaken in the manufacture of the Aluminium components. The weld map must outline, for each connection, the following:

a) WPS number used;

b) welder's initials (or welder ID) and date welded; and

c) nominated welding supervisor's initials (or welder ID) and date inspected.

9.14 The weld maps must be submitted to the Principal prior to the Aluminium components being released for protective coating.

9.15 A table or legend must be made available if requested to identify the welder's full name and corresponding initials or welder ID.

HOLD POINT 6	
Process Held	Removal of fabricated Aluminium components from the workshop and/or application of protective coating.
Submission Details	The weld maps must be provided to the Principal prior to the removal of the Aluminium components from the workshop and/or application of protective coating.

10. Shop Assembly

10.1 At the earliest possible stage during fabrication, or as indicated on the Design Documentation, the Fabricator must shop assemble each different combination of Aluminium components and panels to check the fit of the Aluminium components and verify the suitability of the templates used in fabrication.

11. Protective Coating

11.1 Fabricated Aluminium bridge barriers, balustrade and rails must be clear anodised. Other Aluminium components must be coated in accordance with the details shown on the Design Documentation.

11.2 Unless specified otherwise in the Design Documentation, anodising of Aluminium components must comply with AS 1231 and the following:

a) The Aluminium component is anodised after fabrication.

b) Repairs to the anodised coating and the use of power-operated sanding tools or grinders is not permitted.

c) The anodised film must have a minimum thickness of 25 µm (AA 25).

d) The properties of the finish must be free of all lumps, spikes and other protrusions.

e) Ash and dross marks must be removed.

f) The colour must match the colour of any sample submitted to the Principal.

11.3 Any Aluminium surface that interacts with a concrete surface, including the bottom surface of a post or stanchion base plate, must be painted with two coats of a surface-tolerant epoxy paint. The paint must:

a) be certified as complying with an applicable APAS specification (such as APAS 2973);

b) be applied in accordance with the manufacturer’s requirements; and

c) have a total minimum thickness of 250 µm.

12. Marking, Handling and Transportation

12.1 The Quality Plan must include:

a) procedures for transport, handling and storage; and

b) details of the measures to prevent distortion and damage to the components and the protective coating.

12.2 The Fabricator must ensure that each component can be readily identified when delivered to the site and provide the Principal with details of the identification system, including an electronic copy of drawings showing these markings.

12.3 The components and the protective coatings must not be damaged or distorted during storage, handling and transportation.

13. Certification

13.1 Within 15 working days of the completion of fabrication of the Aluminium components, the Contractor must submit a certificate to the Principal certifying that each fabricated component conforms to the requirements of the Design Documentation and this Specification. The certificate must be accompanied by all test results and other records verifying conformance with this Specification.

13.2 Within 40 working days of the completion of fabrication of the Aluminium components, the Contractor must submit electronic copies of the work-as-executed shop drawings in a format acceptable to the Principal.

Annexure A: Summary of Hold Points, Witness Points and Records

The following is a summary of the Witness Points/Hold Points that apply to this Specification and the Records that the Contractor must submit to the Principal to demonstrate compliance with this Specification.

CLAUSE	HOLD POINT	WITNESS POINT	RECORD
4.1	1. Commencement of fabrication		Quality Plan and program of work
5.6	2. Commencement of fabrication		Shop detailing documentation and certification (where applicable)
6.8	3. Commencement of fabrication		The material test certificates and test reports
6.14	4. Installation of fasteners		Refer ATS 5420
7.2		1. Commencement of fabrication	
8.7		2. Welding qualification	
8.16		3. Butt welding	
9.8	5. Removal of fabricated component from the workshop and/or application of protective coating		Notification that the completed welds are (or will be) ready for inspection
9.15	6. Removal of fabricated component from the workshop and/or application of protective coating		Weld maps
13.1			Contractor's certification and test results/records
13.2			As Constructed Drawings

Amendment Record

Amendment no.	Clauses amended	Action	Date
-	New specification	New	December 2022
1	6.1 – Reference to AS 1874 added to Table 6.1.	New	October 2023
	11.4 – Replace zinc chromate primer with surface-tolerant epoxy.	Substitution	
2	2.1 – Reference to AS 2214.1 added	Substitution	July 2025
	3.1 - Additional definitions added	Substitution	
	4.4–4.6 – Clarification of testing accreditation	Substitution	
	5 – Clause replaced	Substitution	
	6.1 – Clarification of aluminium alloy requirements	Substitution	
	6.13 – Amendment for dissimilar materials	Substitution	
	8.9 – Clarification of requirements for welding supervisor	Substitution	

Key

Format	Change in format
Substitution	Old clause removed and replaced with new clause
New	Insertion of new clause
Removed	Old clauses removed