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## WELDING MODIFICATIONS ON TELSTRA'S ANTENNA SUPPORT STRUCTURES - COMPLIANCE REQUIREMENTS TO STANDARDS AND CODES

Domain: General

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SUMMARY: WELDING MODIFICATIONS ON TELSTRA'S ANTENNA SUPPORT STRUCTURES - COMPLIANCE REQUIREMENTS TO STANDARDS AND CODES

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## 1. PURPOSE

The purpose of this document is to provide Telstra's welding quality requirements when seeking approval to undertake welding activities on Telstra's antenna support structures. This document forms part of the minimum standard that is required for all structural upgrade work that incorporates the welding of additional bracing onto Telstra's primary antenna support structures.

Telstra's antenna support structures include towers, masts, poles and rooftop installations.

## 2. SCOPE

The quality requirements, described in this document, apply to all modification work performed on existing Telstra antenna support structures.

Low risk modifications may be deemed, by Telstra, to be exempt from the requirements of this document. Where an exemption has been sought, and approval has been granted by Telstra Towers Infrastructure Management:

- Telstra Towers Infrastructure Management shall issue a written notification for the exemption.
- The exemption notification shall be available, on site, at all times, when the welding work is being performed.

Excluded from the Scope of this document are:

- Design of modifications
- Coatings
- Health, Safety and Environment

The individual or company seeking Telstra approval to make welding modification is known as the "Applicant", herein.

## 3. REFERENCED STANDARDS AND CODES

The current edition is applicable to the list of Standards and Codes, below:

AS/NZS 1554, "Structural Steel Welding"

AS/NZS 3834, "Quality Requirements for Fusion Welding of Metallic Materials"

AS 3995, "Design of Steel Lattice Towers and Masts"

AS 4100, "Steel Structures"

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## 4. PRECEDENCE

The precedence of documents, in descending order is:

1. Design drawings approved by Telstra.
2. This document.
3. Standards and Codes referenced in this document.

Where there is difficulty in interpretation of requirements, Telstra shall be consulted.

## 5. COMPLIANCE TO STANDARDS AND CODES

The work shall comply with the Standards and Codes listed in Section 3, above.

## 6. QUALITY PLANNING – HOLD POINT

### 6.1. INSPECTION AND TEST PLAN (ITP)

Prior to commencement of works, the Applicant shall produce an Inspection and Test Plan (ITP). It shall contain the following elements:

- Process stage
- Inspection activity
- Specification
- Acceptance criteria
- Inspection method
- Inspection frequency
- Inspection responsibility
- Compliance/non-compliance
- Hold and Witness Points (including authority to release from these points.)

The ITP shall be forwarded to Telstra for review. **No work shall commence until a review of the ITP has been performed by Telstra.**

## 7. WELDING

### 7.1. COLLATERAL DAMAGE

All welding and associated processes, such as grinding, shall be performed in a manner that does not cause damage or detriment to the surrounding structure:

- Temporary, non-flammable shielding shall be installed around the welding work-zone to fully contain all grinding plume, weld spatter and other hot material.
- At the completion of welding works:
  - Dust, dirt or contaminants, of any kind, arising from the welding works, shall be removed from the surrounding structure.
  - All rubbish and debris, of any kind, associated with the welding works, shall be removed from site.

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- All temporary shielding and structures, associated with the welding, shall be removed from site.
  - The surrounding structure shall be left in a condition at least as good as its condition before the welding works commenced.
  - Any remaining damage or detriment to the surrounding structure, caused by the welding, shall be reported, in writing, to Telstra, within 1 business day.

## 7.2. EXISTING STRUCTURE

The grade of the material shall be determined so that it can be classified into an AS/NZS 1554 welding group.

## 7.3. CATEGORY

All welding (excluding stainless steel)<sup>1</sup> shall be compliant with AS/NZS 1554.1 category SP (structural purpose)

## 7.4. WELD PROCEDURE

All welding shall be according to a Procedure (WPS) qualified to AS/NZS 1554, or equivalent<sup>2</sup>.

### 7.4.1. COATED SURFACES (GALVANIZED AND/OR PAINTED)

Hazardous fumes are evolved when coatings are heated in the weld zone. Furthermore, coatings in the weld zone can lead to hydrogen embrittlement and spatter. For these reasons, all coatings shall be removed from the weld zone, prior to welding.<sup>3</sup>

## 7.5. WELDER

All welding shall be performed by a welder qualified to AS/NZS 1554.1, or equivalent<sup>4</sup>, and the WPS, described in Section 8.3.

## 7.6. SUPERVISION

Welding shall be supervised by a person who is acceptable, as Supervisor, under AS/NZS 1554.1. The duties of the Supervisor shall be as described in AS/NZS 1554.1. In summary, the duties are to ensure that the ITP is applied and that welding is according to the WPS.

## 7.7. INSPECTION

### 7.7.1. WELDING INSPECTOR

The Welding Inspector shall satisfy the qualification requirements of AS/NZS 1554.1. He/she shall be independent of the work performed. The roles of Welding Supervisor and Welding Inspector shall not be filled by the same person.

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<sup>1</sup> Stainless steel welding is covered by AS/NZS 1554.6.

<sup>2</sup> Suitable alternative Standards for weld procedure qualifications include AS 3992 and ASME IX.

<sup>3</sup> Further information at <http://www.gaa.com.au/index.php?page=welding>.

<sup>4</sup> Suitable alternative Standards include AS 3992 and ASME IX.

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### 7.7.2. INSPECTION BY WELDING INSPECTOR

- As a minimum, the Welding Inspector shall be on site to witness:
  - That welding is performed to the nominated WPS by a Welder qualified to the WPS. The Applicant shall ensure that the Welding Inspector has access to the following documents:
    - ITP.
    - Evidence of weldability group of the existing steelwork.
    - WPS and Procedure Qualification Record (PQR).
    - Welder performance qualification (WPO) to the WPS.
    - Mill Certificates for all steel sections added to the existing structure.
    - Mill Certificates for the consumables.
  - An example of joints prepared for welding.
  - An example of welding being performed.
  
- The Welding Inspector shall perform the visual inspections listed within this Section and confirm that MT/PT is performed to the requirements of this Section.
  - All welds shall be “scanned”, as described in AS/NZS 1554.1.
  - 50% of the number of welds shall be subject to visual examination for compliance to AS/NZS 1554.1, Table 6.2.2.<sup>5</sup> Telstra may increase the percentage of visual examination for highly stressed or critical welds.
  - 10% of the number of welds shall be subject to magnetic particle examination (MT) or liquid penetrant examination (PT) for compliance to AS/NZS 1554.1, Table 6.2.2.<sup>5</sup> Telstra may increase the percentage of MT/PT for highly stressed or critical welds. (These tests shall be performed by a laboratory NATA accredited for MT/PT.)
  - The Welding Inspector shall provide an Inspection Report including:
    - Identification of the Site.
    - Dates and times of attendance at site.
    - A photographic record of the Inspection.
    - Details of the welds inspected.
    - Identification of any non-compliances.
    - Repairs.
    - Reference to MT or PT Reports.
    - Name, qualifications, signature and date.
  
  - Non-compliant welds shall be repaired according to the requirements of AS/NZS 1554.1 and then subject to 100% visual examination and 100% MT or PT.

## 8. FASTENERS

Fasteners shall be as specified on the design drawing. They shall be installed according to the requirements of AS 4100.

Existing fasteners, that have been removed, shall not be re-used, unless written authorization is obtained from Telstra. (Although reuse of some categories of fastener may be acceptable, under some circumstances, there are many categories of fastener, including

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<sup>5</sup> Unless inspection locations are stipulated by Telstra, the selection of locations is at the discretion of the Welding Inspector.

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galvanized fasteners, that should not be re-used.<sup>6</sup> Therefore, the requirement is that fasteners shall not be re-used, without written authorization from Telstra.)

Steelwork supplies, for attachment by fasteners, shall be according to design documents and the Applicant shall ensure that Mill Certificates are available, on site.

A NATA accredited, "ISO 17020 Type A Inspection Body" shall inspect at least 10% of the steelwork supplies and fasteners, after installation, spread throughout the job, to confirm:

- Fastener number, location, dimensions and markings are consistent with the requirement of the design drawing.
- Correct installation and tightening of fasteners.
- Compliance of steel work supplies to drawing.

The Inspection Body shall issue a NATA endorsed Report, including:

- Identification of the Site.
  - Dates and times of attendance at site.
  - A photographic record of the Inspection.
  - Details of the steelwork inspected.
  - Identification of any non-compliances.
  - Repairs.
- Name, signature and date.

## 9. AUDIT

Telstra may appoint representative(s) to perform a site audit of this Procedure. The Applicant shall comply with all reasonable requests by Telstra appointed auditors for:

- Access to site.
- Witnessing of work, including photography.
- Discussion with personnel.
- Perusal of documents and records.

Removal of samples

## 10. DELIVERABLES

The Applicant shall deliver the following documents and records to Telstra:

### 10.1. PRIOR TO COMMENCEMENT OF WORKS – HOLD POINT

- Design drawings for the all modifications and attachments.
- Identification of the AS/NZS 1554.1 weldability group of the existing steelwork.
- Welding Procedure (WPS), Procedure Qualification Record (PQR) and Welder Performance Qualification (WPQ).
- Inspection and test plan (ITP).
- Identity and evidence of qualifications, to AS/NZS 1554.1, of proposed Welding Supervisor and Welding Inspector.

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<sup>6</sup> Brittle, intermetallic, galvanized layers may crack during tightening, precluding re-use.

Work shall not commence until Telstra’s written review of the documents and records, listed above, has been received by the Applicant. The Applicant shall ensure that the Telstra reviewed documents, listed above, are on site at all times, whenever work is performed.

## 10.2. AFTER COMPLETION OF WORKS

The following documents shall be delivered to Telstra, within 20 business days of the completion of welding works:

- Welding Inspector’s Report.
- Magnetic Particle (MT) Report or Dye Penetrant (DT) Report. (NATA endorsed).
- Fastener Inspection Report (NATA endorsed).

## 11. REPAIR OF SITE-WELDED JOINTS AND HEAT-DAMAGED ZONES

On completion of all welding activities, any heat damage caused to existing galvanised coatings must be repaired in accordance with the appropriate paint system in Telstra’s approved list of protective coating schedules:

EDMS BKS-3484 - Protective Coatings Painting and Corrosion Protection for Radio Structures

## 12. REFERENCES

DOCUMENT NUMBER	TITLE & LINK
ALS Report No. 35232-1-1 Eng Rev 2	WELDING MODIFICATIONS ON TELSTRA’S ANTENNA SUPPORT STRUCTURES - COMPLIANCE REQUIREMENTS TO STANDARDS AND CODES
EDMS BKS-3484	PROTECTIVE COATINGS PAINTING AND CORROSION PROTECTION FOR RADIO STRUCTURES

## 13. DEFINITIONS

TERM	DEFINITION
AS	Australian Standard
ASME	American Society of mechanical Engineers
ISO	International Standards Organization
ITP	Inspection and Test Plan



MT	Magnetic particle examination
NZS	New Zealand Standard
NATA	National Association of Testing Authorities
PQR	Procedure Qualification Record (welding)
PT	(Dye) Penetrant examination
WPQ	Welder Performance Qualification (i.e. an individual welder's competence)
WPS	Welding Procedure Specification
SP	"Structural Purpose" as described in AS/NZS 1554.1. [Alternate classification is "GP" (General Purpose)]

## 14. ATTACHMENTS

DOCUMENT NUMBER	TITLE & LINK

## 15. ACKNOWLEDGEMENTS

The following contributors are acknowledged for their assistance in the preparation of this document.

NAME	ORGANISATION
John Everton	Principal Corrosion Engineer, ALS Global

**Table 13.1 Acknowledgements**

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## 16. DOCUMENT CONTROL SHEET

Contact for Enquiries and Proposed Changes. If you have any questions regarding this document contact:

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If you have a suggestion for improving this document, please contact the person listed above.

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