

TECHNICAL GUIDELINE

**PRACTICAL UNDERSTANDING AND
INTERPRETATION OF TECHNICAL STANDARD
TS30a
WELDING SPECIFICATION**

**WELDING & WELDING PROCEDURE
QUALIFICATION**



Issued by: Manager Engineering

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Major Changes Incorporated In the March 2006 Edition

The following lists the major changes to the March 2006 edition of TG 61, which have been incorporated in this edition:

Contents

- © SA WATER 2007 2
- MAJOR CHANGES INCORPORATED IN THE MARCH 2006 EDITION 2
- SECTION 1: INTRODUCTION 4
- SECTION 2: SCOPE 4
- SECTION 3: WELDING CODE REQUIREMENTS (AUSTRALIAN STANDARDS)..... 4
 - 3.1 Pressure Pipe..... 4
 - 3.2 Structural..... 5
- SECTION 4: INSPECTION AND TESTING 7
 - 4.0 General 7
 - 4.1 Inspection..... 7
 - 4.2 Testing 7
 - 4.3 Pressure Testing 8
- SECTION 5: WELD PROCEDURE QUALIFICATION & WELDER QUALIFICATION 8
 - 5.1 Procedure Qualification 8
 - 5.2 Welder Qualification 8
- SECTION 6: WELDING FORMS 9
- SECTION 7: SUMMARY 10
- APPENDIX A 11

Tables & Figures

- Figure 3.1 - Process for Selection of Welding Code Requirements..... 6

Referenced Documents

TS30a
 AS/NZS ISO AS/NZS 3834

Section 1: Introduction

This Guideline has been prepared to enable a better understanding in the application of Technical Standard TS30a.

As TS30a is written in the form of a Technical Specification; the intent being a complete Welding Specification, covering all types of welding undertaken by and for SA Water and represents the current state of the art of welding technology and welding quality. TS30a replaces TS30 which was limited in its scope and application.

Specific emphasis is on the development of Welding Procedure Specifications (WPS), Procedure Qualification Records (PQR), Welder Qualification Records (WQR) and Weld traceability (weld quality system AS/NZS ISO AS/NZS 3834), these aspects of TS30a may be less familiar to the user, it should be recognised the intent is to provide general requirements applicable to any situation, leaving room for a judgement to be made for each particular application.

It is important that this Technical Guideline be read in conjunction with TS30a. This Technical Guideline aims to give a better understanding on the job specific information that needs to be specified with TS 30a in contract documentation and design drawings.

Section 2: Scope

TS30a covers all welding of ferrous and non ferrous metals.

TS30a was developed with commonality and simplicity in mind to provide a system of controlling the full range of metal fabrication used by SA Water.

Section 3: Welding Code Requirements (Australian Standards)

3.1 Pressure Pipe

All pipework is to be considered Pressure Pipe for pipe carrying above 50kPa as per AS 4041.

Note:

The Weld Category should be selected by the design Engineer on the basis of the stress level in the weld for the intended applications. The chosen weld category is required to be designated on the drawings.

For most pressure pipe applications for water/wastewater applications AS 4041 – Class 2P should be specified. For special applications such as chemicals, specialist advice will need to be sought and the appropriate class specified.

3.2 Structural

All fabrications other than Pressure Pipe should be considered as structural items. This also includes fabrications constructed of Aluminium and Stainless Steel.

Note:

The Weld Category should be selected by the design Engineer on the basis of the stress level in the weld for the intended applications. The chosen weld category is required to be designated on the drawings.

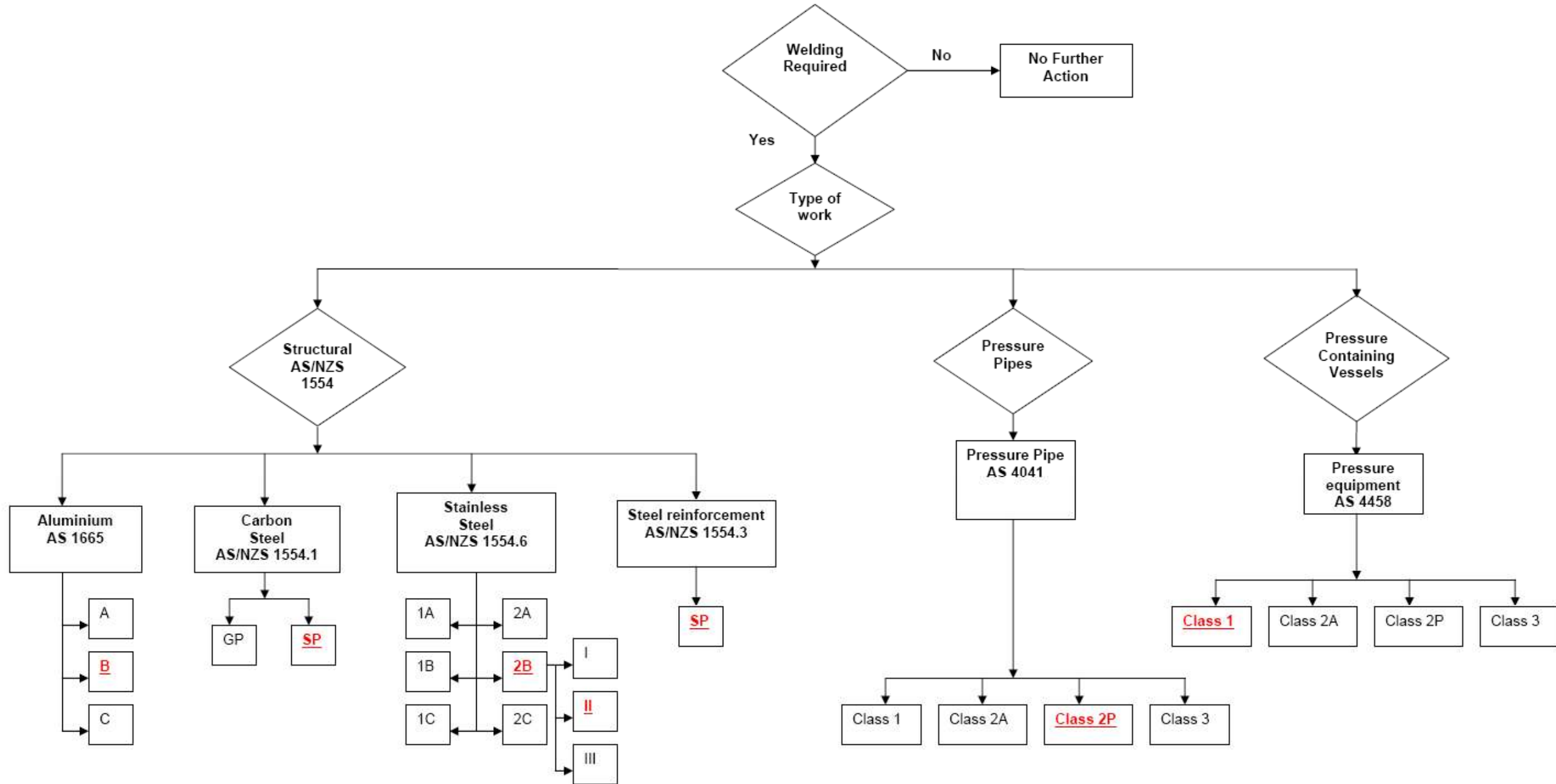
Welding code requirements also need to be specified in all Contract Specifications, Internal (SA Water) Orders and stated clearly on all fabrication related Drawings. To assist in determining the correct code requirements **Figure 3.1** can be used as a **guide**;

To assist in setting weld standards, default welding categories have been nominated in Figure 3.1. For most applications these will be satisfactory but for larger projects a detailed analysis may be warranted to ensure the most suitable and cost effective weld category is chosen.

For the majority of structural fabrications weld category SP (Structural Purpose) should always be clearly specified otherwise fabricators will assume GP (General Purpose) category requirements.

Note: if unsure of the Code Requirements contact a member of the Welding Coordination Team.

PROCESS FOR SELECTION OF WELDING CODE
REQUIREMENTS FOR TENDERS
(And Orders for SA Water Workshops)



Note: Unless otherwise specified the default welding categories are shown in red underlined for each welding application.

Note: All Pipework is considered to be Pressure Pipe

For clarification on Welding Process Selection, contact:

Welding Coordinator	Robin Earle	8204 1841 (0428 113 916)
Authorised Welding Coordinator	Darren Wilkins	8204 1508 (0408 834 091)
Principal Materials Scientist	Greg Moore	8204 2118 (0407 077 038)

FIGURE 3.1 - PROCESS FOR SELECTION OF WELDING CODE REQUIREMENTS

Section 4: Inspection and Testing

4.0 General

Inspection and testing is a critical part of the welding and fabrication process and is often overlooked. Inspection and testing should be carried out only by suitably qualified persons. The default minimum levels of inspection and testing are detailed in 4.1 and 4.2 below and these should also be written into contract documents and specifications

Note – The relevant Australian Standards specify acceptable and allowable levels of weld defects

4.1 Inspection

All welds are to be visually inspected 100% in accordance with the required level specified in the relevant welding Australian Standard specified on the design drawings.

4.2 Testing

A minimum 10% NDT (non destructive testing) of a type to be specified by SA Water; shall be carried out on all fabrications, unless specified higher in the contract specifications; Minimum NDT as follows:

- Pressure Pipe (Carbon Steel)
 - i) Butt Welds – 5% Magnetic Particle Inspection (MPI) + 5% Ultrasonic Test (UT) or 5% Radiographic Test (RT).
 - ii) Fillet Welds – 10% MPI.
- Structural Steel (Carbon Steel)
 - i) Butt Welds – 5% Magnetic Particle Inspection (MPI) + 5% Ultrasonic Test (UT) or 5% Radiographic Test (RT).
 - ii) Fillet Welds – 10% MPI.
- Pressure Pipe (Stainless Steel)
 - iii) Butt Welds – 5% Dye-Penetrant Test (PT) + 5% Ultrasonic Test (UT) or 5% Radiographic Test (RT).
 - iv) Fillet Welds – 10% PT.
- Structural Steel (Stainless Steel)
 - iii) Butt Welds – 5% Dye-Penetrant Test (PT) + 5% Ultrasonic Test (UT) or 5% Radiographic Test (RT).
 - iv) Fillet Welds – 10% PT.
- Structural Aluminium
 - v) Butt Welds – 5% Dye-Penetrant Test (PT) + 5% Ultrasonic Test (UT) or 5% Radiographic Test (RT).
 - vi) Fillet Welds – 10% PT.

4.3 Pressure Testing

If pressure testing is a requirement, testing shall be recorded on a Pressure Test Record [TS30a-08 PTR] or approved equivalent.

Note: If unsure of the type and extent of testing contact the Welding Coordination Team.

Section 5: Weld Procedure Qualification & Welder Qualification

5.1 Procedure Qualification

All Welds shall be welded using the proven parameters of a qualified welding procedure; all procedures are to be qualified to the level set out in the relevant welding Australian Standard code specified on the design drawings.

Note: In most cases contractors will endeavour to use pre-qualified welding procedures as this saves a lot of time and expense in testing.

Pre-qualified welding procedures under the relevant Australian Standards still require one Macro examination by a NATA approved laboratory to qualify the welder & the procedure.

5.2 Welder Qualification

All Welding operators working on the fabrication shall be qualified to the welding procedure in accordance with the relevant Australian Standard welding code specified on the design drawings.

Section 6: Welding Forms

Welding documentation is required to be completed by the welding contractor as evidence of conformance to TS30a.

Standard Welding Forms are available from the Welding Coordination Team, these include the following;

Form Name	Form Number	REV:	Issue Date	Comments
Procedure Qualification Record (PQR)	TS30a-01 - PQR	0	13/01/05	
Weld Procedure Specification (WPS)	TS30a-02 - WPS	0	7/01/05	
Welder Qualification Record (WQR)	TS30a-03 - WQR	0	7/12/04	
Welding / Non Destructive Testing Log (W/NDTLOG)	TS30a-04 - W/NDTLOG	0	7/12/04	
Weld Map (WMAP)	TS30a-05 - WMAP	0	7/12/04	dwg Template
Weld Map - Blank (WMAP)	TS30a-05a - WMAP	0	7/12/04	dwg Template Blank
Manufacture's Data Report (MDR)	TS30a-06 - MDR	0	7/12/04	
Inspection Test Plan Checklist (ITPCK)	TS30a-07 - ITPCK	0	7/12/04	
Non Destructive Test Report (NDTR)	TS30a-08 - NDTR	0	7/12/04	
Pressure Test Record (PTR)	TS30a-09 - PTR	0	16/12/04	
Piping Fabrication Checklist (PFCK)	TS30a-10 - PFCK	0	16/12/04	

Section 7: Summary

The following requirements cover the minimum information required of SA Water Workshops and Contractors under TS30a.

TS 30a is to be specified in any Contract Specification or Internal (SA Water) Order where welding is required.

A summary of TS 30a requirements includes:

1. Quality Plan, Section 5 (AS/NZS 3834:1999 – Part 4. Elementary / Part 3. Standard / Part 2. Comprehensive) – Part 3 should be specified as a minimum in all Contracts/Orders.
2. Schedule, section 10.
3. Qualified Weld Procedure Specifications (WPS's), section 6.
4. Qualified Welding Personnel, section 7.
5. Manufactures Data Report (MDR), which includes:
 - i. Weld Procedure Specifications (WPS's)
 - ii. Procedure Qualification Records (PQR's) – NATA test results.
 - iii. Welder Qualification Records (WQR's).
 - iv. Inspection Test Plan (ITP) - 10% NDT on all fabrications.
 - v. Weld Map (WMAP).
 - vi. Welding/NDT Log (NDTLOG).
 - vii. Other Forms, contract/WO specific:
 - a. Inspection Test Plan Checklist (ITPCK)
 - b. Non Destructive Test Report (NDTR)
 - c. Pressure Test Record (PTR)
 - d. Piping Fabrication Checklist (PFCK)

Appendix A

The Welding Coordination Team

The Welding Coordination Team can be contacted for clarification and assistance in implementing TS30a in a contract.

- Welding Coordinator
 - Robin Earle , Ph 08 8204 1841
0428 113 916
- Principal Materials Scientist
 - Greg Moore, Ph 08 8204 2118
0407 077 038