

Strengthening Compliance Requirements

Structural Steel Standards and Specifications

In April 2016 revisions to four Australian Standards and two Technical Specifications covering structural steels were released by Standards Australia. These were timely releases given the increasing concerns in the construction industry on the non-compliance of building materials and the risk they pose to industry and the community more generally.

Specifying and procuring product compliant with the relevant Australian and New Zealand standards may reduce both your professional risk and the safety risk to the community.

Projects which specify these Standards and Technical Specifications will be in a better position to manage the risk that would otherwise exist.

The four Standards are:

- AS/NZS 1163-2016 Cold-formed structural steel hollow sections
- AS/NZS 3678-2016 Structural steel – Hot-rolled plates, floorplates and slabs
- AS/NZS 3679.1-2016 Structural steel – Part 1: Hot-rolled bars and sections
- AS/NZS 3679.2-2016 Structural steel – Part 2: Welded I sections

The two Technical Specifications are:

- SA TS 102-2016 Structural steel – Limits on elements added
- SA TS 103-2016 Welding to AS/NZS 1554 Parts 1, 5 and 7– Limits on boron in parent materials.

Changes to Standards

The changes to the Standards and the introduction of the Technical Specifications address three key areas:

1. **WELDABILITY:**
The ability of the steels to be welded as a prequalified material to the Australian Welding Standard AS/NZS 1554.1 (and also AS/NZS 1554 Parts 5 and 7)
2. **CERTIFICATION:**
Mandatory requirement that test certificates be made available for all products
3. **PRODUCT CONFORMITY:**
Requirements: to prevent re-grading of product based on inadequate test data.

Other changes have also been made to harmonise the four Standards with each other and their international equivalents where possible.

Weldability

The addition of boron to steels is known to have a negative impact on weldability. When these four Structural Steel Standards were first written over 20 years ago, the addition of boron and indeed any other alloy that did not provide a metallurgical benefit was not precluded. This was presumably on the economic basis that a steelmaker would not want to add to the production cost if it did not improve the product.

However, there are substantiated claims^[1] that the addition of boron to steels in overseas mills created an economic advantage for products imported into Australia via tax concessions from the local government and the circumvention of imposed duties in Australia.

Whether the reported increase in imports of these alloyed steels was for this reason or some other, the concern is that this product may be procured by fabricators who are unaware they are not pre-qualified for welding.

The Technical Specifications were written in order to address the potential risk to the steel industry that the increasing prevalence of alloyed steels in the market posed for welded structures. The Technical Specification supplements the four Structural Steel Standards by providing limits on alloying elements.

It is recommended by the Australian Steel Institute, the Weld Australia and the Heavy Engineering Research Association New Zealand, that SA TS 102 - **Structural steel – Limits on elements added** be referenced in specifications whenever any of the four Structural Steel Standards are referenced and that SA TS 103-2016 - **Welding to AS/NZS 1554 Parts 1, 5 and 7– Limits on boron in parent materials** be referenced whenever AS/NZS 1554 parts 1, 5 or 7 are referenced. This ensures that the products supplied are prequalified for welding.

Certification

In this revision of the four Standards, it is a mandatory requirement that test certificates are made available for a purchaser of the product. The mandatory minimum requirements to be reported on the test certificates have been modified slightly, including the requirement to report the amount of boron in the chemical composition and any other element intentionally added.

Australian Standard AS 4100 – **Steel structures** recognises that test certificates from the steel mill constitute sufficient evidence of compliance of the steel with the four Structural Steel Standards. No other alternative is offered in AS 4100.

A test certificate that complies with these Australian Structural Steel Standards must contain all the items on the check list in English alphanumeric characters:



“The addition of boron to steels is known to have a negative impact on weldability.”

Test Certificate Checklist

- Manufacturer's name
- The test certificate number
- The date of certification
- Product, testing specification and grade, e.g. AS/NZS 3679.1-350
- Product designation
- Product steelmaking process, e.g. basic oxygen or electric arc
- Length, bundle, pack or unique identifier to which the test certificate applies
- Heat number (from casting)
- Chemical analysis type, e.g. cast analysis 'L' or product 'P'
- For each test, a laboratory identification providing traceability to the laboratory accreditation of the test type.
- Chemical composition with ALL the following listed:

Carbon (C)	Manganese (Mn)
Silicon (Si)	Chromium (Cr)
Molybdenum (Mo)	Vanadium (V)
Titanium (Ti)	Niobium (Nb)
Aluminium (Al)	Carbon equivalent(CE)
Phosphorus (P)	Nickel (Ni)
Sulphur (S)	Copper (Cu)
Boron (B)	Any element intentionally added

- Mechanical properties

Tensile testing:

Tensile tests	Yield stress MPa	Tensile strength MPa	% elongation
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Impact test results:

At the specified test temperature only for low temperature (LO) and seismic (SO) grades.

- The manufacturing facility's quality management system's certifier and certification number.
- The body assessing the product conformity to this Standard.
- A declaration from the manufacturer that products supplied comply with the requirements validated by the manufacturer's authorised inspection representative, including their name and position.
- Testing to be carried out by ILAC - MRA certified (e.g. NATA in Australia) test laboratories.

The alternative to working through the checklist is to ensure that it's InfraBuild product. For hot-rolled structural sections 150mm or deeper there is a rolled-in mark and a inkjet label identifying it is a InfraBuild product, its size or designation and the heat number linking it back to a production batch. For cold-formed hollow sections there is an inkjet label identifying it is both a InfraBuild (Austube Mills) product and a unique identifier linking back to production batch.



Pictured left to right, the unique identifiers for hot-rolled structural product and Austube Mills product.

Product Conformity

The new product conformity requirements in combination with the test certificates are designed to prevent the re-grading of product from lower grade to a higher grade based on one or two test results reported on a test certificate or conducted by a testing laboratory.

A test certificate for a product is required to nominate the grade to which the product is manufactured and this is the grade to which the product shall be designed, specified and procured. While the certificate will have test results reported, these values are not those that are to be used in design or (re-)grading of the product.

The Steel Products Standards now require type testing to produce a minimum of 30 consistent and satisfactory test results on product manufactured in a facility with demonstrated factory production control in order to grade or re-grade a product.

How can I get Compliant Product?

STEP 1

To ensure you get compliant product, include in all your steelwork specification the following:

Structural Steel must comply with one of the standards below:

- *AS/NZS 1163-2016 Cold-formed structural steel hollow sections*
 - *AS/NZS 3678-2016 Structural steel – Hot-rolled plates, floorplates and slabs*
 - *AS/NZS 3679.1-2016 Structural steel – Part 1: Hot-rolled bars and sections*
 - *AS/NZS 3679.2-2016 Structural steel – Part 2: Welded I sections*
- and also,*
- *SA TS 102-2016 Structural steel – Limits on elements added*

Structural steel welding to comply with AS/NZS 1554 Parts 1, 5 or 7 and Standards Australia Technical Specification SA TS 103 – Limits on boron in parent materials.

STEP 2

Check that the test certificates supplied with the structural steel products comply with the requirements of the 2016 revisions of the Steel Product Standards.

Alternatively, specify InfraBuild product and look for our line marking on the product supplied.

References:

[1] Anti-Dumping Commission, Final Report No.291, Anti-Circumvention Inquiry, Hollow Structural Sections Exported from the People's Republic of China, The Republic of Korea, Malaysia and Taiwan (Document 037), Australian Government, 29 February 2016.