Technical Note

October 2025 – Revision 1.

Why plate grade designations must only be created or modified by the plate manufacturer

Introduction

According to AS/NZS 3678:2016, only the plate manufacturer can create/modify the grade designation of supplied plate, whether it be strength level, impact toughness or being designated as Z-Grade (a grade that has been tested to ensure through-thickness tensile properties).

This Technical Note outlines why plate customers should not accept third-party modification of the grade designation and be aware of the risks involved in using third-party testing laboratories to conduct additional mechanical testing

Risks of third-party upgrading plate to a higher strength designation

Most plate supplied in Australia is tested in accordance with the batch testing requirements of AS/NZS 3678:2016, Appendix B3.2.

Batch testing is a method by which the manufacturer of a batch of plates tests one or more plates from the batch to determine conformance of all plates in the batch to the requirements of AS/NZS 3678:2016. If the tested plate(s) passes the required tests then, subject to the test rules, all plates in the batch are deemed to have met the requirements of AS/NZS 3678:2016.

AS/NZS 3678:2016 Appendix B3.2 includes strict rules about batch testing. Batch testing, in which the results of tests for one plate are applied to all other plates in the batch, can only be performed by the plate manufacturer.

Sometimes a third party will want to re-test plates for the purpose of achieving a higher strength designation. If a third party purchases a number of plates in the same batch from a manufacturer, it can perform tests on each plate, and the results of each plate test can be attributed to that specific plate. However, the results for one plate cannot be applied to the other plates.

This is particularly important where a third party performs tests on a plate that show an uprating from the manufacturer's original rating to a higher strength designation. In these circumstances, if the third party applies the results of tests on one plate to other plates in the batch to uprate the strength of those other plates, this uprating is not recognised under the requirements of AS/NZS 3678:2016. In these circumstances a builder or project owner can be left with a build that may need remedial action before it can be certified and used. This remedial action may include further strengthening works or even an entire rebuild.

Risks of third-party modification of Charpy impact designation

The impact properties of plate are batch tested at the time of manufacture in accordance with the batch testing requirements of AS/NZS 3678:2016, Appendix B3.2, and the Charpy test results are included on the test certificate along with the correct grade designation. Third parties may not perform batch testing to achieve different Charpy test results.

Supplemental Charpy impact testing of plate commissioned by customers is commonly done by third party laboratories to confirm specified impact properties. This may be done appropriately and within the requirements of AS/NZS 3678:2016, provided the third party applies the test results for each plate to that plate only, and not to other plates in the batch.

Those carrying out supplemental testing should be aware that there are very specific requirements regarding where on the plate the sample comes from, sample orientation, sample position within the thickness of the plate and number of samples. If the correct testing procedures are not followed for each plate, then the test results for that plate would be invalid.

If a third party wants to subject a series of plates to a Charpy impact test, all plates would need to be tested The risk of relying on third party batch test results for Charpy impact tests is the same as the risk of relying on third party higher strength designations, because in

both cases third party batch tests are not recognised under the requirements of AS/NZS 3678:2016, meaning that in both cases builds may need significant remedial action before certification and use.

Risks of third-party designating non-Z-grade plate as Z-grade

Through-thickness tensile testing for Z-grade plate is undertaken at the time of manufacture and results are indicated on the test certificate.

Z-grade plate is made to specific steel chemistry and rolling conditions to deliver the Z-testing through-thickness tensile testing performance. Note that there are maximum sulfur content levels mandated within AS/NZS 3678:2016 for different Z-grade levels, as shown in the table below:

Z-Grade Level	Maximum Sulfur Level
Z15	0.03% *(see Note)*
Z25	0.008%
Z35	0.005%

Note: For Z15 steels, BlueScope produces plate with a sulfur content less than 0.01%, as higher sulfur content produces variability in through-thickness performance within the plate.

Whilst non-Z-grade plate may pass the Z-testing requirements in the position where the sample was taken, this does not guarantee the entire plate conforms as this grade hasn't been designed to meet these requirements.

As such, builders should rely on manufacturer testing to determine whether each plate meets Z-testing requirements. Under no circumstance should non-Z-grade plate or plate certified Z-grade by third parties be used where Z-grade plate has been specified as only manufacturer testing can verify that the plate meets the Z-test tensile performance requirements of AS/NZS 3678:2016

Summary

Customers that commission additional third-party testing on plate to attribute additional properties other than those stated on the BlueScope test certificate, should understand that there are complications and risks as highlighted above.

Customers can however be confident that all BlueScope supplied plates are fully compliant with the requirements of AS/NZS 3678:2016.

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