

WEATHER RESISTANT STEELS

TECHNICAL BULLETIN TB-26

Rev 4, June 2004

This issue supersedes all previous issues

INTRODUCTION

BlueScope Steel Limited produce a range of steels in Plate and Hot Rolled Coil that have enhanced weather resistance in comparison to AS/NZS 3678-250 steels. These steel types have a nominal yield strength of 350 MPa and were previously known as "Austen50" and "Lyten". Typical end uses of these steels are truck bodies, rolling stock and shipping containers. Weather resistant steels have also been used for architectural applications as a result of the "patina" developed after bold exposure to the atmosphere.

CORROSION RESISTANCE

The weathering steels may exhibit a greater resistance to corrosion than normal structural steels (eg AS/NZS 3678-250) up to approximately 4-6 times under some environments and applications. The improved corrosion resistance is the result of the development of a complex protective oxide layer on the steel surface. If this layer is damaged or disturbed then the process of corrosion may recommence in that area until the oxide layer has reformed. The formation of the protective oxide layer relies on the following conditions:

- i) bold exposure to the atmosphere of all the steel surfaces
- ii) alternate wetting and drying of all of the steel surface
- iii) limited access to atmospheric chloride contamination.

Where these conditions are NOT met, eg the underside of horizontal surfaces, the weathering steels will corrode at approximately the same rate as normal structural steel. It is necessary for the designer and/or fabricator to allow for the formation of the protective oxide layer on the steel surface when using this steel type.

Weathering steels do not provide any advantage in terms of the corrosion resistance over normal structural steels for buried or submerged situations or for applications exposed to severely concentrated industrial fumes. Furthermore there is no advantage to using weathering steels (*compared to normal structural steels*) for marine applications where salt may be deposited by either spray or fog. However, when painted for use in these conditions weathering steels have been found to give up to four times the paint life of plain carbon steels. Where further corrosion protection is required refer to Australian Standard AS/NZS 2312:1994.

USE AND HANDLING OF WEATHERING STEELS

As for the normal structural steels (*such as AS/NZS 3678-250*) care should be exercised in the handling of the weathering steels. These steels must be kept free from oil, chalk marks, paint, concrete splatter and similar staining by other construction materials. Any foreign matter adhering to the steel needs to be removed as soon as practicable. Care should also be exercised in design as run off staining may occur to the surrounding area depending on the nature of the surface, eg bare concrete. Contact with clothing may also result in staining to clothing in the same manner as for normal structural steels.

WELDING

The weathering steels can be readily welded both to other plates of weathering steel and to plain carbon steels. When welding these steels low hydrogen electrodes should be used.

Care should also be taken in the selection of the welding procedure. Consult AS/NZS 1554.1 2004 Structural Steel Welding (Welding of Steel Structures). Note that weathering steels are Group 5 materials as are AS/NZS 3678 350 grade structural steels.

The need to colour match weld areas is dependant on the end result required. Over a period of 1-2 years there is little difference between standard electrodes and specialised electrodes designed for this type of steel (E70xx). However, over extended time periods the standard weld metal discolours and corrodes at a different rate to the weather resistant steel. Where close colour matching is required, such as for architectural applications special electrodes must be used (*contact a welding consumable manufacturer*). However, when welding thin plate (<12mm) there is sufficient dilution of the parent plate into the weld metal to result in a close colour match.

AVAILABILITY

The weathering steels are available in thicknesses ranging from 3 mm to 20 mm. The grade names covering weathering steels are:

Xlerplate – AS/NZS 3678-WR350

Xlercoil – AS/NZS 1594-HW350

The nearest equivalent overseas grades are COR-TEN A, BS 4360 WR50A, JISG 3125-SPA-H and ASTM A242 Type 1.

ARCHITECTURAL APPLICATIONS

Weathering steels are used in many countries in the unpainted condition to take architectural advantage of their structural and aesthetic qualities.

Weathering steels were first offered in Australia in the late 1960's, and the steel types available today from BlueScope Steel have resulted from continual development of the Aus-Ten 50 of the 1960's and 70's.

Whilst the excellent weathering characteristics of WR350 and HW350 allow it to be used unpainted, this product is not ideally suited for all applications, environments or service conditions. It is recommended that specialist advice be sought from our BlueScope Steel Direct on toll free 1800 024 402.

The information and advice contained in this Bulletin is of a general nature only, and has not been prepared with your specific needs in mind. You should always obtain specialist advice to ensure that the materials, approach and techniques referred to in this Bulletin meet your specific requirements.

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BlueScope Steel Limited ABN 16 000 011 058
BlueScope Steel (AIS) Pty Ltd ABN 19 000 019 625



AUSTRALIA	SYDNEY	Telephone: (02) 9795 6700
	MELBOURNE	Telephone: (03) 9586 2222
	BRISBANE	Telephone: (07) 3845 9300
	ADELAIDE	Telephone: (08) 8243 7333
	PERTH	Telephone: (08) 9330 0666

OVERSEAS	BlueScope Steel (Malaysia) Sdn Bhd	Telephone: (603) 3250 8333
	BlueScope Steel (Thailand) Limited	Telephone: (66 38) 685 710
	PT BlueScope Steel Indonesia	Telephone: (62 21) 570 7564
	BlueScope Steel Southern Africa (Pty) Limited	Telephone: (27 21) 555 4265

