

Xlerplate®
Xlercoil®

PRODUCT INFORMATION



XLERPLATE®

Standard range products

XLERPLATE® Standard range products - quick and easy for your convenience

Our XLERPLATE® Standard range encompasses the most frequently used grades of XLERPLATE® and XLER® coil plate in varying sizes, from plates small enough to be easily handled (1200mm x 6.0m), through to very large plates (3200mm x 12.0m) designed to assist you to optimise nesting efficiency on plate profiling beds, or to minimise welding costs.

This huge range is stocked "in market" by BlueScope Steel distributors around Australia and New Zealand and is available on very short lead times.

These sizes are ideal for project start-up requirements to ensure your project will not be delayed.

Speed of delivery ensures XLERPLATE® Standard range products are the most economic choice for many common applications.

The comprehensive XLERPLATE® Standard range is shown below.

THICKNESS (mm)	WIDTH (mm)	LENGTH (m)
Standard XLER® Coil Plate (AS/NZS 1594-HA 250)		
3	1200	6.0
	1500	6.0
	1800	6.0
5	1200	6.0
	1500	6.0
	1800	6.0
6	1200	6.0
	1500	6.0
	1800	6.0
Standard XLERPLATE® 250 (AS/NZS 3678-250)		
5	2400	6.0
	2400	9.0
	3000	9.0
6	2400	6.0
	2400	9.0
	3000	9.0
	3200	12.0
8	1800	6.0
	2400	6.0
	2400	9.0
	3000	9.0
	3200	12.0
10	1800	6.0
	2400	6.0
	2400	9.0
	3000	9.0
	3200	12.0
12	1800	6.0
	2400	6.0
	2400	9.0
	3000	6.0
	3000	9.0
16	1800	6.0
	2400	6.0
	2400	9.0
	3000	6.0
	3000	9.0
20	1800	6.0
	2400	6.0
	2400	9.0
	3000	6.0
	3000	9.0
22	2400	6.0
	2400	9.0
	1800	6.0
	2400	6.0
25	2400	9.0
	3000	9.0
	3200	12.0
	3200	12.0
28	2400	6.0
	2400	9.0
32	1800	6.0
	2400	6.0
	2400	9.0

THICKNESS (mm)	WIDTH (mm)	LENGTH (m)
Standard XLERPLATE® 250 (Continued)		
36	2400	6.0
	2400	9.0
	2400	9.0
40	1800	6.0
	2400	6.0
	2400	9.0
45	2400	6.0
	2400	9.0
50	1800	6.0
	2400	6.0
	2400	9.0
55	2400	6.0
	2400	8.4
60	1800	6.0
	2400	6.0
70	1800	6.0
	2400	6.0
80	1800	6.0
	2400	5.2
90	2400	6.0
	1800	5.6
100	2400	4.0
	110	1800
2400		3.7
120	1800	4.6
	2400	3.4
130	1800	4.2
	2400	3.1
140	1800	3.9
	2400	2.9
	2400	2.7
150	1800	3.6
	2400	2.7
Standard XLERPLATE® 350 (AS/NZS 3678-350)		
5	2400	9.0
6	2400	9.6
8	2400	9.6
10	2400	9.6
12	3100	9.6
	2400	9.6
16	2400	9.6
	3100	9.6
20	2400	9.6
	3100	9.6
25	2400	9.6
	3100	9.6
32	2400	9.6
	3100	9.6
40	2400	7.6
	2400	7.6
60	2400	7.6
	2400	6.0
80	2400	5.5

THICKNESS (mm)	WIDTH (mm)	LENGTH (m)
Standard XLERPLATE® Pressure Vessel (AS 1548-7-430R)		
5	2400	9.0
(AS 1548-7-460R)		
6	3100	9.6
8	3100	9.6
10	3100	9.6
12	3100	9.6
16	3100	9.6
20	3100	9.6
25	3100	9.6
32	3100	9.6
40	2400	9.6
50	2400	7.6
60	2400	6.0
70	2400	6.0
80	2400	5.2
90	2400	5.2
100	2400	5.2
Standard XLERPLATE® K1042 (AS/NZS 3678-K1042)		
12	2400	6.0
16	2400	6.0
20	2400	6.0
25	2400	6.0
32	2400	6.0
40	2400	6.0
50	2400	6.0
60	2400	6.0
70	2400	6.0
80	2400	6.0
XLER® Coil Floor Plate (AS/NZS 1594-HU250)		
2.1	1200	6.0
3	1200	6.0
5	1200	6.0
	1500	6.0
6	1200	6.0
	1500	6.0
8	1500	6.0
XLER® Floor Plate (AS/NZS 3678-250)		
6	1800	6.0
8	1800	6.0
10	1800	6.0
12	1800	6.0
16	1800	6.0
20	1800	6.0

XLERPLATE® General range products

XLERPLATE® General range products for a tailored solution

Many special XLERPLATE® and XLER® coil plate grades are available on much shorter lead times than in the past in a huge range of size combinations. Tailored sizes and grades may enable you to reduce costs associated with processing, testing, blasting and painting, welding or material waste.

The schedule of available size combinations in the XLERPLATE® General range is shown in the following tables. These show width and thickness in millimetres with minimum and maximum rolled lengths in metres. For lengths greater than 18.3 metres, additional freight charges may be negotiated.

How to read the Size Schedules

WIDTH (mm)	LENGTH (mm)							
	6	8	10	12	15	20	25	28
1250				33.8	25.8	20.5	16.4	14.7
1300				36.6	28.6	23.0	18.8	23.0
1400				37.0	24.7	19.0	15.5	14.3
1400				36.6	26.8	21.7	14.9	22.3
1400				30.3	26.8	16.8	14.8	13.3
1400				30.3	28.4	20.8	23.2	20.8
1500				34.0	28.4	21.6	17.0	12.5
1600				36.6	24.0	24.8	21.6	18.8
1600				37.0	24.0	20.3	16.3	13.0
1600				36.0	26.0	20.6	16.7	23.5
1700				30.3	25.3	19.0	15.3	12.2
1700				36.6	26.6	20.1	14.0	21.1
1800				35.0	28.7	24.0	17.0	14.2
1800				36.6	26.6	20.6	12.5	25.9

Example 1

(1400mm x 16mm)

23.0m Minimum Rolled Length
36.6m Maximum Rolled Length

Say (1400mm x 16mm x 6.0m) plate length required
6.0m x **4 plates** = 24.0m (*within Rolled Length range*)
6.0m x **5 plates** = 30.0m (*within Rolled Length range*)
6.0m x **6 plates** = 36.0m (*within Rolled Length range*)

Thus, XLERPLATE® orders to be greater and in multiples of either **4, 5 or 6** plates etc.

eg. 10, 12, 15, 16, 18, 20, 24, 25 plates etc.

For example, if 6.0m plate lengths are required, either 4, 5 or 6 plates can be obtained from each rolled length.

*Minimum order requirement for each item is 10 tonnes.

Example 2

(1550mm x 18mm)

Intermediate or Non-Preferred Width & Thickness

The rolled length range for intermediate width/thickness is determined as follows:

- Minimum = longest of the minimum lengths for the nearest preferred sizes.
- Maximum = shortest of the maximum lengths for the nearest preferred sizes.

21.6m = Minimum Rolled Length
= Maximum of (21.6; 17.4; 20.3; 16.2)

27.8m = Maximum Rolled Length
= Minimum of (34.8; 27.8; 36.6; 33.2)

Say (1550mm x 18mm x 6.0m) plates are required:

6.0m x **4** = 24.0m (*within Rolled Length range*)
6.0m x **5** = 30.0m (*outside Rolled Length range*)

Thus XLERPLATE® orders must be in multiples of **4** plates: eg. 4, 8, 12, 16, 20 plates etc.

*Minimum order requirement for each item is 10 tonnes.



Pacific Industrial Company founded in 1969, is now one of Western Australia's leading fabrication and construction organisations. It recently carried out work on sections of the bucket wheel reclaimer - including the boom pivot connection point (below); the counterweight pivot part (bottom left) and the portal assembly (top left) - for the Yandi Upgrade Project.

XLERPLATE® 250/250L15

Availability

GRADE	THICK (mm)
AS/NZS 3678 - 250	6 - 110*
AS/NZS 3678 - 250L15	6 - 110

Notes:

6.00mm plate is supplied as trimmed edge. All other thicknesses are generally supplied as untrimmed edge. Plates may be supplied as trimmed edge at BlueScope Steel's discretion.
 Maximum plate length available is 18.3m, or the maximum rolled length, whichever is lesser. Lengths greater than 18.3m available by enquiry only. Minimum plate lengths are shown at the top of the table.
 The two numbers shown for each section are the minimum and maximum rolled lengths.

WIDTH (mm)	THICKNESS (mm)																						
	← (4.0m minimum plate length) →						← (2.4m minimum plate length) →																
	6	8	10	12	16	20	25	28	32	36	40	45	50	55	60	70	80	90	100	110			
1250					33.8	25.8	20.5	16.4	14.7	13.0													
					36.6	36.6	33.0	25.8	23.0	20.3	18.3	16.5	14.7	13.2	12.0	11.0	9.5	8.2	7.3	6.6	5.9		
1300					33.0	24.7	19.9	15.9	14.3	12.5													
					36.6	36.6	31.7	24.9	22.3	19.6	17.6	15.9	14.2	12.8	11.6	10.6	9.1	7.9	7.0	6.3	5.7		
1400					30.5	23.0	18.5	14.8	13.3	11.7													
					36.6	36.6	29.6	23.3	20.9	18.3	16.4	14.9	13.2	11.9	10.8	9.9	8.5	7.4	6.5	5.8	5.3		
1500					34.0	28.5	21.6	17.4	13.9	12.5	10.9												
					36.6	36.6	34.8	27.8	21.8	19.6	17.2	15.4	13.9	12.4	11.1	10.1	9.3	7.9	6.9	6.1	5.5	4.9	
1600					32.0	26.8	20.3	16.2	13.0	11.6	10.2												
					36.6	36.6	36.6	33.2	26.2	23.5	20.6	18.5	16.8	14.9	13.4	12.2	11.2	9.6	8.4	7.4	6.6	6.0	
1700					30.3	25.3	19.1	15.3	12.2	11.0	9.6												
					36.6	36.6	36.6	34.0	27.1	24.4	21.3	19.2	17.4	15.5	13.8	12.6	11.5	9.9	8.6	7.6	6.8	6.2	
1800					35.6	28.7	24.0	17.8	14.2	11.4	10.1	8.9											
					36.6	36.6	36.6	36.6	32.5	25.9	23.1	20.2	18.2	16.4	14.6	13.2	12.0	11.0	9.4	8.2	7.2	6.5	5.9
1900					34.0	27.3	22.8	16.8	13.5	10.8	9.6	8.1											
					36.6	36.6	36.6	36.6	30.7	24.6	21.9	19.0	17.3	15.6	13.9	12.5	11.3	10.4	8.9	7.7	6.8	6.1	5.5
2000					32.4	25.9	21.7	16.0	12.8	10.2	9.1	7.7											
					36.6	36.6	36.6	36.6	29.5	23.4	20.9	18.1	16.4	14.9	13.2	11.9	10.8	9.9	8.4	7.3	6.5	5.8	5.3
2100					30.8	24.8	20.7	15.2	12.2	9.7	8.7	7.3											
					36.6	36.6	36.6	34.9	28.0	22.4	20.0	17.2	15.7	14.2	12.6	11.3	10.3	9.4	8.0	7.0	6.2	5.5	5.0
2200					29.5	23.7	19.7	14.6	11.6	9.3	8.3	6.9											
					36.6	36.6	36.6	33.4	26.8	21.4	19.1	16.5	15.0	13.6	12.1	10.8	9.8	9.0	7.7	6.7	5.9	5.3	4.8
2300					28.2	22.7	18.9	13.9	11.1	8.8	7.9	6.6											
					36.6	36.6	36.6	32.0	25.7	20.5	18.3	15.8	14.4	13.0	11.5	10.4	9.4	8.6	7.3	6.4	5.6	5.0	4.6
2400					21.4	27.1	21.8	17.9	13.2	10.7	8.5	7.6	6.3										
					36.0	36.6	36.6	36.6	30.5	24.7	19.7	17.6	15.1	13.8	12.5	11.1	10.0	9.0	8.2	7.0	6.1	5.4	4.8
2500					20.6	26.0	20.9	17.4	12.8	10.3	8.2	7.3	6.1										
					36.0	36.6	36.6	36.6	29.7	23.8	18.9	16.9	14.5	13.2	12.0	10.6	9.5	8.6	7.9	6.7	5.8	5.2	4.6
2600					19.8	25.0	20.1	16.7	12.4	9.9	7.9	7.0	5.8										
					36.0	36.6	36.6	36.6	28.6	22.9	18.2	16.3	13.9	12.7	11.5	10.2	9.2	8.3	7.6	6.5	5.6	5.0	4.4
2700					19.1	24.1	19.3	16.1	11.9	9.5	7.6	6.8	5.6										
					31.0	36.6	36.6	36.6	27.5	22.0	17.6	15.7	13.4	12.3	11.1	9.8	8.8	8.0	7.3	6.2	5.4	4.8	4.3
2800					18.5	23.2	18.6	15.5	11.5	9.2	7.3	6.5	5.4										
					30.0	30.0	36.6	35.4	26.6	21.2	17.0	15.1	12.9	11.8	10.7	9.5	8.5	7.7	7.0	6.0	5.2	4.6	4.1
2900					17.9	22.4	18.0	14.9	11.1	8.9	7.1	6.3	5.2										
					29.0	30.0	36.6	34.2	25.6	20.5	16.4	14.6	12.5	11.4	10.3	9.1	8.2	7.4	6.8	5.8	5.0	4.4	4.0
3000					17.3	21.7	17.4	14.3	10.6	8.6	6.8	6.1	4.9										
					30.0	30.0	36.6	32.6	24.5	19.8	15.8	14.1	12.0	11.0	10.0	8.8	7.9	7.2	6.6	5.6	4.8	4.3	3.8
3100					16.7	21.0	16.8	14.0	10.4	8.3	6.6	5.9	4.8										
					30.0	30.0	36.6	32.1	24.0	19.7	15.3	13.6	11.6	10.7	9.7	8.5	7.6	6.9	6.3	5.4	4.7	4.1	3.7
3200					16.2	20.3	16.3	13.5	10.1	8.0	6.4	5.7	4.6										
					30.0	30.0	36.6	31.1	23.2	18.5	14.9	13.2	11.3	10.3	9.3	8.3	7.4	6.7	6.1	5.2	4.5	4.0	3.6

Subject to change. Consult www.xlerplate.com.au or XLERPLATE® Customer Service group for current information.

XLERPLATE® 350/350L15

Availability

GRADE	THICK (mm)
AS/NZS 3678 - 350	6 - 80*
AS/NZS 3678 - 350L15	6 - 50

Notes:

6.00mm plate is supplied as trimmed edge. All other thicknesses are generally supplied as untrimmed edge. Plates may be supplied as trimmed edge at BlueScope Steel's discretion.
 Maximum plate length available is 18.3m, or the maximum rolled length, whichever is lesser. Lengths greater than 18.3m available by enquiry. Minimum plate lengths are shown at the top of the table.
 The two numbers shown for each section are the minimum and maximum rolled lengths.

WIDTH (mm)	THICKNESS (mm)																
	← (4.0m minimum plate length) →						← (2.4m min plate) →										
	6	8	10	12	16	20	25	28	32	36	40	45	50	55	60	70	80
1250																	
1300																	
1400																	
1500																	
1600																	
1700																	
1800																	
1900																	
2000																	
2100																	
2200																	
2300																	
2400																	
2500																	
2600																	
2700																	
2800																	
2900																	
3000																	
3100																	
3200																	

Subject to change. Consult www.xlerplate.com.au or XLERPLATE® Customer Service group for current information.

XLERPLATE® 250/350 (Long Plate)

Availability

GRADE	THICK (mm)
AS/NZS 3678 - 250	6 - 110
AS/NZS 3678 - 350	By enquiry only

Notes:

Typical edge condition is untrimmed. Plates may be supplied as trimmed edge at BlueScope Steel's discretion. Plates or multiples thereof are only available if they fall within the rolled length range shown. Maximum plate length available is 18.3m, or the maximum rolled length, whichever is less. Lengths greater than 18.3m available by enquiry only.

	WIDTH (mm)		THICKNESS (mm)				
	60	70	80	90	100	110	
1200	15.8	13.5	11.8	10.5	9.4	8.6	
	18.3	18.3	17.5	16.7	15.5	14.1	
1560	15.9	13.6	11.9	11.5	10.9	8.6	
	18.3	18.3	18.3	16.9	15.3	13.9	
1700	16.0	13.6	12.0	11.3	10.7	10.2	
	18.3	18.3	17.6	15.6	14.0	12.7	

Subject to change. Consult www.xlerplate.com.au or XLERPLATE® Customer Service group for current information.

Australian Pressure Vessel Heads, a division of Apollo Engineering, produces dish ends for use in the fabrication of pressure vessels, storage tanks and process vessels at North Sunshine, Victoria - an Australian manufacturing success story.



XLERPLATE® Pressure Vessel range

Availability

AS 1548 - 7- 460 GRADES	THICK (mm)
7-460R/A 662B	6 - 40
7-460R	> 40 - 100
7-460TL20	10 - 40

Notes:

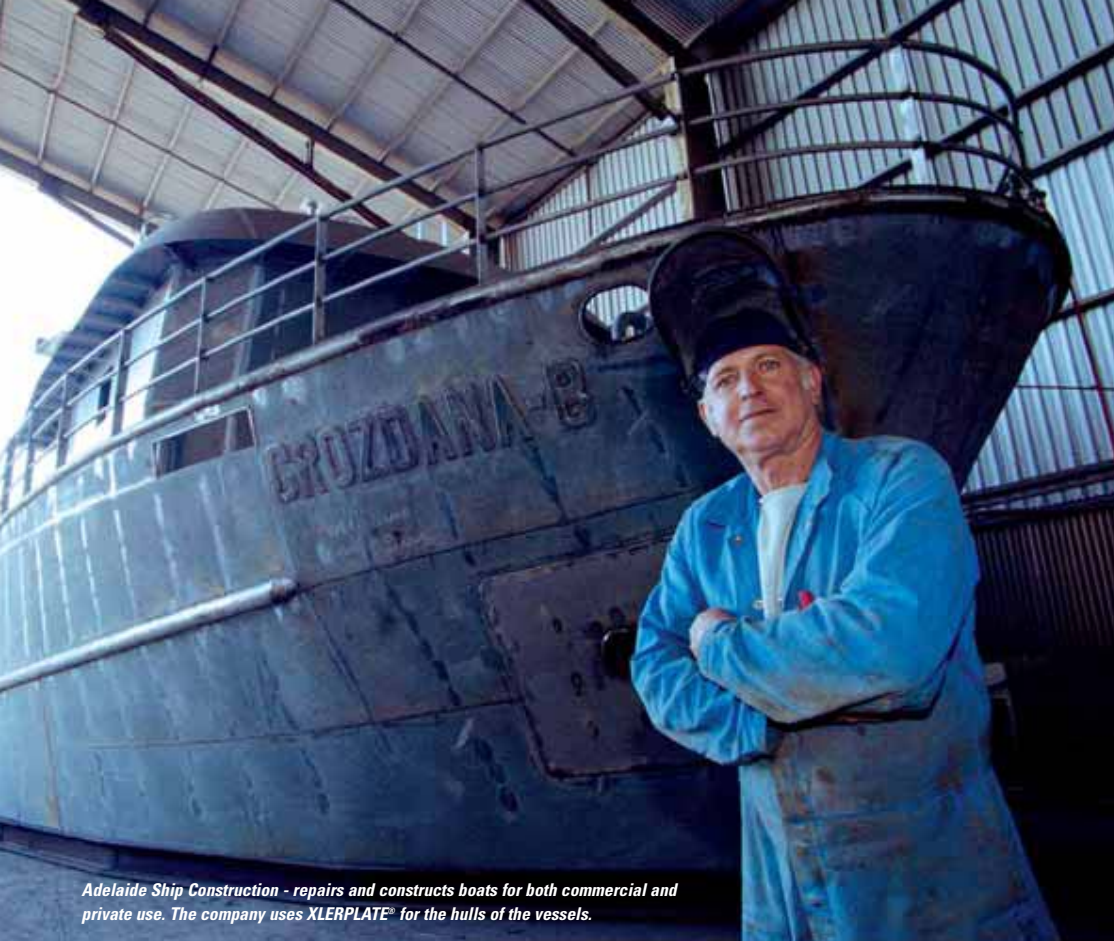
Plate is supplied as trimmed edge. Maximum plate length available is 18.3m, or the maximum rolled length, whichever is lesser. Lengths greater than 18.3m available by enquiry. Minimum plate lengths are shown at the top of the table. Plate thicknesses greater than 80mm may be available by enquiry.

	WIDTH (mm)		THICKNESS (mm)																								
	← (4.0m minimum plate length) →										← (2.4m min plate) →																
	6	8	10	12	14	16	18	20	22	25	28	30	32	36	40	45	50	55	60	70	80						
1600	28.8	27.0	25.4	22.6	20.3	18.6	16.2	14.5	13.7	12.8	11.4	10.3	9.2	8.3	7.5	6.8	5.8	5.1	18.2	16.5	14.7	13.2	12.0	11.0	9.4	8.2	
	36.6	36.6	36.6	35.6	32.0	29.3	25.8	23.1	21.5	20.2	17.8	15.6	13.8	12.5	11.3	10.4	8.8	7.7	18.2	16.5	14.7	13.2	12.0	11.0	9.4	8.2	
1700	30.8	26.4	23.3	20.6	18.7	16.9	15.0	13.4	12.4	11.7	10.7	9.7	8.7	7.8	7.1	6.5	5.5	4.8	17.8	15.6	13.8	12.5	11.3	10.4	8.8	7.7	
	36.6	36.6	36.6	34.2	30.5	27.8	24.5	21.9	20.4	19.2	17.8	15.6	13.8	12.5	11.3	10.4	8.8	7.7	17.8	15.6	13.8	12.5	11.3	10.4	8.8	7.7	
1800	28.2	29.1	25.0	22.0	19.5	17.6	16.0	14.1	12.6	11.8	11.0	10.1	9.2	8.2	7.3	6.7	6.1	5.2	16.3	14.7	13.1	11.8	10.7	9.8	8.4	7.3	
	36.6	36.6	36.6	35.9	32.0	28.9	26.3	23.2	20.7	19.4	18.2	16.3	14.7	13.1	11.8	10.7	9.8	8.4	7.3	16.3	14.7	13.1	11.8	10.7	9.8	8.4	7.3
1900	27.0	27.7	23.8	20.9	18.6	16.7	15.2	13.4	12.0	11.2	10.5	9.6	8.7	7.7	6.9	6.3	5.8	4.9	15.5	14.0	12.4	11.2	10.1	9.3	7.9	6.9	
	36.6	36.6	36.6	34.2	30.5	27.5	25.0	22.0	19.7	18.4	17.3	15.5	14.0	12.4	11.2	10.1	9.3	7.9	6.9	15.5	14.0	12.4	11.2	10.1	9.3	7.9	6.9
2000	32.4	25.8	26.4	22.7	19.9	17.7	16.0	14.5	12.8	11.4	10.6	10.0	9.1	8.3	7.3	6.6	6.0	5.5	14.7	13.3	11.8	10.6	9.6	8.8	7.5	6.5	
	36.6	36.6	36.6	36.6	32.7	29.1	26.2	23.8	21.0	18.8	17.6	16.5	14.7	13.3	11.8	10.6	9.6	8.8	7.5	14.7	13.3	11.8	10.6	9.6	8.8	7.5	6.5
2100	30.8	24.4	25.2	21.7	19.0	16.9	15.2	13.8	12.2	10.9	10.1	9.5	8.7	7.9	7.0	6.3	5.7	5.2	14.1	12.7	11.3	10.1	9.2	8.4	7.1	6.2	
	36.6	36.6	36.6	35.5	31.2	27.8	25.1	22.8	20.1	17.9	16.7	15.7	14.1	12.7	11.3	10.1	9.2	8.4	7.1	14.1	12.7	11.3	10.1	9.2	8.4	7.1	6.2
2200	29.5	23.4	24.1	20.7	18.2	16.2	14.6	13.2	11.6	10.4	9.7	9.1	8.3	7.5	6.7	6.0	5.4	4.9	13.4	12.2	10.8	9.7	8.8	8.0	6.8	5.9	
	36.6	36.6	36.6	34.0	29.9	26.6	24.0	21.8	19.2	17.1	16.0	15.0	13.4	12.2	10.8	9.7	8.8	8.0	6.8	13.4	12.2	10.8	9.7	8.8	8.0	6.8	5.9
2300	28.2	22.4	23.2	19.9	17.4	15.5	13.9	12.7	11.1	9.9	9.3	8.7	7.9	7.2	6.4	5.7	5.2	4.7	12.9	11.6	10.3	9.2	8.4	7.6	6.5	5.6	
	36.6	36.6	36.6	32.6	28.6	25.5	23.0	20.9	18.4	16.4	15.3	14.4	12.9	11.6	10.3	9.2	8.4	7.6	6.5	12.9	11.6	10.3	9.2	8.4	7.6	6.5	5.6
2400	21.4	27.1	21.5	22.3	19.1	16.7	14.8	13.3	12.1	10.7	9.5	8.9	8.3	7.6	6.9	6.1	5.4	4.9	12.3	11.1	9.9	8.8	8.0	7.3	6.2	5.4	
	32.0	36.6	36.6	36.6	31.4	27.5	24.5	22.0	20.0	17.6	15.8	14.7	13.8	12.3	11.1	9.9	8.8	8.0	7.3	12.3	11.1	9.9	8.8	8.0	7.3	6.2	5.4
2500	20.6	26.0	20.6	21.4	18.3	16.1	14.2	12.8	11.6	10.2	9.1	8.5	8.0	7.3	6.6	5.8	5.2	4.7	11.8	10.7	9.5	8.5	7.7	7.0	6.0	5.2	
	31.8	36.6	36.6	35.2	30.2	26.5	23.5	21.2	19.3	17.0	15.1	14.1	13.2	11.8	10.7	9.5	8.5	7.7	7.0	11.8	10.7	9.5	8.5	7.7	7.0	6.0	5.2
2600	19.8	25.0	19.9	20.6	17.8	15.4	13.7	12.3	11.2	9.8	8.8	8.2	7.7	7.0	6.3	5.6	5.0	4.5	11.4	10.3	9.1	8.1	7.4	6.7	5.7	5.0	
	28.8	36.6	36.6	33.9	29.1	25.5	22.6	20.4	18.5	16.3	14.5	13.6	12.7	11.4	10.3	9.1	8.1	7.4	6.7	11.4	10.3	9.1	8.1	7.4	6.7	5.7	5.0
2700	19.1	24.1	19.1	19.9	17.0	14.9	13.2	11.9	10.8	9.5	8.4	7.9	7.4	6.7	6.1	5.4	4.8	4.4	11.0	10.9	9.9	8.7	7.9	7.1	6.5	5.5	4.8
	28.8	36.6	36.6	32.8	28.1	24.6	21.8	19.7	17.9	15.7	14.0	13.1	12.2	10.9	9.9	8.7	7.9	7.1	6.5	11.0	9.9	8.7	7.9	7.1	6.5	5.5	4.8
2800	18.5	23.2	18.4	19.2	16.4	14.3	12.7	11.4	10.4	9.1	8.1	7.6	7.1	6.4	5.8	5.2	4.6	4.2	10.5	9.5	8.4	7.6	6.8	6.2	5.3	4.7	
	28.6	30.0	36.6	31.7	27.1	23.7	21.1	19.0	17.2	15.2	13.5	12.6	11.8	10.5	9.5	8.4	7.6	6.8	6.2	10.5	9.5	8.4	7.6	6.8	6.2	5.3	4.7
2900	17.9	22.4	17.8	18.6	15.8	13.9	12.3	11.0	10.0	8.8	7.9	7.3	6.9	6.2	5.6	5.0	4.5	4.0	10.2	9.2	8.1	7.3	6.6	6.0	5.1	4.4	
	27.6	30.0	36.6	30.6	26.2	23.0	20.4	18.3	16.6	14.6	13.0	12.2	11.4	10.2	9.2	8.1	7.3	6.6	6.0	10.2	9.2	8.1	7.3	6.6	6.0	5.1	4.4
3000	17.3	21.7	17.1	18.0	15.3	13.4	11.9	10.7	9.7	8.5	7.6	7.1	6.6	6.0	5.5	4.8	4.3	3.9	9.8	8.9	7.9	7.0	6.4	5.8	5.0	4.3	
	26.8	30.0	35.7	29.7	25.4	22.2	19.7	17.8	16.1	14.2	12.6	11.8	11.0	9.8	8.9	7.9	7.0	6.4	5.8	9.8	8.9	7.9	7.0	6.4	5.8	5.0	4.3
3100	16.7	21.0	16.7	17.4	14.8	13.0	11.5	10.4	9.4	8.3	7.4	6.9	6.4	5.8	5.3	4.7	4.2	3.8	9.5	8.6	7.6	6.9	6.2	5.6	4.8	4.1	
	26.0	30.0	34.6	28.8	24.6	21.5	19.1	17.2	15.6	13.7	12.2	11.4	10.6	9.5	8.6	7.6	6.9	6.2	5.6	9.5	8.6	7.6	6.9	6.2	5.6	4.8	4.1
3200	16.2	20.3	16.1	16.9	14.4	12.6	11.2	10.0	9.1	8.0	7.1	6.6	6.2	5.6	5.1	4.5	4.0	3.6	9.2	8.3	7.4	6.6	6.0	5.4	4.6	4.0	
	25.2	30.0	34.6	27.9	23.8	20.8	18.5	16.6	15.1	13.3	11.8	11.0	10.3	9.2	8.3	7.4	6.6	6.0	5.4	9.2	8.3	7.4	6.6	6.0	5.4	4.6	4.0

Subject to change. Consult www.xlerplate.com.au or XLERPLATE® Customer Service group for current information.

For your convenience BlueScope Steel offers a pressure vessel steel certified to both Australian and American (ASTM) standards. In the 6-40mm thickness range, the 7-460R grade is also certified to the ASTM A662 Grade B standard. Similarly, above 40mm in thickness, 7-460N also carries dual certification.

*Plate thicknesses between 80/100mm may be available by enquiry.



Adelaide Ship Construction - repairs and constructs boats for both commercial and private use. The company uses XLERPLATE® for the hulls of the vessels.



Special purpose grades, customer negotiated specifications and international standards

The XLER® range encompasses special purpose grades that may be highly formable or have enhanced weldability and may be individually developed to customer specifications, as well as selected grades from international standards.

All customer requirements can be considered, by enquiry, with positive responses being dependant upon technical requirement, tonnage and size.

BlueScope Steel is currently supplying steels to the requirements of various Australian, US, European and Japanese standards and this range includes structural, pressure vessel and shipbuilding steels.

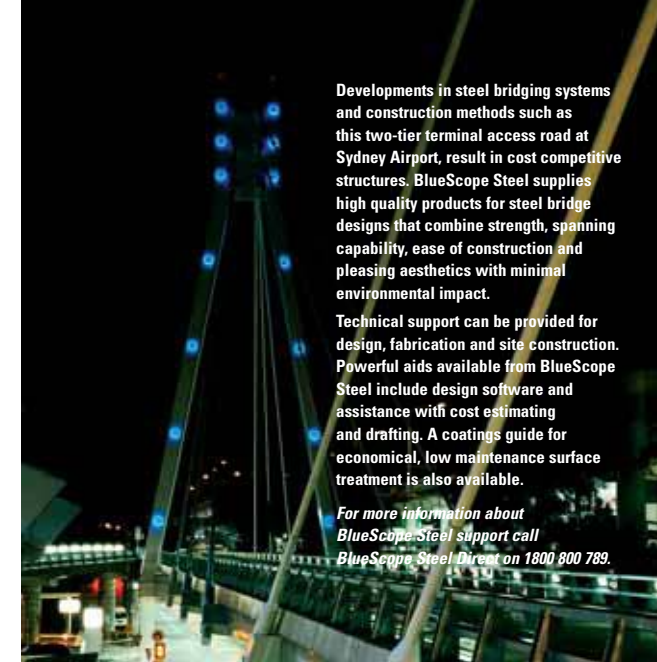
International standards comparisons are shown on pages 16 and 17:

XLERPLATE® grades available by enquiry

ANALYSIS GRADES	
GRADE	THICKNESS (mm)
AS/NZS 3678 - A1006	10 - 180
AS/NZS 3678 - K1042	10 - 100
STRUCTURAL GRADES	
AS/NZS 3678 - 250	110 - 150
AS/NZS 3678 - 300	8 - 60
AS/NZS 3678 - 300L15	8 - 40
AS/NZS 3678 - 350	>80 - 100
AS/NZS 3678 - 400	10 - 80
AS/NZS 3678 - 400L15	10 - 40
AS/NZS 3678 - 450	10 - 40
AS/NZS 3678 - 450L15	10 - 40
AS/NZS 3678 - WR350	8 - 20
SHIPBUILDING GRADES	
Lloyds Grade A	6 - 100
Lloyds Grade D	6 - 50
Lloyds Grade E	6 - 50
LASER GRADES	
Lasercut™ 250	8 - 32
Lasercut™ 350	8 - 20
PRESSURE VESSEL GRADES ⁽¹⁾⁽²⁾	
AS 1548 - 5 - 490A	10 - 100
AS 1548 - 5 - 490N	10 - 100
AS 1548 - 7 - 460	>80 - 100
AS 1548 - 7 - 490R/A 662C	8 - 40 ⁽³⁾
AS 1548 - 7 - 490R	>40 - 100

Notes:

- International grades may be available by enquiry.
- Other variations on these base grades, including impact tested and high temperatures tensile tested grades, available by enquiry.
- Dual certified to ASTM A662 Grade C.



Developments in steel bridging systems and construction methods such as this two-tier terminal access road at Sydney Airport, result in cost competitive structures. BlueScope Steel supplies high quality products for steel bridge designs that combine strength, spanning capability, ease of construction and pleasing aesthetics with minimal environmental impact.

Technical support can be provided for design, fabrication and site construction. Powerful aids available from BlueScope Steel include design software and assistance with cost estimating and drafting. A coatings guide for economical, low maintenance surface treatment is also available.

For more information about BlueScope Steel support call BlueScope Steel Direct on 1800 800 789.

XLER® coil plate General range

FORMABLE GRADES		
GRADE	THICKNESS (mm)	WIDTH (mm)
AS/NZS 1594 - HA1	3 - 12	900 - 1800
STRUCTURAL GRADES		
AS/NZS 1594 - HA200	3 - 12	900 - 1800
AS/NZS 1594 - HA250	3 - 12	900 - 1800
AS/NZS 1594 - HA300	3 - 12	900 - 1800
AS/NZS 1594 - HU300	3 - 8	900 - 1800
AS/NZS 1594 - HA300	3 - 8	900 - 1800
AS/NZS 1594 - HA350	3	1200
	4 - 8	1200, 1500
FLOOR PLATE GRADE		
AS/NZS 1594 - HU250	2.1 - 3	1200
	4 - 8	1200, 1500

Notes:

Minimum bundle mass 2 tonnes.

International Standards Comparison

STRUCTURAL STEEL PLATE

Based on Tensile Strength

Tensile Strength MPa	European EN10025	British BS4360	German DIN17100	Japanese JIS	American ASTM	International ISO630	Australian AS3678
290			St33				
300							200
310					A283A	Fe310-0	
330				G3101-SS330			
360	S235JR	40A,B, C,D	St37-2 St37-3		A283B	Fe360 A,B, C,D	
380					A283C		
400				G3101-SS400 G3101-SM400 A,B,C	A36 A573-400		
410	S275JR S275J0 S275 J2G3 S275 J2G4		St44-2 St44-3		A283D A2834C A529 A572-290D		250 250 L15
430		43A,B, C,D			A633A	Fe430 A,B, C,D	300 300 L15
450					A573-450 A572-345		350 350 L15
480					A573-485		400 400 L15
490	S355JR S355J0 S355 J2G3 S355 J2G4	50,A,B, C,D	St52-3	G3101-SS490 G3106-SM490 A, B,C G3106-SM490 YA,YB		Fe510 B, C,D	
520				G3106-SM520 B,C	A572-415	Fe510 B, C,D	450 450 L15
540				G3101-SS540			

- This table indicates the approximate relationship between international grades and their Australian equivalents. For more detailed comparisons contact BlueScope Steel technical staff or BlueScope Steel Direct on 1800 800 789.
- For grades with **BOLD** suffix letters **C, D** on British, European and International Standards, **B, C** on Japanese Standards and suffix numbers **2** and **3** on German Standards, the appropriate Australian alternative is the nearest **L15** grade of the equivalent strength level (ie High or Medium).
- Grades most readily available from BlueScope Steel are 250, 250L15, 350, 350L15.
- This table is designed to allow customers to determine the nearest available Australian grade to an international specification. It should not be used in reverse.

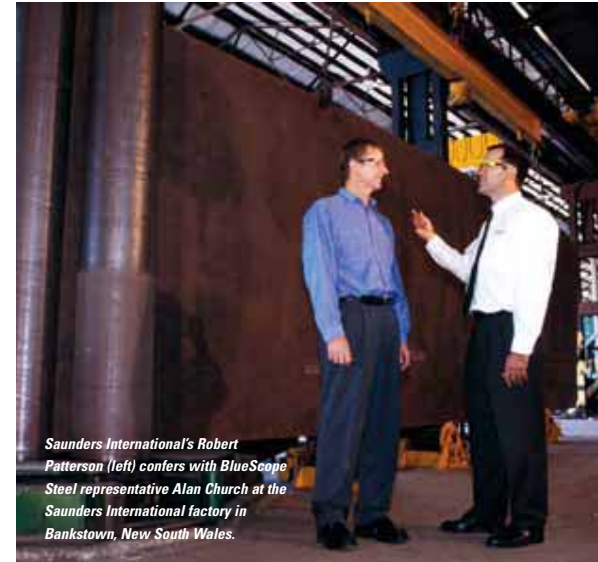
BOILER AND PRESSURE VESSEL PLATE

Tensile Strength MPa	Japanese JIS	European EN10028	American ASTM	International ISO9328.2	Australian AS1548
310			A285A		
340			A285B		
360		2-P235GH		P235	
380			A285C A516-55		
390		3-P275N#			
400	G3115-SPV235 G3126-SLA235		A662-A		
410	G3103-SB410	2P265GH G3118-SGV410		P265	
415			A515-60 A516-60#		
430					7-430
440	G3126-SLA325				
450	G3108-SB450 G3118-SGC450		A515-65 A516-65		
460		2-P295GH#	A662-B*	P290	7-460
480	G3103-SB480 G3118-SGV480				
490	G3115-SGV315		A515-70 A516-70# A662-C*	P315	7-490
490	G3126-SLA360	3-P355N#	A537-C11 A737-B A841	P315	5-490
510		2-P355GH#		P355	
520	G3115-SPV355		A299 A738-A		

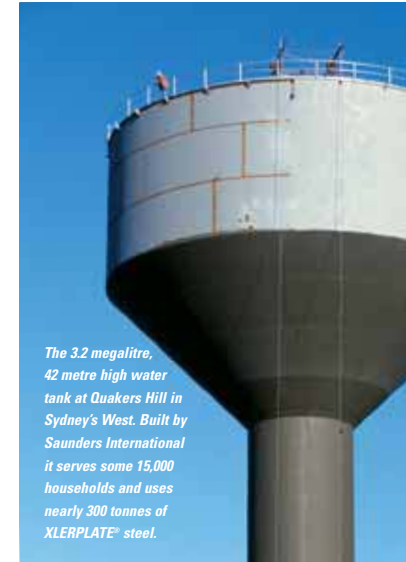
- This table indicates the approximate relationship between international grades and their Australian equivalent. For more detailed comparisons contact BlueScope Steel technical staff or BlueScope Steel Direct on 1800 800 789.
- Grades are shown in their increasing tensile strength order. AS1548-5-490 and equivalent grades have a higher minimum yield strength requirement than the corresponding AS1548-7-490 and equivalent grades.
- Grade equivalence shown is based on room temperature tensile properties only.
- Grades readily available from BlueScope Steel are shown in bold type.
- *ASTM A662 Grade B & C are dual certified with AS1548-7-460 & 7-490 respectively, in thickness 8-40mm
- #These overseas grades may be available subject to enquiry.
- It may be possible to substitute readily available BlueScope Steel grades for international grades outside the designated strength band shown, provided relevant design factors are considered. Refer to BlueScope Steel Direct - 1800 800 789 within Australia.
- This table is designed to allow customers to determine the nearest available Australian grade to an international specification. It should not be used in reverse.

Service and support

Doing business with us is easy



Saunders International's Robert Patterson (left) confers with BlueScope Steel representative Alan Church at the Saunders International factory in Bankstown, New South Wales.



The 3.2 megalitre, 42 metre high water tank at Quakers Hill in Sydney's West. Built by Saunders International it serves some 15,000 households and uses nearly 300 tonnes of XLERPLATE® steel.

Many steel users purchase their XLER® products directly from a steel distributor. In fact, BlueScope Steel distribute the majority of their XLER® products through an extensive network of independent steel service centres which offer a comprehensive range of services including:

- An extensive range of popular XLER® sizes and grades ex stock.
- Same day delivery, in most cases.
- Personalised customer service, from assistance with ordering XLER® products to technical advice.
- Extensive processing services, such as steel "cutting and profiling".
- Professional order management assistance to help you buy XLER® products as cost-effectively as possible to meet your requirements, with prompt issue of all relevant purchase documentation such as invoices and test certificates.
- Delivery anywhere in Australia.

For the location of your nearest distributor of XLER® products, check the "Suppliers" section of the XLER® website www.xlerplate.com.au or The Australian Steel Institute's website www.steel.org.au.

Even if you purchase XLER® products through a distributor, you can still enjoy many of the services BlueScope Steel offers.

Project management for peace of mind

Working as a team, in conjunction with you and your chosen XLER® distributor, a BlueScope Steel customer service representative can act as a project leader for the supply of XLER® products to large projects, monitoring all aspects of your order. The earlier you involve us in the project, the better. By talking to a BlueScope Steel representative at the feasibility and design stage, project leaders can more easily access the best and most cost-efficient way to go forward.

An estimate of your XLER® product requirements in terms of grade, sizes, volume and timing will enable us to recommend a variety of supply options. If we know the project timetable and work with the project team we can ensure that the right XLER® product will be supplied at the right time to ensure key milestones are met.

Comprehensive product information on line

You can also access a wealth of information about the XLER® range at our product website, www.xlerplate.com.au. In Australia you can also talk to one of our friendly technical advisors at our call centre BlueScope Steel Direct, on 1800 800 789. The call centre is supported by an extensive database of information about the full range of BlueScope Steel products and is the "human face" of our web site.

Technical support team delivers inspired solutions



XLER® hot-rolled steel plate and coil products are backed by an experienced technical support team throughout Australia and New Zealand. These highly trained technical specialists can help deliver solutions for virtually any steel related problem big or small, from the blade on a mining excavator to an offshore oil rig or a new vessel for the defence forces. By working closely with our customers our Metallurgical Technology team understands your needs and provides solutions that will improve your business. As the link between our customers and the steel plant they use their specialist knowledge to recommend the right material for an application or ensure that the right grade of steel is developed to meet performance requirements.

The team can assist with a range of issues from day to day technical enquiries to special joint task forces working in customers' plants on process improvement or product development projects.

It's all part of the BlueScope Steel win-win philosophy, and they can help our customers save time and money, and even make the difference between winning or losing a tender. The Metallurgical Technology department is constantly pioneering the

design of new and improved steel grades, and finding precisely the right steel grade to meet customer requirements.

Our customers are our partners

For those who buy their XLER® products directly from BlueScope Steel, we provide a range of services and support to ensure you and your customers will reap benefits of you choosing BlueScope Steel as a supplier to your business. We know that our success



depends on our customers success. Our strength lies in working closely with you to create value and trust, together with superior products, services and ideas.

The BlueScope Steel offer includes pricing, quality, delivery and support functions. This focus on our customers is entrenched in the way we do business, from our frontline sales and marketing teams and technical experts to the production crews at the Mill.

By tailoring production to meet customer requirements we create a win-win situation, a partnership in which we succeed by helping our customers to be successful.

We've got you covered

When you buy XLERPLATE® or XLERCOIL® you will appreciate just how easy it is to do business with BlueScope Steel. A network of sales offices across the Australian mainland states give BlueScope Steel a unique understanding of our customers. Our customer service representatives are available to help with advice before and after you buy, and should a problem occur, they are on hand to react quickly to your needs. Our sales teams are committed to our customers' success through the provision of tailored market offers, market intelligence and flexible solutions.

Our field sales representatives are backed by our XLER® Customer Service groups, based at our Port Kembla Steelworks who handle order booking and management functions, thus bringing our customers closer to the Mill and to the information required for successful order management. The XLER® Customer Service groups are at your call from the moment you place your XLER® product orders. Because they are on the spot, these customer representatives can be inside the Mill within minutes, talking to the production crew on your behalf to keep your order on track.

Delivery that's fast, on time and flexible

BlueScope Steel understands the importance of short lead times and flexible delivery options. That is why we have introduced shorter lead times to make our XLERPLATE® Standard range readily available. The average lead time is two weeks for our most commonly ordered grades of XLERPLATE® (AS/NZS 3678 – 250

and 350 grades and AS 1548 –7-460R grade), and AS 1594 XLER® coil plate. Shorter lead times allow better tailoring of stock mix, ensure that valuable sales are not lost due to stock-outs, and they improve stock turn, cost of possession and cash flow.

You don't have to trade-off shorter lead times for flexibility of supply. XLERPLATE® and XLERCOIL® can be delivered on shorter than normal lead times to meet project start-up requirements. Deliveries can be 'flowed' to meet your needs. This minimises sorting, handling and storage, and reduces the risk of handling damage.

Steel at your fingertips

With our [bluescopesteelconnect.com](http://www.bluescopesteelconnect.com) e-commerce web site, dealing with BlueScope Steel is faster and more cost efficient than ever. You can have steel at your fingertips 24 hours a day, seven days a week.

Our new **OrderIntegrator™** system provides single point data entry that delivers timesavings, productivity enhancements and reduced error potential while giving you more control over your orders.

At www.bluescopesteelconnect.com you can access your repeat order catalogue, select the items, the quantities and the delivery timing, then send your order. The Order Status facility allows you to check the progress of your order through the post-production process.

Other benefits are real time invoices and statements, printable test certificates, including historical certificates and the ability to check the despatch history of your purchase.

If you would like more information about our free technical support service, call BlueScope Steel Direct on 1800 800 789 within Australia.

"Bisalloy Steels needs to respond quickly to customers' demands and market changes anywhere in the world. We work closely with BlueScope Steel to achieve this, using XLERPLATE® because of the superior after-sales service and product quality."

Nick Hardcastle, Bisalloy Steels





Park Engineers operates Western Australia's second largest workshop complex in suburban Perth. Specialising in large, heavy and complex steelwork it has worked on a range of large-scale projects for the mining, resources and the oil and gas market sectors.

Rigorous quality control for your peace of mind

Quality is important for your peace of mind and our good name. XLER® products are manufactured from continuously cast steel that conforms to Australian and New Zealand quality standards. Their consistent, superior quality means that customers experience no surprises.

Our production teams inspect XLER® products "on-line" at different stages of the production route to ensure that customers receive steel that is consistent with their order. If the product is intended for critical applications, a more detailed "off-line" inspection can be arranged. Subject to prior agreement customers can nominate their own inspector to monitor production.

Also subject to prior agreement, facilities can be given to visiting inspectors to examine the steel at agreed stages, and to stamp the steel and test pieces in the specified manner.

Comprehensive test certificates are provided for all XLER® products.

BlueScope Steel quality control laboratories are registered with the National Association of Testing Authorities (NATA). An authority inspector can witness mechanical testing on request, and endorse the test certificate.

Because all steel products may exhibit some variation within a single plate or coil, and from batch to batch, our technical specialists offer a free advice service on manufacturing tolerances, properties and grade selection. Specific processing methods can be negotiated to meet special requirements. The final decision on the suitability of a grade or steel type for a particular application rests with our customers.

Through its technical support staff BlueScope Steel is contributing to the development of new Australian quality standards. As well as contributing to the work of Standards Australia committees, material testing programmes are carried out at our Port Kembla laboratories. This active involvement in the Standards process gives the company access to information about the current and future needs of industry, and assists with new product development.

BlueScope Steel stands behind the name. By putting the XLER® brand name on our hot-rolled plate and coil products, we are backing them with our reputation. Provided our products are properly selected and used, any steel which is proved defective will be replaced without further charge or an appropriate credit will be negotiated.

A reliable contribution to the future

Our modern world couldn't function without steel. We depend on it for literally thousands of applications that affect our daily lives, from traditional uses to exciting new developments such as wind farms that produce clean alternative energy. Because steel is a reliable material with sound environmental credentials you can use XLERPLATE® and XLERCOIL® products with confidence.

Steel is the world's most recycled material. The world steel industry recycles 385 million tonnes a year that go back into the steelmaking process to create a continuous cycle. Other steel is re-used, while the by-products of modern steel production are either recycled, or used for a wide range of other applications.

Significant technical advances over the past thirty years have reduced by half the amount of energy required to produce steel.

This emphasis on environmental responsibility is part of BlueScope Steel's commitment to a sustainable future. As a member of the International Iron and Steel Institute we are committed to providing leadership in achieving a high standard of environmental care while contributing to the needs and prosperity of society through the production of steel.



Cesco concrete mixer barrels.

We also acknowledge our responsibility to the communities in which we operate. Our communities are our homes. Our success relies on communities supporting our business and products. In turn, we care for the environment, create wealth, respect local values and encourage involvement.

Health, safety, environment and community responsibilities are therefore integral to the way BlueScope Steel does business. With a goal of zero harm, health and safety targets are continually stretched to reduce risks to

our employees, contractors and visitors. Our standards are high and internationally recognised.

Our strength is in choosing to do what is right. When you buy XLER® products, it is your strength too.

(below) From its headquarters in Jandakot, Western Australia, Fremantle Steel services a variety of projects in a range of commercial, government and rural sectors. Here XLERPLATE® is being used as part of the reclaimers steelwork for a mining project.



Product reference standards

General specification requirements

Unless otherwise agreed or required by the specification, products are supplied in accordance with AS/NZS 3678 (Structural steel - hot-rolled plates and floor plates), AS/NZS 1594 (Hot-rolled steel flat products), AS1548 (Steel plates for pressure equipment) and AS/NZS1365 (Tolerances for flat-rolled steel products). These specifications cover such matters as testing, inspection, certification procedures and dimensional tolerances.

Because BlueScope Steel supplies products to the latest edition of any published standard specification, the year of issue of a standard specification is not used in its designation on certificates, product brands, or delivery documents. For the same reason references to standard specification in this brochure may not always include the year of issue. Information about standard specifications was current at the date of publication of this brochure.

Engineering & Structural Grades

AS/NZS 3678, AS/NZS 1594

These standards specify a range of engineering and structural grades defined by mechanical properties and chemical composition. These fully-killed, fine-grained carbon-manganese and carbon-manganese-niobium steels have excellent forming and welding characteristics. Chemical composition and properties are shown in the following tables.

AS/NZS 3678 CHEMICAL COMPOSITION - MECHANICAL PROPERTY GRADES

Grade	Cast or product analysis																
	C	Si		Mn	P	S	Cr (Note 1)		Ni (Note 1)		Cu (Note 1)		Mo (Note 1)	Al	Ti	Micro-Alloying elements (Note 2)	CE (Note 2)
	Max	Min	Max	Max	Max	Max	Min	Max	Max	Min	Max	Max	Max	Max	Max	Max	Max
250 & 250L15	0.22	–	0.55	1.70	0.040	0.030	–	0.30	0.50	–	0.40	0.10	0.100	0.040	(Note 3)	0.44	
*300 & 300L15	0.22	–	0.55	1.70	0.040	0.030	–	0.30	0.50	–	0.40	0.10	0.100	0.040	(Note 3)	0.44	
350 & 350L15	0.22	–	0.55	1.70	0.040	0.030	–	0.30	0.50	–	0.40	0.35	0.100	0.040	(Note 4)	0.48	
*400 & 400L15	0.22	–	0.55	1.70	0.040	0.030	–	0.30	0.50	–	0.40	0.35	0.100	0.040	(Note 4)	0.48	
*450 & 450L15	0.22	–	0.55	1.80	0.040	0.030	–	0.30	0.50	–	0.60	0.35	0.100	0.040	(Note 4)	0.48	
*WR350	0.14	0.15	0.75	1.70	0.160	0.030	0.35	1.05	0.55	0.15	0.50	0.10	0.100	0.040	(Note 4)	–	

*By enquiry only

NOTES:

1. Except for grades 450, 450L15, WR350, Cr + Ni + Cu + Mo = 1.00% maximum apply
2. Carbon equivalent (CE) is calculated from the following equation based on actual cast analysis:

$$CE = C + \frac{Mn}{6} + \frac{Cr + Mo + V}{5} + \frac{Ni + Cu}{15}$$

3. Niobium plus vanadium : 0.030% maximum.
4. Vanadium: 0.10% maximum, Nb + V + Ti: 0.15% maximum.

AS/NZS 3678 CHEMICAL COMPOSITION - ANALYSIS GRADES

Grade	Cast analysis %								
	C		Si	Mn		P	S	Al	Ti
	Min	Max	Max	Min	Max	Max	Max	Max	Max
A1006	–	0.08	0.03	–	0.40	0.040	0.030	0.100	0.040
K1042	0.39	0.47	0.50	0.60	0.90	0.040	0.040	0.100	0.040

AS/NZS 3678 TENSILE TEST REQUIREMENTS FOR PLATE AND FLOOR PLATE

Grade	Minimum yield stress, MPa								Minimum tensile strength MPa	Minimum elongation on a gauge length of 5.65 \sqrt{S} %
	Thickness, mm									
	≤8	>8 ≤12	>12 ≤20	>20 ≤32	>32 ≤50	>50 ≤80	>80 ≤100	>100 ≤150		
250 250L15	280	260	250	250	250	240	230	230	410	22**
*300 300L15	320	310	300	280	280	270	–	–	430	21
350 350L15	360	360	350	340	340	340	*330	–	450	20
*400 400L15	400	400	380	360	360	360	–	–	480	18
*450 450L15	450	450	450	420	400	–	–	–	520	16
									500	18
*WR350	340	340	340	–	–	–	–	–	450	20

*By enquiry only
**Elongation testing not required for floorplate.

AS/NZS 3678 CHARPY V-NOTCH IMPACT TEST REQUIREMENTS*

Grade	Test temperature °C	Minimum absorbed energy, J					
		Size of test piece					
		10mm x 10mm		10mm x 7.5mm		10mm x 5mm	
		Average of 3 tests	Individual test	Average of 3 tests	Individual test	Average of 3 test	Individual test
250L15 350L15 *300L15 *400L15 *450L15	-15	27	20	22	16	18	13

*By enquiry only
† Test Direction Longitudinal

AS/NZS 1594 CHEMICAL COMPOSITION REQUIREMENTS FOR FORMABILITY, STRUCTURAL AND WEATHER-RESISTANT GRADES

Grade	Chemical composition (cast or product analysis) %																
	C	Si		Mn	P		S	Cr (Note 1)		Ni (Note 1)		Cu (Note 1)		Al	Ti	Micro-Alloying elements	IIW Carbon equivalent
	Max	Min	Max	Max	Min	Max	Max	Min	Max	Min	Max	Max	Max	Max	Max	Max	Max
	Max	Min	Max	Max	Min	Max	Max	Min	Max	Min	Max	Max	Max	Max	Max	Max	Max
HA1	0.13	–	0.03	0.50	–	0.040	0.030	–	0.15	0.15	–	0.15	0.100	0.040	(Note 2)	–	
HA200	0.15	–	0.35	0.60	–	0.030	0.030	–	0.15	0.15	–	0.15	0.100	0.040	(Note 3)	0.29	
HA250 HU250	0.20	–	0.35	1.20	–	0.040	0.030	–	0.25	0.25	–	0.25	0.100	0.040	(Note 3)	0.39	
HA300 HU300	0.20	–	0.35	1.60	–	0.040	0.030	–	0.25	0.25	–	0.25	0.100	0.040	(Note 3)	0.39	
HA350	0.20	–	0.35	1.60	–	0.040	0.030	–	0.25	0.25	–	0.25	0.100	–	(Note 4)	0.44	
HW350	0.15	0.15	0.75	1.60	0.055	0.160	0.030	0.35	1.05	0.55	0.15	0.50	0.100	–	(Note 4)	0.54	

NOTES:

- For all grades other than HW350 - Molybdenum 0.05% maximum. Copper + nickel + molybdenum - 0.6% maximum.
- Niobium - 0.010% maximum. Niobium + vanadium - 0.030% maximum. Boron (total) - 0.015% maximum.
- Niobium + vanadium - 0.030% maximum.
- Vanadium - 0.10% maximum. Niobium + vanadium + titanium - 0.15% maximum.

AS/NZS 1594 - 2002 CHEMICAL COMPOSITION REQUIREMENTS FOR ANALYSIS GRADES

Grade	Cast analysis %									IIW Carbon equivalent
	C		Si	Mn		P	S	Al	Ti	
	Min	Max	Max	Min	Max	Max	Max	Max	Max	
HA 1006	–	0.08	0.03	–	0.40	0.040	0.030	0.100	0.040	0.29
HA 1010	0.08	0.13	0.03	0.30	0.60	0.040	0.03	0.100	0.040	0.29
HA 1016	0.12	0.18	0.03	0.60	0.90	0.040	0.030	0.100	0.040	0.39
HK 1042	0.39	0.47	0.50	0.60	0.90	0.040	0.030	0.100	0.040	–
HXX15B30#	0.25	0.33	0.50	–	1.50	0.030	0.020	0.100	0.060	0.64

For Grade HXX15B30, the following elements may be present to the limits stated: Copper - 0.35% maximum; Nickel-0.5% maximum; Chromium - 1.2 % maximum; Molybdenum - 0.5% maximum; acid-soluble boron 0.0005% minimum or total boron 0.0008% minimum and titanium 0.060% maximum.

AS/NZS 1594 TENSILE PROPERTY REQUIREMENTS FOR FORMABILITY, STRUCTURAL AND WEATHER-RESISTANT GRADES

Grade	Minimum upper yield stress MPa	Minimum tensile strength MPa	Elongation, % min (Notes 1 and 2)					
			Normal Thickness, mm					
			≤ 3			> 3		
			L ₀ =50mm	L ₀ =80mm	L ₀ =200mm	L ₀ =50mm	L ₀ =80mm	L ₀ =200mm
HA1	(Note 3)	(Note 3)	–	–	–	–	–	–
HA200	200	300	24	22	17	28	26	19
HA250, HU250	250	350	22	20	16	26	24	17
HA300, HU300	300	400	20	18	15	24	22	16
HA350	350	430	18	16	14	22	20	15
HW350	340	450	–	–	15	–	–	15

NOTES:

1. L₀ = original gauge length of test piece.
2. Elongation testing is not required for floor plate.
3. For design purposes, yield and tensile strengths approximate those of Structural Grade HA200. For specific information contact BlueScope Steel.



Conducting a tensile test on XLERPLATE™ material test piece in the Mechanical Testing Laboratory of BlueScope Steel.



“A world class Australian product at our doorstep with quality, value and great customer service to back it up.”

*Mario Cuzzocrea,
OneSteel Steel & Tube*

Boiler and Pressure Vessel Grades

AS 1548

The XLER® range of boiler and pressure vessel grades is based on Australian Standard 1548 (Steel Plates for Boilers and Pressure Vessels). This provides for the supply of silicon-aluminium killed, carbon-manganese steel plates up to a maximum thickness of 100mm. AS 1548 grades are designated in the following manner:



AS 1548 – T – YDHLX where

T = Type of steel, as follows:

5 – silicon-aluminium killed, niobium treated

7 – silicon-aluminium killed

Y = Specified minimum tensile strength; either 460 or 490 MPa

D = Heat treatment as follows:

N – Plates supplied normalised in temperature range 870°C - 930°C after final rolling.

R – Plates supplied as rolled.

A – Plates supplied as rolled; test pieces normalised prior to testing. **A** designation plates are ordered where it is the intention of the purchaser to normalise or hot form during fabrication.

“**R**” and “**A**” designation plates may be supplied in the normalised condition at the steel manufacturer’s option.

T – Plates supplied in the TMCR (thermo mechanical control rolled) process. This results in low temperature impact properties equivalent to those of normalised material and may be used as an alternative process to normalising. “**T**” plates are not suitable for hot forming.

H Indicates that an elevated temperature tensile property is specified. The required test temperature must be specified.

LX Indicates that a low temperature impact test is specified. The temperature is inserted in place of “**X**”, e.g. L50 indicates impact testing at minus 50°C.

ZX Indicates that a through-thickness tensile test is required (**Z**) together with a percentage reduction of area (**X**), e.g. Z25 for 25% minimum average reduction of area.

All test pieces are subject to a simulated stress relieving treatment at a temperature of 600°C ± 20°C for a period of 3 hours (approx.) before testing.

The chemical composition and mechanical test requirements for the AS 1548 grades are shown below. A current version of the Standard should be consulted to confirm the values given, and to obtain detailed specification requirements.

Ordering of Boiler and Pressure Vessel Grades

Pressure vessel steel grades require special care in defining all requirements, and the following information is intended to assist customers in preparation of enquiries and orders. Always refer to the original specification and the Order Checklist in Section Seven of this brochure.

Pressure vessel grades, apart from those in the Standard range are by enquiry to ensure grade, size and supplementary specifications are available.

The following tables show the chemical compositions and mechanical test requirements for AS 1548 grades:



“The fabrication of the bridge steelwork for the West Angelas Rail Project was on a very tight program. BlueScope Steel helped my company deliver the columns and girders ahead of schedule through their flexibility of supplying non-standard XLERPLATE® on a very short lead-time. Together, we enabled the project to overcome the risk of delays due to potential flooding of the creek.”

*Vince and Mark D’Amato,
Fremantle Steel*

AS 1548 CHEMICAL COMPOSITION - PRESSURE VESSEL GRADES

Type and Grade	Analysis type	Analysis, percent (see notes 1, 2, 5 and 6)										Carbon equivalent max. percent (see note 3)
		C	Mn		Si	P	S	Nb		Al	Ti	
		Max	Min	Max	Max	Max	Max	Min	Max	Max	Max	
5-490 N or A	Cast/Product	0.24	0.90	1.70	0.60	0.040	0.030	0.010	0.070	0.100	0.040	0.48
7-430 R**	Cast/Product	0.22	0.50	1.60	0.50	0.040	0.030	*	0.010 Note 4	0.100	0.040	0.45
7-460 R,N,T or A	Cast/Product	0.20	0.90	1.70	0.60	0.040	0.030	*	0.010 Note 4	0.100	0.040	0.45
7-490 R,N,T or A	Cast/Product	0.22	0.90	1.70	0.60	0.040	0.030	*	0.010 Note 4	0.100	0.040	0.48

*No specified limit **Offered as 5mm Standard Pressure Vessel size only

NOTES:

1. The following elements may be present to the limits stated below:

Copper 0.40%

Nickel 0.50%

Chromium 0.25%

Molybdenum 0.10%

Vanadium 0.030%

2. The use of sulphide shape control elements for these grades is permitted.

3. Carbon equivalent (CE) is calculated from the equation:

$$CE = C + \frac{Mn}{6} + \frac{Ni + Cu}{15} + \frac{Cr + Mo + V}{5}$$

4. Niobium (up to 0.025%) may be added for L20, L40 and L50 designations

5. If percent by mass of copper exceeds 0.3%, the percent mass of nickel must be at least half the percent by mass of copper.

6. Copper + chromium + molybdenum = 0.45% max.

AS 1548 TENSILE REQUIREMENTS FOR PRESSURE VESSEL GRADES

Type and grade	Minimum upper yield stress value, MPa						Tensile strength MPa	Minimum elongation 'A' as a percentage proportion of gauge length of 5.65√S. %
	Thickness, mm							
	≤ 16	>16	≤ 40	> 40	≤ 80	> 80 ≤ 100		
5-490N and A	360	340	330	320	490 to 610	20		
7-430R	300	280	270	250	430 to 550	22		
7-460R, N, T and A	305	295	275	265	460 to 580	21		
7-490R, N, T and A	320	310	300	280	490 to 610	20		

AS 1548 CHARPY V-NOTCH IMPACT TEST REQUIREMENTS FOR PRESSURE VESSEL GRADES*

Type and Grade	Impact designation	Test temperature °C	Minimum absorbed energy, J					
			Size of test piece					
			10mm x 10mm		10mm x 7.5mm		10mm x 5mm	
			Individual test	Average of 3 tests	Individual test	Average of 3 tests	Individual test	Average of 3 tests
5-490N or A	L20	-20	35	47	28	38	25	33
	L40	-40	23	31	18	25	16	22
	L50	-50	20	27	16	22	14	19
7-460R	L0	0	23	31	18	25	16	22
7-460N,T or A	L20	-20	35	47	28	38	25	33
	L40	-40	23	31	18	25	16	22
	L50	-50	20	27	16	22	14	19
7-490R	L0	0	23	31	18	25	16	22
7-490N	L20	-20	35	47	28	38	25	33
	L40	-40	23	31	18	25	16	22
	L50	-50	20	27	16	22	14	19

NOTE: For thickness less than 7mm, full thickness impact tests may be negotiated.

* Test Direction Longitudinal

Elevated Temperature Tensile Tests

Plates with "verified" elevated temperature properties can be supplied hot-tested at the temperature specified.

AS 1548 ELEVATED TEMPERATURE TENSILE TEST VALUES FOR PRESSURE VESSEL GRADES

Type and Grade	Thickness mm	Lower Yield Stress or 0.2% proof stress minimum, MPa									
		Temperature °C									
		20*	50*	100	150	200	250	300	350	400	450
5-490NH or AH	≥8 ≤16	350	336	310	286	268	240	220	208	196	180
	>16 ≤40	330	322	308	286	268	240	220	208	196	180
	>40 ≤80	320	312	300	286	268	240	220	208	196	180
	>80 ≤100	312	306	296	286	268	240	220	208	196	180
7-460RH, NH TH or AH	≥3 ≤16	284	276	266	246	222	198	176	168	158	148
	>16 ≤40	272	268	260	242	220	198	176	168	158	148
	>40 ≤80	262	258	250	236	216	198	176	168	158	148
	>80 ≤100	248	240	228	216	208	198	176	168	158	148
7-490RH, NH TH or AH	≥3 ≤16	304	296	284	264	240	212	192	182	172	164
	>16 ≤40	300	292	280	260	236	212	192	182	172	164
	>40 ≤80	292	286	272	256	234	212	192	182	172	164
	>80 ≤100	274	268	256	250	228	212	192	182	172	164

*Values at 20°C and 50°C are included for design purposes only and are not subject to test.



“We are a leading manufacturer of steel beams and columns for a range of applications from bridges to sports stadiums. XLERPLATE® offers a quality product with the flexibility that allows us to produce made-to-order products on a short lead time.”

Tom Korber, Manager, BlueScope Steel Welded Products Plant

Through-Thickness tested XLERPLATE®

AS/NZS3678-250Z and 350Z

This special soundness “Z” quality plate steel is a lamellar tear-resistant grade, with guaranteed through-thickness tensile properties, often specified for critical applications including some pressure vessels.

Lamellar tearing is a form of cracking in a plane parallel to the plate surface in the vicinity of highly restrained welded joints. Such joints are likely to be found where plate is used in the fabrication of such structures as offshore platforms, high-rise buildings, bridges, large draglines, and open-cut dredging machines.

Three factors contribute to the occurrence of lamellar tearing – structural restraint, joint design and through-thickness ductility of the plate.

BlueScope Steel supplies lamellar tear-resistant steels to through-thickness tensile requirements subject to availability.

Steels which are to be supplied to through-thickness tensile requirements are made to a high standard of internal cleanliness and have a low sulphur level, generally 0.01 per cent or less, and may be treated with calcium for inclusion shape control.

Supply to a minimum through-thickness reduction of area can be negotiated for any structural or pressure vessel steel. Plates are supplied ultrasonically tested to AS1710 Level 2 standard as a mandatory requirement.

Heat treatment of test pieces

Test pieces are prepared from samples cut from the plate in the ordered delivery condition, and are heat treated at the steelworks according to specification. Stress relief of test pieces is mandatory for all AS 1548 grades, regardless of plate delivery condition. Stress relief is not carried out on plates. Standard stress relief treatment is to hold the test pieces at 600°C ± 20°C for three hours.

Product analysis

Product analysis is available on enquiry at a price extra and is carried out on a sample obtained from the rolled plate product. Where product analysis is specified by the customer for AS 1548 grades it is normal practice to



The re-development of Brisbane's Suncorp Stadium relied heavily on XLERPLATE® because it offered a lightweight, flexible design solution.

Controlled rolling

A process where controlling the amount of deformation and the temperature at which it occurs, results in a fine-grained microstructure with the desired mechanical properties. The mechanical properties obtained by controlled rolling are generally lost if the steel is reheated above 620 °C. Customers should consult BlueScope Steel prior to hot forming these grades.

Normalised rolling

A process where the final deformation is carried out in a certain temperature range leading to a material condition equivalent to that obtained after normalising, so that the specified values of the mechanical properties are retained even after normalising.

report all elements listed in the relevant specification. For other specifications, or where variation from this practice is required, this should be noted when ordering.

Product certification

The supply of NATA endorsed test certificates for XLERPLATE® and XLERCOIL® products is standard practice. Supply of certificates is not subject to a price extra. The identity of the plate should be verified against order and test documents as soon as practicable after delivery.

that additional samples be taken for quality assurance purposes after normalising.

Dimensions of normalised plates are limited by the capacity of our normalising contractor and by other production factors such as lifting capability. Reference should first be made to the plate size schedule appropriate to the steel grade concerned.

Normalising, controlled rolling & normalised rolling

Normalising

A heat treatment process where the steel is austenitised (heated to temperatures of 880 - 920°C) for approximately 30 minutes per 25 mm of thickness, and air-cooled. The process refines grain size to improve uniformity in microstructure and to remove stresses produced in the steel during rolling. For pressure vessel grades (AS1548) where it is intended to normalise plates as part of fabrication procedure, plates may be ordered in the as-rolled condition with tests to be carried out on normalised test pieces (“A” condition). Normalising temperature depends on steel grade, and users should refer to test certificates for the actual temperature used in Works normalising of plates or test pieces.

Where customers order “A” grade plate they must ensure that the appropriate heat treatment is carried out. It is recommended



J. Furphy & Sons has supplied galvanising kettles to Australia, New Zealand, Asia and the Middle East for over 15 years. Manufacturing kettles is a controlled process carried out by skilled operators with suitable equipment and incorporating constant inspection, testing and monitoring.

Tolerances for XLERPLATE® AND XLERCOIL®

Flatness

To measure flatness, the product, resting under its own weight, is placed on a flat horizontal surface in such a manner that any deviation from flatness is in the centre, not at the ends. Deviations from flatness are measured by allowing a straight edge to rest on at least two points on the product surface and then measuring the distance between the product and the straight edge (Diagram A).

Only that portion between two consecutive points of contact is taken into consideration. The straight edge may be placed in any direction.

Where two points of contact do not exist, the deviation may be determined by measuring the distance between the flat horizontal surface and the bottom surface of the product (Diagram B).

Measurement of flatness

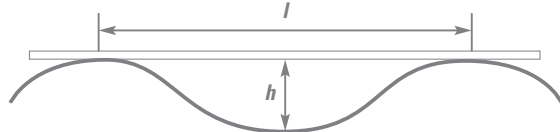


DIAGRAM A: Between two points of contact

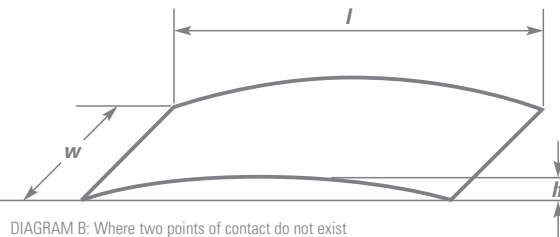


DIAGRAM B: Where two points of contact do not exist

LEGEND:

h = deviation from flatness

w = width of sheet

l = length of sheet between two points of contact

Steepness ratio

This is an alternative method for expressing flatness. The product resting under its own weight is placed on a flat horizontal surface with the depression to be measured facing upwards. The steepness ratio, expressed as a percentage, is calculated by determining the maximum distance between the product surface and straight edge in accordance with the procedures specified above (illustrated in Diagram above), then applying the following equation:

$$\text{Steepness ratio} = \frac{h}{l} \times 100, \%$$

where:

h = deviation from flatness (wave height),
in millimetres

l = length of sheet between two points of contact,
in millimetres



“We don’t just sell our customers “trucks”, we provide engineering support in the order preparation stages, consultation during manufacture and factory-based after sales support. Our culture is one of customer support, vertically integrated throughout our enterprise, owned and operated in Australia. The extent of our investment in ourselves gives our customers the confidence to invest in our products. When choosing our suppliers we look for the same culture, values and locally based technical capability. When a new challenge emerges we know we can call on the partnership we have with BlueScope Steel, with the confidence that their technical resources and XLER® brand products will support us and our customers in turn. More than once during a customer plant tour we have been asked where did you get your steel? The answer ‘BlueScope Steel’ is given and accepted with confidence.”

Chris Hancox, Clark Equipment Australia



Melbourne-based Apollo Engineering manufactured hot metal vessels for the Pasmenco lead smelting plant at Port Pirie in South Australia. XLERPLATE® was used to manufacture the spherical vessels, which span 4.6 metres in diameter and are designed to hold 420 tonnes of molten lead.

Out-of-squareness

The deviation from squareness of a length cut from trimmed-edge steel strip is measured by scribing a line perpendicular to the trimmed edge adjacent to the cut.

The out-of-squareness is expressed by a percentage of the measured value of deviation from square divided by the nominal width (DIAGRAM D).



DIAGRAM D: Measurement of out-of-squareness

NOTE: Out-of-squareness is expressed as: $\frac{u}{w} \times 100\%$

where:
w = nominal width
u = deviation from square

Edge camber

To measure edge camber the product is laid on a flat horizontal surface and a straight edge placed on the concave side edge. The maximum distance between the

side edge and the straight edge (W_c) is then measured (DIAGRAM C). Camber is expressed as a percentage of the measured value divided by the length of sheet.

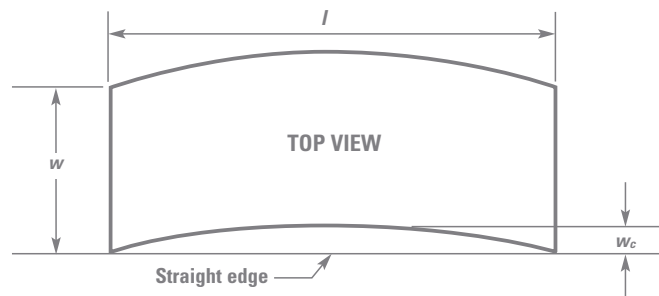
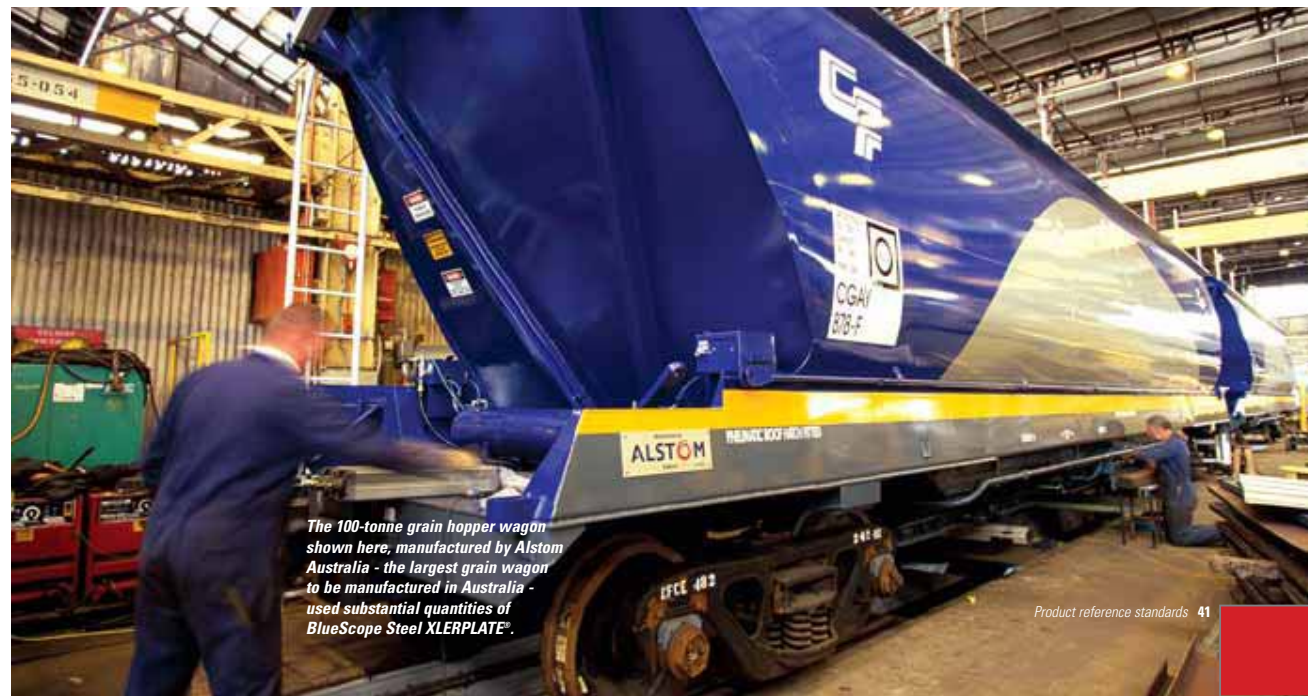


DIAGRAM C: Measurement of edge camber

NOTE: The camber is calculated from the following equation:

$$c = \frac{W_c}{l} \times 100\%$$

where:
c = camber, in percent
w = width of sheet
W_c = linear measurement of camber
l = length of sheet in mm



The 100-tonne grain hopper wagon shown here, manufactured by Alstom Australia - the largest grain wagon to be manufactured in Australia - used substantial quantities of BlueScope Steel XLERPLATE®.

Tolerances for XLERPLATE®

Plate and floorplate rolled on a reversing mill

This section specifies the manufacturing tolerances for steel plate and floorplate over 4.5mm thick that have been hot-rolled on a reversing mill. Unless otherwise indicated, tolerances apply to 100% of product supplied.

Edge camber tolerances: Edge camber shall be limited to ensure that the dimensions of the ordered plate are within the delivered size. If agreed to at the time of ordering, edge camber shall be limited to 0.2% of the actual length of the plate for a trimmed edge and 0.3% of the actual length of the plate for an untrimmed edge.

Out-of-square tolerances: For all sizes, the cut lengths shall be such that plates conforming to the ordered nominal dimensions can be obtained.

THICKNESS TOLERANCES FOR PLATE AND FLOORPLATE AS/NZS 3678

millimetres

Specified width mm		Thickness tolerance, plus or minus										
		Nominal plate thickness										
		>4.5 ≤6	>6 ≤8	>8 ≤10	>10 ≤13	>13 ≤18	>18 ≤22	>22 ≤30	>30 ≤42	>42 ≤63	>63 ≤100	>100 ≤180
≥600	<1000	0.35	0.35	0.40	0.45	0.50	0.55	0.65	0.80	1.10	1.60	2.25
≥1000	<1600	0.35	0.40	0.40	0.45	0.55	0.60	0.70	0.85	1.15	1.70	2.30
≥1600	<2100	0.40	0.45	0.45	0.50	0.60	0.65	0.75	0.90	1.20	1.75	2.35
≥2100	<2700	0.50	0.50	0.55	0.60	0.65	0.75	0.85	1.00	1.30	1.85	2.40
≥2700	<3300	0.65	0.65	0.70	0.75	0.80	0.90	0.95	1.15	1.45	1.95	2.40

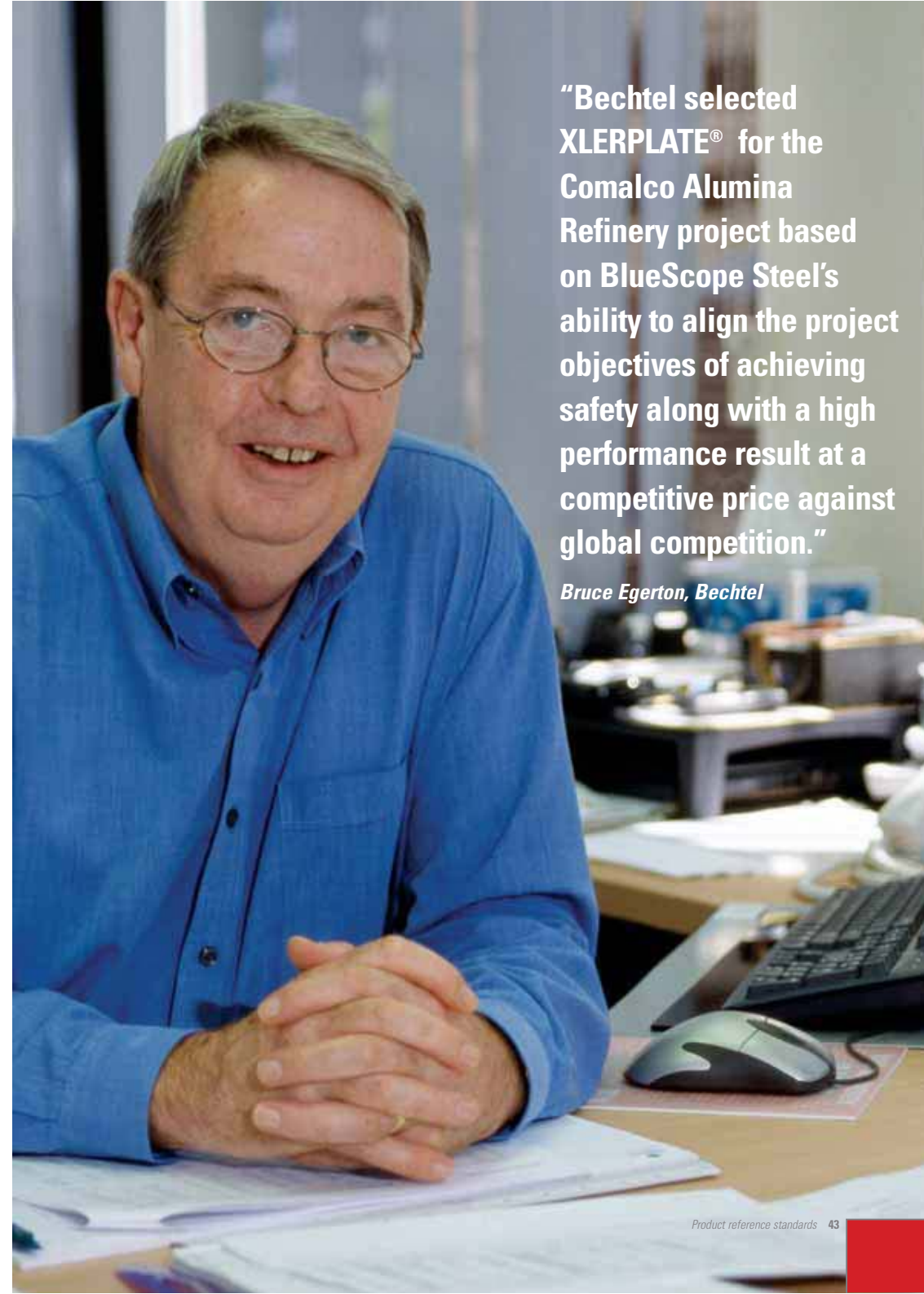
The table specifies thickness tolerances applicable to plate and floorplate in all edge conditions that have a specified or typical minimum yield strength of 360 Mpa or less. For steels with a specified or typical minimum yield strength greater than 360 Mpa, the thickness tolerance is determined by multiplying the values by a factor of 1.5. The thickness tolerance for floorplate applies to the unraised thickness of the plate.

THICKNESS TOLERANCES FOR PRESSURE VESSEL PLATE AS/NZS 1548

millimetres

Specified width mm		Under tolerance mm	Permissible variation over specified thickness									
			Specified thickness									
			>4.5 ≤6	>6 ≤8	>8 ≤10	>10 ≤13	>13 ≤18	>18 ≤22	>22 ≤30	>30 ≤42	>42 ≤63	>63 ≤100
≥600	<1000	0.30	0.40	0.40	0.50	0.60	0.70	0.80	1.00	1.30	1.90	2.90
≥1000	<1600	0.30	0.40	0.50	0.50	0.60	0.80	0.90	1.10	1.40	2.00	3.10
≥1600	<2100	0.30	0.50	0.60	0.50	0.70	0.90	1.00	1.20	1.50	2.10	3.20
≥2100	<2700	0.30	0.70	0.70	0.80	0.90	1.00	1.20	1.40	1.70	2.30	3.40
≥2700	<3300	0.30	1.00	1.00	1.10	1.20	1.30	1.50	1.60	2.00	2.60	3.60

The table specifies thickness tolerances applicable to plate and floorplate in all edge conditions that have a specified or typical minimum yield strength of 360 Mpa or less. For steels with a specified or typical minimum yield strength greater than 360 Mpa, the thickness tolerance is determined by multiplying the values by a factor of 1.5.



“Bechtel selected XLERPLATE® for the Comalco Alumina Refinery project based on BlueScope Steel’s ability to align the project objectives of achieving safety along with a high performance result at a competitive price against global competition.”

Bruce Egerton, Bechtel



In Brisbane, more than 400 tonnes of XLERPLATE™ steel went into the Arbour Walk which winds along 1.5 km of the Southbank Parklands. The eye-catching sculpture - comprising 403 individual steel 'trees' - was designed by Melbourne architects Denton Corker Marshall and engineered by Connell Wagner.

WIDTH TOLERANCES FOR PLATE AND FLOORPLATE AS/NZS 3678 & AS 1548

millimetres

Edge condition	Width	Width tolerance			
		Specified thickness			
		>4.5	<16	≥16	≤180
Trimmed	All	+20,	-0	+25,	-0
		All thickness			
Untrimmed	<2 400 ≥2 400	+80,	-0	+100,	-0

The table specifies width tolerances for plate and floorplate in all edge conditions.

LENGTH TOLERANCES FOR PLATE AND FLOORPLATE AS/NZS 3678 & AS 1548

millimetres

Specified length	Length tolerance			
	Specified thickness			
	>4.5	<25	≥25	≤180
All	+30,	-0	+40,	-0

The table specifies length tolerances for plate and floorplate in all edge conditions.

FLATNESS TOLERANCES FOR PLATE AND FLOORPLATE AS/NZS 3678 & AS 1548

millimetres

Specified thickness	Distance between points of contact		Flatness tolerance ¹				
			Specified width				
			<1500	≥1500 <1800	≥1800 <2400	≥2400 <3000	≥3000
>4.5 ≤8	>500	≤500	4	4	4	5	8
		≤750	6	6	6	8	12
	>750	≤1500	8	8	8	10	15
		≤2000	10	10	10	15	20
		≤3500	15	15	15	25	30
>2000	20	20	30	35	40		
>8 ≤12	>500	≤500	3	3	4	5	8
		≤750	5	5	6	8	12
	>750	≤1500	6	6	8	10	15
		≤2000	8	8	10	15	20
		≤3 500	10	10	15	20	25
>2 000	12	15	20	30	30		
>12 ≤25	>500	≤500	3	3	3	5	5
		≤750	5	5	5	8	8
	>750	≤1500	6	6	6	10	10
		≤2000	6	6	10	12	12
		≤3500	8	10	12	16	16
>2000	10	15	20	25	25		
>25 ≤180	>500	≤500	3	3	3	3	3
		≤750	5	5	5	5	5
	>750	≤1500	6	6	6	6	6
		≤2000	8	8	8	8	8
		≤3500	8	8	10	10	10
>2000	10	12	12	20	20		

When measured in accordance with the procedure described above in the section Tolerances for flat-rolled steel products, the flatness of carbon and carbon-manganese steel plate, in all edge conditions, that has a specified maximum carbon content less than or equal to 0.25%, and a specified or typical yield strength equal to or less than 360 MPa, shall comply with the tolerance requirements of this table. For floorplate and all other steels the flatness tolerance is determined by multiplying the values given in the table by a factor of 1.5. Care is required when measuring the flatness of floorplate due to the difficulty in accurately measuring deviations caused by the raised pattern.

¹The tolerances apply when measured at least 20mm from the longitudinal edges and 100mm from the transverse edges.

Tolerances for XLERCOIL[®] and XLER[®] coil plate

Hot-rolled plate, floorplate, sheet and strip rolled on a continuous mill

This section specifies the manufacturing tolerances for hot-rolled steel plate, floorplate, sheet and strip rolled on a continuous mill in thicknesses up to 13mm, and widths up to 2000mm. Unless otherwise indicated, tolerances apply to 100% of product supplied.

Edge camber tolerances: When measured in accordance with the procedure described previously in the section Tolerances for XLERPLATE[®] and XLERCOIL[®], the maximum

deviation of the side edge from a straight edge for hot-rolled plate, strip, floorplate and sheet in all edge conditions shall not exceed 0.4% of the actual length.

Out-of-square tolerances: For all sizes, the cut lengths shall be such that sheets or plates of the ordered nominal dimensions can be obtained. When measured in accordance with the procedure described previously, the out-of-squareness of a cut length from trimmed-edge steel strip shall not exceed 1.0%.

THICKNESS TOLERANCES FOR HOT-ROLLED PLATE, SHEET AND STRIP AS/NZS 1594

millimetres

Specified thickness	Thickness tolerance, plus or minus	Thickness tolerance, plus or minus
≤1.60	±1.60	0.16
>1.60	±2.00	0.18
>2.00	±2.50	0.19
>2.50	±3.00	0.21
>3.00	±4.00	0.23
>4.00	±5.00	0.25
>5.00	±6.00	0.27
>6.00	±8.00	0.29
>8.00	±10.00	0.32
>10.00	±13.00	0.36

This table specifies thickness tolerances applicable to carbon and carbon-manganese steel plate, sheet and strip in all edge conditions. For floorplate the thickness tolerance is determined by multiplying the values shown in the table by a factor of 1.5.

NOTE

- For coated products, thickness tolerances apply to the base metal only.
- An approximation of the thickness tolerances shown in the table can be obtained from the expression, tolerance = 0.017 x thickness + 0.14mm.
- Because of the raised pattern, care is required when measuring the thickness of floorplate. The thickness tolerance applies to the unraised thickness of the plate.
- Thickness is measured at a distance of not less than 10mm from a trimmed edge or not less than 25mm from an untrimmed edge.



“Bradken is one of Australia's largest heavy engineering and foundry groups. Our focus has covered major projects in rail, mineral processing, mining, industrial markets and replacement and refurbishment of engineered products for these sectors.

The broad scope of our business and urgent needs of our customers require a fast response to a diverse range of needs.

Our success in both domestic and export markets has been supported by BlueScope Steel's broad understanding of our product range and the market needs. Their excellent technical backup, fast enquiry response and world competitive pricing through the XLERPLATE[®] Customer Service group has been invaluable to us.”

*Trevor Hines,
Manager Engineering Operations & Projects,
Bradken Industrial*



“Victorian-based Keppel Prince Engineering built the Codrington wind farm in 2001 and is currently fabricating towers for the Ararat wind farm on behalf of NEG Micon. The size of the fabrications and the tightness of the construction timetable, mean that the accurate and finely timed delivery of a precise set of plates for each tower is imperative. BlueScope Steel has been able to achieve a perfect delivery schedule into Smorgon Steel for them to strip plates and deliver to us, on a just-in-time basis.”

Steve Garner, Keppel Prince Engineering

WIDTH TOLERANCES FOR UNTRIMMED EDGE HOT-ROLLED PLATE, FLOORPLATE, SHEET AND STRIP AS/NZS 1594

millimetres

Specified width		Width tolerance, plus or minus
>599	≤1000	+25, -0
>1000	≤1250	+30, -0
>1250	≤1500	+35, -0
>1500	≤2000	+40, -0



The Caterpillar Cat 797 (pictured left) is an Off Highway Truck locally built and designed for use in mining, with a maximum capacity of 326 tonnes and top speed (fully loaded) of 64 km/h.

WIDTH TOLERANCES FOR TRIMMED EDGE HOT-ROLLED PLATE, FLOORPLATE, SHEET AND STRIP AS/NZS 1594

millimetres

Specified width		Width tolerance	
		Specified thickness	
		<3.0	≥3.0 ≤13
<150		+1.00, -0	+1.50, -0
≥150	<300	+1.50, -0	+2.00, -0
≥300	<450	+2.00, -0	+2.50, -0
≥450	<600	+2.50, -0	+3.00, -0
≥600	<750	+3.00, -0	+3.00, -0
≥750	<1000	+4.00, -0	+4.00, -0
≥1000	<1250	+5.00, -0	+5.00, -0
≥1250	<1500	+6.00, -0	+6.00, -0
≥1500	<2000	+7.00, -0	+7.00, -0

Caterpillar is the only large machinery supplier in Australia to manufacture its own earth-moving equipment, giving it the ability to manufacture body systems to meet the specific requirements of its customers.



LENGTH TOLERANCES FOR HOT-ROLLED PLATE, FLOORPLATE AND SHEET AS/NZS 1594

millimetres

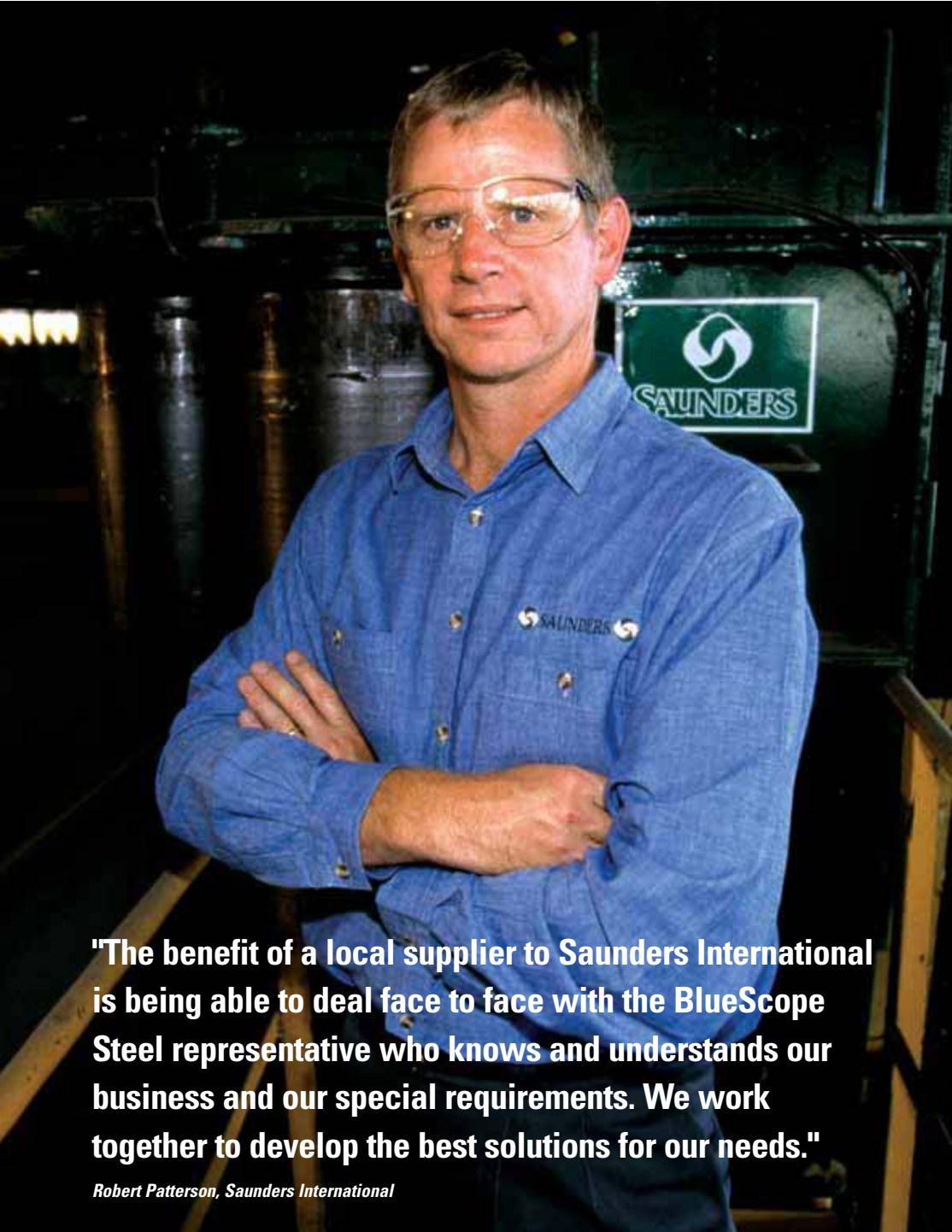
Specified length		Length tolerance
	<2 000	+10, -0
≥2 000	<4 000	+15, -0
≥4 000	<6 000	+20, -0
≥6 000	<12 000	+30, -0
≥12 000		+50 -0

This table specifies tolerances for all edge conditions.

Challenge Implements is a tractor attachment specialist with its manufacturing plant situated in Orange, a regional city in New South Wales. Using XLERPLATE® in the manufacture of agricultural implements, it has grown its product line through constant research and development and by introducing new designs and models to its range.



The Valley of the Giants in the Walpole-Nornalup National Park (420 kilometres South of Perth) has long been one of the area's most popular tourist destinations. The tree top walk allows visitors to walk high up in the treetops and explore the canopy of the magnificent tingle forest. Most similar canopy walks around the world are constructed using suspension bridge-type structures not for the faint of heart. The Tree Top Walk, however, is a series of sixty-metre, lightweight steel trusses built on steel pylons to form a secure ramp. The loop extends nearly 600 metres and rises up to 40 metres above the forest floor.



"The benefit of a local supplier to Saunders International is being able to deal face to face with the BlueScope Steel representative who knows and understands our business and our special requirements. We work together to develop the best solutions for our needs."

Robert Patterson, Saunders International

FLATNESS TOLERANCES FOR HOT-ROLLED PLATE AND SHEET AS/NZS 1594

millimetres

Nominal thickness	Distance between points of contact		Flatness tolerance	
			Class A	Class B
≤2	>500	≤500	10	3
		≤750	15	4
		≤1000	20	5
		≤1500	25	8
			30	10
>2 ≤5	>500	≤500	8	3
		≤750	12	4
		≤1000	15	5
		≤1500	20	8
			25	10
>5 ≤13	>500	≤500	5	--
		≤750	8	--
		≤1000	10	--
		≤1500	15	--
			20	--

NOTES

When measured in accordance with the procedure described above in the section Tolerances for XLERPLATE® and XLERCOIL®, the flatness of carbon and carbon-manganese steel plate and sheet having a specified carbon content equal to 0.25% or less and specified or typical minimum yield strength less than 340MPa, shall comply with the requirements of this table. For floorplate and all other steel plate and sheet, the flatness tolerance is determined by multiplying the values shown in this table by a factor of 1.5. Flatness tolerance does not apply to strip in coil form (either slit or mill edge).

The table gives the option of two classes of flatness tolerance. Unless specified otherwise by the customer or the relevant product standard, material with Class A tolerances will be supplied. Care is required when measuring the flatness of floorplate due to the difficulty in accurately measuring deviations caused by the raised pattern.

¹The tolerances apply when measured at least 20mm from the longitudinal edges and 100mm from the transverse edges.

Factors influencing the flatness of continuous mill product

The inability of a plate or sheet cut from hot-rolled coil to lie flat on a smooth horizontal surface is due to one or more of the following conditions:

- Edge wave: A condition that occurs when the edges of the strip elongate more than the centre of the strip during rolling.
- Centre buckle: A condition that occurs when the centre of the strip, in the rolling direction, elongates more than the edges.
- Longbow (Coilset): Longbow occurs as the result of a temperature differential in the product which on cooling assumes the curvature of the coil. It can be removed by a flattening operation using larger diameter rolls. Reverse longbow can be induced into steel strip by incorrect set-up and operation of flattening and levelling equipment.

- Crossbow: This occurs as a result of cooling effects associated with the rolled coil which is thicker in the centre than at the edges. The resultant strip will have a cross or transverse bow when the coil cools. Crossbow can be removed by a flattening or levelling operation.

All four of these conditions can result from incorrect flattening and levelling operations, involving set-up, equipment or operator inexperience.

The presence of edge wave or centre buckle is directly associated with the rolling procedures used when rolling slab into a coil.

It is not possible to remove edge wave and centre buckle when coils have been levelled and cut to length without subjecting the coil product to additional processing such as skin passing or stretcher levelling.



Light towers at Queensland's Gabba stadium are made from XLERPLATE®.

Technical information

Flame cutting

Flame cutting, using a combination of a fuel-gas and oxygen, is a commonly used method for both cutting and edge preparation of a range of steel plate qualities. Conventional flame cutting utilises a cutting torch equipped with a tip that enables the dual functions of preheating the steel to ignition temperature and directing a stream of high-pressure oxygen through a centrally located orifice to perform the cutting.



Acetylene and LP gas are the most commonly used fuel gases for the preheating flame, although natural gas and town gas are also used. Oxygen is fundamental to the process as it chemically combines with the preheated steel (at around 700°C). This chemical oxidation reaction liberates considerable amounts of additional heat, which melts the oxide formed. The high-pressure oxygen jet has the combined functions of reacting with the steel, generating heat, and sweeping away molten products of the reaction from the cut section (kerf). This thermal cycle will also produce a hardened heat-affected zone adjacent to the cut edge, the width and hardness of which will vary with cutting speed, steel thickness and steel chemistry. For many applications, removal of the hardened heat-affected zone may not be required, however if the cut face is to be welded, light dressing of the cut surface with a grinder is recommended to remove the thin carbide layer formed during flame cutting.

The process of flame cutting therefore involves both chemical oxidation and the physical removal of molten oxide. It is the interrelation of these two factors that dictates the gas flow rates, nozzle design, cutting speed, etc appropriate for satisfactory flame cutting. Equipment manufacturers can provide information on cutting procedures for a wide range of applications. The Welding Technology Institute of Australia (WTIA)-Technical Note 5 "Flame Cutting of Steels" provides a comprehensive coverage of the subject.

Mild and medium strength grades

Steels in this category are typified by the structural grade AS/NZS 3678-250, and the AS 1548-7-460 grade used in pressure vessel manufacture. These grades exhibit relatively low hardenability by virtue of the deliberate low carbon equivalents used on these grades. Flame cutting of "mild" steels presents little difficulty regardless of fuel gas used. The hardened heat-affected zone adjacent to the cut edge is usually only of significance where subsequent, severe cold forming of the edge is envisaged, or in particularly critical applications where a risk of brittle fracture or fatigue exists.

High strength grades

Structural grades such as AS/NZS 3678-350 and 490MPa tensile pressure vessel grades are also readily flame cut without the need for special precautions in most applications. The increased hardenability of these grades means they are more susceptible to hardening of the cut edge, and this may be unacceptable for certain critical applications. Reduced edge hardening may be facilitated by either 1. reduction in cutting speed, and/or 2. initial preheating of the plate. Both of these procedures serve merely to slow down the cooling rate at the cut edge.



Steel's versatility as a construction material allows items fabricated from XLERPLATE® and XLERCOIL® to be subjected to a wide range of service environments.

Medium to high carbon grades

Where carbon content exceeds about 0.3%, plates may require both preheating and reduced cutting speeds in order to obtain acceptably low hardness levels in the heat-affected zone. Preheating is particularly important for heavy sections where uniform preheating will assist considerably in reducing the chilling effect of the surrounding steel as well as ensuring a consistent cut. Machining of the cut is also facilitated by the softer edge produced by adherence to the above procedures. Post heating immediately after cutting may be desirable to ensure even slower cooling of the flame cut edges of heavy thickness, hardenable steels. Furnace cooling or insulation after cutting may be appropriate in such cases.

Plasma cutting

Plasma cutting offers the prime advantage of speed over conventional flame cutting processes. Cutting speeds in thinner sections are typically two to three times higher for plasma cutting processes for steel thicknesses up to 25mm, especially at

the lower end of the thickness range. Thicker sections can be cut with plasma processes but speed advantages diminish rapidly beyond 25mm. Conversely, plasma cutting typically produces a wider kerf than flame cutting processes, with cut quality considered inferior due to rounding of the top edge and the difficulty in obtaining a square cut face on both edges.

The hardened heat-affected zone of plasma cut steels is typically narrower than flame cut steels being less than a millimetre wide in 25mm thick steels compared with in excess of 2.5mm when the same steels are flame cut. Whilst the peak hardness of the heat-affected zone is less than that generated by flame cutting processes, it is still considered hard and potentially troublesome for subsequent machining or forming, especially where severe cold forming of the edge is envisaged, or in critical applications where a risk of brittle fracture or fatigue exists.

BlueScope Steel recommends that the surface layers of the plasma cut face be

at least lightly ground to remove the hardest layers prior to subsequent processing.

Laser cutting

Laser cutting offers the advantages of speed, precision and quality of cut over the more conventional forms of cutting. As the laser concentrates its energy into a narrow focussed beam that results in low levels of excess heat, a small kerf and narrow heat-affected zone is produced, making the process particularly suitable for applications requiring high part accuracy or minimal distortion. There are restrictions on the thickness of steel that can be laser cut with additional demands on the selection of the appropriate steel grade compared to other technologies. Surface quality and flatness have a large impact on the ability to laser cut steel, and the quality of the cut. Steels suitable for laser cutting need to have a thin, tightly adherent surface scale and be free from contaminants.

BlueScope Steel grades developed for laser cutting are Lasercut™ 250 and Lasercut™ 350 which meet the plate Standard AS/NZS 3678.

Corrosion prevention

Steel's versatility as a construction material allows items fabricated from plate and hot-rolled strip to be subjected to a wide range of service environments. The service environment determines whether there is a need for the protection of steel against corrosion and which corrosion prevention method should be used. Other factors to be considered include the required service life of the structure and whether an increased thickness of steel can be designed into the structure to make allowance for corrosion.

The various environments to which structural steel is exposed can be broadly categorised as follows:

- interior atmospheric (buildings, containers)
- exterior atmospheric
- immersed (salt and fresh water)
- buried in soil
- chemical (fume, splash, solids and immersion)

As a general rule, corrosion is negligible in atmospheric environments where the relative humidity is below 60-70% at normal

temperatures and where the steel is not contaminated with salts. Therefore, steel work within buildings and containers and in dry, rural environments does not require corrosion protection and surface treatment is carried out for aesthetics only.

For other atmospheric environments where moisture, airborne contamination and corrosion may be significant, the best approach to corrosion prevention usually involves the use of protective coatings.

AS/NZS 2312 "Guide to the protection of structural steel against atmospheric corrosion by the use of protective coatings" provides comprehensive advice on the selection and specification of various coating systems including organic coatings, galvanising and hot metal spray. It also provides advice on corrosiveness of various atmospheric environments in Australia and New Zealand and on structural design to minimise the effects of corrosion. Advice can also be obtained from protective coating manufacturers on the selection of coating systems for various environments.

Steel-work subjected to immersion in salt and fresh water can be subjected to much

higher corrosion rates, however, organic coatings such as high build epoxies and vinyl esters applied over abrasive blast cleaned surfaces have provided good service life. Galvanising can also be effective in fresh water as can corrosion inhibitors in recirculating non-potable fresh waters.

Corrosion rates of steel buried in soils are largely dependant on soil chemistry and on the availability of atmospheric oxygen at the steel surface. Compacted soils typically have very low corrosion rates while moist, salt laden loosely compacted soils will have a much higher corrosion rate. Use of protective coatings and encasement in concrete can eliminate corrosion. A number of proprietary processes are available for the protection of pipelines including shop-applied coatings and cathodic protection.

There are numerous chemicals and chemical environments in the form of gases, solutions and solids that can have different effects on the corrosion of steel. Although many chemicals are not corrosive to steel, specialist advice should be obtained from chemical suppliers before exposing structural steel to a chemical environment.

XLERPLATE® steel is used extensively throughout the \$1.5 billion Comalco Alumina refinery in Gladstone, Queensland.

Shot blasting and priming

BlueScope Steel has on-line facilities for the abrasive blast cleaning and shop priming of XLERPLATE®. The fully automated process produces a surface cleaned to minimum Class 2+ in accordance with AS 1627, Part 4 which is then coated with a preconstruction primer to typical dry film thickness of



20 micrometers. Preconstruction primers provide protection from atmospheric corrosion for periods of between 6 and 12 months, have minimal effect on gas cutting and welding and are compatible with a wide range of coating systems. Generic types of preconstruction primer currently applied include inorganic zinc silicate and epoxy. The automated abrasive blast cleaning and priming process provides substantial cost and quality benefits over traditional manual methods of surface treatment.

Forming and bending

Many plate applications require that the steel be formed to varying extents ranging from simple cold bending in a press brake to deep drawing in complex, multi-stage die presses. The latter is a specialist process outside the scope of this note, however, the metallurgical principles involved and some

general guidelines appropriate to the more conventional forming operations are outlined. The chemical composition, mechanical properties, metallurgical microstructure, surface condition, thickness, edge condition and forming direction in relation to the rolling direction of the steel, will have an influence on the plate forming properties.

Cold forming

Cold forming involves plastic deformation, or stretching, of the material surface on the outside of the bend. The extent to which this plastic deformation can take place without exceeding the limits of the material ductility, controls the minimum radius of bend that can be utilised for a particular application. The plastic deformation associated with cold forming results in strain hardening of the material and this in turn affects the mechanical properties. In the areas subject to this plastic deformation, ductility and fracture toughness decrease. For certain critical applications it may be necessary either to restrict the radius of the bend to

RECOMMENDED MINIMUM INSIDE RADIUS FOR COLD BENDING OF XLERPLATE® GRADES DURING FABRICATION (1)

Thickness, T, mm		Bend direction (2, 3)	AS 3678	250 & 300	350 & 400	WR 350/1 & 450
>	≤		AS 1548	7/460	5/490	-
-	6	Transverse Longitudinal		1.0T 1.5T	1.5T 2.25T	1.5T 2.25T
6	10	Transverse Longitudinal		1.5T 2.25T	2.0T 3.0T	2.0T 3.0T
10	20	Transverse Longitudinal		2.0T 3.0T	2.5T 3.75T	3.0T 4.5T
20	50	Transverse Longitudinal		4.0T 6.0T	Hot form ⁽⁴⁾ Hot form	
50	-	Both		Hot form ⁽⁴⁾	Hot form ⁽⁴⁾	

NOTES:

1. The recommended minimum bending radii of flooplate are as above except where the raised pattern is in tension, when a more liberal radii should be used.
2. A transverse bend is one where the axis of the bend is at right angles to the direction of rolling.
3. A longitudinal bend is one where the axis of the bend is parallel to the direction of rolling.
4. Hot forming - refer comments under "Hot Forming".

minimise these effects, or even to undertake subsequent heat treatment to restore the original properties. The major factors affecting the extent to which forming is possible without failures are:

Steel type

Low strength steels are generally more ductile than higher strength steels and are therefore capable of being shaped to more restrictive forming radii. Material produced to AS/NZS 3678 and AS/NZS 1594 by BlueScope Steel are fully killed steels with good homogeneity and micro structural cleanliness, which imparts good formability. Product data sheets give information on minimum bend radii. Generally low carbon content is a prerequisite to good formability and higher carbon steels have limitations in this respect.

Direction of forming relative to the principal rolling direction of the plate

The properties of steel plates are directionally dependent by virtue of the rolling process during manufacture, which elongates the metallurgical structure, inclusions, etc parallel with the principal rolling direction (i.e. length direction) of the plates. Plates (and indeed all steel products) will therefore exhibit different mechanical and physical properties depending on the orientation relative to the original rolling direction. The extent of this directionality dependence of properties varies with steel type, steel mill rolling practice and

product size and shape, but the most favourable forming properties will generally be obtained in the longitudinal, or principal steel mill rolling direction. Ductility of steel plates follows this rule and for this reason plates are more readily formed, or stretched, with the bend axis transverse to the principal rolling direction of the plate. Because of reduced ductility, bending with the axis parallel to the principal rolling direction of the plate will normally necessitate larger bend radii. For recommended cold bending radii on individual grades refer to BlueScope Steel product data sheets for the relevant grades at www.xlerplate.com.au.

Edge and surface condition

Steel ductility can be reduced significantly by the presence of local stress raising influences. For this reason the removal of sharp corners on sheared edges, gouge marks on flame cut edges and other similar stress-concentrating sources on either the edge or the surface, should precede cold forming. Attention to the "outside" or tension side of the edge or surface is most important in this respect, particularly in thicker plate where it is necessary to utilise restrictive bend radii. For such applications, careful examination of the edge and surface prior to bending is advised. Grinding or similar methods should be employed to remove gouge marks, notches, heavy scoring, and sharp edges. Similarly,



The 18.2 megawatt (MW) Codrington wind farm generates enough clean electricity for up to 11,000 homes and avoids generation of 71,000 tonnes of greenhouse gases each year.

The project cost \$30 million and is Australia's first privately funded wind farm.

Keppel Prince and other local companies were contracted to manufacture the towers, install roads, foundations, transformers and cabling.

Vessels being manufactured for the Woodside 4th LNG Train Project. Bradken Mining built nine pressure vessels using a total of around 800 tonnes of XLERPLATE®.



“Smorgon Sheet Metal Distribution is proud to support Australian made BlueScope Steel XLERPLATE®, due to the reliability and expertise behind their product range. On time deliveries, conformance to all specifications required, and manufacture to the highest quality on the world stage, delivers savings along the whole supply chain, ensuring that XLERPLATE® is the prime choice throughout the Australasian market.”

*Chris Williams,
Smorgon Sheet Metal Distribution*

the localised edge hardening associated with shear cut edges and flame cutting, may impair the cold bending performance of the plates. For particularly critical applications it may be necessary to apply some form of edge conditioning to remove the metallurgically affected edge area. Smoothing of edges and removal of sheared edge arris is recommended. Where forming is to be carried out without prior removal of the sheared edge arris, positioning of the component with the arris on the inside, or compression side of the bend will reduce the risk of failure during forming.

Other practical factors

Forming dies should exhibit chamfered corners and openings. The provision of liberal die radii, consistent with the finished component, will minimise excessive local strains and thereby reduce the risk of forming failure.

The risk of failure on forming heavy plate thickness or particularly restrictive bends may be somewhat reduced by preheating the plate (to about 75°C) prior to bending. This is particularly applicable to plate thickness above 20mm where the outer fibres of the tension face of the plate are subject to triaxial stress states by virtue of the bulk surrounding material. Brittle failure can result from such conditions and mild heating of the plate will reduce the tendency to failure. For similar reasons, forming should not be undertaken where the plate temperature is below 15°C. Formed plate components will generally exhibit springback on removal of the die or bending press force. This springback is due to the release of elastic strain energy and the magnitude of this strain is directly related to the yield strength of the material. For this reason a slightly greater “overbending” allowance should be made for high yield strength steels.

Properties of cold-formed components

For most structural applications, the extent of strain hardening and consequent increase in strength with reduction in toughness and ductility resulting from cold working need not warrant specific attention. For certain more critical applications however, or where particular processing is to be carried out subsequent to cold forming, it may be necessary to adopt alternative procedures. On most hot-rolled plates mechanical properties can be restored by a normalising heat treatment, typically at 900°C, followed by air-cooling.

This treatment eliminates all traces of cold work. However, such a “cold form-normalise”

cycle may not be appropriate to controlled rolled steels, which rely on steel mill rolling practice to attain their mechanical properties. Heat treatment of such steels (especially micro alloyed steels) may significantly lower the mechanical properties and should not be undertaken except with specialist advice. Partial restoration of properties and reduction of the residual stresses inherently associated with cold forming may be obtained with a stress relief heat treatment, typically at 600°C. Pressure vessels, heat exchangers and boilers, including those utilising steel plates to AS 1548, are generally subject to specification, or statutory authority requirements in respect of heat treatment after cold forming and hot forming. Reference to the appropriate specification (AS 1210) or authority is recommended before such processing of these steels.

Strain ageing is a metallurgical phenomenon whereby a delayed increase in strength, and loss of ductility and toughness occurs in susceptible steels as a result of strains induced by cold working. The ageing changes are both time and temperature dependent, and proceed very slowly at ambient temperatures. Exposure of a severely cold worked steel plate to elevated temperatures (up to about 450°C) may, however, result in an unacceptable loss of ductility, and may require that the component be subjected to additional heat treatment to restore acceptable mechanical properties. The extent to which strain ageing occurs depends on a large number of factors including steel type, thickness, degree of cold work, etc.

Welding of plate material adjacent to areas which have been severely cold worked may result in the area undergoing a thermal cycle sufficient to result in a reduction of toughness and ductility due to the mechanism of strain ageing. Welds on or immediately adjacent to cold worked regions of plate should be avoided if possible for this reason. The combined effects of hydrogen embrittlement during acid pickling, and strain ageing due to the thermal effects of hot dip galvanising, may result in unacceptably low ductility of cold worked and galvanised components. Stress relieving, or preferably normalising is recommended prior to galvanising of cold worked components which are to be subjected to any significant degree of stress in service. Brittle failure at quite low stresses can occur if this precaution is not observed, particularly where cold bending is carried out using a sharp edged former.



MaxiTRANS - manufacturing facility (this picture & below) at Ballarat. By plasma-cutting XLERPLATE®, the company can make key components such as main rails and even very small parts such as washers and brackets.



Hot forming

Hot forming refers to deformation carried out at a temperature (usually near 900°C) such that the strain hardening and the distorted grain structure produced by the process are rapidly eliminated by the formation of new strain free grains via a mechanism known as re-crystallisation. Very large deformations are possible in hot working because the recovery processes keep pace with the deformation. Therefore a much greater degree of forming may be carried out with hot working than with cold working. Additionally, because the strength of steel decreases with increasing temperature, the total energy (or press capability) necessary to deform a given component will be much lower for hot working than for cold working. Hot forming is therefore appropriate to plate applications where the required deformation is greater than that attainable with cold forming (e.g. certain pressure vessel heads). Hot forming may also be a desirable alternative to cold forming where press capacity is limited. There are, however, certain limitations to hot forming. The high temperatures involved often mean that surface oxidation (or scaling) and surface de-carburisation may be a problem. It may also be difficult to avoid rolling or pressing into the plate surface, the scale produced during the hot forming operation. Due allowance must be made for thermal expansion and contraction in hot forming. Certain steel plate grades rely on controlled thermo-mechanical processing at the steelworks in order to establish their mechanical properties. These include AS/NZS 3678-350, WR 350 and impact-tested grades (where plates are tested in the as-rolled condition). Such grades have their mechanical properties modified markedly by heat treatment or hot forming above 600°C and are therefore not readily amenable to such processing without specialist guidance. As a general rule plates should not be soaked for prolonged periods above 950°C, and it is preferable to hot form within normalising range near 900°C.

(left) There are five P&H 9020 walking draglines currently in operation around the world, with four of these in Australia. P&H MinePro Services use BlueScope Steel's XLERPLATE® in the construction of the deck, the high-strength radial tub and the walking shoes of the 9020.

Welding

To find the welding energy input and the preheat temperature required for use with a particular welding process on a particular steel of known thickness, the steps given below should be followed.

Good joint fit-up under moderate levels of restraint are assumed and additional preheat beyond that recommended will be required where fit up is poor or where high levels of restraint are likely to be encountered.

Step 1:

From Table 1 find the "Group Number" for the steel grade. For joints containing different steels use the higher Group Number.

Step 2: (over page)

Using Figure 1 (over page) calculate the "Combined Thickness" of the joint.

Step 3:

From Figure 1 find the closest curve to the intersection of Combined Thickness and Group Number. This curve designates the "Joint Weldability Index Letter".

Step 4:

From Figure 2 and using the curve bearing the same Joint Weldability Index Letter found from Step 3, read off the preheat temperature for the welding energy input or vice versa.

Table 1: Weldability Guide

Grade designation	Group numbers	Qualifying notes
XLERPLATE® Structural Grades - AS/NZS 3678		
250, 250L15	4	0
300, 300L15	4	0
350, 350L15	5	H/O
400, 400L15	5	H/O
450	5	H/O
WR350 (AUS TEN)	5	H/O
XLERPLATE® Analysis Grades - AS/NZS 3678		
A1006	1	0
K1042	8	H, SC, SR
XLERPLATE® Boiler & Pressure Vessel Grades		
AS 1548 - 5 -490	5	H/O
AS 1548 - 7 -430	4	0
AS 1548 - 7 -460	4	0
AS 1548 - 7 -490	5	H/O
ASTM A516 Grade 70	5	H/O
XLERCOIL® Hot-Rolled Strip Grades - AS/NZS 1594		
HA1	1	0
HA1006	1	0
HA1010	1	0
HA200	1	0
HA250 HU250	3	0
HU300, HU300/1	3	0
HA350	4	0
HW350	5	H/O
HXK15B30	8	H, SC, SR

Steel Grades and Group Numbers
Qualifying Notes

0 - Any electrode type or welding process is satisfactory.

H/O - Hydrogen controlled electrodes, or semi-automatic, or automatic processes are recommended; but rutile or other electrodes may be used.

H - Hydrogen controlled electrodes, or semi-automatic, or automatic processes are essential for good welding.

SC - Slow cooling from welding or preheat temperature is recommended.

SR - Postweld heat treatment (stress relief) is suggested for high quality work, particularly where severe service conditions apply to the component.



ED1 Rail of Port Augusta used XLERPLATE® steel to build these rail wagons used during the construction of the 1,420km Alice Springs to Darwin Rail Line. The harsh conditions encountered during construction demanded a flexible and durable solution.

Figure 1

Method of establishing Joint Weldability Index (A to L) from Grade Group Number and Joint Combined Thickness

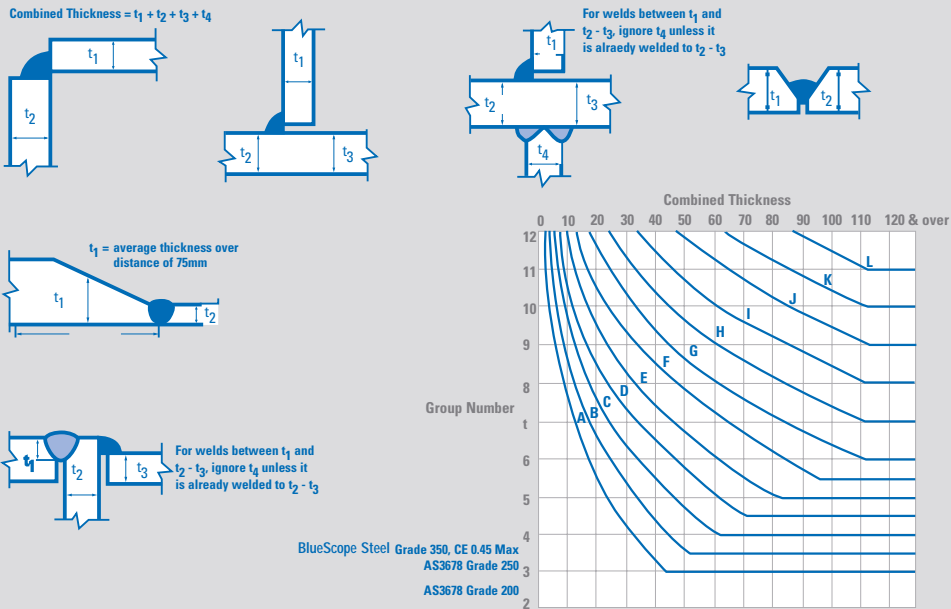
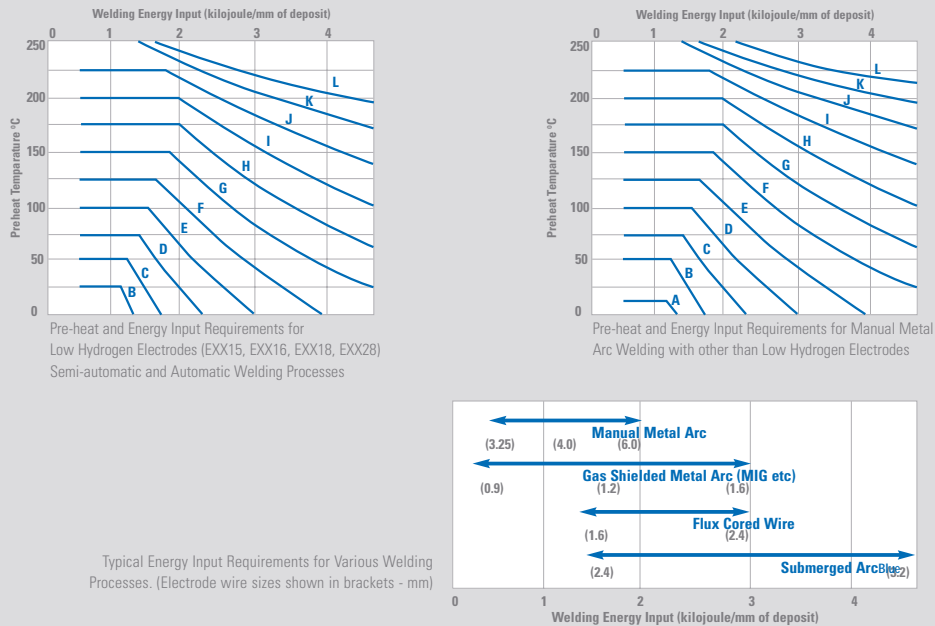


Figure 2

Method of establishing Pre-heat Temperature using Joint Weldability Index Letter and Welding Energy Input



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Ultrasonic testing AS 1710

Ultrasonic testing of plate is carried out for various engineering applications to ensure the product is free of any injurious defects.

This standard applies to the testing of steel plate for general internal quality, using methods which specify scanning to a designated scanning system. Quality grading, allows the specification of three quality levels for the body of the plate and one quality level for the edge zone (Levels 1, 2, 3 & E).

BlueScope Steel would normally limit the maximum thickness for Level 1 and 1E to 110mm and levels 2, 2E, 3 and 3E to 150mm for ultrasonic testing of plates. Plate thicknesses above these values should be referred to customer technical services.

Scanning of plate

Level 1 - Scan transverse to rolling direction at intervals of 75mm centres over the entire plate.

Level 2 - Scan transverse to rolling direction at intervals of 100mm centres over the entire plate.

Level 3 - Scan transverse to rolling direction at intervals of 150mm centres over the entire plate.

Edges of plate

Trimmed edges (for all quality levels) are scanned along a continuous band within 25mm of the trimmed edge.

No supplementary scanning is to be carried out along the untrimmed edges. Guarantee of limiting discontinuities in the body of the plate does not include the edge zone within 25mm of the untrimmed edge or half the plate thickness up to a maximum of 50mm.

Evaluation sensitivity

For plate thicknesses ≥ 5 mm and ≤ 15 mm

The gain required to bring the first back echo to full graticule height.

For plate thicknesses > 15 mm and ≤ 40 mm

The gain required to bring the second back echo to full graticule height.

For plate thicknesses > 40 mm and ≤ 180 mm

The gain required to bring the first back echo to full graticule height.



Sensitivity shall be monitored continuously. Any change in testing conditions shall be immediately compensated for by adjusting the gain of the flaw detector to maintain the correct testing sensitivity.

Evaluation

For plate thicknesses ≥ 5 mm and ≤ 15 mm - Twin 4 MHz
 > 15 mm and ≤ 40 mm - Single 4 MHz
 > 40 mm and ≤ 180 mm - Single 2 MHz

Probes and sensitivities used for plate testing differ from those used in weld testing. Therefore different results can be obtained testing the same material.

Significant discontinuity

Any indication greater than 50% of the reduced first or second back echo is considered significant. When significant discontinuities are found evaluation probes and sensitivities are used.

Evaluation

For plate thicknesses ≥ 5 mm and ≤ 15 mm

Laminations - Any discontinuity causing total reflection of acoustic energy for a probe movement of 5mm in a direction transverse to the major dimension of the discontinuity.

Cluster - Each area over which the echo amplitude exceeds 50% of the first back echo or reduced back echo. This determination shall be made when the discontinuity echo and the back echo are displayed simultaneously.

For plate thicknesses > 15 mm and ≤ 40 mm

Laminations - Any discontinuity causing total reflection of acoustic energy for a probe movement of 5mm in a direction transverse to the major dimension of the discontinuity.

Cluster - Each area over which the echo amplitude exceeds 50% of the second back echo or reduced back echo. This determination shall be made when the discontinuity echo and the back echo are displayed simultaneously.

For plate thicknesses > 40 mm and ≤ 180 mm

Laminations - Any discontinuity causing total reflection of acoustic energy for a probe movement of 5mm in a direction transverse to the major dimension of the discontinuity.

Cluster - Each area over which the echo amplitude exceeds 50% of the first back echo or reduced back echo. This determination shall be made when the discontinuity echo and the back echo are displayed simultaneously.

MAXIMUM SIZE OF DISCONTINUITIES

Main body of plate

Quality level	Minimum area discontinuity considered (significant discontinuity mm ²)		Maximum area of any individual laminar discontinuity	Maximum total area of discontinuity in any area 1m x 1m mm ²		Maximum avg. inclusion cluster area per m ² of entire plate surface
	Lam.	Incl.	mm ²	Lam.	Incl.	mm ²
Level 1	500	2000	1000	3000	5000	1500
Level 2	500	2000	3000	10000	16000	6000
Level 3	1000	5000	6000	20000	40000	15000

Plate edges (trimmed edges only)

Quality level	Min area of discontinuity considered significant discontinuity	Maximum length of discontinuity	Maximum area of individual discontinuity	Maximum avg. length of discontinuity in any 1m length	Maximum length of discontinuity per metre of edge length
	mm ²	mm	mm ²	mm	mm
Level E	300	50	500	100	50

Marking and identification of XLER[®] products

The traceability of product throughout the manufacturing process is maintained by computer tracking and physical identification. The most important product identifiers are the **plate serial number** or **coil number**. It is also important that heat number, material grade and dimensions are retained. This information is clearly presented on the final product by stencil or sticker and is also recorded on accompanying documentation.

Verification of identity

Verification of product identification should be made on receipt of product. The maintenance of the identification throughout storage or in further processing is the customer's responsibility.

Plate stencil

The Works standard practice is to mark each plate with a stencil. The stencil contains the following information:

- customer name
- destination
- size
- heat number
- steel grade
- serial number

- gross mass
- BlueScope Steel order and item number
- BlueScope Steel Australian made

Plate label

A recent innovation to XLERPLATE[®] has been the introduction of a new label. The label is stuck on the surface of the plate and wraps around the plate edge. The label has the plate serial number in alphanumeric characters and a barcode containing the following information:

- serial number
- grade
- size

Metal stamping

Metal stamping of heat number and serial number is available on enquiry, using low stress stamps.

Coil labels

All domestic mill edge coils are identified with an adhesive paper label, containing the following information:

- customer name
- destination

- size
- heat number
- steel grade
- colour brand
- serial number
- gross mass
- customer order number
- BlueScope Steel order and item number
- BlueScope Steel Australian made

Coil plate

BlueScope Steel custom processors cut coil to length. It is a requirement to stencil all cut plate with coil number, heat number and grade. Additional special customer information may be included within these markings on enquiry.

Floor plate

Plate mill rolled floor plate is stencilled as for normal plate.

Cut to length coil floor plate is generally not stencilled due to restrictions of roller type stencilling equipment.



XLER® Enquiries and order checklist

Order checklist

The following checklist should be used to ensure that your requirements are correctly specified for order placement or product enquiry. If you would like assistance, or you require information about a product or process that is not shown here, contact our XLERPLATE® or XLERCOIL® Customer Service groups or your nearest BlueScope Steel sales office listed below.

✓ Product

Specify your requirement for plates, coil plates, floor plates or coiled floor plates.

✓ Grade

Standard, General, or Negotiated. Include any special requirements, and take special care when ordering pressure vessel grades.

✓ Dimensions

Specify width (mm) x thickness (mm) x length (m). Check size schedules and note information about preferred and non-preferred dimensions, edge-trimming, re-squaring and machining allowances. Mill edge untrimmed plates should be resquared prior to use. Because there may be minor surface imperfections it is recommended that a minimum of 50mm additional allowance per edge be included for critical applications. These additional allowances should be included at the design stage to ensure allowance for gas cutting to final dimensions. Sufficient additional thickness should be allowed for machining to achieve final dimensions and clean-up surface.

✓ Quantity

Orders are expressed in terms of numbers of plates or coil plates, and mass (tonnes). The minimum ordering quantity for Standard

grades is in the range 10-13 tonnes depending on size. General and Pressure Vessel range is 10 tonnes. For other minimum order quantities refer to the appropriate product offer or consult a customer service representative. An exact number of plates may be ordered, however a price extra will apply.

Theoretical mass of plain plates and coil plates is calculated using the nominal dimensions and the density factor 7.85 tonnes per cubic metre.

With floor plates, 2 kg per square metre of plate area is added to the mass of plain plate of the same nominal dimensions to account for the pattern projections.

Not less than the ordered number of plates will be supplied unless it is agreed that a part supplied item can be taken as complete. Up to a maximum of 10 per cent may be over-supplied. Where an exact number of plates is required, a price extra will apply.

✓ Edge condition

Specify trimmed, or untrimmed/mill edge. It is not recommended that untrimmed edges be used directly in any fabrication. Trimmed Edge is produced by shearing or gas cutting.

✓ Inspection

Works inspection, inspection by an independent authority, or off-line inspection can be called out at your request.

✓ Ultrasonic inspection

If required for critical structural or pressure vessel plate applications, specify AS 1710 and the required quality level. (Refer to Section Six of this brochure)

✓ Certification

Test certificates are supplied. Specify if you require certificates witnessed and endorsed by an independent authority.

✓ Marking

Specify any special identification requirements.

✓ End Use

Specify end use or project, or whether the product is required for stock. Where flatness is critical, talk to the Customer Service Group.

✓ Destination

The address to which delivery is to be made.

✓ Leadtime

This should be established in consultation with a BlueScope Steel representative.

Where to buy XLER® products

BlueScope Steel XLERPLATE® and XLERCOIL® products are available from an extensive network of Australian distributors who offer a range of value adding services. For the location of your nearest distributor check the "Suppliers" section of the XLER® web site (www.xlerplate.com.au) or the Australian Steel Institute web site (www.steel.org.au).

Or you can contact one of the BlueScope Steel offices listed below.

XLER® Customer Service groups

For all XLERPLATE® pricing and order management enquires.

Free Call 1300 135 004

Facsimile 1300 135 003

email:

plate.customer.service@bluescopesteel.com.au

For all XLERCOIL® pricing and order management enquires:

Free Call 1800 007 247

Free Fax 1800 009 247

BlueScope Steel Direct

General enquires about BlueScope Steel, technical enquires about XLER® products or BlueScope Steel publications

Free Call 1800 800 789

Facsimile 1800 800 744

BlueScope Steel Direct

www.bluescopesteel.com

Locked Bag 8825

South Coast Mail Centre NSW 2521

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Facsimile (07) 3845 9394

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76 Lysaght St Acacia Ridge QLD 4110

New South Wales

Telephone (02) 9795 6700

Facsimile (02) 9795 6878

PO Box 144 Greenacre NSW 2190

73 Anzac St Chullora NSW 2190

Victoria & Tasmania

Telephone (03) 9586 2222

Facsimile (03) 9586 2201

PO Box 139 Mordialloc VIC 3195

207-213 Governor Road Braeside VIC 3195

South Australia & Northern Territory

Telephone (08) 8243 7333

Facsimile (08) 8243 7304

PO Box 59 Rosewater East SA 5013

69 Wingfield Rd Wingfield SA 5013

Western Australia

Telephone (08) 9330 0615

Facsimile (08) 9330 0697

PO Box 4035 Myaree Business Centre WA 6960

88 Norma Rd Myaree WA 6154

New Zealand

New Zealand Steel

Telephone (09)3758209

Facsimile (09)3758213

Plate Technical Enquires

(09) 3758090 / (09) 3758015

Private Bag 92121, AUCKLAND

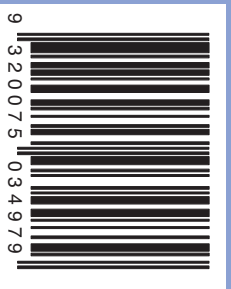
Xlerplate® Xlercoil®



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