

Plate – PL

Pressure Vessel - PV

GENERAL DESCRIPTION

A fully killed, fine grained, carbon-manganese steel for boiler and pressure vessel applications, with a guaranteed minimum tensile strength of 460MPa. Produced by hot rolling and normalising

AUSTRALIAN STANDARDS

AS 1548:2008
AS/NZS 1365: 1996

FEATURES & BENEFITS

- Guaranteed design strengths as per AS1210
- Superior weldability and formability
- Grade available with guaranteed low temperature properties
- This grade is recognised in the ASME material codes

WARNINGS

- This material should be used in conjunction with the appropriate design and welding standards
- Guidelines for cold bending, where fracture toughness is important are given in AS 4100 and AS12210

NORMAL / OPTIONAL SUPPLY CONDITIONS

	Normal	Optional
Thickness Range	10mm – 100mm	
Availability		
Edge Condition	Trimmed	
Tolerances	Thickness: AS 1548: 2008 Others: AS/NZS 1365: 1996	
Ultrasonic Inspection		AS 1710: 2007
Surface Inspection	BlueScope Steel	Third party
Certification	BlueScope Steel	Third party endorsed

Optional supply conditions may be subject to dimensional restrictions

CHEMICAL COMPOSITION

Element	Guaranteed Maximum %	Typical % Thickness (mm)	
		N,NL20,NL40 10 ≤ t ≤ 80	N,NL20 80 < t ≤ 100
Carbon	0.20	0.15	0.15
Silicon	0.60	0.35	0.35
Manganese	1.70	1.35	1.35
Phosphorus	0.040	0.020	0.020
Sulfur	0.030	0.006	0.003
Chrome	0.25	0.017	0.023
Nickel	0.50	0.023	0.021
Copper	0.40	0.010	0.017
Molybdenum	0.10	0.003	0.002
Aluminium	0.100	0.035	0.035
Titanium	0.040	0.018	0.018
Niobium*	0.010	0.003	0.005
CEQ (IIW)	0.43	0.39	0.39

All values shown refer to the relevant Australian Standard unless otherwise stated

$$CEQ(IIW) = C + \frac{Mn}{6} + \frac{(Cr + Mo + V)}{5} + \frac{(Cu + Ni)}{15}$$

*Niobium (up to 0.030%) may be added for L20, L40 and L50 designations

MECHANICAL PROPERTIES

Tensile Properties (Transverse)		Thickness (mm)			
		10 < t ≤ 16	16 < t ≤ 40	40 < t ≤ 80	80 < t ≤ 100
Yield Strength (MPa)	Guaranteed Min	305	295	275	265
	Typical	320 - 400	320 - 380	290 - 370	280 - 360
Tensile Strength (MPa)	Required	460 - 580	460 - 580	460 - 580	460 - 580
	Typical	480 - 520	470 - 530	460 - 530	470 - 530
Elong. On 5.65√S ₀ (%)	Guaranteed Min	21	21	21	21
	Typical	22 - 39	22 - 36	24 - 35	24 - 36

Charpy Impact Properties	Longitudinal on 10 x 10mm specimen	Test Temp °C	Absorbed Energy (joules)	
			Av. Of 3	Ind.
Guaranteed Min	PT460N	0	31	23
Typical			80 - 200	40 - 180
Guaranteed Min	PT460NL0	0	51	38
Typical			80 - 200	40 - 180
Guaranteed Min	PT460NL20	-20	47	35
Typical			80 - 150	40 - 180
Guaranteed Min	PT460NL40	-40	45	33
Typical			50 - 120	40 - 150

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PT460NH– Elevated Temp. Tensile Properties - Guaranteed Min 0.2% Proof Stress (MPa)									
Thickness (mm)	50°C	100°C	150°C	200°C	250°C	300°C	350°C	400°C	450°C
t ≤ 16	295	277	257	236	216	199	184	173	163
16 < t ≤ 40	285	268	249	228	209	192	178	167	157
40 < t ≤ 80	266	250	232	213	195	179	166	156	145
80 < t ≤ 100	256	241	223	206	188	173	160	150	141

Values correspond to the lower trend curve determined according to EN10314 with a confidence limit of around 98% (2 standard deviations below the mean)

FORMABILITY

Thickness (mm)	Long	Trans
t < 20	1.5t	1.0t
20 < t ≤ 50	6.0t	4.0t
t > 50	Hot form	

Recommended min. inside radii

HARDNESS

Typical
130 – 170 BHN

WELDABILITY

Group
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Refer to WTIA Technical Note 1 or AS/NZS 1554.1