Comparison quality P460NL and P460NL2

EN 10028:3

The specification EN 10028:3 covers a range of weld-able fine grain steels supplied in the normalised condition and intended for pressure purposes. It has three steel grades (P275, P355, and P460) which indicate each grade's minimum yield strength (in MPa) for plates 16 mm thick and below. These are further subdivided on the basis of impact testing (transverse) temperature: N and NH indicate impact testing at -20 degrees C or above, NL1 at -40 degrees C or above, and NL2 at -50 degrees C or above.

The designation EN 10028:3 **P460NL1** shows that this is steel for pressure purposes (P) with minimum yield strength of 460 MPa (460) which is impact tested in the transverse direction at -40 deg C (NL1).

The designation EN 10028:3 **P460NL2** shows that this is steel for pressure purposes (P) with minimum yield strength of 460 MPa (460) which is impact tested in the transverse direction at -50 deg C (NL2).

Chemical Requirements - P460NL1

(cast analysis, % by mass, **maximum** permitted unless indicated otherwise)

C	Si	Mn	P	S	Al_{total} *	N	Cr
0.20	0.60	1.10-1.70	0.025	0.015	0.020 min	0.025	0.30
Cu **	**Mo**	**Nb**	**Ni**	**Ti**	**V**	**Nb+Ti+V**	
0.70	0.10	0.05	0.80	0.03	0.20	0.22	

*The Al content may fall short of this minimum if Nb, Ti, or V are additionally used for Nitrogen binding. If only Al is used for Nitrogen binding, the ratio Al/N shall be 2 or greater.

**If Cu exceeds 0.30%, Ni shall be at least half of the Cu content.

Chemical Requirements - P460NL2

(cast analysis, % by mass, maximum permitted unless indicated otherwise)

C	Si	Mn	P	S	Al_{total} *	N	Cr
0.20	0.60	1.10-1.70	0.020	0.010	0.020 min	0.025	0.30
Cu **	**Mo**	**Nb**	**Ni**	**Ti**	**V**	**Nb+Ti+V**	
0.70	0.10	0.05	0.80	0.03	0.20	0.22	

*The Al content may fall short of this minimum if Nb, Ti, or V are additionally used for Nitrogen binding. If only Al is used for Nitrogen binding, the ratio Al/N shall be 2 or greater.

**If Cu exceeds 0.30%, Ni shall be at least half of the Cu content.

Tensile Requirements - P460NL1

Product Thickness	Yield Strength MPa	Tensile Strength MPa	Elongation A%
up to 16 mm	460 min	570 to 730	17 min
16 to 40 mm	445 min	570 to 720	17 min
over 40 to 60 mm	430 min	570 to 720	17 min
over 60 to 100 mm	400 min	540 to 710	17 min

Impact energy values for the normalised condition

a) transverse

-50 °C	-40 °C	-20 °C	0 °C	+20 °C
-	27 J min	35 J min	50 J min	60 J min

b) longitudinal

-50°C	-40°C	-20°C	0 °C	+20°C
30 J min	40 J min	50 J min	70 J min	80 J min

Tensile Requirements - P460NL2

Product Thickness	Yield Strength MPa	Tensile Strength MPa	Elongation A%
up to 16 mm	460 min	570 to 730	17 min
16 to 40 mm	445 min	570 to 720	17 min
over 40 to 60 mm	430 min	570 to 720	17 min
over 60 to 100 mm	400 min	540 to 710	17 min

Impact energy values for the normalised condition

a) transverse

-50 °C	-40 °C	-20 °C	0 °C	+20 °C
27 J min	30 J min	40 J min	60 J min	70 J min

b) longitudinal

-50°C	-40°C	-20°C	0 °C	+20°C
42 J min	45 J min	55 J min	75 J min	85 J min