

DILLIDUR 400 V

WATER QUENCHED WEAR RESISTANT STEEL

— **DILLIDUR 400 V** is a wear resistant steel fine grain treated at average hardness of 400 HB in delivery condition whose mechanical properties are obtained by water quenching.

— The production range of the **DILLIDUR 400 V** plates is 6 mm (¼ in) to 150 mm (6 in), other sizes possible on request.

Chemical composition

C	Mn	Si	S	P
≤ 0.20	≤ 1.80	≤ 0.50	≤ 0.010	≤ 0.025

Depending on thickness, the following alloying elements are used singly or in combination for controlling of full hardening:

Mo	Ni	Cr	V	Nb	B
≤ 0.50	≤ 0.80	≤ 1.50	≤ 0.08	≤ 0.05	≤ 0.005

Typical values for the carbon equivalent:

Thickness (mm)	≤ 25	25 - 30	30 - 50	50 - 90	90 - 150
CEV[*]	0.37	0.44	0.54	0.64	0.72

[*] $C + Mn/6 + (Cr + Mo + V)/5 + (Ni + Cu)/15$

Mechanical properties in delivery condition (indicative values)

— Hardness:

Hardness at room temperature: 400 HB average, 370 - 430 HB (Hardness tested once per heat and 40 t).

UTS (MPa (ksi))	YS (MPa (ksi))	E (%)
1 300 (190)	1 000 (145)	12

— Toughness:

Thickness (mm (in))	Toughness (J) at -40 °C
20 (0.8)	30

Processing information

— Cold bending:

Cold bending should be carried out at a minimum temperature of 10 °C. The bending radius should be as large as possible considering the minimum stated parameters. It is advisable to use as generous radius as possible and ensure plates are above 10 °C. Power requirements are extremely high and springback must be allowed for. To avoid cracking, flame cut plate edges should have a 2 - 3 mm wide chamfer ground on the top and the bottom edges. bending angles 90°.

	Internal minimum radius	Die opening minimum
Transversal	3 x th	10 x th
Longitudinal	4 x th	12 x th

— Drilling:

8 % cobalt high speed steel drills (grade M42) in styles having a slow helix, a short flute length, a thick web and a point thinned angle of 130° are recommended. A very rigid set-up is essential with an abundant flow of cutting fluid. The work-piece should preferably be securely clamped to a mild steel backing plate and positioned close to the drill post. The following speeds / feeds are appropriate.

Ø 5 mm		Ø 10 mm		Ø 15 mm		Ø 20 mm		Ø 30 mm	
rpm	feed mm / rev	rpm	feed mm / rev	rpm	feed mm / rev	rpm	feed mm / rev	rpm	feed mm / rev
570	0.05	290	0.10	190	0.16	150	0.20	90	0.30

— Hot forming:

The grade is not suitable for hot forming. Heating above 200 °C reduces the as-supplied mechanical properties.

— Flame cutting & welding:

For flame cutting, the following minimum preheating temperatures should be observed: 75 °C for plate thicknesses from 30 up to 50 mm and 100 °C for thicker plates.

— For a manual welding operation, electrodes with a very low residual moisture level must be used. It may be necessary to carry out an additional drying process according to the manufacturers parameters.

— Additionally the following recommendations are to be considered: Generally up to a thickness of 20 mm (0.8 in.) the steel can be butt welded without preheating. In order to eliminate the risk of cracking in the welded joint, in case of high rigidity of structure, a preheating temperature of 125 - 175 °C is generally recommended for thicknesses > 20 mm (0.8 in.). A preheating over 200 °C must be avoided, as this would decrease the hardness of the plate.

— Weld fillers should be as soft as loading conditions of the construction and wear and tear of the weld will allow.