NLMK Europe – Plate

Quend®
HIGH YIELD STRENGTH STEEL

EXTRA HIGH STRENGTH STRUCTURAL STEELS

QUEND 700

1. Steel description and applications

Quend 700 is extra high strength structural steel produced as quenched and tempered with a minimum yield strength of 700 MPa. Quend 700 complies with the requirements corresponding to the S690QL given in the EN 10025-6 standard, where a minimum impact thoughness of 27 J is guaranteed at -40°C.

Quend 700 is recommended for the **following applications:**

- truck chassis
- lifting and hoisting equipment
- handling equipment
- trailers …

2. Technical characteristics

Tensile properties

TRANSVERSE TESTING		
Yield strength Rp 0.2	Tensile Strength Rm	Elongation A5
700 MPa min	780 - 930 MPa	14% min

Impact toughness

Minimum values at		
0 °C	-20 °C	-40 °C
35 J	30 J	27 J

Transverse testing according to EN 10025 option 30. Thickness < 12 mm subsized charpy V specimen have been used.

Testing according to EN 10025.

Chemical composition The steel is fine grain treated.

Max ladle analysis , %													
C	Si	Mn	P	S	Nb	Cr	V	Ti	Ni	Al	Mo	N	B
0,20	0,60	1,50	0,020	0,010	0,040	0,80	0,070	0,040	1,00	0,070	0,50	0,014	0,005

Carbon equivalent, typical values, %		
Thickness	CEV(1)	CET(2)
4 - 15 mm	0.45	0.29
15.01 - 25 mm	0.44	0.30
25.01 - 40 mm	0.45	0.30
40.01 - 64 mm	0.54	0.33

(1) CEV = C+Mn/6+ (Ni+Cu)/15+ (Cr+Mo+V)/5, (2) CET = C+(Mn+Mo)/10+Ni/40 +(Cr+Cu)/20

3. Dimensions

Quend 700 is currently supplied in the **following range**:

- thickness: 4 – 64 mm
- width: 1500 - 3100 mm

For more information, please check our website or contact your local NLMK Clabecq representative.

4. Flatness, tolerances & surface properties

Quend 700 is delivered with a unique combination of excellent flatness, tight thickness tolerances and superior surface finish.

Feature	Norm
FLATNESS	- EN 10029: . Class N (standard) & . Class S **PLUS**
THICKNESS tolerance	- meets and exceeds EN 10029 Class A - tighter tolerances upon request **PLUS**
Shape, length, width tolerances	meets EN 10029
SURFACE properties	exceeds the usual market standards, EN 10163-2 Class B3 **PLUS**

5. Delivery conditions

Quend 700 is delivered as quenched and tempered. Our Quend plates are supplied as standard in the **shotblasted and painted** condition. In order to maintain a good weldability and laser cutting performance, a low zinc silicate primer is applied. Plates can also be delivered unpainted.

6. Heat treatment

The mechanical properties of Quend 700 has been obtained by quenching and tempering. For not losing the guaranteed properties of Quend 700, the plate should not be used in applications requiring hot working and service temperatures above 550 °C.

7. Ultrasonic testing

Ultra sonic testing (UT), is applied to secure the plate from discontinuities like inclusions, cracks and porosity. In thickness from 8 mm and up, all plates are UT tested and controlled against class S2, E2, according to EN 10160.

8. General processing recommendations

To obtain optimal work shop productivity when processing Quend 700, it is essential to use the recommended procedures and tools given below.

Thermal cutting

Quend 700 may be cut either by oxygen fuel, plasma and laser cutting without any restrictions.

Subsequent to cutting, let the cut parts slowly cool down to room temperature. Do never accelerate the cooling of the parts. A slow cooling rate will reduce the risk of cut edge cracking.

Cold forming

Quend 700 is very well suited for cold forming operations.

Quend 700 complies with the S690QL bending requirements but offer even closer R/t ratios:

Thickness (mm)	Transverse to rolling (R/t)	Longitudinal to rolling (R/t)	Trans. Width (W/t)	Long. Width (W/t)
$t < 8.0$	1.5	2.0	8	9
$8 \leqslant t < 20$	2.0	3.0	8	9
$t \geqslant 20.0$	3.0	4.0	9	10

R = Recommended punch radius (mm), t = Plate thickness (mm) , W – Die opening width (mm) (bending angle $\leqslant 90°$)

Due to the homogeneous properties and narrow thickness tolerances of Quend 700, variations in springback are kept at a low level. Grinding of flame cut or a sheared edge in the bending area is recommended to further prevent cracking during bending.

Welding

Welding of Quend 700 can be performed using any of the conventional welding methods available both as manual or automatic.

In the thickness range up to 30 mm, preheating prior to welding is normally not needed, if a heat input of 1,7 kJ/mm is used.

Welding of Quend 700 is recommended to be performed at ambient temperature not lower than +5 °C. Subsequent to welding, let the welded parts slowly cool down to room temperature. Do never accelerate the cooling process of the weld.

It is always recommended to use low hydrogen electrodes when welding Quend 700.

Machining

Quend 700 provides a very good machinability and can be drilled, counter sinked and milled in the same way as any other 700MPa or S690QL Q&T steel.

For more information regarding welding, cold forming and machining, please consult the respective manuals with technical recommendations on http://qt.nlmk.com

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