ABRASERVICE
UK

DILLIMAX 1100

HIGH-STRENGTH STRUCTURAL STEEL (QUENCHED AND TEMPERED)

— **DILLIMAX 1100** is a high strength quenched and tempered, fine grained structural steel with a minimum yield strength of 1100 MPa in its delivery condition ex works. Its mechanical properties are achieved by water quenching followed by tempering.

— **DILLIMAX 1100** is preferentially used by the customers for welded steel structures within mechanical constructions, plant constructions and structural steel work, such as machines for structural engineering, conveying plants, hoists, cranes and frameworks.

Product description

— **Designation and range of application:**
DILLIMAX 1100 can be delivered with minimum impact values down to -40 °C and in the following dimensions according to the dimensional program: Thickness from 8 to 30 mm (0.3 to 1.2 in); Width up to 2500 mm (98 in).

— Plate thicknesses and dimensions which deviate from the usual dimensional program for this steel grade, may be possible on request.

Chemical composition

C	Si	Mn	P	S	Cr	Ni	Mo	B	V + Nb	Ti
≤ 0.18	≤ 0.50	≤ 1.60	≤ 0.015	≤ 0.005	≤ 2.00	≤ 3.50	≤ 0.70	≤ 0.004	≤ 0.10	≤ 0.01

The steel is fine grained through sufficient aluminium content.

Mechanical properties in delivery condition

— **Delivery condition:**
Water quenched and tempered. Direct quenching after rolling with subsequent tempering is equivalent to the conventional water quenching and tempering.

— **Tensile test at ambient temperature transverse test specimens:**

Thickness (mm (in))	UTS (MPa)	Ys (MPa)	E (%)
≤ 30 (1.2)	1200-1500	1100	10

— **Impact test on charpy-V-specimens:**

Specimen direction	Impact energy Av (J) (ft.-lb.) at test temperature of 40 °C
longitudinal / transverse	30 / 27

The specified minimum value is the average of 3 tests. Not more than one individual value is permitted to be below this minimum value, and no more than 30 %. For plate thickness below 10 mm, the test will be carried out on Charpy-V test specimens with reduced width. The minimum impact value will be reduced proportionally.

— **Tolerances:**
Unless otherwise agreed, the tolerances will be in accordance with EN 10029, with class A for thickness and table 4, steel group H, for the maximum flatness deviation.

— **Testing:**
Tensile and impact tests will be performed on both ends of the rolled plate. The specimens for the tensile test are prepared according to EN 10025-6. Testing is carried out on specimens of gauge length $L_0 = 5.65\sqrt{S_0}$ or $L_0 = 5d_0$ in accordance with EN 10002-1. Tensile tests according to ASTM A370 may be agreed. The impact test will be carried out on Charpy-V-specimens in accordance with EN 10045-1. Unless otherwise agreed, the test will be performed on transverse test specimens taken close to the surface. Unless otherwise agreed, the test results are documented in a certificate 3.1 (3.1 B) in accordance with EN 10204.

— **Identification:**
The marking of plates is carried out via steel stamps with at least the following information:
- steel designation (**DILLIMAX 1100**);
- heat number;
- number of mother plate and individual plate;
- the manufacturer's symbol;
- inspection representative's sign.

— **Surface quality:**
Unless otherwise agreed, the specifications will be in accordance with EN 10163, class A2.

* If not apparent, the yield strength $R_{p0.2}$ is measured instead.

Processing information

— **Processing:**

The entire processing and application techniques are of fundamental importance to the reliability of the products made from this steel. The user should ensure that his design, construction and processing methods are aligned with the material, correspond to the state-of-the-art that the fabricator has to comply with and are suitable for the intended use. The customer is responsible for the selection of the material. It has to be respected, that with higher yield strength the notch- and fatigue sensibility is increased for the base and weld material. This will often imply higher requirements for the construction and the quality of welds. We recommend to consult us prior to the first working with **DILLIMAX 1100**.

— **Hot forming:**

Forming at temperatures above 200 °C is not allowed. The original quenched and tempered condition would thereby be altered. As a result, a new quenching and tempering treatment is always necessary after hot forming.
When applying a new quenching and tempering treatment, it should be noted that it is not always possible to obtain the same properties as with the original heat treatment at the mill, because of different heat treatment equipment, for example. In this respect we recommend you to contact us prior to ordering in all cases where hot forming is required. However, it is the fabricator's responsibility to obtain the required values of the steel through an appropriate heat treatment.

— **Cold forming:**

DILLIMAX 1100 can be cold formed below 200 °C taking into account its high yield strength. Flame cut or sheared edges in the bending area should be ground before cold forming. Cold forming is always related to a hardening of the steel and a decrease in toughness. In contrast to lower yield strength steels **DILLIMAX 1100** can not be heat treated at temperatures about 550 °C to reduce the strain hardening effects. After higher cold forming amounts or if prescribed by regulations, a new quenching and tempering treatment may become necessary to restore the required mechanical properties. In this case, we recommend to consult us prior to ordering.

— **Welding and flame cutting:**

Due to its high yield strength, the fabrication of **DILLIMAX 1100** requires special care. For flame cutting, preheating becomes necessary for higher plate thickness. For general welding instructions, please consult the standard EN 1011. The raised yield strength of the base material must be taken into account when the filler materials are chosen. It should be considered that increased heat input leads to lower tensile properties in the weld metal. Experience has shown that the welding conditions should be chosen so that the cooling time t does not exceed 8 seconds. As yet no welding consumables are commercial that produce 8 / 5 tensile properties matching the ones of the base material. Thus fully loaded joints must be avoided by an appropriate design. To avoid hydrogen-induced cold cracking, only filler materials which add very little hydrogen to the weld metal may be used. Therefore, shielded arc welding should be preferred. For manual arc welding, electrodes with basic coating (type HD < 5 mL / 100g in accordance with ISO 3690) which are redried and stored according to the manufacturer's instructions, should be used. With increasing plate thickness and restraint of the weld, a soaking for hydrogen effusion immediately after welding is recommended. The maximum temperature for this treatment should in any case not exceed 200 °C.

General note

— If further informations are required, please request a copy of our technical guide.

Contact

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