

DILLIDUR 325 L

Air hardened wear resistant steel

Material data sheet, edition October 2020¹

DILLIDUR 325 L is successfully applied by the customers where high resistance to wear is required together with good weldability and good machinability, especially if heat treatment or hot forming is provided.

Examples: loading machines, dredgers, skip cars, conveying plants, trucks, cutting edges, knives and breakers.

Product description

Designation and range of application

DILLIDUR 325 L can be delivered in thicknesses from 6 mm ($\frac{1}{4}$ in.)² to 100 mm (4 in.)² according to the dimensional program. It may be possible to supply other dimensions on request.

Chemical composition

For the ladle analysis, the following limiting values in % are applicable:

| C | Si | Mn | P | S | Cr |
|--------|-------------|-----------|---------|---------|-----------|
| ≤ 0.23 | 0.30 - 0.70 | 1.2 - 1.7 | ≤ 0.025 | ≤ 0.010 | 1.0 - 1.6 |

| Mo | Cu | Ni | V | Nb + V + Ti |
|-------|-------|-------|--------|-------------|
| ≤ 0.5 | ≤ 0.6 | ≤ 0.6 | ≤ 0.20 | ≤ 0.20 |

The steel is fully killed and fine grain treated.

Delivery condition

The plates are delivered normalized or in an equivalent condition obtained by normalizing rolling (short designation in the certificate for both delivery conditions: N). Depending on the thickness, a complementary tempering treatment may be performed.

¹ The current version of this material data sheet can be also found on www.dillinger.de.

² The approximately converted values in brackets are for information only.

Mechanical properties in the delivery condition

| Plate thickness t [mm] (in.) ^a | Brinell surface hardness at room temperature [HBW] |
|---|--|
| t ≤ 15 (0.6) | ≥ 280 |
| 15 (0.6) < t ≤ 25 (1) | ≥ 260 |
| 25 (1) < t ≤ 100 (4) | ≥ 240 |

^a The approximately converted values in brackets are for information only.

Auxiliary values for 10 mm plate thickness

| | |
|------------------|--|
| Hardness | 325 HBW |
| Tensile strength | 1 000 MPa (145 ksi) ³ |
| Yield strength | 650 MPa (95 ksi) ³ |
| Elongation | 13 % ($L_0 = 5.65 \cdot \sqrt{S_0}$, transverse specimen) |
| Impact energy: | Charpy-V longitudinal specimens: 20 J (15 ft·lbf) at -20 °C (-4 °F) ³ |

Testing

Brinell surface hardness tested once per heat and 40 t.

Identification of plates

Unless otherwise agreed the marking is carried out via steel stamps with at least the following information:

- steel grade (DILLIDUR 325 L)
- heat number
- number of mother plate and individual plate
- the manufacturer's symbol
- inspector's sign

Fabrication properties

The entire fabrication and application techniques are of fundamental importance to the reliability of the products made from this steel. The fabricator should ensure that his calculation, design and fabricating 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. The recommendations in accordance with EN 1011 should be observed.

³ The approximately converted values in brackets are for information only.

Flame cutting and welding

General recommendations for welding are indicated in EN 1011, whereby the high content of alloying elements and the higher hardenability have to be taken into account.

Additionally, the following recommendations have to be considered:

For flame cutting, a preheating temperature of at least 120 °C (250 °F) is recommended for plate thicknesses above 10 mm.

In case of high rigidity of structure, high weld metal hardness, unfavourable atmospheric conditions, a preheating temperature of 100 - 200 °C (210 - 390 °F) is recommended to reduce the risk of cracking in the welded joint.

The maximal working temperature is 300 °C (570 °F), for a short period. Welding consumables should be chosen as soft as possible provided the construction and wear conditions of the welded joint allow for it.

Cold forming

DILLIDUR 325 L can be cold formed in spite of its high hardness. Grinding of the flame cut or sheared edges in the bending area is recommended to avoid crack initiation.

The cold forming operations should be carried out under consideration of the following recommendations (t is the plate thickness):

| Position of bending line to rolling direction | Minimum bending radius | Minimum die opening |
|---|------------------------|---------------------|
| Transverse direction | 5 t | 14 t |
| Longitudinal direction | 6 t | 16 t |

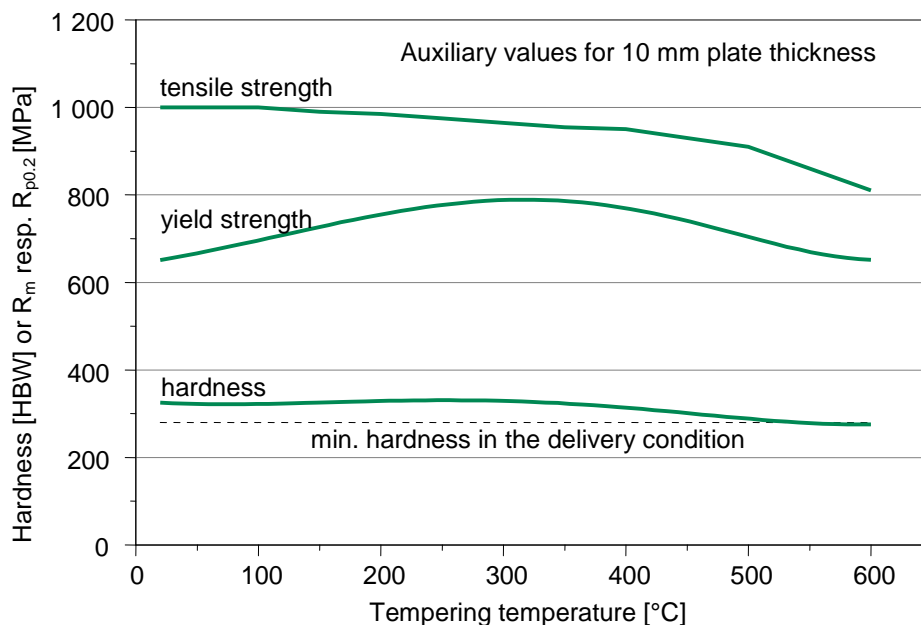
Hot forming and heat treatment

The steel obtains its hardness by normalizing (air cooling from austenitizing temperature, if necessary with additional tempering). Consequently, there is no hardness drop after hot forming if temperature cycles equivalent to normalizing are applied, or if the hot forming process is followed by a normalizing heat treatment.

Normalizing temperature: 920 - 970 °C (1 690 - 1 780 °F).

The steel can be heated to about 500 °C (930 °F) without any additional heat treatment and any substantial drop in hardness.

The following diagram shows the general changes in hardness or strength values after a heat treatment :



Machining

The steel can be machined with HSS-drills and especially with HSS-Co-alloyed drills with a satisfactory service life if the drill advance and cutting speed are correspondingly accommodated. Drilling with hard metal drills is not necessary.

For milling and sawing, reversible carbide tips with a negative cutting edge are recommended.

General technical delivery requirements

Unless otherwise agreed, the general technical requirements in accordance with EN 10021 are applicable.

Tolerances

Unless otherwise agreed, the tolerances are in accordance with EN 10029, with class A for thickness.

Surface quality

Unless otherwise agreed, the provisions in accordance with EN 10163-2, class A2 are applicable.

General note

If special requirements, which are not covered in this material data sheet, are to be met by the steel due to its intended use or processing, these requirements are to be agreed before placing the order. The information in this data sheet is a product description. This data sheet is updated at irregular intervals. The current version is available from the mill or as download at www.dillinger.de. For more information about application and machining of DILLIDUR 325 L, please refer to our technical information DILLIDUR.

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