



DILLINGER HÜTTE GTS

DICLADUR

CLAD PLATES FOR WEAR RESISTANT APPLICATION

Specification DH-E49-A
Edition June 1999

DICLADUR is a double layer steel made through rolling bonding combining best wear resistance properties with very good toughness and fabrication behaviour. Its major application is load bearing and impact loaded members exposed to heavy wear. DICLADUR is used in the earth moving and construction industry, in quarries, gravel pits, mines and in the iron and steel industry. A typical application field is also longitudinally welded and inside hardened piping for the transport of solid material by air pressure or immersed in water, e.g. harbour dredging, mud, coal or iron ore pumping, concrete pumps.

Product description

Designation and range of application

DICLADUR can be delivered in different types for hardening and for different applications. The standard base material is steel grade S235JR. As clad material steel grades with higher carbon contents for hardening with good wear resistant properties and depending on the alloying content simultaneously good properties against corrosion are used. The clad materials are divided into 3 groups depending on wear and corrosion resistance properties, whereas the designation of cladding is given by the height of the carbon content.

1. Group: Normal wear resistance (NAR), carbon content of the clad material: $C < 0,80\%$

Designation	Clad material
DICLADUR NAR 50	C50
DICLADUR NAR 51	51Mn7X4
DICLADUR NAR 75	75Cr1

2. Group: High wear resistance (HAR), carbon content of the clad material: $C \geq 0,80\%$

Designation	Clad material
DICLADUR HAR 86	86CrMoV7

3. Group: Wear and corrosion resistance (CAR)

Designation	Clad material
DICLADUR CAR 42	X42Cr13

Cladding with other base materials, for example S355J2G3, or other clad materials is possible on request.

DICLADUR

DICLADUR can be delivered with total thickness ranging from 8 to 80 mm (0.3 to 3.15 in.), a maximum width of 3000 mm (118 in.) and a maximum length of 12000 mm (472 in.). The combination of different thicknesses is possible, but the minimum thickness of the base metal should be 25-75% of the total thickness, that means ≥ 2 mm (0.08 in.) or ≤ 60 mm (2.4 in.). Please indicate the required thickness combination of the base and clad material, and of the dimensions when ordering (see order example). Other thickness combinations and dimensions are possible on request.

Delivery condition

For better workability DICLADUR is delivered with a softening annealing. If a special minimum or maximum hardness is required in the delivery condition, it should be agreed before ordering.

Order example

DH-D49-A, DICLADUR NAR 51 // S235JR, 6//2 x 2000 x 6000 mm (0.24//0.08 x 79 x 236 in.)

DH-D49-A, DICLADUR HAR 86 // S235JR, 50//30 x 3000 x 12000 mm (2.0//1.18 x 118 x 472 in.)

The values in brackets are for information only.

Mechanical properties in the delivery condition

Tensile properties and hardness

The properties of different kinds of steel are according to the appropriate standards or material specifications, as far as applicable for clad plates. It has to be taken into account, that the mechanical properties depend on the delivery condition agreed upon (as rolled, annealed, other heat treatment) and that subsequent heat treatment such as water quenching will alter them substantially. The achievable maximum hardness after water quenching can go up to 66 HRC, depending on clad materials.

Shear Strength of the bonding area

The shear strength of the bonding area reaches a minimum value of 250 N/mm² in the delivery condition. Higher requirements on the bonding shear strength may be respected on request.

Testing

Testing consists of verification of the chemical composition (ladle analysis of both components) and hardness measurement on the clad material. The test is for information only, if no minimum or maximum values are agreed.

If required, the following additional tests are possible: Bend test, side bend test, torsion test and shear test according to DH-standard, and furthermore, if asked for, a shear test to determine the adhesive shear strength according to DIN 50162 or ASTM A263.

Results are certified by 3.1.B certificate as per EN 10 204, if not otherwise agreed upon.

Marking

Minimum standard marking contents:

- heat number
- plate number
- designation of the material (e.g. DICLADUR NAR 51 // S235JR)
- manufacturer's brand

Stamping is carried out on the base metal side.

Fabricating properties

The entire fabrication and application techniques are of fundamental importance for the reliability of products manufactured with these steels. The fabricator should ensure that his calculation, design and manufacturing methods are suitable for the intended application, are state of the art and, that they correspond with the properties of the material. The customer is responsible for the selection of the material. It has to be considered that the fabrication properties highly depend on the material and thickness proportions of the cladding.

Tolerances

If not otherwise agreed upon, the tolerances will be in accordance with EN 10 029, with class D for the thickness and table 4, steel group L for the maximum flatness deviation.

Surface quality

Unless otherwise agreed, the specifications will be in accordance with EN 10 163, class A2.

General Note

If particular requirements arising from planned application or fabrication are demanded and not covered in this data sheet, please contact us with the specifications for our review and agreement prior to ordering.

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