

# 80 HLES

## Steel grade for submarine

80 HLES steel is dedicated to submarine hulls and secondary structures. 80 HLES offers high yield strength with an improved toughness and a good weldability.

### STANDARD

80 HLES satisfies requirements from DCN – STF 22 -52 / T5008.a  
80 HLES offers characteristics equivalent to HY 100 grade

### CHEMICAL ANALYSIS

#### Guaranteed values (Weight %)

C	S	P	Ti	Mn	Ni	Cr	Mo
≤0.150	≤ 0,005	≤ 0,015	≤ 0,250	≤ 0,550	4,00 to 5,00	≤ 0,550	≤ 0,500

### MECHANICAL PROPERTIES

Values	Yield Strength		UTS		Elong %	KV -85°C transverse to rolling direction	
	MPa	KSI	MPa	KSI		J	Jt/lb
Required	≥ 700	≥ 100	780 ≤ UTS ≤ 900	113 ≤ UTS ≤ 130	≥ 15	≥ 56	≥ 41
Typical	770	110	850	125	19	200	150

## HEAT TREATMENT

Water quenched and high tempered steel

## PROCESSING

### Cutting

Standard thermal cutting techniques (oxygas, plasma) can be used without any preheating at room temperature.

### Forming

Cold forming is usually performed. Hot forming is possible. Industeel is ready to offer these processings.

### Welding

80 HLES can be weld assembled : a preheating at 100 to 125°C temperature (210°F to 255°F) is necessary, with a post-heating at same temperature -100 to 125°C- during 2 hours.

The interpass temperatures must not exceed 150°C (300°F).

#### Before welding :

Edges of cut parts must be ground to remove any traces of oxide or surface defects.

Stove the welding rods (generally 350°C/660°F), then store at 150°C (300°F) before welding.

#### During welding :

Ignition on an over length rather than on the joint itself.

Short arc to optimize protection of welding-rod coating.

#### required consumables :

	Shielded Metal Arc Welding	Gas Metal Arc Welding	Submersed SAW	Flux-cored Arc Welding
<b>EN</b>	<b>EN 757</b> E69 5 Mn2 NiCr Mo B42	<b>EN 12534</b> G Mn4 Ni 1,5 CrMo		<b>EN 756 SQ+</b> <b>EN 760 SA FB 165DC</b>
<b>AWS</b>	<b>A5-5 E 11018</b>	<b>AR-28 ER 110 SG</b>	<b>A5-29 ER 110-T5</b>	<b>A5-23 (EF3)</b>

## SIZES TOLERANCES

<b>Thickness range :</b>	5 mm $\leq$ th $\leq$ 150 mm (0.20" $\leq$ th $\leq$ 5.9")
<b>Width :</b>	for the most part: $\leq$ 3250 MM (10.66') with possibility up to $\leq$ 4000 mm (13.12')
<b>Length :</b>	$\leq$ 11 400 mm (37.4')

Remark : other thicknesses and sizes can be proposed : in that case, please contact us.

**Usual tolerances** : according to EN 10 029 norm

Flatness : according to EN 10 029 norm, with a flatness garanty  $\leq$  3 mm/m ( $\leq$  0.118"/39")

Remark : any special inquiry can be studied by Industeel

## CONTROL

### Soundness

Each plate is 100% UT controlled according to NF EN 0160 class S2 E3

### Mechanical properties

Mechanical tests are made in top and bottom of each plate

### Thickness

Thickness gauging on grid as required ; weight of plate is calculated from results of thickness gauging values.

## STORAGE

Plates are systematically shot blasted.  
Therefore, storage is possible in a dry wear house.  
However, in other conditions, plate must be primed before storage.

## APPROVAL



## REFERENCE

80 HLES has been widely manufactured for submarines constructions for French Navy and foreign Navies.

Nota –

Technical data and information are to the best of our knowledge at the time of printing. However, they may be subject to some slight variations due to our ongoing research programme on HLE Steels. Therefore, we suggest that information be verified at time of enquiry or order.

Furthermore, in service, real conditions are specific for each application. The data presented here are only for the purpose of description, and considered as guarantees when written formal approval has been delivered by our company.

For further information may be obtained from the following address.

***For any information***

**INDUSTEEL Creusot - [www.industeel.info](http://www.industeel.info)**

56, rue Clemenceau – BP 19  
F-71201 LE CREUSOT CEDEX

Sales	+33 3 85 80 58 58 – 55 25 – 55 20
	+33 3 85 80 53 66
Marketing	+33 3 85 80 58 36 – 55 25
	+33 3 85 80 59 00