



## Superplast®33

### Superplast®33: Engineering & Tool steels

**Superplast®33** is a prehardened steel delivered in as quenched and double tempered condition with an excellent toughness and a high machinability for engineering components or molding applications.

#### Dimensions

Superplast® 33 is available in plates with thicknesses between 15 and 100 mm. For higher thicknesses, please contact us.

### PROPERTIES

#### CHEMICAL ANALYSIS (TYPICAL; IN WEIGHT%)

C	Si	Mn	S	Ni	Cr	Mo	B
0.250	0.125	1.300	< 0.001	< 0.30	1.300	0.450	+

#### MECHANICAL PROPERTIES

Hardness HBW <sup>(1)</sup>
280 - 320

Toughness at room temperature in the transverse direction (J) <sup>(2)</sup>
> 50
Typical value for a plate in 95 mm thick. At quarter thickness (J)
123

<sup>(1)</sup>According to EN ISO 6506 - 1

<sup>(2)</sup>Charpy - V notch test according to EN 10025 and EN ISO 148 with a 2 mm striker

Tensile properties at room temperature in the transverse direction		
Tensile strength (MPa)	Yield strength (MPa)	A (%)
900 - 1050	> 750	> 12
Typical value for a plate in 45 mm thick. (quarter thickness)		
Tensile strength (MPa)	Yield strength (MPa)	A (%)
923	803	18

#### ULTRASONIC TESTING

Ultrasonic examination is performed according to **EN 10 160 S3 E3** (100% scanning).

#### MICROCLEANLINESS

ASTM E 45 / Method A
A:≤ 1.0 / B:≤ 1.5 / C:≤ 1.0 / D:≤ 2.0

## PROPERTIES

### MICROSTRUCTURE / GRAIN SIZE

100% tempered martensite with a grain size conforming to DIN EN ISO 643 = at least 7 and finer.

### FLATNESS

Flatness tolerances are according to EN 10 029 Class N (steel type L).

### POLISHABILITY

Superplast® 33 can be used for molding applications requiring a polishing until 600 µm.



## DELIVERY CONDITIONS

Superplast®33 is delivered **quenched and double tempered at 560°C minimum ready to be used.**

### TYPICAL DELIVERY SIZES

Manufacturing process	Thickness	Width
Hot rolling	15 - 150 mm	1000 - 2000 mm

## PLATE PROCESSING

### HEAT TREATMENT

Even if Superplast® 33 is delivered ready to be used, this one can be heat treated.

#### Soft annealing

In order to facilitate shaping or machining, you can perform an annealing according to the following parameters:

- > Heating at 750°C during 2 hours minimum
- > Cooling down (10°C/h) until 600°C then air cooling

#### Stress relieving

If you want to remove constraints after rough machining you can perform a stress relieving according to the following parameters:

- > Heating at 530°C during 2 hours minimum
- > Air cooling

#### Hardening

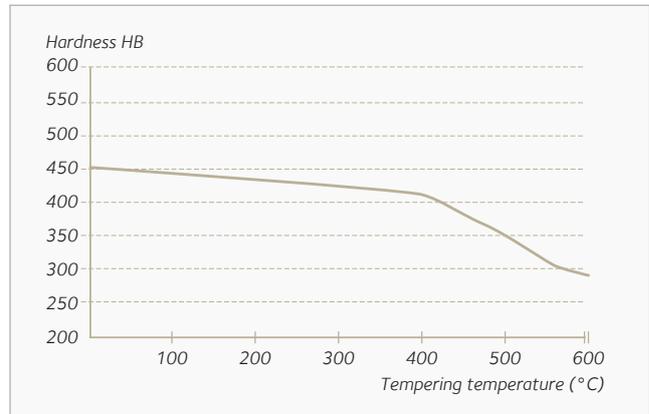
To have a higher hardness on Superplast® 33, you can perform a hardening according to the following parameters:

- > Heating at 880°C during 1 min per mm of thickness
- > Water quenching (to have excellent toughness)
- > Tempering

### Tempering (double)

After quenching, we advise to perform two tempering according to the following parameters:

- > Heating at the tempering temperature according to the wished hardness (see chart below) during 2min per mm of thickness
- > Air cooling until room temperature
- > Heating at 30°C below the first tempering temperature during 2min per mm of thickness
- > Air cooling until room temperature



### FLAME, LASER OR INDUCTION HARDENING

Superplast® 33 can be flame, laser or induction hardened to achieve 50 HRC. Cooling by air is preferable.

### NITRIDING AND NITROCARBURIZING

To improve wear and erosion resistance, it is possible to perform nitriding or nitrocarburizing on the Superplast® 33 grade if this one is performed below 540°C. To achieve best results, we advise to perform rough machining, stress relieving, grinding and nitriding. We advise to remove the white layer (hard and brittle) by polishing.

Following surface hardness and nitriding depths will be achieved after nitriding.

Method	Temperature (°C)	Time (h)	Surface hardness (HV <sub>10</sub> )	Depth (mm)
Gas nitriding	520	25	810	0,38
Ion nitriding	520	15	820	0,32

### HARD CHROMIUM PLATING

After hard chromium plating, the tool could be tempered at 450°C during 2 hours in order to avoid hydrogen embrittlement.

### MACHINING

The provided cutting data are guiding values which can be adapted as a function of the equipment.

#### Rough milling (dry)

Holder reference : SECO R220.29-0040-06.04A		
Tool reference : SECO RPHT 1204MOT-M15		
Cutting speed Vc (m/min)	Feed fz (mm)	Depth of cut Ap (mm)
200	0.2	3
Tool reference : SECO LPHW 1204MOT-D06 (high feed)		
Cutting speed Vc (m/min)	Feed fz (mm)	Depth of cut Ap (mm)
300	0.6	0.7

### Drilling

HSS reference : SECO RSD1103		
Diameter (mm)	Cutting speed Vc (m/min)	Feed fz (mm/rev)
3	100	0.11
4	100	0.13
6	100	0.16
8	100	0.2
10	100	0.24
12	100	0.26
14	100	0.28
16	100	0.3
18	100	0.32
20	100	0.34

### Welding

Superplast® 33 can be welded either to be assembly or to be repaired. For welding repair until 1 or 2 mm, we advise to repair by laser welding. For bigger surface, we recommend TIG or MMA methods.

Method	Consumables
Laser (repair)	Improbond 01_9100
TIG - MMA	C <0.1%; Mn=1.1% ; Mo=0.5% ; Low P ; Low S ; Low H2

*No pre-heating, post-heating and post welding heat treatment is necessary.*

### YOUR CONTACTS

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*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 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. Further information may be obtained from the address opposite.*