

KEY
LOS® 2316

Stainless steel for
plastic moulding



General characteristics

KeyLos[®] 2316 is a martensitic stainless steel, resistant to corrosion, manufactured through a 'super clean' technology that guarantees high microcleanness levels.

KeyLos[®] 2316 is the ideal option if the following characteristics are required at the same time:

- good toughness
- resistance to corrosion
- homogeneous mechanical properties throughout the mould

Resistance to corrosion allows the surface characteristics of the mould to be maintained over time. It is possible to reduce the expensive and complicated operations of cleaning and setting up of the mould before usage.

KeyLos[®] 2316 is normally supplied in the annealed condition with surface hardness lower than 220 HB, in order to guarantee excellent machinability.

KeyLos[®] 2316 offers the following advantages:

- excellent machinability
- excellent suitability for photo-engraving
- excellent suitability for polishing
- excellent suitability for nitriding, in order to increase the wear resistance
- excellent wear resistance
- good weldability
- Good resistance to corrosion.

This grade is suitable for the production of moulds subject to corrosive action due to aggressive polymers (PVC, recycled polymers, etc.) or to unfavourable atmospheric conditions (high humidity / salinity)

KeyLos[®] 2316 is 100% ultrasonically inspected, according to the most demanding of standards.

Chemical analysis

KEYLOS [®] 2316		Alloying %	
C	0,33 ÷ 0,43	Cr	15,0 – 17,50
Si	≤ 1,00	Mo	1,00 – 1,30
Mn	≤ 1,00	Ni	< 1,00

Table for comparison of international classification

W. Nr. 1.2316

EN ISO X38CrMo16

Lucchini RS's tool steels have been researched and formulated to optimize the performance of the materials.

The brand name identifies the Lucchini RS product and the number evokes the Werkstoff classification or other means of reflecting the characteristics of use.

Main applications

KeyLos[®] 2316 is suitable for the following applications:

- moulds for corrosive plastic materials (PVC, recycled polymers, etc.)
- moulds for the automotive industry (head lamp components)
- moulds for medical instruments
- moulds for food industry products
- moulds for the cosmetics industry
- moulds for rubber pressing
- dies and gauges for PVC extrusion
- mechanical parts for extrusion presses (ex. extrusion heads).

Physical and mechanical properties

Main physical properties

KEYLOS 2316	at 20°C	at 250°C	at 500°C
Modulus of elasticity [kN/mm ²]	210	198	177
Coefficient of thermal expansion from 20 °C at [10 ⁻⁶ /K]	-	11,4	12,2
Thermal conductivity [W/mK]	17,5	20,7	23,2

Main mechanical properties

KEYLOS 2316	at 20°C
Ultimate tensile strength (UTS) [N/mm ²]	1.100
Yield stress (YS) [N/mm ²]	900

These values are average values obtained on a sample which has been hardened at 1020° C, oil quenching and tempering at 580° C to obtain 35 HRc hardened.

Hardening

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Heat treatments

KeyLos® 2316 is supplied in the annealed condition with hardness lower than 220 HB. We suggest applying the following parameters if a different hardness is required or if heat treatment is needed. This information is only indicative and must be adapted depending on the different heat treatment facilities employed and on the thickness of the bar.

Soft annealing

Suggested temperature	750 °C
Soaking time	60 min for every 25 mm thickness
Cooling	Slow in the furnace

Soft annealing is useful to improve machinability. The obtained hardness is lower than 220 HB.

Stress Relieving

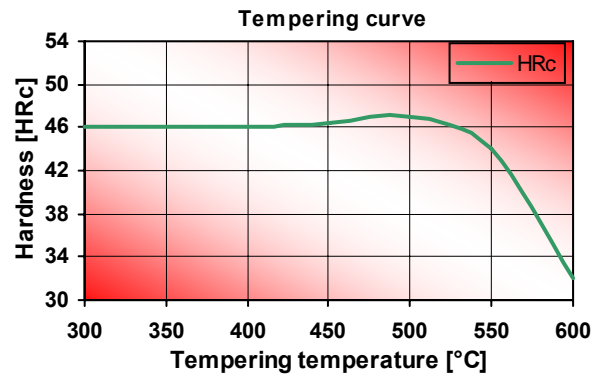
Suggested temperature	650 °C
Soaking time	60 min every 25 mm thickness
Cooling	Slow in the furnace

If the suggested temperature is lower than the tempering temperature, the stress relieving temperature will be 50° C lower than the tempering temperature previously applied

Stress relieving is recommended where it is necessary to eliminate residual stresses induced by mechanical working or by a preceding heat treatment.

Pre heating	700 °C
Heating	50 °C/h max
Soaking time	60 min every 25 mm thickness

Austenising suggested temperature	1020 °C
Heating	50 °C/h max
Soaking time	60 min every 25 mm thickness
Cooling	Oil or salt bath



Tempering curve of a sample which has been austenitised at 1020 °C.

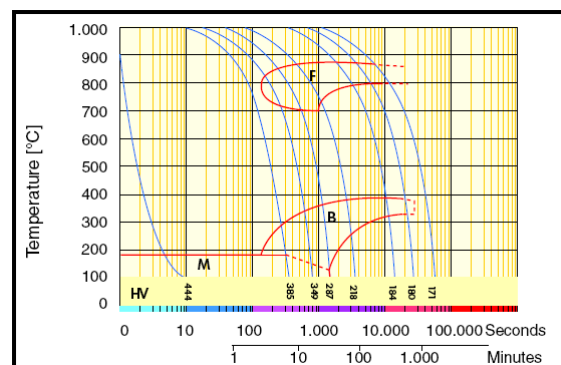
After tempering we suggest stress relieving at a temperature lower than 50 °C.

CCT Curve

We suggest to carry out hardening on material supplied in the annealed condition and tempering immediately afterwards.

Tempering

Suggested temperature	The tempering temperature to be applied to the material depends on the required mechanical properties. See following graph.
Soaking time	60 min every 25 mm thickness
Cooling	Room temperature



Welding

Welding of KeyLos[®] 2316 can give good results if the following procedure is followed:

Welding technique	TIG	TIG
Pre-heating at	Annealed	Hardened and tempered
Hardness after welding	250÷300 °C	
Recommended heat treatment	Heating at 680 °C and cooling at room temperature	Tempering at 50°C below the temperature of the last tempering

For further information, please refer to the brochure.

Photo-engraving

Thanks to modern production processes and to the low sulphur content, KeyLos[®] 2316 is suitable for photo-engraving to obtain various patterns. For further information, please refer to the brochure.

Polishing

KeyLos[®] 2316 is particularly suitable for polishing. For further information, please refer to the brochure.



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