

KEYLOS[®] 2002

Pre-treated steel,
suitable for the most
demanding plastic
moulding



General characteristics

KeyLos® 2002 is a pre-treated steel, suitable for the manufacture of medium and big size injection moulds.

KeyLos® 2002 is obtained through a special 'super clean' production process and special heat treatments. This steel has a balanced mixture of characteristics that make it particularly suitable for the manufacture of dies and moulds subjected to high mechanical stress.

KeyLos® 2002 is normally supplied in the pre-treated condition with a surface hardness of 320-360 HB. KeyLos® 2002 represents the synthesis and the perfect balance of all the grades normally applied in this field. Thanks to an accurate mixture of the chemical elements and to the addition of particular microalloys, KeyLos® 2002 is characterized by its low variation between surface and internal mechanical characteristics.

KeyLos® 2002 is very resistant to plastic deformation, both internally and on the surface. Because of the low carbon equivalent content, the weldability level is excellent. Being calcium treated, KeyLos® 2002 has an excellent level of machinability and micro-purity. Due to its high level of micro-purity and micro-structural homogeneity, KeyLos® 2002 is very suitable for polishing and guarantees excellent suitability to photo-engraving. KeyLos® 2002 is the best option for the production of blocks with thicknesses up to 1200 mm in that there is no major variation of internal hardness.

KeyLos® 2002 offers the following advantages:

- excellent toughness level
- excellent suitability for photo-engraving
- excellent suitability for polishing
- excellent wear resistance
- internal homogeneous hardness on blocks with thicknesses up to 1200 mm
- excellent weldability.

KeyLos® 2002 is 100% ultrasonically inspected, according to the most demanding of standards.

Chemical analysis

KEYLOS® 2002		Alloying %	
C	0,20 ÷ 0,30	Cr	1,20 ÷ 1,60
Si	0,10 ÷ 0,50	Mo	0,40 ÷ 0,80
Mn	1,20 ÷ 1,60	Ni	0,90 ÷ 1,30

Main applications

KeyLos® 2002 is suitable for the following applications.

Plastic moulding:

- medium and big sized moulds for the automotive industry
- moulds for the food industry
- moulds for rubber pressing
- pressure moulds (SMC, BMC)
- bolsters.

Extrusion:

- dies and gauges for PVC extrusion
- mechanical parts for extrusion presses

Physical and mechanical properties

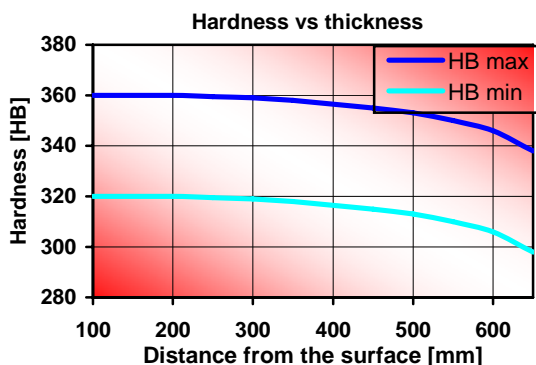
Main physical properties

KEYLOS 2002	at 20 °C	at 250 °C	at 500 °C
Modulus of elasticity [kN/mm ²]	210	194	176
Coefficient of thermal expansion from 20 °C at [10 ⁻⁶ /K]	-	12,5	14,3
Thermal conductivity [W/mK]	34,5	34,0	33,8

Main mechanical properties

KEYLOS 2002	at 20 °C
Ultimate tensile strength (UTS) [N/mm ²]	1.080
Yield stress (YS) [N/mm ²]	980
Elongation (A) [%]	17
Reduction of area (Z) [%]	53

These values are average values obtained from the middle of the section of a 1000 mm thick bar, subjected to hardening at 950 °C, oil quenching and tempering at 600 °C.



Heat Treatments

KeyLos® 2002 is supplied in the pre-treated condition. If it is necessary to obtain different hardness levels or if a heat treatment cycle is necessary, the parameters in the following table are recommended. The attached data are for information purposes only and must be varied dependent on the heat treatment facility and the thickness of the bar.

Soft annealing

Suggested temperature	700 °C
Soaking time	60 min every 25 mm thickness
Cooling	Slow in the furnace

Soft annealing is useful to improve machinability. The obtained hardness is lower than 250 HB.

Stress Relieving

Suggested temperature	550 °C
Soaking time	60 min every 25 mm thickness
Cooling	Slow in the furnace

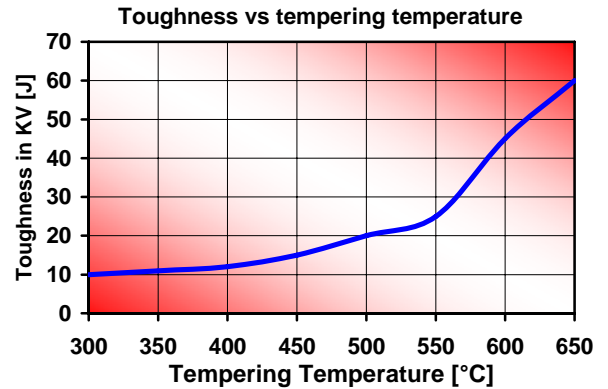
If the suggested temperature is lower than the tempering temperature, the stress relieving temperature will be 50° C lower than the tempering temperature previously applied

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

Hardening

Suggested temperature	900 °C
Soaking time	60 min every 25 mm thickness
Cooling	Oil or water quench

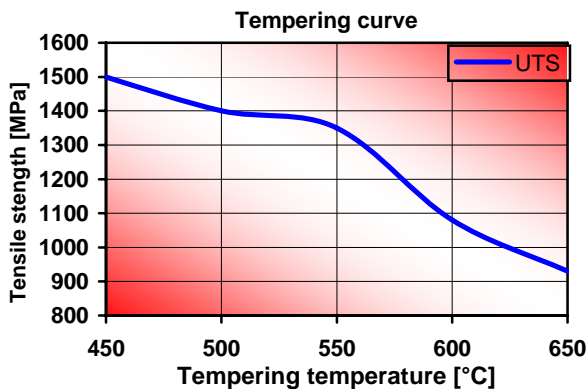
We suggest to carry out hardening on material supplied in the annealed condition and tempering immediately afterwards.



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

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

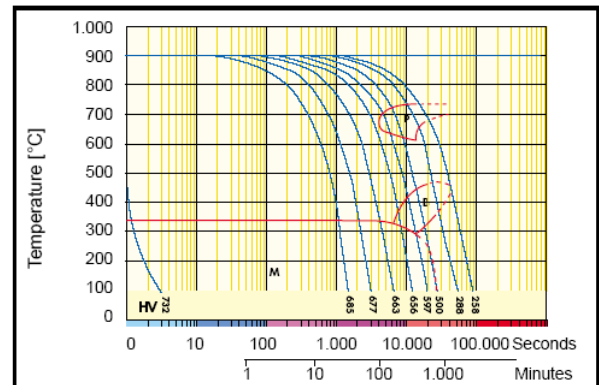


Tempering curve of a sample which has been austenitised at 900 °C.

Induction hardening

On this steel it is possible to carry out induction hardening. We recommend cooling at room temperature and tempering after heat treatment.

CCT Curve

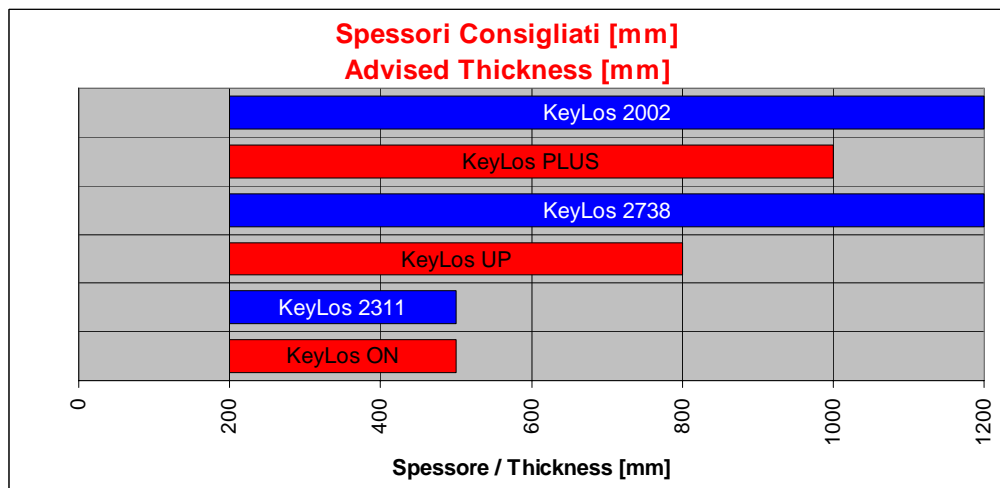
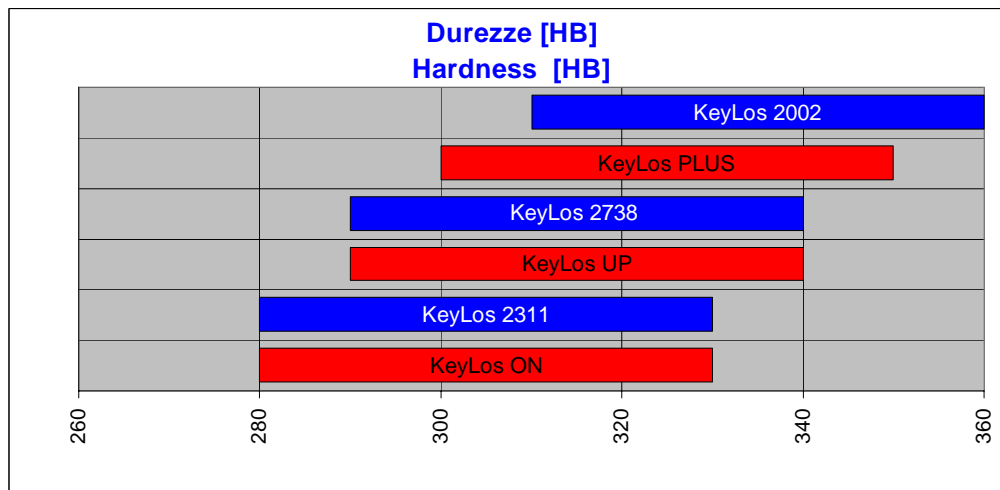


Critical points

Ac1	710°C	Ms	305°C
Ac3	840°C	Mf	75°C

Lucchini RS Main Tool Steels

	Machinability	Polishing	Texturing	Weldability
KEYLOS 2002	★ ★	★ ★ ★	★ ★ ★ ★	★ ★ ★
KEYLOS PLUS	★ ★ ★	★ ★ ★	★ ★ ★ ★	★ ★ ★
KEYLOS 2738	★ ★ ★	★ ★ ★	★ ★ ★ ★	★
KEYLOS UP	★ ★ ★	★ ★ ★	★ ★ ★ ★	★ ★
KEYLOS 2311	★ ★ ★	★ ★	★ ★	★ ★
KEYLOS ON	★ ★ ★ ★	★ ★	★ ★	★ ★ ★



Welding

Welding of KeyLos[®] 2002 can give good results if the following procedure is followed:

Welding technique	TIG	MMA
Pre-heating at	250÷300 °C	
Recommended heat treatment	Stress relieving (see heat treatment paragraph)	

For further information, please refer to the brochure.

Photo-engraving

Thanks to modern production processes and to the low sulphur content, KeyLos[®] 2002 is suitable for photo-engraving to obtain various patterns. For further information, please refer to the brochure.

Polishing

KeyLos[®] 2002 is particularly suitable for polishing. For further information, please refer to the brochure.

The logo for LUCCHINI RS features the company name in a bold, sans-serif font. Above the text is a stylized graphic element consisting of a green swoosh that transitions into a red swoosh, both curving upwards and to the right.

Via G. Paglia, 45

24065 Lovere (BG) - ITALY

Tel. + 39 035 963492

Fax + 39 035 963551

Web <http://www.LucchiniRS.it>

E-mail toolsteels@LucchiniRS.it