

A larger version of the KEYLOS UP logo, featuring the same stylized "KEY", solid red "LOS", and solid red "UP" with a horizontal line underneath.

The new pre-
treated steel for
medium and big
moulds.

The logo features a green swoosh above a red swoosh, both pointing to the right. Below these swooshes, the word "LUCCHINI" is written in a bold, italicized, dark blue font, followed by "RS" in a smaller, italicized, dark blue font.

General characteristics

KeyLos® UP is the new steel grade coming from the long experience of Lucchini RS in the production of plastic moulding steel grades. It is particularly suitable for punches and dies.

One of the main characteristics of this steel grade is the large size range for which it is reliable.

Thanks to its chemical analysis and production process KeyLos UP is able to guarantee high mechanical properties also for big blocks.

It is recommended for blocks of thickness up to 800 mm.

KeyLos® UP is supplied in pre-treated state to give hardness between 290 and 340 HB.

KeyLos® UP represents the ideal option for the end-user who is looking for:

- good toughness and mechanical properties
- machinability
- micro cleanness

This steel is obtained through a special 'super clean' production process, which allows a high level of micro-purity.

High level of machinability and microstructural homogeneity are obtained thanks to a calcium treatment process and to careful heat treatment.

KeyLos® UP is the best option for the production of blocks with medium and high thickness in that there is no major variation of hardness.

KeyLos® UP offers the following advantages:

- good machinability
- excellent suitability for photo-engraving
- excellent suitability for polishing
- good wear resistance
- good weldability.

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

Chemical analysis

KEYLOS UP		Alloying %	
C	0,38 ÷ 0,48	Cr	1,80 ÷ 2,20
Si	0,20 ÷ 0,60	Mo	0,15 ÷ 0,35
Mn	1,30 ÷ 1,70	Ni	0,30 ÷ 0,60

Main applications

KeyLos® UP in the pre-treated condition is suitable for the following applications.

Plastic moulding:

- small and medium sized moulds for the automotive industry
- moulds for food industry products
- 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

	at 20 °C	at 250 °C	at 500 °C
Modulus of elasticity [kN/mm ²]	210	196	177
Coefficient of thermal expansion 20 °C at [10 ⁻⁶ /K]	-	12,6	14,4
Thermal conductivity [W/m K]	34,0	33,4	33,0

Main mechanical properties

	a 20 °C
Ultimate tensile strength (UTS) [N/mm ²]	1.050
Yield stress (YS) [N/mm ²]	900

These values are average values obtained from the middle of the section of a 400 mm thick bar, subjected to hardening at 860 °C, oil quenching and tempering at 600 °C.

Heat treatment

KeyLos® UP 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

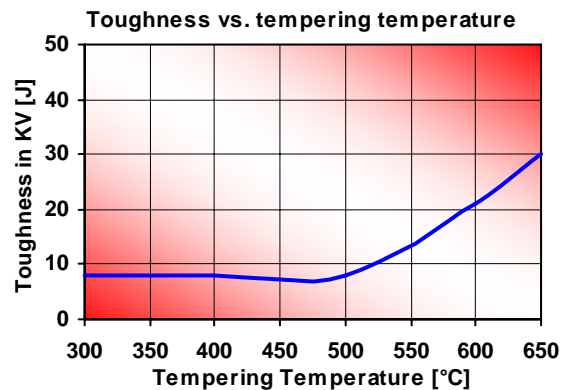
If the suggested temperature is lower than the tempering temperature, the stress relieving temperature will be 50° C lower than the tempering temperature previously applied

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	860 °C
Soaking time	60 min every 25 mm thickness
Cooling	Oil or water quench

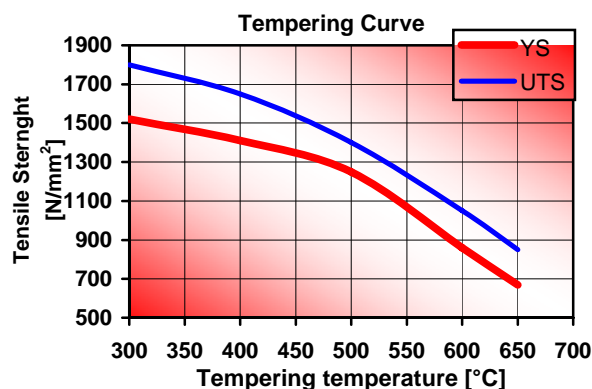
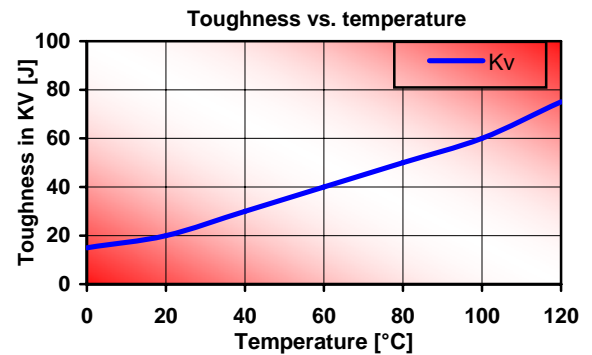
We suggest to carry out hardening on material supplied in the annealed condition and tempering immediately afterwards.



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

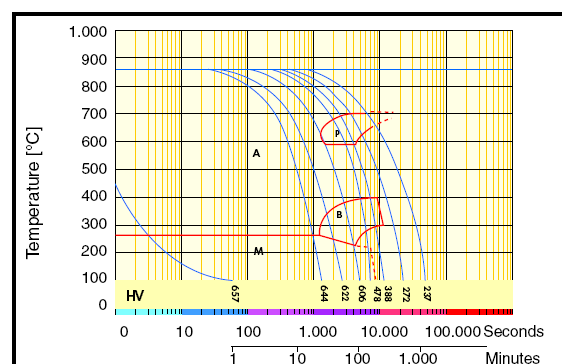


Tempering curve of a sample which has been austenitised at 860 °C.

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

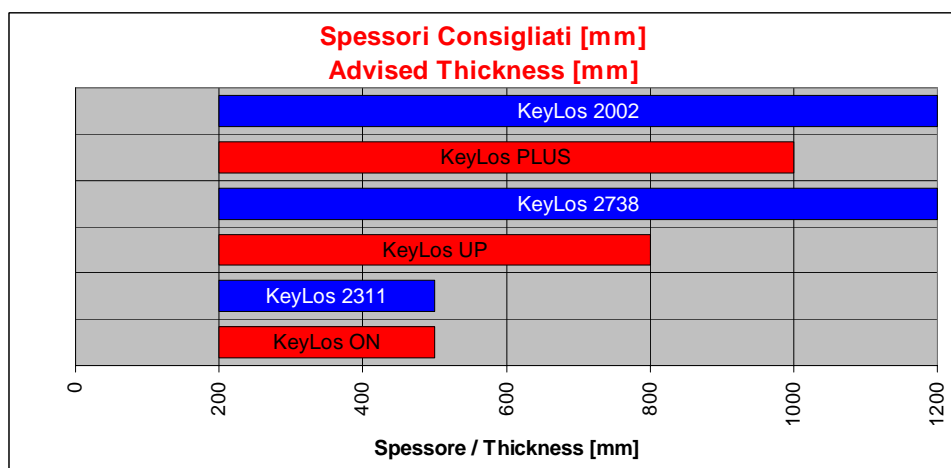
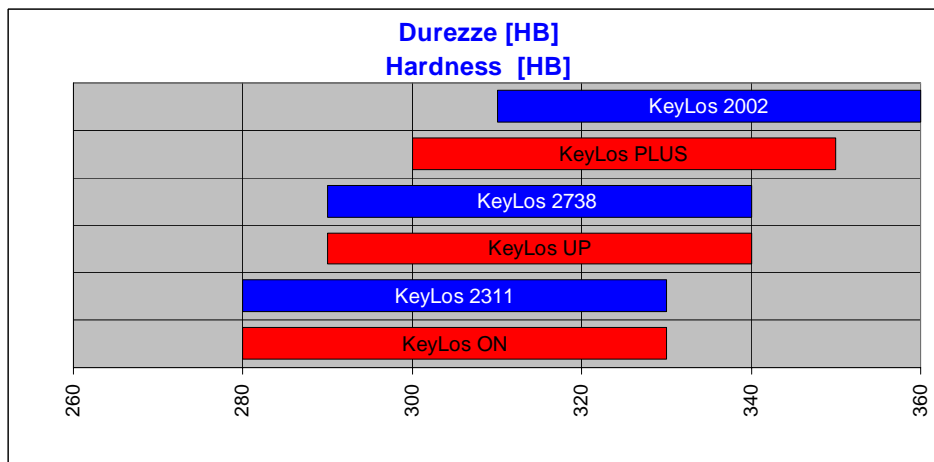


Critical points

Ac1	760°C	Ms	260°C
Ac3	800°C	Mf	140°C

Lucchini RS Main Tool Steels

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



KEYLOS UP		
Machinability	★ ★ ★	Very good, thanks to the optimized chemical analysis
Polishing	★ ★ ★	Very good, thanks to a very low sulphur content
Texturing	★ ★ ★ ★	Excellent, thanks to a very low sulphur content and to the homogeneous microstructure.
Weldability	★ ★	Good, thanks to a limited value of carbon equivalent

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Welding

Welding of KeyLos® UP 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® UP is suitable for photo-engraving to obtain various patterns. For further information, please refer to the brochure.

Polishing

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



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