KEYLOS® 2083

Stainless steel for plastic moulding

LUCCHINI RS

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General characteristics

KeyLos® 2083 is a martensitic stainless steel, resistant to corrosion, manufactured through a 'super clean' technology that guarantees high micro-purity levels.

KeyLos® 2083 is the ideal option if the following characteristics are required together:

- 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 reduce the expensive and complicated operations of cleaning and setting up of the mould before usage.

KeyLos® 2083 is normally supplied in the annealed condition with superficial hardness lower than 220 HB, in order to guarantee excellent machinability.

KeyLos® 2083 can be hardened and tempered to guarantee good dimensional stability and excellent suitability for polishing.

KeyLos® 2083 offers the following advantages:

- excellent machinability
- excellent suitability for embossing
- 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).

To obtain improved performances, it is available the ESR (Electro Slag Remelting) version of this steel, known as EskyLos® 2083

KeyLos® 2083 is 100% ultrasonically inspected, according to the most demanding of standards.

Chemical analysis

KEYLOS 2083		Alloying %	
C	0,35 ÷ 0,45	Cr	12,50 ÷ 13,50
Si	≤ 1,00	Mn	≤ 1,00

Table for comparison of international classification

W. Nr. 1.2083

EN ISO X40Cr14

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® 2083 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).

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Physical and mechanical properties

Main physical properties

KEYLOS 2083	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]	-	11,5	12,1
Thermal conductivity [W/mK]	16,5	19,8	24,1

Main mechanical properties

KEYLOS 2083	at 20°C
Ultimate tensile strength (**UTS**) [N/mm^2]	1.350
Yield stress (**YS**) [N/mm^2]	1.200

These values are average values obtained on a sample which has been hardened at 980 °C, quenched in oil and tempered at 550 °C to achieve a hardness of 42 HRc.

Heat treatments

KeyLos® 2083 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 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.

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Hardening

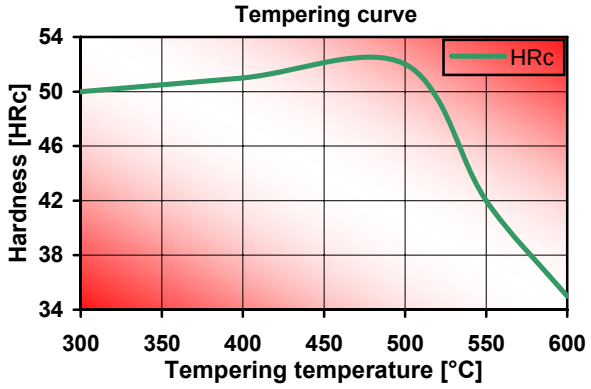
Pre heating	**700 °C**
Heating	50 °C/h max
Soaking time	60 min every 25 mm thickness

Austenising suggested temperature	**980 °C**
Heating	50 °C/h max
Soaking time	60 min every 25 mm thickness
Cooling	Oil or salt bath

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

Tempering

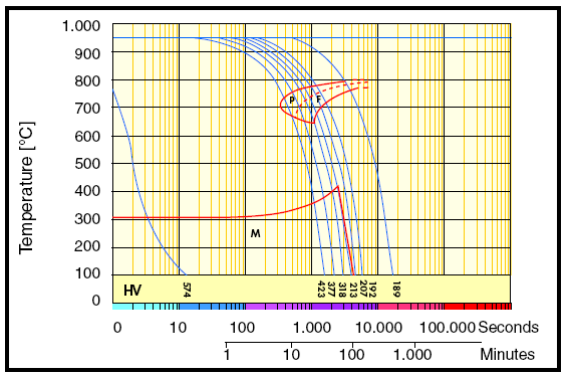
Suggested temperature	The tempering temperature to be applied to the material depends on the required mechanical properties. See following graph.
Soaking time	60 min every 25 mm thickness
Cooling	Room temperature



Tempering curve of a sample which has been austenitised at 980 °C.

After tempering we suggest a second tempering with temperature below than 50 ° C.

CCT Curve



Critical points

Ac1	**823°C**	**Ms**	**310°C**
Ac3	**900°C**	**Mf**	**150°C**

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Welding

Welding of KeyLos® 2083 can give good results if the following procedure is followed:

Welding technique	TIG	
Condition of material	Annealed	Hardened and tempered
Pre-heating at	250÷300 °C	
Recommended heat treatment	Heating at 680 °C and cooling at room temperature	Stess relieving 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® 2083 is suitable for photo-engraving to obtain various patterns. For further information, please refer to the brochure.

Polishing

KeyLos® 2083 is particularly suitable for polishing. If a mirror finished die is required we recommend to use the ESR (Electro Slag Remelting) version of this steel, known as EskyLos® 2083. For further information, please refer to the brochure.

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