

ESKYLOS® 2083

ESR stainless
steel for plastic
moulding

The logo for Lucchini RS features a stylized swoosh above the text. The swoosh is green on the left and red on the right, tapering to a point. Below the swoosh, the word "LUCCHINI" is written in a bold, italicized, sans-serif font, followed by "RS" in a smaller, regular, italicized, sans-serif font.

LUCCHINIRS

General characteristics

EskyLos[®] 2083 is a martensitic stainless steel, resistant to corrosion.

EskyLos[®] 2083 is the ideal option if the following characteristics are simultaneously required:

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

EskyLos[®] 2083 is obtained through a special 'super clean' production process and the ESR (Electro-Slag-Melting) technology. This technology offers the following advantages:

- increase of material toughness
- high micro-cleanness level
- total isotropy of the material
- very low segregation level.

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.

EskyLos[®] 2083 is normally supplied in the annealed condition with surface hardness lower than 200 HB, in order to guarantee excellent machinability.

EskyLos[®] 2083 offers the following advantages:

- excellent machinability
- excellent suitability to 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 unfavorable atmospheric conditions (high humidity / salinity).

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

Chemical analysis

ESKYLOS [®] 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.


Typical applications

EskyLos[®] 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)

Physical and mechanical properties

Main physical properties

	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

	a 20°C	a 200°C
Tensile strength (UTS) [N/mm ²]	1.350	1.100
Yield stress (YS) [N/mm ²]	1.200	980

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 hardness of 42 HRC.

Heat treatments

EsKyLos[®] 2083 is supplied in the annealed condition with hardness lower than 220 HB, or in the pre-hardened condition. 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

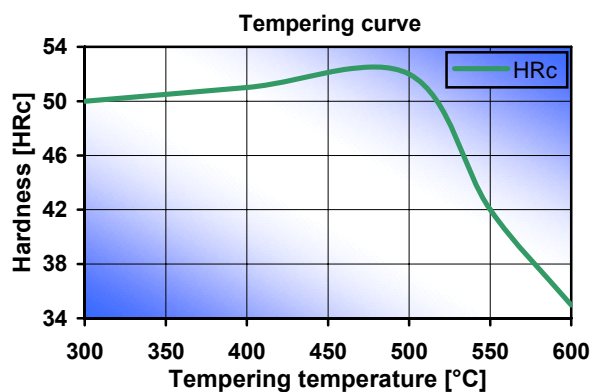
If the suggested temperature is lower than the tempering temperature, the stress relieving temperature will be 50° C lower than the tempering temperature previously applied

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

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



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

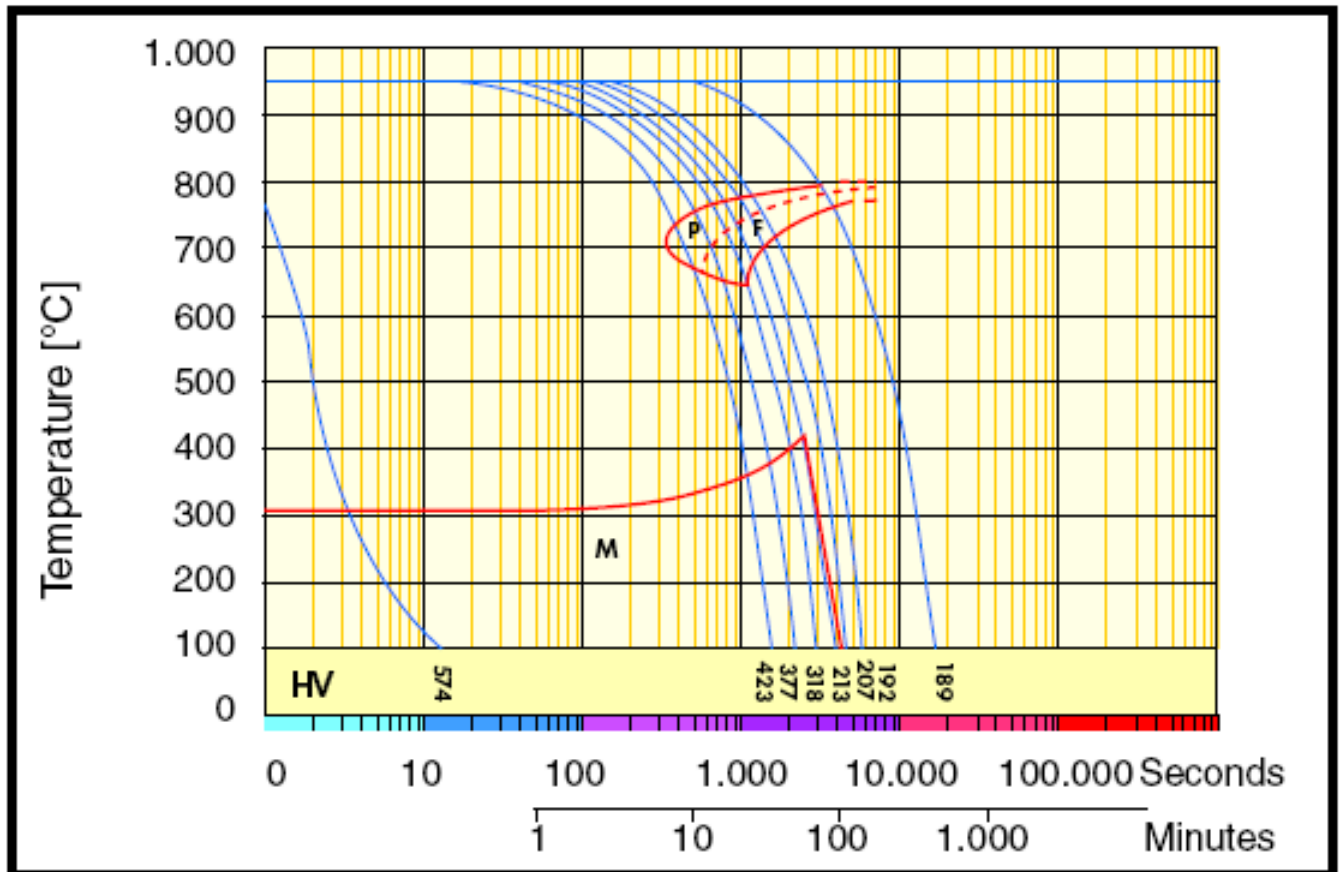
After tempering we suggest a second tempering with temperature below than 50 ° C.

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

CCT Curve



The advantages of the ESR technology

The ESR (Electro-Slag-Melting) manufacturing technology offers the following advantages:

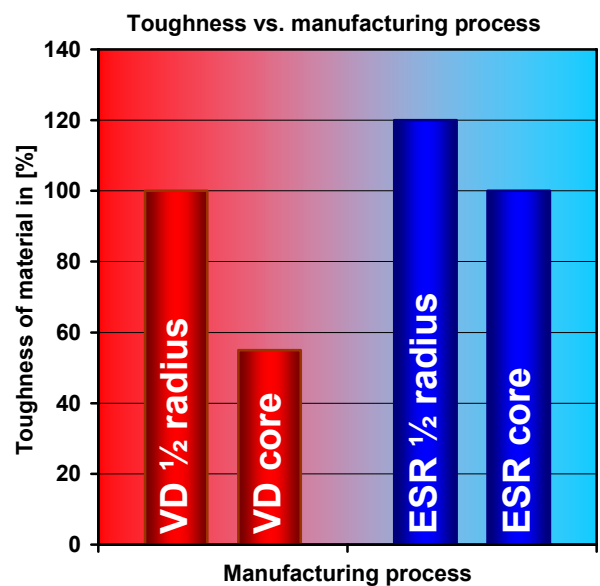
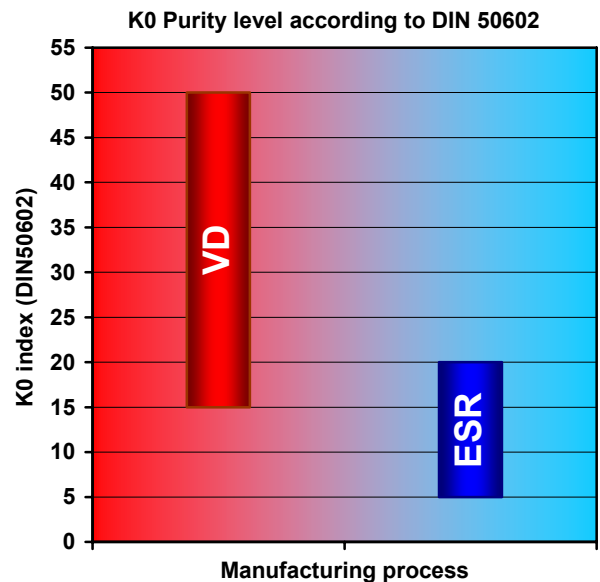
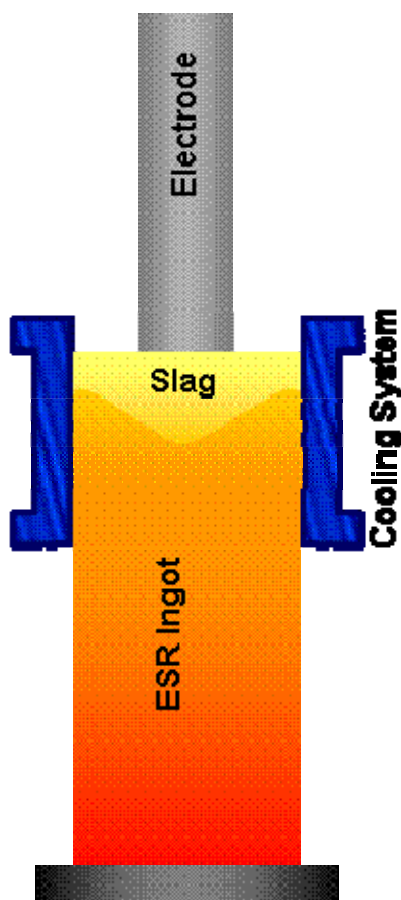
- increase of material toughness
- high micro-cleanness level
- total isotropy of the material
- very low segregation level

The ESR process is based on ingot remelting, through a traditional VD (vacuum degassing) process, using a particular copper ingot mould that contains basic slag.

The ingot is remelted in a way that the liquid metal passes through the slag, which acts as a filter and retains the inclusions.

The process of solidification inside the ingot mould is faster than in a traditional process.

The result is homogeneous and isotropic steel.



Thanks to the ESR process, EskyLos[®] 2083 satisfies the most difficult requirements in terms of toughness and suitability to polishing. It is suitable for the manufacture of moulds subjected to mirror polishing and to high mechanical stress.

Welding

Welding of EskyLos[®] 2083 can give good results if the following procedure is followed:

Welding technique	TIG	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	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, EskyLos[®] 2083 is suitable for photo-engraving to obtain various patterns. For further information, please refer to the brochure.

Polishing

Thanks to the ESR (Electro-Slag-Remelting) manufacturing process, EskyLos[®] 2083 has excellent suitability to polishing. For further information, please refer to the brochure.



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