

DATA SHEET

ABOUT US

RR Special Steel combines the experience & know-how of two specialists in their respective fields, Steel Making and Remelting (Rubiera Special Steel) and Forging and Heat Treatment (Ringmill).



RUBIERA SPECIAL STEEL

Since 1965 supplying high integrity ingots with superb homogeneity and cleanliness and since 2009 top quality large size ESR and VAR ingots to the market.

With RR Special Steel the ownership family, with a centenary experience in the steel and forging industry, has created the stars of tool steel.



RINGMILL

Since 1978 supplying top quality forgings to the most demanding markets using the latest state of the art technologies and machinery.

RR SPECIAL STEEL UNIQUENESS

VAR: The largest top-quality Vacuum Arc Remelted materials on the market.

ESR: The largest single electrode static Electro Slag Remelted materials on the market.

	Conventional material	ESR material	VAR material
Cleanliness	● ● ●	● ● ● ●	● ● ● ● ●
Homogeneity	● ● ●	● ● ● ● ●	● ● ● ● ●
Isotropy of toughness	● ●	● ● ● ●	● ● ● ● ●
Manufacturing complexity	● ● ●	● ● ● ●	● ● ● ● ●

CERTIFICATE QUALITY

Manufacturing parameters and material properties are monitored and controlled by RR's quality management system. The results of cleanliness, microstructure, and toughness for example are available for internal- and external certification at any time.

REFERENCE COMPOSITION OF STEEL GRADE RR SIRIO / 1.2367MOD.

C	Si	Cr	Mo	V
0.3 %	0.2 %	5.0 %	2.3 %	0.5 %

Comparable tool steel grades: NADCA #207 type C

MATERIAL PROPERTIES

- High hot strength and tempering resistance against softening in critical tool areas
- Excellent creep resistance
- High toughness and ductility
- High resistance at elevated temperature against heat checking and washout wear
- Excellent homogeneity and cleanliness
- Good machinability in the fine annealed condition
- Reasonable weldability
- Good for nitriding and coating
- High polishability
- Hardness up to 54 HRC, working hardness 42-50 HRC

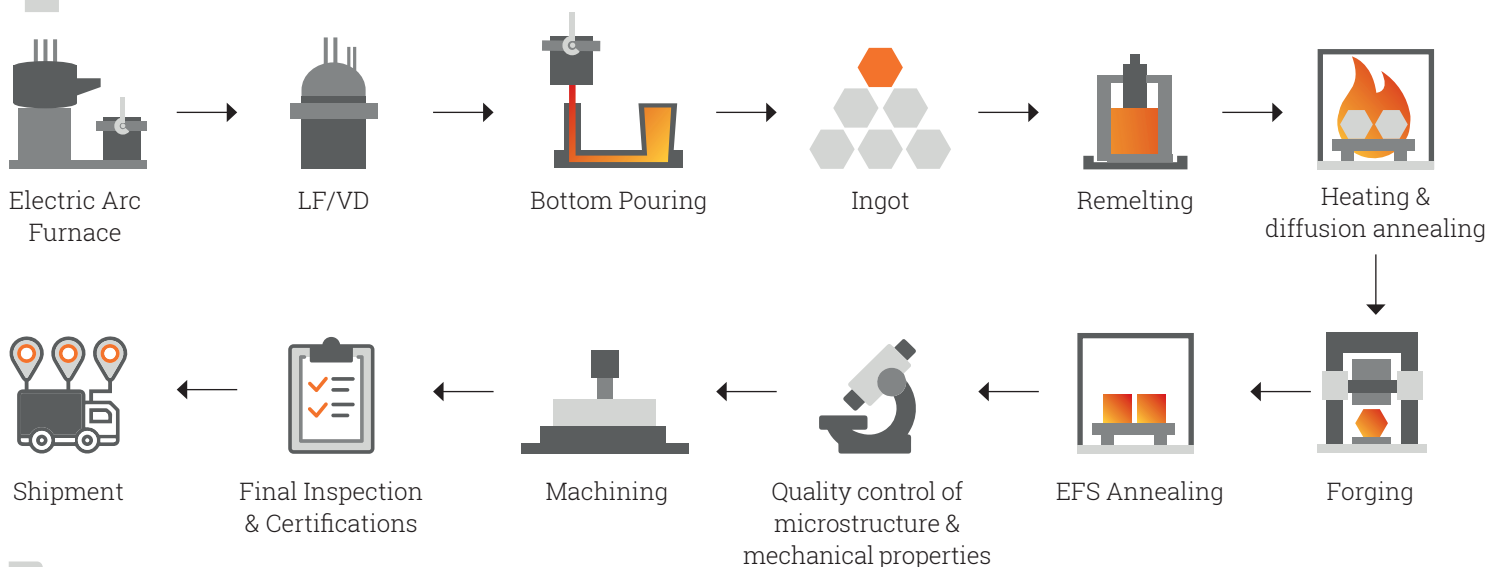
APPLICATIONS

- Die casting tools with improved resistance against:
 - thermal fatigue cracks
 - heat checking
 - abrasive wear in exposed areas
 - early cracking in deep cavities
- Molds for big castings as structural parts
- Inserts with surface coating
- Al-extrusion tools for high temperatures
- High thermal loaded forging dies and inserts
- Hot stamping tools, punches-and shearing blades >10mm
- Cold forging-and extrusion tools

PROPERTIES	STEEL GRADE*	1	2	3	4	5	
Toughness & Ductility	SIRIO	●	●	●	●	●	Very good toughness and ductility due to homogeneity and isotropy. According to NADCA #207 Charpy-V is guaranteed. Standard Charpy-V toughness is about 24J at 44-46 HRC and room temperature.
	1.2343	●	●	●	●		
	1.2344	●	●	●			
	1.2367	●	●				
Tempering Resistance	SIRIO	●	●	●	●	●	Very good high-temperatures properties. High resistance against softening improves life time.
	1.2343	●	●				
	1.2344	●	●	●			
	1.2367	●	●	●	●	●	
Heat Checking Resistance	SIRIO	●	●	●	●	●	High toughness gives better crack resistance under thermal shock conditions during operations.
	1.2343	●	●	●			
	1.2344	●	●				
	1.2367	●	●	●			
Erosion & Hot Wear Resistance	SIRIO	●	●	●	●	●	Tempering resistance helps against wear and erosion. Optimizing of design and process parameter and nitriding/coating may be decisive factors as well.
	1.2343	●	●				
	1.2344	●	●	●			
	1.2367	●	●	●	●	●	
Resistance to Al sticking (Soldering)	SIRIO	●	●	●			Sticking means that the temperature is high at that region. Try to decrease temperature or/and use nitriding or coating.
	1.2343	●	●	●			
	1.2344	●	●	●			
	1.2367	●	●	●			
Machinability	SIRIO	●	●	●	●		Tough material can be even more tough in machining - optimize machining parameters. We help by providing a low EFS hardness.
	1.2343	●	●	●	●		
	1.2344	●	●	●	●		
	1.2367	●	●	●			
Polishability	SIRIO	●	●	●	●	●	ISO/SPI: NO/A-1 at 48-52 HRC: "lense quality". Keep attention on right polishing steps.
	1.2343	●	●	●	●		
	1.2344	●	●	●			
	1.2367	●	●				
Weldability	SIRIO	●	●	●			CET= 0.85% acc. DIN EN 1011-2: pre- and after-heating necessary.
	1.2343	●	●	●			
	1.2344	●	●	●			
	1.2367	●	●				
Texturability	SIRIO	●	●	●	●	●	Hardened and homogeneous material is excellent for texturing.
	1.2343	●	●	●	●		
	1.2344	●	●	●			
	1.2367	●	●	●			
Nitridability	SIRIO	●	●	●	●	●	Hardness of nitrided surface 900-1250 HV1: avoid brittle surface layer.
	1.2343	●	●	●			
	1.2344	●	●	●	●		
	1.2367	●	●	●	●		
Chrome Plating Ability	SIRIO	●	●	●	●	●	High cleanliness improves Cr plating ability.
	1.2343	●	●	●	●		
	1.2344	●	●	●			
	1.2367	●	●	●			

*All grades in the remelted condition

PRODUCTION TECHNOLOGY



PRODUCT RANGE

RR SIRIO	Form	Thickness (mm)	Width (mm)	Length (mm)	Weight (Kg)
	Square/Rectangular Bar	max. 600	max. 1,500	max. 6,000	max. 20,000
	Round Bar	max. 600	N/A	max. 6,000	max. 20,000

DELIVERY CONDITIONS

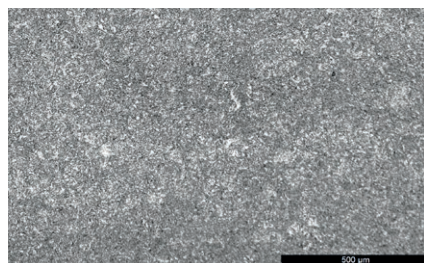
Heat treatment: EFS Annealing

Hardness: ≤ 220 HBW

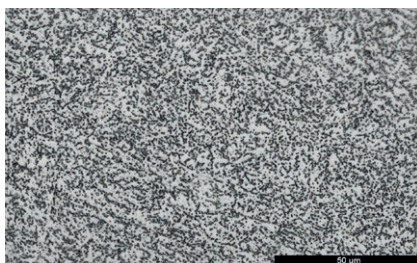
Surface: machined

PHYSICAL PROPERTIES

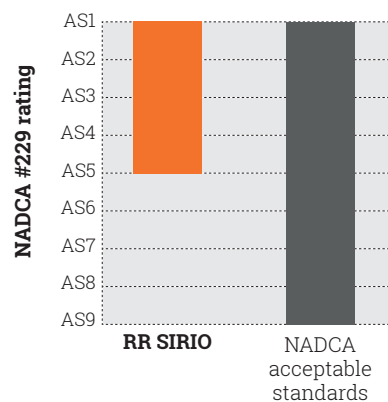
MICROGRAPHIC EXAMINATION IN EXTRA FINE ANNEALED CONDITION (EFS)



EFS macrostructure at 50X: very low microsegregation of VAR material



EFS microstructure at 500X: AS1-2 rating



* The examined surface is parallel to the principal direction of deformation

	20°C	400°C	500°C
Elastic Modulus [kN/mm ²]	205,000	--	190,000
Thermal Expansion Coefficient [10 ⁻⁶ /K]	--	12.4	13.2
Thermal Conductivity [W/mK]	21	30	32

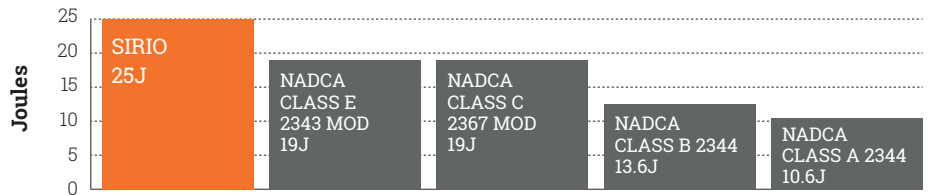
HEAT TREATMENT	TEMPERATURE
Soft Annealing	800-830°C
Stress Relieving (before Q+T)	600-650°C
Hardening (Vacuum)	1010-1025°C
Tempering (2-3X)	550-650°C

MECHANICAL PROPERTIES AFTER QT

HARDNESS	44 HRC	48 HRC	50 HRC
Yield Strength Rp02 [N/mm ²]	~ 1,200	~ 1,400	~ 1,500
Tensile Strength, Rm [N/mm ²]	~ 1,500	~ 1,680	~ 1,800

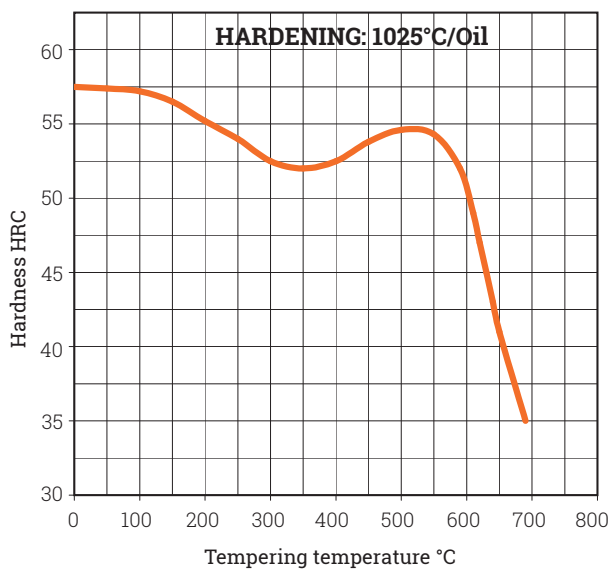
Toughness Properties

Chapy-V toughness on oil-hardened & double tempered samples, 44-46 HRC, transversal direction, 1/4T, 20°C.

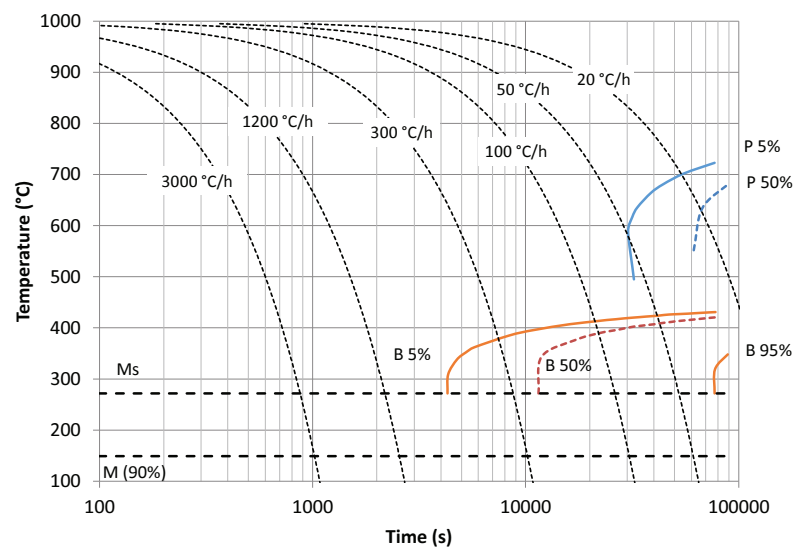


DIAGRAMS

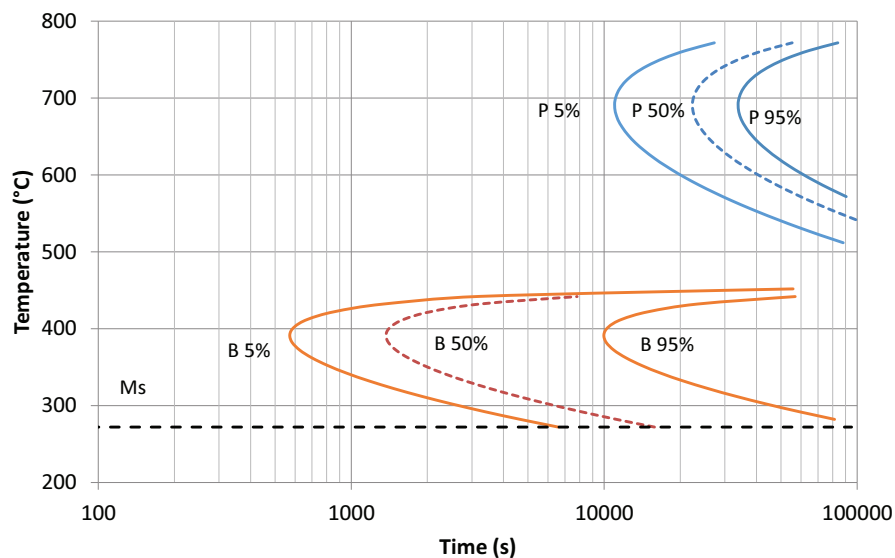
TEMPERING DIAGRAM



CCT DIAGRAM



TTT DIAGRAM





SPECIALTM STEEL

The stars of Tool Steel



SIRIOTM
Hot Work
Tool Steel

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