

**ROVALMA**

THE STEEL INNOVATOR



EFICAST 4-RR

Highest Quality High Performance

Hot Work Tool Steel

# EFICAST 4-RR

EFICAST 4-RR is a highest quality high performance hot work tool steel, with high mechanical properties, specially at high temperature, good ductility, as well as high tempering resistance combined with good machinability and polishability. EFICAST 4-RR features excellent levels of micro-cleanliness and very high levels of toughness and thermal fatigue resistance through a tailored thermo-mechanical processing, enabling longer lifetimes of the dies and moulds, in which it is used.

## Applications

Main applications of EFICAST 4-RR include: big moulds and dies for die casting of light alloys, aluminium extrusion tools, such as liners, pressure pads, liner holders or mandrels. It is also used for applications such as sliders, punches, forging stamps and blades for circular cutting, or die inserts for plastic injection requiring high polishing and toughness.

## Typical Composition (in %)

C	Si	Mn	Cr	Mo	V
0.40	1.00	0.35	5.25	1.40	0.90

## Physical and Mechanical Properties

Properties	300 K	Unit
Density	7.8	g/cm <sup>3</sup>
Mechanical Resistance	1500	MPa
Yield Strength 0.2 %	1290	MPa

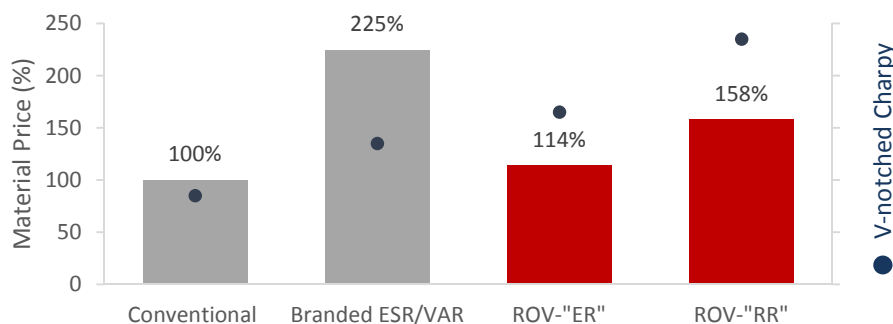
The values given in the table are typical values (neither maximum nor minimum values) for properly heat treated materials at a hardness level of 44-46 HRC. Presented values have been obtained in samples taken from the center of a 810 x 410 mm bar.

## Thermal Properties

Properties	293 K	473 K	673 K	Unit
Linear Thermal Expansion Coefficient		11.9	12.6	$\times 10^{-6}/K$
Thermal Conductivity	26.6	28.4	29.2	W/m·K

The values given in the tables are typical values (neither maximum nor minimum values), for properly heat treated materials at a hardness level of 44-46 HRC. Thermal conductivity values are calculated on the basis of thermal diffusivity values measured by laser flash. Presented values have been obtained in samples taken from the center of a 810 x 410 mm bar.

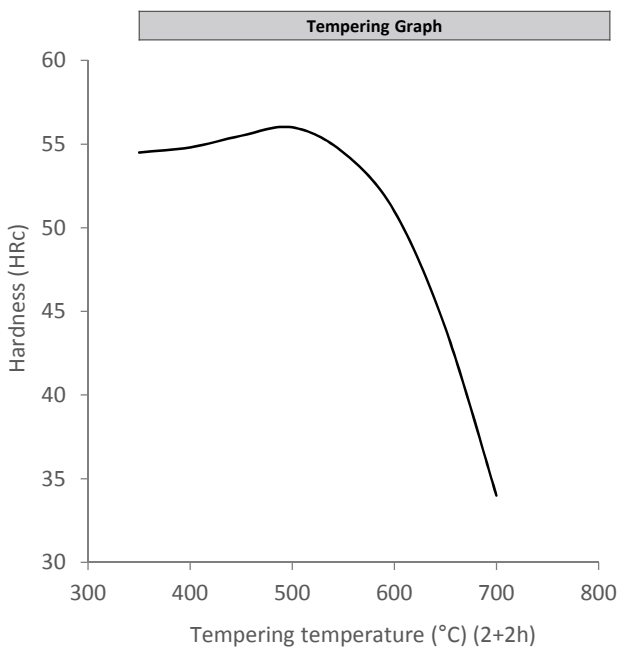
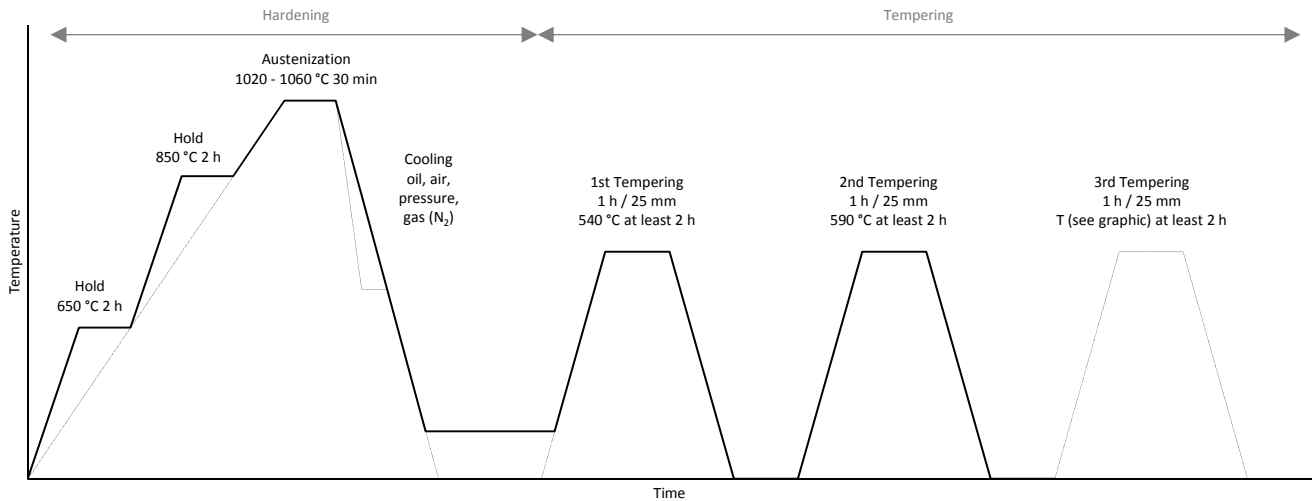
## Price Comparison



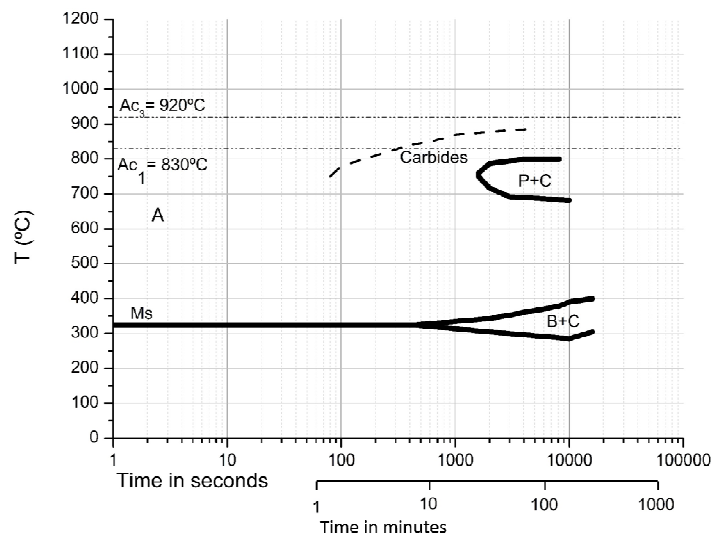
For the Rovalma grades, V-notched Charpy values have been obtained in samples taken from the center of a 850 x 445 mm bar, hardened at 1020 °C for 30 min., quenched in air and tempered twice. Final hardness was 44-46 HRC.

For conventional and branded ESR/VAR, charpy values have been averaged based on published data and material prices based on price information provided by buyers of these materials.

# Heat Treatment



Austenizing temperature, 1020 °C 30 min									
%C	%Cr	%Mo	%V	%Si	%Mn	%P	%S	N <sub>2</sub> (ppm)	O <sub>2</sub> (ppm)
0.39	5.20	1.30	0.85	1.04	0.37	0.0012	0.0008	26	9



## Welding

### Joining and Surfacing Hardened Material

Preheat the part until the core reaches 500 - 550 °C. Weld the piece while keeping it at a temperature between 400 - 550 °C, reheat if necessary. After every weld bead, conduct a post weld upsetting to reduce tensions originating from solidification and cooling of the area. After welding, subject the pieces to one or two tempering cycles (depending on the geometry of the piece and the amount of welding conducted).

### Joining and Surfacing Annealed Material

Weld the part directly, and after every weld bead, conduct a post weld upsetting to reduce tensions originating from solidification and cooling of the area. Conduct an annealing treatment at 800 - 830 °C before the part has cooled down.

## Nitriding

- EFICAST 4-RR can be both, bath and gas, nitrided.
- To avoid deformations and structural changes, it is recommended to perform the second/third tempering cycle 10-20 °C above the temperature, at which the nitriding treatment will be done.
- This consideration is valid for surface coatings such as TiN, or any other that needs to be applied at temperatures above 500 °C.

# Designer & Provider of First-Class Tool Materials

ROVALMA, S.A. provides innovation in tool materials. Thanks to comprehensive research, innovative design and development, most recent production techniques as well as in depth quality control, we have achieved significant advances in the knowledge about material forming processes and generated important know-how regarding the production and optimal usage of our materials for a specific application. As a result, we can provide you with **first-class tool steels** for cold and hot work material forming processes and outstanding technical assistance.

We are proud to make our High Performance Tool Steels available to you for your specific applications. Do not hesitate to contact us for the latest information.

## Application Engineering Service

In order to fully exploit the advantages and the potentials of ROVALMA's High Performance Tool Steels, we offer our customers the support of our Application Engineering Service. Our highly qualified and dedicated engineers can assist you in selecting the optimized grade for your application and provide you with the corresponding technical recommendations. It is our mission to increase the competitive-advantage of our customers and support them in achieving the highest possible cost-effectiveness.

You can access our service directly by sending an email to: [ae-fast@rovalma.com](mailto:ae-fast@rovalma.com).



ROVALMA, S.A. carries out ongoing research for many applications regarding the usage of the materials here presented. This research often brings along significant advances in the knowledge of a given process and thus important information regarding the best possible usage of the materials for a specific application. We strongly recommend to get in contact with ROVALMA, S.A. for the latest information regarding a specific application.

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