

ROVALMA

WOV[®]-555

(State 03/2013)

Characteristics and Applications

WOV[®]-555 is a fine grained steel of high carbide content with outstanding wear resistance and exceptional retention of high hardness at high temperatures. WOV[®]-555 provides also a good level of toughness-hardness ratio. It can be nitrided by conventional methods, without diminishing its hardness. By gas nitriding, micro hardness levels higher than 1.200 Hv can be obtained, with core hardness levels above 66 HRC.

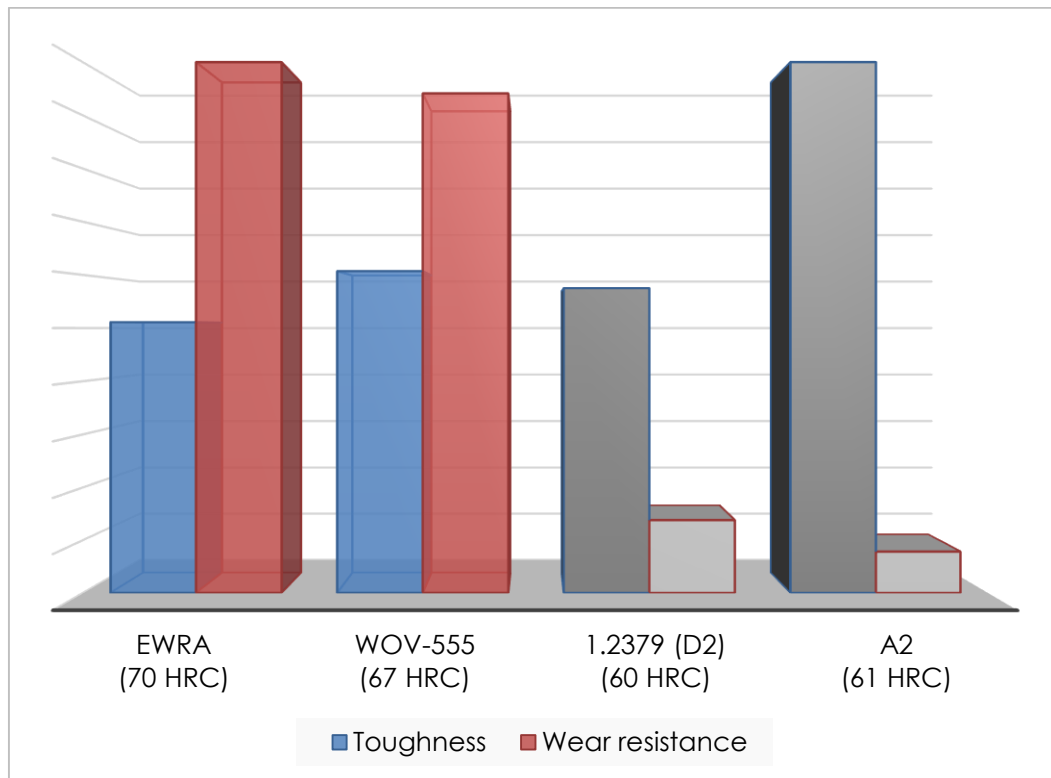
WOV[®]-555 is commonly used in dies and punches for cutting stainless steels, magnetic sheets, pre-treated strips, abrasive fibres and conventional materials in high serial production. WOV[®]-555 has been applied in dies for fine cutting (double acting) and for rapid presses. WOV[®]-555 can be advantageous for inserts of dies for pressing or injecting abrasive thermosets, metallic powders, ceramics or resins, as well as other applications, in which high abrasion resistance is required.

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NOTICE: All information provided herein is for general information purposes only. The optimal choice of a tool steel depends on individual process parameters, allowable tolerances and other production process factors, work conditions and preferences.

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Physical and Mechanical Properties – Comparison chart



Heat Treatment

- Like most tool and other specialty steel grades WOV-555 obtains its optimized mechanical and physical properties through a corresponding heat treatment of the material prior to final machining. As is the case for most tool steels, these properties vary after heat treatment along the cross-section from the surface to the core of the work piece. The heat treatment strategy therefore needs to be adapted in order to obtain the best possible compromise of desired mechanical and physical properties for a given application and production envions and with regard to the area where these properties are to be optimized (working zone of the steel).
- For the most recent guidelines and recommendations for an adequate and proper heat treatment, in particular concerning specific heat treatment objectives, we strongly recommend users to consult with Rovalma, S.A. at the given moment. Since application requirements, specific heat treatment objectives as well as working and processing circumstances of the user vary, optimal heat treatment strategies may also differ considerably.

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Guidelines and recommendations for Austenizing

It is strongly recommended to directly contact ROVALMA, S.A. regarding the optimized heat treatment for a given application. **Note that Rovalma, S.A. explicitly excludes all liabilities for the results and quality of heat treatments performed by third companies or other entities.**

The following heat treatment guidelines and recommendations aim at providing maximum hardness of WOV®-555. Note, that this heat treatment strategy is not always the optimal strategy for all possible applications of WOV®-555.

- Pre-heating from room temperature to 400 °C [752 °F] (duration 1 hour).
- Hold for homogenization at 400 °C [752 °F] minimum 1 minute for each 2 millimetre thickness.
- Heat up to 650 °C [1202 °F] (duration 40 minutes).
- Hold for homogenization at 650 °C [1202 °F] minimum 1 minute for each 2 millimetre thickness.
- Heat up to 900 °C [1652 °F] at maximum speed available.
- Hold for homogenization at 900 °C [1652 °F] minimum 1 minute for each millimetre thickness.
- Heat another furnace up to 1240 °C [2264 °F] and when this furnace is at temperature convey the piece from the furnace at 900°C [1652°F] to the one at 1240 °C [2264 °F].
- When the furnace returns to austenitization temperature after having introduced the piece, hold for:

Time (min)	Thickness (mm)	Thickness (in)
2.25-2.5	< 6	< ¼
3-4	6-12	¼ - ½
3.75-5	12-20	½ - ¾
4.5-6	20-25	¾ - 1
6-7.5	25-38	1 - 1 ½
7.5-9	38-50	1 ½ - 2
10-12	50-75	2 - 3
13-15	75-100	3 - 4
15.5-18	100-125	4 - 5

- OBS: Holding times start when the core reaches specified temperature levels.

Guidelines and recommendations for Quenching

- Immediately after austenitization, introduce the part in an isothermal bath at 550 °C [1022 °F].
- When the temperatures are balanced, continue the cooling in air.

OBS: For maximum hardness in pieces with simple geometries, a direct cooling performed in oil bath at 80 °C [175 °F] is also possible.

Vacuum furnaces with gas cooling can be used if gas pressure and cooling gas flow ensure a cooling rate equivalent to the cooling rate in oil-bath (minimum 2-6 bars recommended).

Hardness should be measured after the quenching and first tempering cycle. If treatment is successfully performed, a minimum level of 62 HRC should be obtained.

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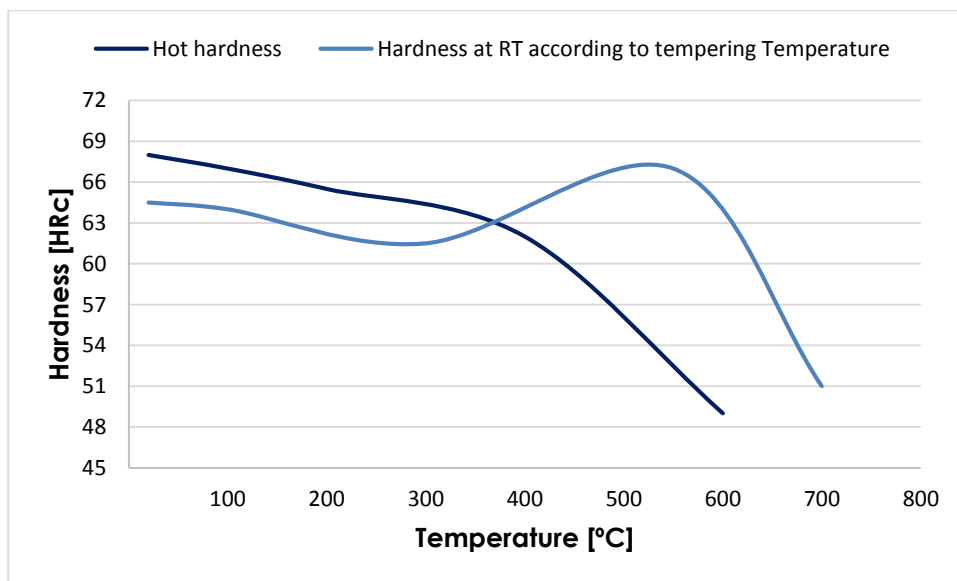
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Tempering Recommendations for a Hardness Level of 65-67 HRC

Immediately after quenching, when the tool has reached room temperature, start with the tempering cycles. The tempering temperature should be never below 540 °C [1004 °F]. Three tempering cycles must be carried out, making sure that the piece fully reaches room temperature between them.

- For maximum hardness:
 - Three tempering cycles at 550 °C [1022 °F].
 - Allow complete cooling until room temperature between the tempering cycles
 - Time at tempering temperature: 5 minutes for every 2 millimetre thickness (minimum 1 hour)

- For other hardness levels, please refer to the following graph:



Note

ROVALMA, S.A carries out ongoing research for many applications regarding the usage of WOV®-555 material. 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 WOV®-555 material for a specific application. The material itself and the processing parameters (machining, welding etc.) are also constantly further developed.

Due to ongoing changes in production practices and process parameters for specific applications by users on the one hand and continuing research and development efforts to further optimize our materials on the other hand, it is impossible to keep catalogs always up-to-date. It is therefore strongly recommended to get in contact with ROVALMA, S.A. for the latest information regarding a specific application.

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