

ROVALMA

THE STEEL INNOVATOR



HWS[®]

High Performance PM Cold Work
Tool Steel

The Tool Steel HWS® is a High Wear resistance Steel with an exceptional high toughness. It is specially designed for hard cutting of Advanced High Strength Steels (AHSS). It is a powder metallurgical steel, which combines very high wear resistance, hardness and toughness. HWS® is marketed in two different grades: HWS® Isotropic and HWS® Premium. The latter has an increased toughness compared to HWS® Isotropic.

Applications

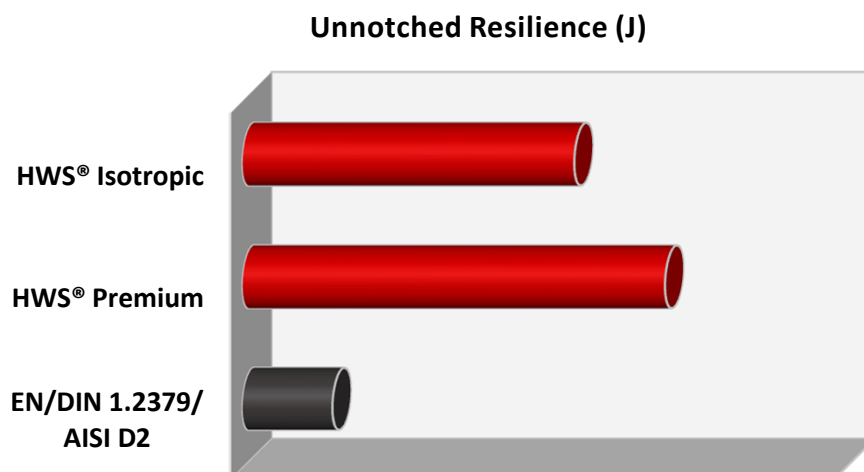
HWS® steels are employed in high demanding cold work applications like cutting, deep-drawing, and bending dies, as well as for tools which are used to shape difficult materials (like CP, DP, TRIP and Mart, all of which combine high yield strength with high elongation and considerable work hardening). HWS® has also showed very advantageous in other engineering applications, in which the above mentioned combination of properties is required from the tool such as: punching tools for deep drawing, dies and punching tools to press powder (metallic powder, bakelites, sintered pieces, resins, brake pads, composites); inserts of plastic injection tools where the plastic material is reinforced with abrasive particles; fine cutting dies for stainless steel (especially for thick sheets); rolls, jaws and combs for rolling threads; rolls for cold and hot work; forging stamps for hot and cold work; punching tools to nail and extrude in cold work; cutting blades and bending tools for medium-gauge sheets; blades for circular cutting.

Physical and Mechanical Properties

Properties	300 K	Unit
Mechanical Resistance	2727	MPa
Yield Strength 0,2 %	2329	MPa
Compressive Yield Strength 0,2 %	2850 - 3050	MPa
Density	7.67	g/cm ³
Elastic Modulus	219	GPa

The values given in the table are typical values (neither maximum nor minimum values), for properly heat treated materials at a hardness level of 63 HRC.

Typical Impact Strength



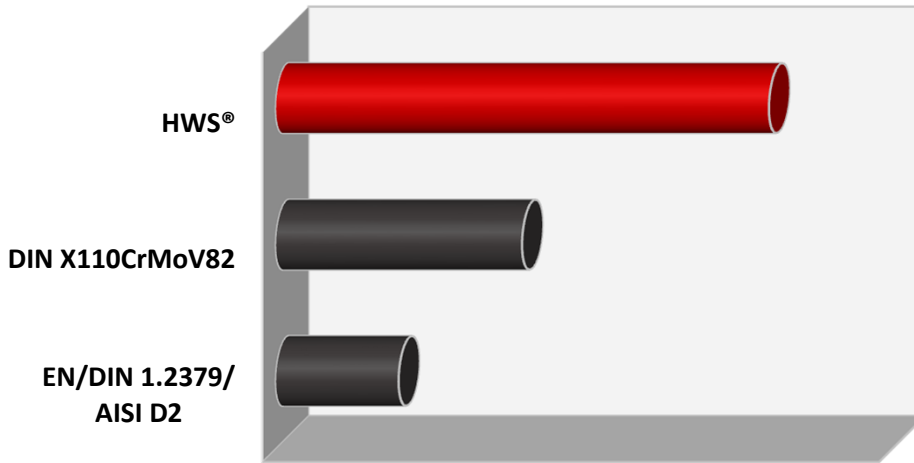
All specimens were taken from the center of Ø100 mm bar and tested in transversal direction at room temperature and at a hardness level of 63 HRC.

Thermal Properties

Properties	300 K	373 K	Unit
Linear Thermal Expansion Coefficient		10.8	$\times 10^{-6} / K$
Thermal Diffusivity	5.69	5.53	mm^2/s
Thermal Conductivity	20	21	$W/m \cdot K$
Specific Heat Capacity	0.46	0.49	$J/g \cdot K$

The values given in the table are typical values (neither maximum nor minimum values), for properly heat treated materials at a hardness level of 63 HRC. Thermal conductivity values are calculated on the basis of thermal diffusivity values measured by laser flash.

Wear Resistance



Wear resistance comparison based on pin on disc test between HWS®, DIN X110CrMoV82 and EN/DIN 1.2379/ AISI D2.

Heat Treatment

Like most tool and other specialty steel grades, HWS® obtains its optimized mechanical and physical properties through a corresponding heat treatment prior to final machining. Depending on application requirements and objectives, HWS® can be heat treated by means of oil or vacuum quenching.

The heat treatment strategy can be adapted in order to obtain the best possible compromise of desired mechanical and physical properties for a given application and production environs. It is recommended to directly contact ROVALMA S.A., or its local distribution partners, regarding the optimized heat treatment for a given application.

For more detailed heat treatment guidelines, please refer to our “General Guidelines & Recommendations for the Processing of HWS®”.

Processing of HWS®

For information regarding the machining, welding, wire electro-erosion and surface treatment on HWS® material, please refer to our “General Guidelines & Recommendations for the Processing of HWS®”.

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.



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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