

Saarschmiede Hot-Work Steel Micro 900/BG





ADAPTED MANUFACTURING PROCESSES REFERRING TO

- optimized chemical composition
- highest purity
- least possible segregations

PROPERTIES

- optimized machinability
- higher dimensional stability
- longer tool life
- higher polishability

- best homogeneity and isotropy
- optimized microstructure
- higher toughness
- multiblock concept
- higher flexibility
- cost savings



Special Processes for Highest Microstructure Requirements

The MICRO 900 / BG design is additionally structure-treated, whereby a uniform formation of the soft-annealing structure under avoidance of grain boundary carbides is assured.

It meets the high requirements according to VDG Merkblatt M82 (Association of German Foundry Experts Code of Practice M82) in the usual bar steel range and even the significantly higher toughness requirements according to the DGM (German Association for Material Science) regulation of up to medium-size tool cross-sections – for example up to 500 mm and higher for 1.2343.

MICRO 900 AND MICRO 900 / BG IN COMPARISON WITH DIN EN ISO 4957 AND VDG AND DGM CODE OF PRACTICE

	REQUIREMENTS				
QUALITY FEATURE	DIN EN ISO 4957	VDG code of practice M82	DGM code of practice	MICRO 900	MICRO 900 / BG
Carbon (in comparison to DIN – limited)					
Phosphorus (in comparison to DIN – reduced)				•	
Sulfur (in comparison to DIN – strongly reduced)		•	•	•*	•*
Fulfillment of certain cleanness requirements		•	•	•	•
Measures for improvement of					
 segregations 					-
 banding 				•	-
carbides				•	-
 Isotropy 		-	-	-	-
Selection of favorable forming technology/forming degrees		•			•
Fulfillment of certain microstructure requirements		•	•		•
Fulfillment of certain toughness requirements • in longitudinal direction • in transverse direction				:	
* further reduced in comparison to VDG and DGM code of practice: < 0.003 % S					

ESR (ELECTRO-SLAG REMELTED) HOT-WORK STEELS FOR

- even higher requirements
- exceptionally large dimensions

- special hot-work steels
- special customer specifications

We deliver hot-work steels forged from ESR ingots remelted in our own ESR facility, with diameters from 500 to 1,300 mm maximum.

Optimized Chemical Composition and Focused Measures

Depending on the production process and the material to be processed, hot-work tools must resist mechanical, thermal, tribological and chemical loads in varying intensities. Steels which are to satisfy these multiple requirements need special properties, which may be divided into two groups:

GROUP 1:

- great high-temperature strength
- high tempering resistance
- high wear resistance
- high resistance to corrosion and oxidation.

GROUP 2:

- high toughness at ambience and operational temperature
- high resistance against temperature changes
- high homogeneity and isotropy.

Group 1: The properties are defined by the chemical composition (Cr, W, Mo, V, Co); a suitable heat treatment adapts them to the respective requirement. Higher performances thus require the selection of a higher-alloyed steel.

Quite different group 2: These properties can – at the same alloy content – be decisively improved through suitable special treatment during melting, hot forming and heat treatment.

This is of decisive importance as the life span of a big portion of all hot-work tools is limited by insufficient toughness. Thus, the optimization of these properties is the main goal of our work.

THE SAARSCHMIEDE RECIPE FOR A HIGH PERFORMANCE

The increase of toughness of hot-work tools with simultaneous improvement of homogeneity and isotropy has two prerequisites: Exact knowledge of the individual influences and state-of-the-art facilities for melting or remelting, forming and heat treatment.

This results in the following tasks:

The **carbon content** is adjusted to the realization of the highest toughness – under consideration of the content of alloy elements. A particularly narrow range of the carbon content assures the uniformity of properties on a high level.

Sulfur reduces toughness in a great measure, especially transversely to the forming direction; with increasing tool hardness this influence becomes more and more distinct. For MICRO 900 / BG, the sulfur content is thus limited to max. 0.003 %.

MICRO 900 / BG shows the least **segregations**. Through intensive diffusion annealing, combined with optimized hot forming, a more regular distribution of the alloying elements is achieved. The carbides are smaller and more regularly distributed, too.





Hot-Work Tools from MICRO 900/BG: More Cost-Effective, More Durable

BECAUSE HOT-WORK TOOLS FROM MICRO 900 / BG

- are more easily machined
- show a higher dimensional stability during heat treatment

- can be manufactured mostly from the bar = less storage, faster delivery
- show longer tool life in operation

Whether die forging plant, die pressure plant, extrusion press or similar hot-forming processing – the hot-work tool steel always makes an important contribution to cost-effectiveness. This is where a material with **higher toughness, better homogeneity and isotropy** helps to save time and money.

ITS ADVANTAGES ... IN MATERIAL PROPERTIES:

- narrowed range for carbon content
- lowest sulfur content
- improved degree of cleanliness
- reduced crystalline segregation and finer carbides
- regular formation of the soft-annealing microstructure under avoidance of grain boundary carbides
- higher toughness in longitudinal and especially in transverse direction, also in larger tool cross-sections
- better homogeneity and isotropy

... IN TOOL PRODUCTION:

- better machinability through regular formation of the soft-annealing microstructure and higher homogeneity
- greater dimensional stability and reduction of the risk of rejects through heat treatment thanks to higher homogeneity, isotropy and toughness
- to a large extent, a possible abandoning of forging of individual components. Advantage: Less storage and shorter delivery time.

... AND DURING OPERATION:

higher tool performance through longer tool life

Multiblocks

Multiblocks are a special product of our company. These are hot-work steels, made by the ESR-route, with large cross-sections offering identical property values of the highest level in all directions (isotropy) (image 1). These permit production of desired square or flat dimensions through saw cutting as needed (image 2).

Multiblocks offer **multiple advantages** to the customer:

- blank, decarburization-free surface of the saw-cut sides
- less allowance and narrower tolerances (weight savings)
- less machining
- early delivery and high flexibility, which enables just-in-time production



Image 2 The multiblock principle



You can obtain further information at www.saarschmiede.com



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