

# MDC-i

## Introduction:

MDC-i is a hot work tool steel which offers very good resistance to heat checking, gross cracking. By increasing the content of alloy elements such as Mo, its benchmark steel grades are Dievar and DAC55, belonging to the 1.2367 modified steel grade in the NADCA classification. It has the following advantages:

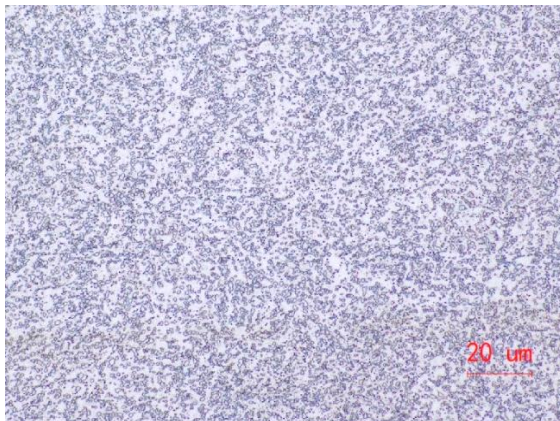
- Excellent high-temperature resistance to heat checking
- Excellent impact toughness
- Excellent hardenability
- Excellent dimensional stability and hardness uniformity after heat treatment
- Excellent nitriding performance

## Chemical Composition::

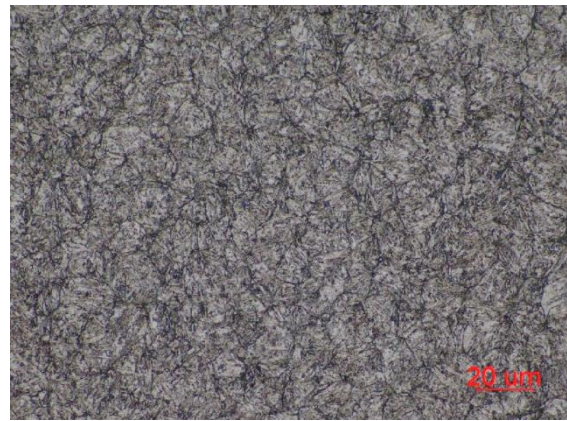
Chemical Composition (wt%)	C	Mn	Si	S	P	Cr	Mo	V
MDC-i	0.36	0.62	0.20	0.003max	0.005	5.10	2.40	0.60
Dievar	0.35	0.50	0.20	0.003max	0.020Max	5.00	2.30	0.60
1.2367 Modified	0.32~0.40	0.10~1.20	0.10~0.50	0.003max	0.020Max	4.70~5.85	2.00~3.30	0.40~0.70

\*The chemical compositions of Dievar and DAC55 are derived from their product brochures.

Spheroidized Annealing Structure



Tempered Martensitic Structure



## Cleanliness:

Rated according to ASTM E45 standard, non-metallic inclusions A, B, C, and D are all  $\leq 1.0$  level.

A		B		C		D	
thin	heavy	thin	heavy	thin	heavy	thin	heavy
0.5	0	0.5	0.5	0	0	0.5	0

## Applications:

Suitable for manufacturing medium and small-sized die-casting molds with high requirements for resistance to heat checking and high-temperature strength, as well as inserts with high requirements for erosion resistance. The effect is particularly good when combined with nitriding surface treatment.

Physical Properties: Room Temperature

Temperature	200°C	400°C	600°C
Density Kg/m <sup>3</sup>	7800	7750	7680
Elastic Modulus MPa	2.05 X 10 <sup>5</sup>	1.90 X 10 <sup>5</sup>	1.50 X 10 <sup>5</sup>
Thermal Expansion Coefficient °C	11.7 X 10 <sup>-6</sup>	12.2 X 10 <sup>-6</sup>	12.8 X 10 <sup>-6</sup>
Thermal conductivity* W/m ° C	28.3	32.1	33.2

Mechanical Properties:

Hardness	44HRC	46HRC	48HRC
Tensile Strength MPa	1510	1600	1690
0.2%屈服强 度 MPa	1200	1320	1450
延伸率 %	13	12.8	12.5
断面收缩率 %	59	58	55

## Heat Treatment:

### Quenching + Tempering:

Usually vacuum quenching + 3 times tempering, for molds with a single thickness  $\geq 300$ mm, temper 4 times;

### Stress Relief Annealing:

It is recommended to perform a stress relief annealing after the mold is finished, and another stress relief annealing after approximately 5000 mold cycles in mass production. The recommended stress relief annealing temperature is 500~530°C, using atmosphere protection to avoid mold oxidation.

## **Nitriding & oxidation:**

Nitriding and Oxidation treatment are recommended to be applied after finishing the mold trial and before mass production. Through nitriding surface treatment, compressive stress is generated on the mold surface. The surface hardness after nitriding is approximately 950 – 1100 HV0.2, which has good wear resistance and anti-adhesive properties, and can significantly improve the service life of the molds.