



DILLINGER HÜTTE GTS

DIMO 2738

PREHARDENED CR MN NI MO-ALLOYED STEEL IN MOLD QUALITY FOR
THE CONSTRUCTION OF PLASTIC MOLDS

Specification DH-E39-C
Edition November 2006

DIMO 2738 is a prehardened CrMnNiMo-alloyed tool steel for the construction of plastic molds with superior surface requirements on molds. It is characterized by excellent polishability, photoetchability, spark erosion behaviour and dimensional stability as well as good machinability. DIMO 2738 shows a better through-hardening compared to DIMO 2311.

Product description

Designation and range of application

DIMO 2738 is a modified version of 1.2738 according to Stahl-Eisen-Liste and of 40CrMnNiMo8-6-4 according to EN ISO 4957. DIMO 2738 differs from 1.2311 according to Stahl-Eisen-Liste and from 40CMD8 according to NF A 35590 by a higher Ni-content of approximate 1 %.

DIMO 2738 is available as plate with sheared or flame cut edges in the following dimensions:

Thickness	> 12 ≤ 130 mm	> ½ ≤ 5 in	> 130 ≤ 165 mm	> 5 ≤ 6½ in
Width ¹⁾	≥ 1000 ≤ 2500 mm	≥ 40 ≤ 98¼ in	≥ 1000 ≤ 2050 mm	≥ 40 ≤ 80½ in
Length	≥ 4500 ≤ 6000 mm	≥ 177½ ≤ 236 in	≥ 4000 ≤ 6000 mm	≥ 157½ ≤ 236 in

¹⁾ Widths < 1250 mm (49 in) have to be ordered with an even number of plates
Other dimensions available upon request.

Production

The DIMO 2738 production route is designed to achieve the excellent properties of this mold steel type with superior surface requirements. DIMO 2738 is characterized by high dimensional stability. The DIMO 2738 production route provides excellent polishability, photoetchability and spark erosion properties. Therefore DIMO 2738 is particularly suitable for molds with superior surface requirements if suitable manufacturing processes are employed.

The good sulfidic and oxidic cleanliness and the modification of the few remaining inclusions by the calcium treatment lead to good machinability and minimize the tool wear. Thicknesses ≥ 100 mm show a better through-hardening compared to DIMO 2311.

These properties can only be achieved by the combination of the following DIMO 2738-production steps:

- desulphurization to $S \leq 0.002$ % for high sulfidic cleanliness
- chemical analysis in dependence of dimensions
- vacuum degassing
- argon stirring for high sulfidic and oxidic cleanliness
- calcium treatment for inclusion shape control
- special casting conditions to assure the high cleanliness and homogeneity
- High Shape Factor Rolling (high thickness reduction) to realize a closely packed structure
- appropriate heat treatment parameters according to analysis and dimensions to assure homogeneous hardness distribution over the plate and to minimize residual stresses

DIMO 2738

Chemical composition

For the ladle analysis the following limiting values in % are applicable

	C	Si	Mn	P	S	Cr	Mo	Ni	V
limiting values	0.35 - 0.45	0.20 - 0.40	1.30 - 1.60	≤ 0.025	≤ 0.002	1.80 - 2.10	0.15 - 0.25	0.90 - 1.10	¹⁾
auxiliary data for 100 mm plate thickness	0.40	0.30	1.50	0.015	0.001	1.90	0.20	0.95	0.05

¹⁾ alloyed depending on dimensions

Delivery condition

DIMO 2738 is supplied in the prehardened (air hardened + tempered) condition.

Mechanical and technological properties in the delivery condition

Hardness

Unless otherwise agreed the hardness at the surface in the delivery condition is 280 - 325 HB. According to EN 18265, table B2, this corresponds to a tensile strength of approximately 890 - 1030 MPa (128 - 148 ksi).

Physical properties (auxiliary data)

specific heat at 20 °C: 0,46 kJ/kg · K (at 68 °F: 0.11 Btu/lb · °F)							
thermal conductivity at W/m · K	20 °C	100 °C	200 °C	300 °C	400 °C		
	34	32	33	34	34		
Btu/ft · h · °F	68 °F	210 °F	390 °F	570 °F	750 °F		
	19.6	18.5	19.1	19.6	19.6		
coefficient of thermal expansion between 10 ⁻⁶ m/m · K	20 °C and	100 °C	200 °C	300 °C	400 °C	500 °C	600 °C
	11.9	12.5	13.1	13.6	14.1	14.1	
10 ⁻⁶ in/in · °F	68 °F and	210 °F	390 °F	570 °F	750 °F	930 °F	1110 °F
	6.60	6.87	7.20	7.48	7.76	7.76	

Testing

- Heat analysis
- Dimension control
- Surface inspection
- Hardness
The hardness (HB) is tested on surface of each rolled mother plate.
- Ultrasonic testing
Unless otherwise agreed, 100 % ultrasonic testing is performed on each plate in the delivery condition in accordance with EN 10160. As admissible limit applies quality class 4 in table 5 of EN 10228-3.
Upon request, an ultrasonic testing in accordance with ASTM A 578, Level C, supplementary requirements S1 and S9 is possible. In this case the desired testing type has to be indicated on the order.

Unless otherwise agreed, the results are documented in an inspection certificate 3.1 in accordance with EN 10204.

Identification of plates

Unless otherwise agreed the marking is carried out via steel stamps with at least the following information:

- steel grade (DIMO 2738)
- heat number
- number of mother plate and individual plate
- the manufacturer's symbol
- inspector's sign

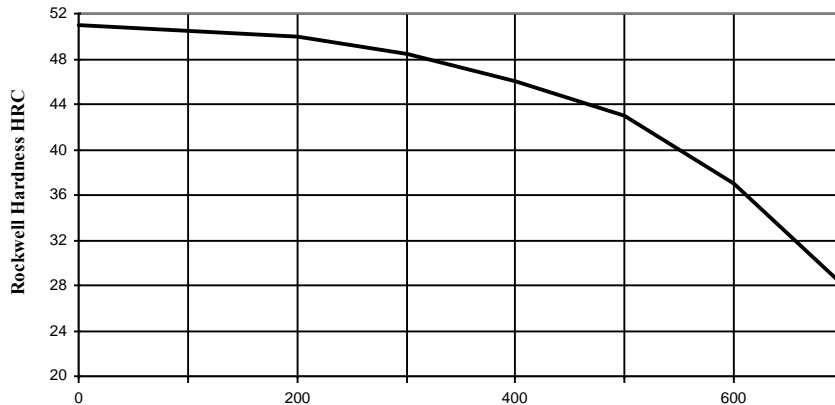
Processing

Heat treatment

DIMO 2738 is delivered in the prehardened condition; therefore further heat treatment is generally not necessary. This avoids the risks and costs involved by the hardening and tempering of a mold after processing. Should a heat treatment become necessary, the following data are recommended:

soft annealing	stress relieving	preheating before hardening	hardening	tempering
720 - 740 °C (1330 - 1360 °F) 2 - 4 h, furnace cooling hardness ≤ 235 HB	in the delivery condition max. 580 °C (1080 °F) 1 - 2 h, furnace cooling	450 - 650 °C (840 - 1200 °F)	840 - 860 °C (1540 - 1580 °F); air cooling or warm bath hardening at 200 - 230 °C (390 - 450 °F)	in accordance with tempering diagram to required hardness (min. 1 h/25 mm (1 in) wall thickness)

Tempering diagram



Tempering temperature [°C] (valid for soaking time 1 h, air cooling)

Remark: the values in the diagram are mean values on samples, diameter 25 mm (1 in), length 50 mm (2 in), hardened at 840 °C (1540 °F) on air

General technical delivery requirements

Unless otherwise agreed, the general technical delivery requirements in accordance with EN 10021 apply.

Tolerances

Unless otherwise agreed, tolerances are in accordance with EN 10029 / ASTM A 6 with the following restrictions:

plate thickness:	in accordance with EN 10029, class C / ASTM A 6			
plate width:	≥ 1000 mm ≤ 1500 mm	± 25 mm	≥ 40 ≤ 59 in	± 1 in
	> 1500 mm ≤ 2050 mm	± 40 mm	> 59 ≤ 80½ in	± 1½ in
	> 2050 mm	± 50 mm	> 80½ in	± 2 in
plate length:		± 1000 mm		± 40 in
flatness:	≤ 3 mm/m (1/8 in/40 in)			

Unless otherwise agreed, short lengths ≥ 2 m (79 in) are part of the delivery.

Surface quality

Unless otherwise agreed, the specifications will be in accordance with EN 10163-2 class A, subclass 3. Shot blasting of upper and lower surface of the plate and shop priming are possible on request.

General note

If special requirements, which are not listed in this specification, are to be met by the steel due to its intended use or processing, these requirements are to be agreed before placing the order.

The information in this specification is a product description. This specification is updated if necessary. The latest version is available from the mill or as download at www.dillinger.de.

Sales organisations:

Germany

Vertriebsgesellschaft
Dillinger Hütte GTS
Postfach 104927
D-70043 Stuttgart
Tel: +49 7 11 61 46-300
Fax: +49 7 11 61 46-221

France

DILLING-GTS Ventes
5, rue Luigi Cherubini
F-93212 la Plaine Saint Denis Cédex
Tel: +33 1 71 92 16 74
Fax: +33 1 71 92 17 98

For your local representative please
contact our coordination office in
Dillingen

Tel: +49 68 31 47 23 85
Fax: +49 68 31 47 99 24 72

AG der Dillinger Hüttenwerke
Postfach 1580
D-66748 Dillingen/Saar

e-mail: info@dillinger.biz
<http://www.dillinger.de>

Tel: +49 68 31 47-34 54
Fax: +49 68 31 47-99 20 25