



DIMO C45

UNALLOYED CARBON TOOL STEEL FOR HIGH QUALITY HOLDERBLOCK APPLICATIONS

Material data sheet, edition February 2015¹⁾

DIMO C45 is an unalloyed carbon tool steel for the construction of plastic mold assemblies. DIMO C45 is designed for holderblock applications requiring extensive machining and high dimensional stability as mold assemblies, ejector plates, supports, clamping plates and housings for diecasting dies.

Product description

Designation and range of application

DIMO C45 is a modified version of C45 in accordance with DIN EN ISO 4957 (steel number 1.1730), DIN EN 10083-2 (steel number 1.0503 or 1.1191) respectively Grade 1045 in accordance with ASTM A 830 in holderblock quality.

DIMO C45 is available as plate with cut edges (sheared, flame cut or water jet cut) in the following dimensions:

Thickness	≥ 10 ≤ 130 mm	≥ $\frac{3}{8}$ ≤ 5 in	> 130 ≤ 305 mm	> 5 ≤ 12 in
Width ^{a)}	≥ 1000 ≤ 3000 mm	≥ 40 ≤ 119 in	≥ 1000 ≤ 2050 mm	≥ 40 ≤ 80½ in
Length	≥ 3000 ≤ 6000 mm	≥ 119 ≤ 236 in	≥ 3000 ≤ 6000 mm	≥ 119 ≤ 236 in

^{a)} Widths < 1500 mm (59 in) have to be ordered with an even number of plates
Other dimensions available upon request.

Production

The DIMO C45 production route is designed to achieve good machinability, dimensional stability and high cleanliness. The good oxidic cleanliness and the modification of remaining inclusions by the calcium treatment lead to good machinability and minimize the tool wear. These properties can only be achieved by the combination of the following DIMO C45-production steps:

- hot metal desulphurization
- 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.

¹⁾ The latest edition of this material data sheet is available at <http://www.dillinger.de/>.



Chemical composition

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

	C	Si	Mn	P	S	Cr ^{a)}	Mo ^{a)}	Ni ^{a)}	Cr+Mo+Ni ^{a)}
Limiting values	0,42 - 0,50	≤ 0,40	0,50 - 0,80	≤ 0,025	≤ 0,010	≤ 0,40	≤ 0,10	≤ 0,40	≤ 0,63
Auxiliary data	0,47	0,34	0,74	0,017	0,0020	0,040	0,012	0,040	0,09

^{a)} steel grades according DIN EN 10083-2

Delivery condition

DIMO C45 is supplied in a stress relieved condition with a normalized ferrite-pearlite-microstructure. The normalizing can be replaced by a normalizing rolling. Cut edges are stress relieved by an appropriate heat treatment.

Mechanical and physical properties in the delivery condition

Hardness / Strength

Unless otherwise agreed the hardness at the surface in the delivery condition is 150 - 220 HBW. A tensile test acc. DIN EN 10083-2 can be agreed. The requirements of the standard have to be met.

Physical properties (auxiliary data)

specific heat at [kJ/(kg K)]	20°C						
	0,47						
specific heat at [Btu/(lb°F)]	68 °F						
	0,11						
thermal conductivity at [W/(m K)]	20 °C	100 °C	200 °C	300 °C	400 °C		
	48	49	49	48	47		
thermal conductivity at [Btu/(ft h°F)]	68 °F	210 °F	390 °F	570 °F	750 °F		
	27,7	28.3	28.3	27.7	27.2		
coefficient of thermal expansion between	20 °C and	100 °C	200 °C	300 °C	400 °C	500 °C	600 °C
10⁻⁶ [m/(mK)]		11.1	11.8	12.8	13.6	13.7	14.3
coefficient of thermal expansion between	68 °F and	210°F	390°F	570°F	750°F	930°F	1110°F
10⁻⁶ [in/(in°F)]		6.2	6,8	7.39	7.86	7.91	7.94

Testing

- Heat analysis
- Dimension control
- Surface inspection
- Hardness

The hardness (HBW) is tested on surface of a rolled mother plate

- Tensile test acc. DIN EN 10083-2 can be agreed
- Ultrasonic testing

Unless otherwise agreed, ultrasonic testing is performed on each plate in accordance with EN 10160, class S2/E3, 100% of the surface.

Upon request, an ultrasonic testing in accordance with ASTM A 578, Level C + S1 is possible. In this case the desired testing standard 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 C45)
- heat number
- number of mother plate and individual plate
- the manufacturer's symbol
- inspector's sign

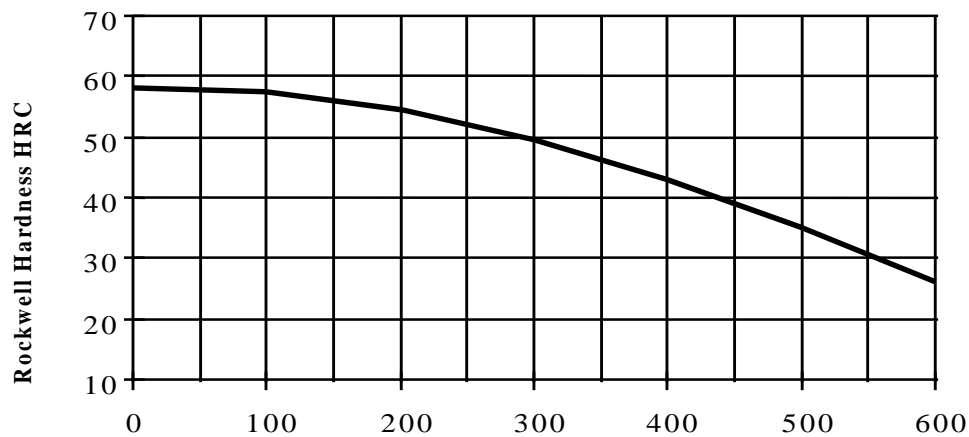
Processing

Heat treatment

DIMO C45 is generally applied in the delivery condition. Should a heat treatment become necessary, the following data are recommended depending on the complexity of the products:

soft annealing	stress relieving	hardening	tempering
680 - 710 °C (1260 - 1310 °F) 2 - 4 h, furnace cooling	in the delivery condition approx. 600 °C (1112 °F) 1 - 2 h; furnace cooling	820 - 860 °C (1508 - 1580 °F) / min. 30 min., water	in accordance with tempering diagram to required hardness

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 800 °C (1470 °F) in water

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 with the following restrictions:

plate thickness:	in accordance with EN 10029, class C			
plate width:	$\geq 1000 \text{ mm} \leq 1500 \text{ mm}$	$\pm 25 \text{ mm}$	$\geq 40 \leq 59 \text{ in}$	$\pm 1 \text{ in}$
	$> 1500 \text{ mm} \leq 2050 \text{ mm}$	$\pm 40 \text{ mm}$	$> 59 \leq 80\frac{1}{2} \text{ in}$	$\pm 1\frac{1}{2} \text{ in}$
	$> 2050 \text{ mm}$	$\pm 50 \text{ mm}$	$> 80\frac{1}{2} \text{ in}$	$\pm 2 \text{ in}$
plate length:		$\pm 500 \text{ mm}$		$\pm 20 \text{ in}$
flatness:	$\leq 3 \text{ mm/m}$ ($\frac{1}{8} \text{ in}/40 \text{ in}$)			

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.

Contact

For your local representative
please contact our coordination office in Dillingen:

Telephone: +49 6831 47 2223

Telefax: +49 6831 47 3350

Or visit our website:

<http://www.dillinger.de/dh/kontakt/weltweit/index.shtml.en>



AG der Dillinger Hüttenwerke
Postfach 1580
66748 Dillingen/Saar
Deutschland

e-mail: info@dillinger.biz

<http://www.dillinger.de>

Telephone: +49 6831 47 3461

Telefax: +49 6831 47 3089