DILLINGER HÜTTE GTS

UNALLOYED CARBON-STEELS

Specification DH-E38-D
Edition March 2010 *)

This specification describes the product profile and the available conditions of unalloyed carbon-steels with average carbon contents of 0.22 to 0.60 % according to EN 10083-2. These steels are used by the customers in mechanical and plant engi-neering as well as in tool construction either in the delivery condition or after heat treatment carried out by the fabricator. In tool construction they find application in a wide range of mold assemblies such as ejector plates, supports, clamping plates and housing for diecasting dies.

According to the very different types of application Dillinger Hütte GTS offers C-steels as follows:
Type A: Delivery condition as rolled +U
Type B: Delivery condition normalized according to EN 10083-2 [1)] +N
Type C: Delivery condition optimised for mold and die application DIMO (stress relieved pearlite-ferrite microstructure)
A more detailed description of DIMO qualities is given in the appropriate DIMO specifications.

Product description

Designation and range of application

This specification covers the following steel grades according to EN 10083-2:

Special steels	Former designation acc. to DIN 17200	Material no.
C22E	Ck 22	1.1151
C35E	Ck 35	1.1181
C40E	Ck 40	1.1186
C45E	Ck 45	1.1191
C50E	Ck 50	1.1206
C55E	Ck 55	1.1203
C60E	Ck 60	1.1221

The national version of EN 10083-2 replaces different former national standards like DIN 17200, NF A35-554 and BS 970-1. An analogous application of other standards like SAE/AISI J 403 is possible on request. This specification is valid for maximum plate thicknesses according to the following table:

Steel grade	Type/Delivery condition A +U	B +N	C DIMO
C22E ... C40E	400 mm	400 mm	-
C45E ... C50E	300 mm	300 mm	205 mm
C55E ... C60E	-	300 mm	205 mm

D'autres dimensions sont possibles sur demande.
[1)] For unalloyed carbon steels according to EN 10083-2, normalising may be replaced by normalising rolling.

*) The actual version of this specification is available at http://www.dillinger.de/

Production

The exact production route depends on the chosen type. Therefore, one or several of the following mechanical and technological production steps can be used:

- hot metal desulphurization
- vacuum degassing
- argon stirring for oxidic cleanliness
- calcium treatment for inclusion shape control
- special casting conditions to assure the good oxidic cleanliness
- High-Shape-Factor-Rolling (high thickness reduction) to realize a closely packed structure
- appropriate heat treatment parameters to assure homogeneous hardness distribution over the plate and to minimize residual stresses

Chemical composition (Heat analysis)

The heat analysis of the steel grades included in this specification conforms with the requirements of EN 10083-2 in %.

Steel	C	Si max	Mn	P max.	S max.	Cr max.	Mo max.	Ni max.	Cr+Mo+Ni max.
C22E	0.17 - 0.24	0.40	0.40 - 0.70	0.020	0.010	0.40	0.10	0.40	0.63
C35E	0.32 - 0.39	0.40	0.50 - 0.80	0.020	0.010	0.40	0.10	0.40	0.63
C40E	0.37 - 0.44	0.40	0.50 - 0.80	0.020	0.010	0.40	0.10	0.40	0.63
C45E	0.42 - 0.50	0.40	0.50 - 0.80	0.020	0.010	0.40	0.10	0.40	0.63
C50E	0.47 - 0.55	0.40	0.60 - 0.90	0.020	0.010	0.40	0.10	0.40	0.63
C55E	0.52 - 0.60	0.40	0.60 - 0.90	0.020	0.010	0.40	0.10	0.40	0.63
C60E	0.57 - 0.65	0.40	0.60 - 0.90	0.020	0.010	0.40	0.10	0.40	0.63

Identification of plates

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

- steel grade
- heat number
- number of mother plate and individual plate
- the manufacturer's symbol
- inspector’s sign
- delivery condition where applicable

General technical delivery requirements

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

General notes

If particular requirements are demanded and not covered in this specification, please contact us with the specifications for our review and agreement prior to ordering.
The information in this specification is a product description. This specification is updated as occasion demands. The latest version is available from the mill or as download at www.dillinger.de.

Types/ Delivery condition

The following standard types are offered.
In addition to these standard types the available options of Dillinger Hütte GTS are pointed out. ("+" = available on request)

Type/ Delivery condition	Type A C... +U	Type B C... +N	Type C DIMO
Condition of treatment/ microstructure	As rolled (free)	Normalized acc. EN 10083 (see remark on p.1)	Stress relieved pearlite-ferrite microstructure
Edges	In general sheared or flame cut	In general sheared or flame cut	In general sheared or flame cut
Heat treatment of flame cut edges	None	None	Stress relieved
Options:			
1.1. Flame cut edges stress relieved	+	+	-
1.2. Edges plasma- or water jet cut	+	+	
2. Soft annealing	+	-	-
Option on request :			
3. Specified S- content (e.g. 0.020 - 0.040 %)	+	+	+
Mechanical properties	No indications defined in EN 10083-2	Corresponding to the requirements of EN 10083-2 (indications only for thickness up to 250 mm/100 mm for C22E)	HB acc. to DIMO specification or clients order
Tests			
Heat analysis	+	+	+
Dimension control	+	+	+
Surface inspection	+	+	+
US- testing	-	-	EN 10160, class S2/E3
Hardness of surface in HB	-	-	One plate per heat and thickness
Options on request:			
4. US-testing 4.1.	EN 10160, class S1/E1	EN 10160, class S1/E1	-
4.2.	EN 10160, class S2/E2	EN 10160, class S2/E2	-
4.3.	EN 10160, class S2/E3	EN 10160, class S2/E3	-
4.4.	-	-	EN 10160, class S3/E4
5. Surface hardness HB	One plate per heat and thickness	One plate per heat and thickness	-
6. Mechanical properties R_e, R_m, A_5, determined on specimen in the delivery condition.	+ Only for information	+	-

Documentation				
Certificate acc. EN 10204		2.2 (only heat analysis)	2.2 (only heat analysis)	3.1 with heat analysis and HB
Options:	**7.**	3.1 with HB, test frequency as per 5.	3.1 with HB, test frequency as per 5.	-
	8.	3.1 with HB and R_m calculated from HB acc. to EN ISO 18265	3.1 with HB and R_m calculated from HB acc. to EN ISO 18265	3.1 with HB and R_m calculated from HB acc. to EN ISO 18265
	9.	-	3.1 with mechanical properties R_e, R_m, A_5	-
Tolerances				
Thickness		Acc. to EN 10029 cl. A	Acc. to EN 10029 cl. A	Acc. to EN 10029 cl. C
Width		Acc. to EN 10029	Acc. to EN 10029	In general ± 50 mm
Length		Acc. to EN 10029	Acc. to EN 10029	In general ± 500 mm
Flatness		Normal tolerances (cl. N)	Normal tolerances (cl. N)	Special tolerances (cl. S)
Options:				
10. Flatness		serrée (EN 10029 cl. S)	serrée (EN 10029 cl. S)	-
Surface		Acc. to EN 10163-2 cl.. A subgroup 3	Acc. to EN 10163-2 cl.. A subgroup 3	Acc. to EN 10163-2 cl.. A subgroup 3

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