

1. PURPOSE:

This document defines general technical delivery conditions of round and square carburizing&quenching materials that Olimpa Makine San. Ve Tic. A.Ş. (SHORTLY Olimpa) uses for production of hydraulic breakers. The required material dimensions and quantity will be informed with order.

2. SCOPE:

This document is an attachment of “inquiry letter” and includes followings specifications of delivered materials:

- Chemical composition and mechanical properties.
- Dimension and tolerance
- Delivery conditions

3. PRODUCTION

Steel production information are given as below. If Olimpa needs an information about production, steel supplier will be responsible to give required information and inform the changes about production method.

3.1 Steel Production Method:

- 3.1.1 In Electric Arc Furnace
- 3.1.2 Boiling Method (Killed steel)
- 3.1.3 Vacuum Degassing
- 3.1.3.1 For Round Materials; Reduction ratio should be min. 6:1

3.2 Chemical Composition (%)

- The chemical composition is given by following table-1

Diameter	Grade		C	Mn	P	S	Si	Cr	Mo	Ni	Cu	Al
....≤100	4140	min.	0,38	0,60	0,035	0,035	0,15	1,00	0,15			
		max.	0,42	0,75	Max.	Max.	0,35	1,10	0,25			
....>100	4140	min.	0,40	0,85	0,035	0,035	0,15	1,00	0,15			
		max.	0,43	0,95	Max.	Max.	0,35	1,10	0,25			

Table-1 Chemical composition

- Unless be informed the inclusion, the values on the Table-2 are valid.

Elemen	% Miktar
Cu	≤ 0,20
Sn	≤ 0,030
Al	0,015 – 0,040
N	≤ 0,012 (120 ppm)
H	≤ 0,0002 (2 ppm)
Cu+10 Sn	± 0,60

Tablo-2 Kalıntı Elementler



3.3 Mechanical Properties

See reference Table-3

Heat Treatment	ØDia. (mm)	Re min. N/mm ²	Rm N/mm ²	A min. %	KV min. J
+QT (Quenched+tempered)	≤16	900	1100-1300	10	30
	16-40	750	1000-1200	11	35
	40-100	650	900-1100	12	35
	100-160	550	800-950	13	35
	160-250	500	750-900	14	35

Table-3 Mechanical Properties

3.4 Hardenability Band

- The hardenability band should be according to EN 10084 as given following Table-4

Material	Hardness HRC	Distance from end.														
		1,5	3,0	5,0	7,0	9,0	11,0	13,0	15,0	20,0	25,0	30,0	35,0	40,0	45	50
4140	Max.	61	61	61	60	60	59	59	58	56	53	51	48	47	46	45
	Min.	53	53	52	51	49	43	40	37	34	32	31	30	30	29	29

Table-4 Hardenability Band

3.5 Non-metallic Inclusions

Non-metallic inclusions level (K4 max.) should be 15, according to DIN 50602.

3.6 Grain Size

Grain size should be 5-8

3.7 Heat Treatment

Annealed, max. 240 HB.

3.8 Ultrasonic Test

% 100 Ultrasonic test should be made with level SEP 1921 D/d and there shouldn't be any segregation, crack or cavity failures in material. Ultrasonic failures should be ≤ 3. (SEP 1920 Table 1 class 3)

3.9 Size and Tolerance

3.9.1 *Length*: Unless be informed by “inquiry letter”, the length should be as shown on the following table.

Dimensions, mm	Length (mm)	Dimensions, mm	Length (mm)
Ø75	5550	Ø170	5850
Ø80	5250	Ø180	5850
Ø85	5670	Ø190	4850
Ø90	5600	Ø200	4850
Ø95	5600	Ø210	5450
Ø100	5500	Ø220	4850
Ø105	5600	Ø230	4650
Ø110	5600	Ø242	4650
Ø115	5100	Ø250	4650
Ø120	5200	Ø260	4200
Ø125	5550	Ø280	4620
Ø130	5500	Ø290	
Ø135	5550	Ø320	
Ø140	5550	Ø330	
Ø145	4840	Ø360	
Ø150	5100	Ø390	
Ø155	5100	Ø400	
Ø165	5100	Ø500	

Table-5 Length

3.9.2 *Tolerance*: Length and linearity ratios of material should be according to following table

Length (mm)	Tolerance (mm)
50	±0,8
100	±1,3
150	±2,0
190-350	±2,5

Table-5 Linearity

3.10 Mill Quality/Test Certificate

MTC shall be acc.to EN10204 3.1 B and must show below information:

- 3.10.1 Steel Grade
- 3.10.2 Dimension
- 3.10.3 Steel production method
- 3.10.4 Ratios of all elements in the chemical composition(According to the table).
- 3.10.5 Hardenability band
- 3.10.6 Grain size measurement.
- 3.10.7 Non-metallic inclusions.
- 3.10.8 Ultrasonic test
- 3.10.9 Delivery Hardness value.
- 3.10.10 Heat treatment information.
- 3.10.11 Forging/Reduction Ratio
- 3.10.12 Heat No
- 3.10.13 Heat Quantity

4. Pre-Acceptance

When the material is ordered, an independent AUDIT Company determined by Olimpa, will audit to follow up the production and analysis results. The manufacturer will allow this Audit Company to work in its laboratories for the necessary measurements and analyzes. After the end of the production, the compliance of the values specified in the Material Certificate in Article 3.10 with the values specified in the specification will be reported to Olimpa by the auditor. When the suitability is approved by Olimpa, the material pre-acceptance will be completed.

5. Packing and Shipping Instruction

Olimpa makes a shipment instruction after the independent auditor company notifies Olimpa about the approval of the material pre-acceptance. The following information will be stamped with cold stamp on the head of each size material

- Producer Name
- Material Grade
- Heat No
- Diameter
- Weight of steel bar

6. Inspection and Rejection

- 6.1 **Material Pre-Acceptance:** In case the conformity specified in Article 4 is not achieved, the materials will be rejected and shipment approval will not be given. The manufacturer company will inform the reasons for the non-compliance by preparing an improvement plan and will offer a solution to eliminate the nonconformity
- 6.2 **Entry Quality Control:** The entrance control of the materials is controlled according to Olimpa Material Entry Control Procedure. In case of detection of nonconformity, the materials will be rejected and returned to the manufacturer. In the event of any material-related problem in the used material during manufacturing or in the final product, Olimpa will use its return authority and demand compensation from the manufacturer for the damage caused by the error.
- 6.3 **Objection:** The producer company should immediately investigate the reasons for rejection of the material and report the detected errors to Olimpa. The rejected material should be seen and examined on site within a maximum of 2 weeks.