

## 1. PURPOSE:

This document specifies 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;

3.1.3.1.1 ... $\geq \varnothing 220$  will be forging. Forging ratio must be min. 5:1.

3.1.3.1.2 ...  $< \varnothing 210$  will be hot rolled or cold rolled. Reduction ratio must be min. 6:1

### 3.2 Chemical Composition (%)

- The chemical composition is given by following table-1

Grade	C	Mn	P	S	Si	Cr	Mo	Ni	Cu	Al	
4340	0,38 0,43	0,60 0,80	0,035 Max.	0,035 Max.	0,15 0,35	0,70 0,90	0,20 0,30	1,65 2,00			

Table-1 Chemical composition

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

Elemen	% Weight
Cu	$\leq 0,20$
Sn	$\leq 0,030$
Al	0,015 – 0,040
N	$\leq 0,012$ (120 ppm)
H	$\leq 0,0002$ (2 ppm)
Cu+10 Sn	$\pm 0,60$

Table-2 Inclusions



**Makine San. Ve Tic. A.Ş.**

### 3.3 Mechanical Properties

Heat Treatment	ØDia. (mm)	Re min. N/mm <sup>2</sup>	Rm N/mm <sup>2</sup>	A min. %	KV min. J
+QT (Quenched+tempered)	≤60	835	1000-1150	12	42
	60-100	740	930-1080	12	42
	100-178	720	930-1080	14	50
	178-240	690	900-1000	14	35

Table-3 Mechanical Properties

### 3.4 Hardenability Band

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

Grade	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
4340	Max.	58	58	58	58	57	57	57	57	57	57	57	57	57	57	57
	Min.	50	50	50	50	49	48	48	48	48	47	47	47	46	45	44

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 must 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)
Ø65		Ø120	
Ø70		Ø130	
Ø75		Ø135	
Ø80		Ø140	
Ø85		Ø145	
Ø90		Ø155	
Ø95		Ø180	
Ø115		Ø200	

**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.

