Leeb hardness testing method – General information

Impact device	Min. Mass (no fixed contact area) kg	Min. Mass (fixed contact area) kg	Min. Thickness (without coupling) mm	Min. Thickness (with coupling) mm
D, DC, DL, D+15	5	2	25	3
G	15	5	70	10
C	1,5	0,5	10	1

REMARK 1 An inappropiate coupling affects incorrect test results.

Impact device	Symbol	Application scale HL	similar to HV	Mass of the Indenter g	Radius of the Indenter ball mm
D	HLD	300 to 890	81 to 955	5,45	1,5
DC	HLDC	300 to 890	81 to 955	5,45	1,5
DL	HLDL	560 to 950	81 to 939	7,25	1,39
D+15	HLD+15	330 to 890	81 to 928	7,75	1,5
C	HLC	350 to 960	80 to 994	3,1	1,5
G	HLG	300 to 750	95 to 550	20,0	2,5

The test is done vertical to the test surface.
The radius of curvature at the measuring point should be not lower than 50 mm for impact device G or 30 mm for the other impact devices.
In all other cases special support rings are needed to ensure a stabile position of the measuring device on the test surface.

Impact device	app. Diameter		
	low hardness	medium hardness	high hardness
D	0,54mm at ~570HLD	0,45mm at ~760HLD	0,35mm at 840HLD
DC	0,54mm at ~570HLD	0,45mm at ~760HLD	0,35mm at 840HLD
DL	0,54mm at ~760HLDL	0,45mm at ~880HLDL	0,35mm at ~925HLDL
D+15	0,54mm at ~585HLD+15	0,45mm at ~765HLD+15	0,35mm at ~845HLD+15
C	0,35mm at ~635HLC	0,32mm at ~820HLC	0,3mm at ~900HLC
G	1,03mm at ~535HLG	0,9mm at ~710HLG	-*

* Out of the normal application scale

An impact is done on the best way, if the distance between the center of the intendation and the edge of the sample allows, that the complete support ring lies on the testing material. For impact device **type G** a minimum distance of **10 mm** is required and for the impact devices **type D**, **DL**, **D+15** and **C** not less than **5 mm**.

Impact device	Max. medium roughness depth Ra in µm
D, DC, DL, D+15	2
C	0,4
G	7

[Source]: DIN EN ISO 16859-1:02-2016 Metallische Werkstoffe – Härteprüfung nach Leeb – Teil 1

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Impact device	Leeb-Hardness of the Test block HL	coefficient of variation of testing instrument V %	max. allowed Error of testing instrument E_{rel} %
D, DC, D+15 DL G C	<500 <700 <450 <600	2,5	± 4,0
D, DC, D+15 DL G C	500 to 700 700 to 850 450 to 600 600 to 750	2	± 3,0
D, DC, D+15 DL G C	>700 >850 >600 >750	1,5	± 2,0

Coefficient of variation V

$$V = \frac{s(H)}{\overline{H}}$$

Here is s(H) the standard deviation of n=10 Leeb-Hardness values:

$$s(H) = \sqrt{\frac{\sum_{i=1}^{n} (H_i - \overline{H})^2}{n-1}}$$

The arithmetic average $\overline{H}$ of n=10 measured Leeb-Hardness values will calculate with:

$$\overline{H} = \frac{H_1 + H_2 + ... + H_n}{n} \quad (n=10)$$

Error of testing instrument

$$E = \overline{H} - H_{CRM}$$

Here is H_{CRM} the Leeb-Hardness of used Test block.

The max. allowed Errorof testing instrument wil calculate with:

$$E_{rel} = \frac{\overline{H} - H_{CRM}}{H_{CRM}} \cdot 100 \text{ in \%}$$

Requirements on mass and thickness of hardness test blocks

Impact device	Min. Thickness mm	Min. Diameter mm	Min. Mass kg
D, DC, D+15, DL, C	33	85	2,7
G	65	115	6,0

[Source]: DIN EN ISO 16859-1:02-2016 Metallische Werkstoffe – Härteprüfung nach Leeb – Teil 2 & Teil 3

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