Brinell Hardness Testing Machine

7. BRINELL HARDNESS TEST

Ex. No.: 2

Date: 02.05.2018

AIM

To measure the brinell hardness number for the given specimen.

BASIC CONCEPT

Brinell tests are static indentation tests using relatively large indentors. For a number of engineering materials which are subjected to friction such as steel, cast iron etc., it is necessary to find out their resistance to wear and tear (hardness). The brinell hardness test is carried out by forcing a hardened steel ball of diameter 'D' under a load of 'P' into a test specimen and measuring the mean diameter 'd' of the indentation left on the surface after the removal of load. Normally for hard materials a ball of 10 mm diameter shall be used. For soft materials 5 mm, 2.5 mm, 2 mm, and 1 mm are to be used depending upon the softness of the surface.

APPARATUS

1. Optical Brinell hardness testing machine

2. Ball indentors

3. Emery paper

FORMULAE

Brinell hardness number = Load/Indenting area

$$\frac{2P}{\pi D \left(D - \sqrt{D^2 - d^2} \right)}$$

Where

P = the major load chosen (kg)

D = diameter of the indentor (mm)

d = diameter of the impression (mm)

TABULATION

Table 1: To determine the brinell hardness number for different materials

Sl.No.	Material	Diameter of the indentor 'D' (mm)	Diameter of impression 'd' (mm)		Load 'P' (kg)	Brinell Hardness Number
			Trial	Mean		
1	Mild steel	5	1.90; 1.83	1.865	750	264.737
2	Aluminium	5	2.52; 2.47	2.495	500	95.165

PROCEDURE

1. The surface of the specimen is cleaned with emery paper.
2. Based on the type of materials, the major load and the indentor are selected from the following table.

Material	Dia. Of the ball indentor (mm)	Load (kg) [x9.81]
Mild steel	10	3000
Mild steel	5	750
Aluminum	5	500

One loading pan and eleven loose weights each equivalent to 250 kgf. Thus the total weight is 3000 kgf for maximum load for 10 mm indentor only

3. The required weight and indentor is chosen.
4. The indentor is inserted and fastened with the screw.
5. Switch on the machine and keep the hand lever at read position. Place the specimen securely on testing position.
6. Turn the hand wheel in clock wise direction, so that specimen will get clamped against clamping cone with slight pressure (Too much clamping force is not necessary).
7. Turn the hand lever from unload position, so that the total load is brought in to action.
8. When the dial gauge pointer reaches a steady position the load may be maintained for up to 6 seconds for accurate work. For releasing the load, take back the lever to unload position. the weights are lifted off and indicator will come to rest (original position).
9. After positioning lever to 'Read' position indentor will get swiveled and diameter of indentation will be projected on screen. Measure the diameter of indentation and calculate the Brinell hardness number.

RESULT

Brinell hardness number for:

Mild steel $= \dfrac{264.737}{}$

Aluminium $= \dfrac{95.165}{}$

INFERENCE