

**METHOD OF TEST FOR VERIFYING MACHINES FOR USE IN  
FLEXURAL STRENGTH TESTS OF CONCRETE MATTRESSES**

1. Scope

1.1 This method describes the procedures for verifying machines which are used in determining the strength of articulated concrete mattresses for bank protection work.

2. Apparatus

2.1 Calibrated ring.- A 3000-lb-capacity ring, complying with the applicable requirements of CRD-C 512, that has either a micrometer or a dial gage to indicate deflection shall be used.

2.2 Centering apparatus.- An appropriate apparatus for properly centering the proving ring during verification testing shall be used. The apparatus described below has been found satisfactory. It is illustrated in Figs. 1-3 and consists of the following items.

2.2.1 A metal cap (A) designed to fit snugly over the ram of the tester, having a small concave depression in the center of the upper surface, with a maximum diameter of 3/8 in. and a depth of 1/8 in.

2.2.2 A 7/16-in.-diameter hardened steel ball (B) to fit into the concavity on the top of the cap.

2.2.3 A load application frame having the following parts.

2.2.3.1 Four threaded screwposts 19 in. long and threaded the same as the regular frame bolts on the tester (C).

2.2.3.2 Eight nuts which fit the screwposts and can be screwed in position against the machine body below, and the crossbeam attachments above to steady the centering device (D).

2.2.3.3 Two upper crossbeam attachments that tie together the screwposts at either end and have cogwheels above which turn independently of the main body of the crossbeams (E).

2.2.3.4 A crossbar below each crossbeam suspended by means of a

spring and bar which allow for long axis, the lower part of the bar rounded in the direction of rotation (F).

2.2.3.5 A link-chain to fit around the cogwheels on the crossbeam, with projection knobs to facilitate turning (G).

2.2.3.6 An upper metal bearing plate with a cylindrically shaped depression on its bottom surface to fit over the top of a proving ring, a concavity similar to that on the metal cap described in Paragraph 2.3.1 on its top surface, and holes and bolts to secure the plate in position below a ball in the center of the stirrup described below (H).

2.2.3.7 A stirrup to fit under the crossbeam attachments, provided with a centrally positioned 3/4-in. steel ball to fit directly above the concave depression on the upper surface of the upper metal bearing plate, and the stirrup also provided with four clamp-on attachments with grooved top surfaces to fit below the rounded lower surface of the crossbars (I).

2.2.3.8 Two flat steel bars with holes 18 in. apart designed to fit over the upper ends of opposite screwposts (J).

3. Procedure

3.1 The procedure for verification shall be essentially as described in CRD-C 516.

3.2 The detailed procedure shall be as follows.

3.2.1 Remove the frame used for testing mattresses, the four long screwposts attached to the machine body, and the bottom loading bar, leaving the machine body and upper surface of the ram exposed.

3.2.2 Install the centering device, using its four screwposts and the eight nuts to anchor and steady it, being sure it is centered over the ram, and the four screwposts are screwed into

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the machine bed the same distance.  
3.2.3 Center the metal cap above the loading ram.

3.2.4 Insert the 7/16-in.-diameter steel ball in the concave depression in the steel cap and line up the proving ring and upper bearing plate.

3.2.5 Take a zero reading on the proving ring with the stirrup in place.

3.2.6 Turn the link-chain until the crossbars make contact with four clamp-on cushions on the stirrups.

3.2.7 Start loading the machine and record readings of the ring at each verification load. The standard loads shall be 500, 1000, 1500, 2000, and 2400 lb.

3.2.8 Convert the readings of ring deflection to corresponding load in pounds, and compare this with the

indicated machine loads. The machine error (E), in percent, shall be calculated using the formula:

$$E = \frac{M-R}{M} \times 100$$

where

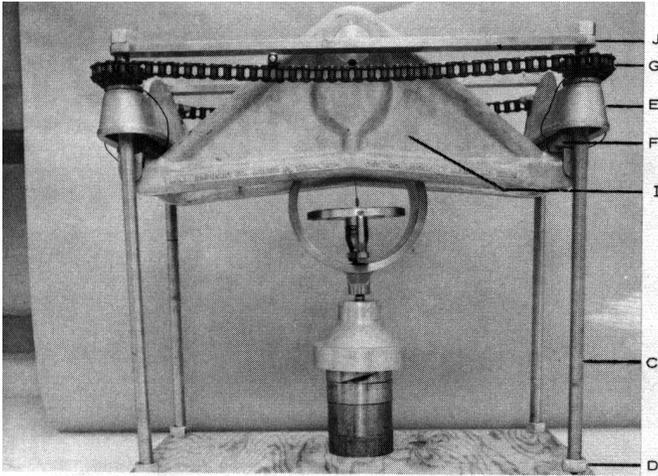
R = ring indicated load in lb, and

M = the machine indicated load in lb.

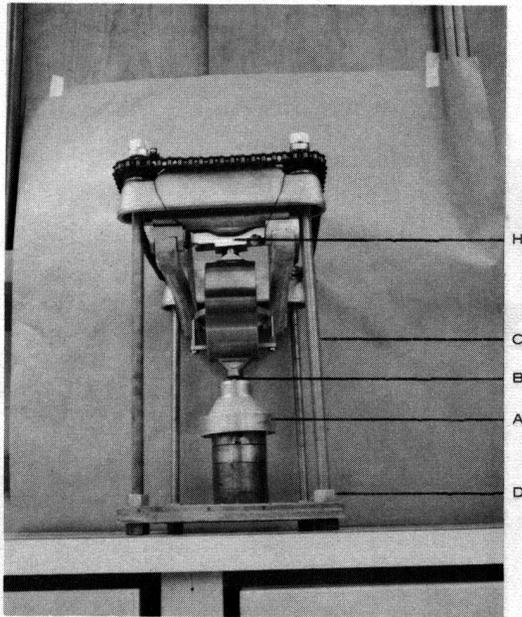
### 4. Report

4.1 The report shall indicate those loads at which verifications were made, whether the error was within the allowable limits, and a graph, plotting machine error in percent as the ordinate and machine load in lb as the abscissa.

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a. FRONT VIEW

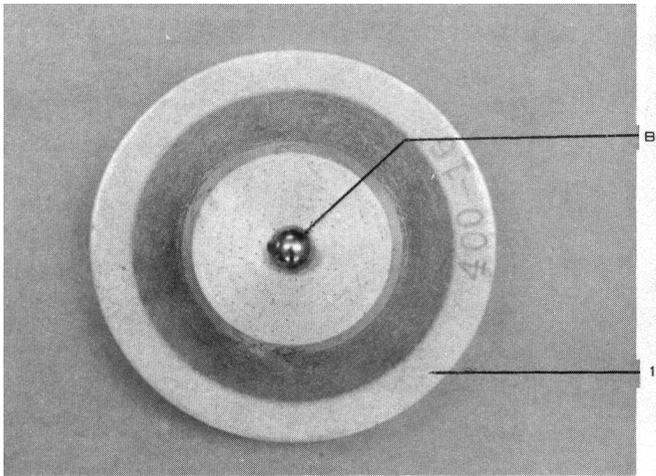


b. BOTTOM VIEW

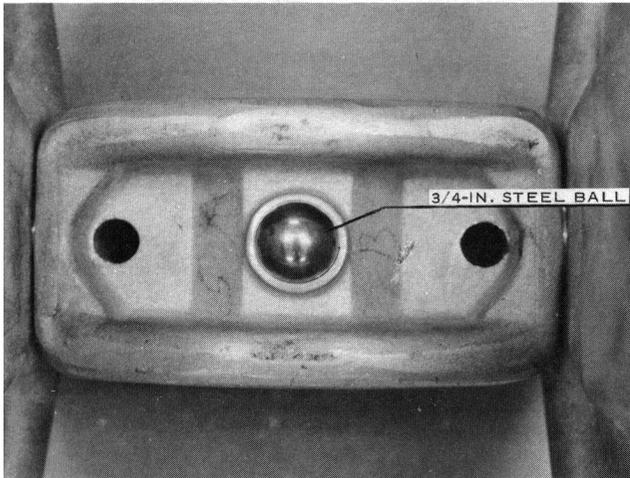
Fig. 1. Centering Apparatus

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a. TOP VIEW OF CAP

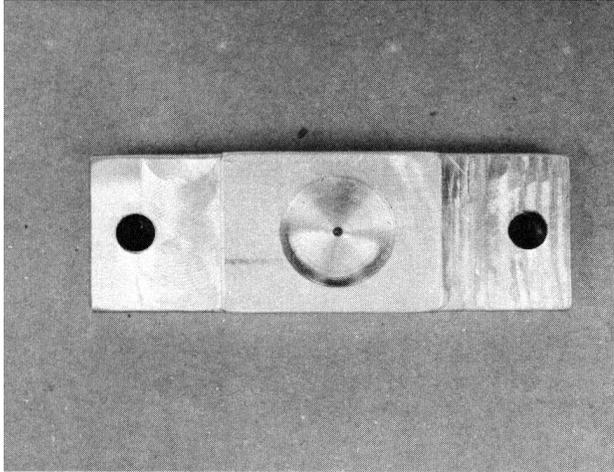


b. BOTTOM VIEW OF STIRRUP (1)

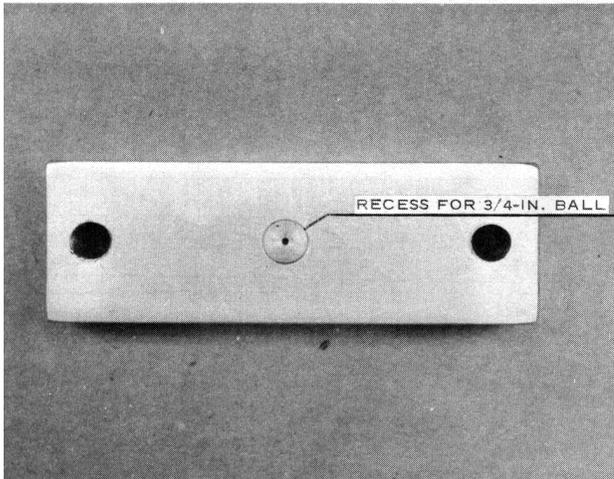
Fig. 2. Lower and Upper Load-Bearing Balls

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a. LOWER VIEW



b. UPPER VIEW

Fig. 3. Upper Bearing Plate (H)