

## CRD-C 90-73

**METHOD OF TEST FOR TRANSVERSE SHEAR STRENGTH  
CONFINED, SINGLE PLANE OR DOUBLE PLANE**

## 1. Scope

1.1 This method of test covers the procedure for testing specimens for transverse shear strength, confined, using a single shear plane, or using a double shear plane.

## 2. Apparatus

2.1 Testing Machine.- The testing machine shall conform to the requirements of CRD-C 14.

2.2 Shear Device.- The shear device shall include a test frame in which the specimen is placed for loading and steel blocks to hold the specimen in the frame. One such device which has been used is shown in Fig. 1. The test frame consists of two pieces of 8- by 3-1/2-in. (203- by 89-mm) steel channel 30 in. (762 mm) long, and two pieces of 8- by 3-1/2-in. (203- by 89-mm) steel channel 15 in. (381 mm) long bolted together with the backs of all channels turned to the inside so as to form a rectangle 30 in. (762 mm) long, 8 in. (203 mm) wide, and 8 in. (203 mm) deep (Note). Three match-marked steel blocks, 8 in. (203 mm) square and 4 in. (102 mm) thick with a 6-3/4-in. (171-mm)-diameter hole normal to the 8-in. (203-mm) square face, are provided to fit into the 8- by 30-in. (203- by 762-mm) rectangular opening as shown in Fig. 1. Stationary blocks 1 and 3 are prepared so that they can be held in place by four 1/2- by 1-in. (13- by 25-mm) cap screws in each side. The movable loading block (block 2) is placed between the two stationary blocks as shown in Fig. 1. The centers of the 6-3/4-in. (171-mm) holes in the three blocks are eccentric so that when the blocks are assembled around a specimen the stationary block or blocks will be offset from the movable loading block.

Note 1.- The dimensions of the frame were selected to allow for the insertion of the 9-in. (229-mm) long spaces marked A and A (Fig. 1) of jacks that may be employed to provide axial load on the specimen during test for transverse shear strength. When axial load is used, it will be transmitted to the ends of the specimens through bearing plates and spherical seats.

Note 2.- In order to insure that the movable block does not bind against the two stationary blocks during the test, it may be necessary to utilize ball bearings to maintain the gap.

2.3 Shim Stock.- Sheet metal shim stock approximately 1/32 in. (1 mm) thick shall be provided.

## 3. Test Specimens

3.1 The test specimens shall be cylinders 6 in. (152 mm) in diameter and 12 in. (305 mm) in length.

## 4. Procedure

4.1 Single-Plane Shear Strength Test.- All blocks shall be removed from the test frame and stationary block 1 shall be placed on a level surface with the 8-in. (203-mm) square surface parallel to the surface on which the block is placed. A test specimen, standing on end, shall be centered in the hole of this block and placed so that the longitudinal axis of the cylinder is normal to the 8-in. (203-mm) square surface of the block. The void between the cylinder and the sides of the hole shall be filled with high-strength gypsum plaster. After the plaster has set, stationary block 1 shall be fastened in the frame by means of the four cap screws on each side. The block shall be placed in the frame so that the mark (1) on the block and the mark (1) on the frame are adjacent. The frame shall then be placed in a vertical position so that the protruding length of the test specimen is on the upper side of the block in which it is emplaced. Shim stock shall be placed on the upper surface of this block in order to prevent bonding of the plaster between blocks. The movable loading block (block 2) shall then be placed on the shim stock so that the mark (2) on the block and the mark (2) on the test frame are adjacent. The void between the test specimen and the sides of the hole in this block shall be filled with plaster which shall be allowed to set.

4.2 Double-Plane Shear Strength Test.- The procedure described in Section 4.1 shall be followed. Upon completion of these operations, the following additional steps shall be taken. Shim stock shall be placed on the upper surface of the movable

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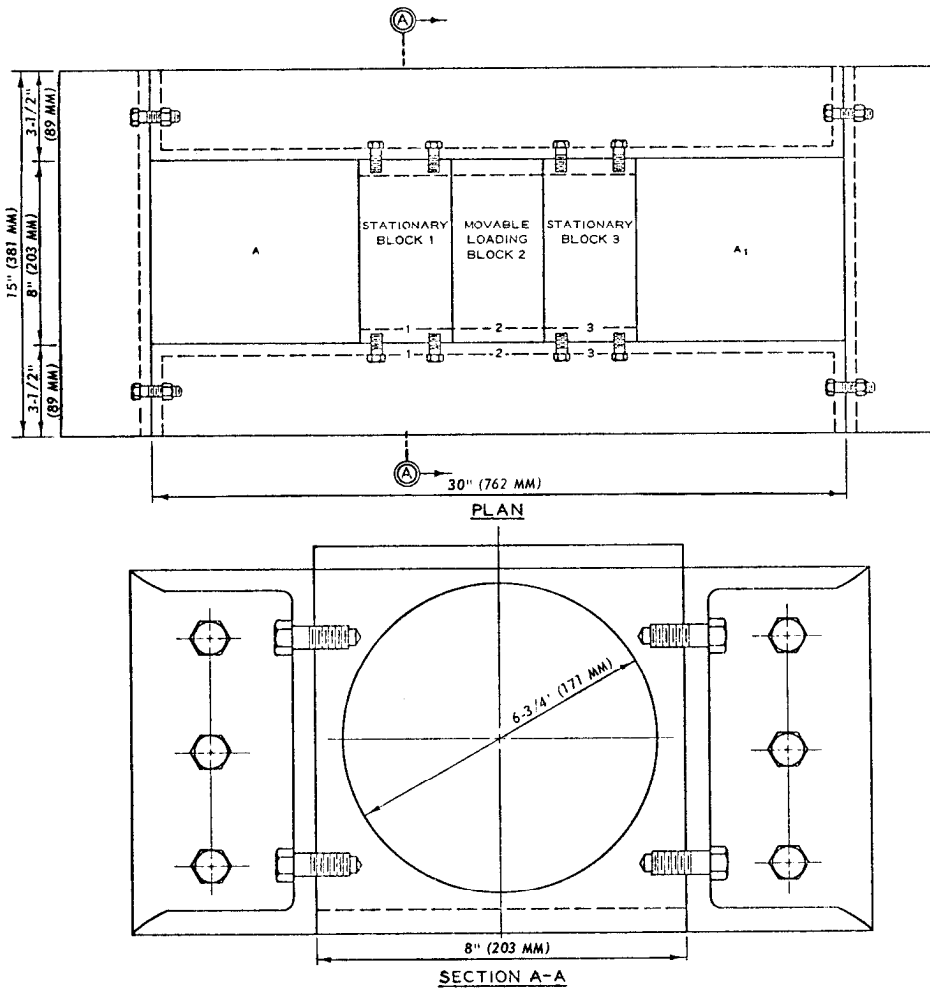


Fig. 1. Plan and section views, schematic, of shear device for determining shear strength, confined, single plane or double plane

loading block. Stationary block 3 shall then be placed on the shim stock and fastened into position by means of the four cap screws on each side. The void between the specimen and the sides of the hole in this block shall be filled with plaster which shall be allowed to set.

4.3 Testing.- For either single- or double-plane testing, the assembled test frame and blocks shall be placed in the testing machine with the projecting end of the movable loading block centered under the spherical head of the testing machine. The head of the testing machine shall then be

lowered until it is in contact with the loading block. The load shall be applied continuously and without shock at a rate of 4250 lb (18.9 KN) per min for single-plane, and at a rate of 8500 lb (37.8 KN) per min for double-plane testing until the specimen fails. The indicated load at failure shall be recorded.

5. Calculations

5.1 The shear strength of the specimen shall be calculated by dividing the maximum load by the vertical

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cross-sectional area of the specimen, normal to the loading face, for the single-plane test, and by dividing this load by twice the vertical cross-sectional area of the specimen for the double-plane test, and shall be expressed to the nearest 5 psi (34 KPa) (Note). The nature of any axial

load applied to the specimen during the shear strength test shall be reported.

Note.- Since, in this test, the effects of a combination of stresses are being measured, the value obtained should not be regarded as the true shear strength of the specimen.