NASM1312-20
STANDARD PRACTICE

FASTENER TEST METHODS

METHOD 20

SINGLE SHEAR

Aerospace Industries Association

THE INITIAL RELEASE OF THIS DOCUMENT SUPERSEDES MIL-STD-1312-20

DESIGNATION FOR THIS TEST METHOD REMAINS MIL-STD-1312-20

LIST OF CURRENT SHEETS									
NO.	1	2	3	4	5	6	7	8	9
REV.	NEW	NEW	NEW	NEW	NEW	NEW	NEW	NEW	NEW
NO.	10	11	12	13	14				
REV.	NEW	NEW	NEW	NEW	NEW				

FSC 53GP

APPROVAL DATE AUGUST 1997

FOREWORD

This standard sets forth a standard test method to define the procedure and apparatus for testing fasteners in single shear.

APPROVAL DATE AUGUST 1997

TABLE OF CONTENTS

FIGURES

APPROVAL DATE AUGUST 1997

TABLES

1. SCOPE

1.1 Applicability. This test method outlines the procedure and apparatus for testing fasteners in single shear.

1.2 While this method primarily is for testing fasteners that cannot be tested in double shear, if used for those fixture types and lengths amenable to double shear testing, the double shear test is considered the referee method.

2. REFERENCED DOCUMENTS

2.1 Government documents.

2.1.1 Specifications, standards and handbooks. Unless otherwise specified, the following specifications, standards and handbooks of the issue listed in the current Department of Defense Index of Specifications and Standards (DoDISS) and the supplement thereto (if applicable), form a part of this standard to the extent specified herein.

STANDARD

MILITARY

MIL-STD-45662 Calibration System Requirements

(Copies of specifications, standards, handbooks, drawings and publications required by contractors in connection with specific acquisition functions should be obtained from the contracting activity or as directed by the contracting officer.)

2.2 Other publications. The following document(s) forms a part of this specification to the extent specified herein. The issue of the documents which are indicated as DOD adopted shall be the issue in the current DoDISS and the supplement thereto, if applicable.

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM E 4 Load Verification of Testing Machines

(Applications for copies should be addressed to the American Society for Testing and Materials, 1916 Race Street, Philadelphia, PA 19103.)

3. DEFINITIONS Not applicable.

APPROVAL DATE AUGUST 1997

4. GENERAL REQUIREMENTS

4.1 Test apparatus.

4.1.1 Testing machine. The testing machine shall be capable of applying a compressive load at a controllable rate. The machine shall conform to the requirements of MIL-STD-45662. Its accuracy shall be verified every six months by a method complying with ASTM E 4, using a calibration device which shall have been calibrated by the National Bureau of Standards not more than two years prior to its use. The loads of the fasteners tested shall be within the loading range of the testing machine as defined in ASTM E 4.

4.1.2 Test fixtures.

4.1.2.1 Test plate. The test plates shall be as shown in Figures 1, 2, 3 or equivalent. Plates must maintain the following essential properties:

a. The hole diameter for installation formed fasteners, shall be as specified in the product specification or (D + 0.001) + 0.002 - 0.000, where D is the maximum fastener shank diameter for cylindrical body fasteners.

b. The hole shall be perpendicular to the test plate within fifteen minutes of arc.

c. The hole shall be radiused at one end to provide clearance between fastener head and shank fillet.

d. The hole shall be chamfered or broken 0.005/0.010 in the shear plane.

e. Unless specified otherwise the width of the shear blade at the fastener contact area shall be 1/2 D + 0.010 - 0.000.

4.1.2.2 Holding fixture. The holding fixture shall be equivalent to Figures 1, 2 or 3. Fixtures shall be capable of providing shear loading while preventing rotation of the fastener. Shear loading shall remain perpendicular to the longitudinal axis of the fastener throughout the complete test.

5. DETAIL REQUIREMENTS

5.1 Test procedures. The ultimate single shear strength shall be obtained as follows:

a. Fasteners shall be installed in the test plates in accordance with the recommendations

APPROVAL DATE AUGUST 1997

of the manufacturer, using approved installation equipment. Unless specified otherwise, no preload shall be used, except where such preload is a necessary consequence of fastener installation.

b. The specimen shall be installed in the jig and placed between the compression heads of the testing machine. When hydraulic testing machines are used, care shall be exercised to locate the jig at the center of the piston. Caution should be exercised to prevent excessive preload. It is recommended that the preload nuts be torqued to 2 in./lbs maximum.

c. The test load is then applied at a uniform load rate as specified in Table I. The ultimate strength is determined by increased deformation of the specimen without increased load. Load rates for oversized fasteners (including blind bolts) shall be the same as for normal size fasteners of the corresponding nominal size. Load rates for larger or smaller size fasteners shall be calculated as 100,000 pounds per minute per square inch of nominal shear area. A tolerance of ±10 percent shall apply on the load rate. Nominal shear area is equal to the nominal shank area for load rate calculation only.

TABLE I. Single shear load rates.

Nominal fastener diameter	Load Rate lb/min	Nominal fastener diameter	Load Rate lb/min
0.125	1,240	0.563	24,800
0.156	1,920	0.625	39,600
0.164	2,100	0.750	44,000
0.190	2,800	0.875	60,000
0.250	5,000	1.000	78,000
0.313	7,700	1.125	100,000
0.375	11,000	1.250	122,000
0.438	15,000	1.375	148,000
0.500	19,600	1.500	176,000

The testing agency, at their option, may use a constant strain rate which will produce the specified load rate (±10 percent) in the elastic range. That is, the strain rate shall equal the load rate divided by the elastic modulus in shear.

6. NOTES

6.1 Test report. The test report shall include the following data:

a. Fastener description.

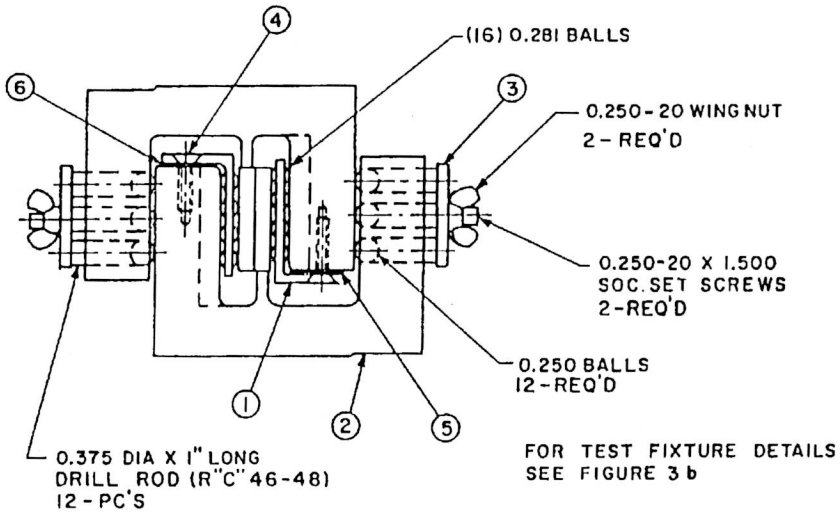
1. Part number.
2. Lot identification.
3. Material.
4. Heat treat.
5. Grip length.
6. Measured fastener diameter.

b. Test machine.

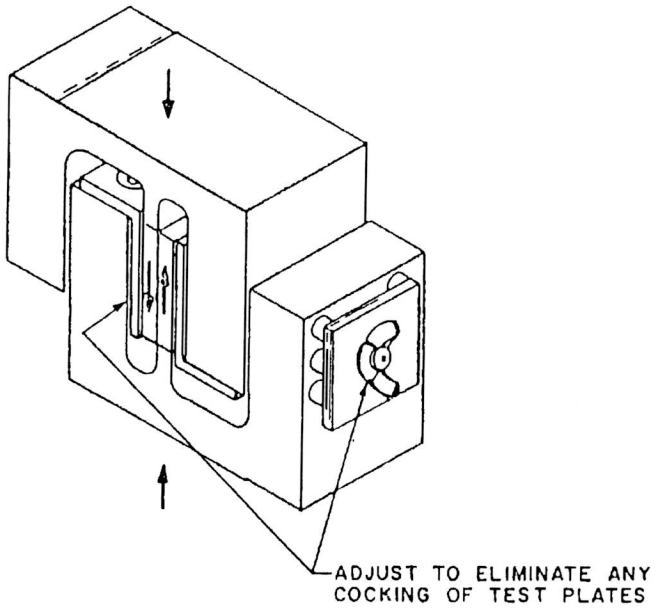
1. Model and serial number.
2. Calibration date.

c. Ultimate load.

d. Test method (where options are available).



SHEAR FIXTURE ASSEMBLY



SHEAR FIXTURE SET UP

FIGURE 1a. Test fixture assembly and set-up.

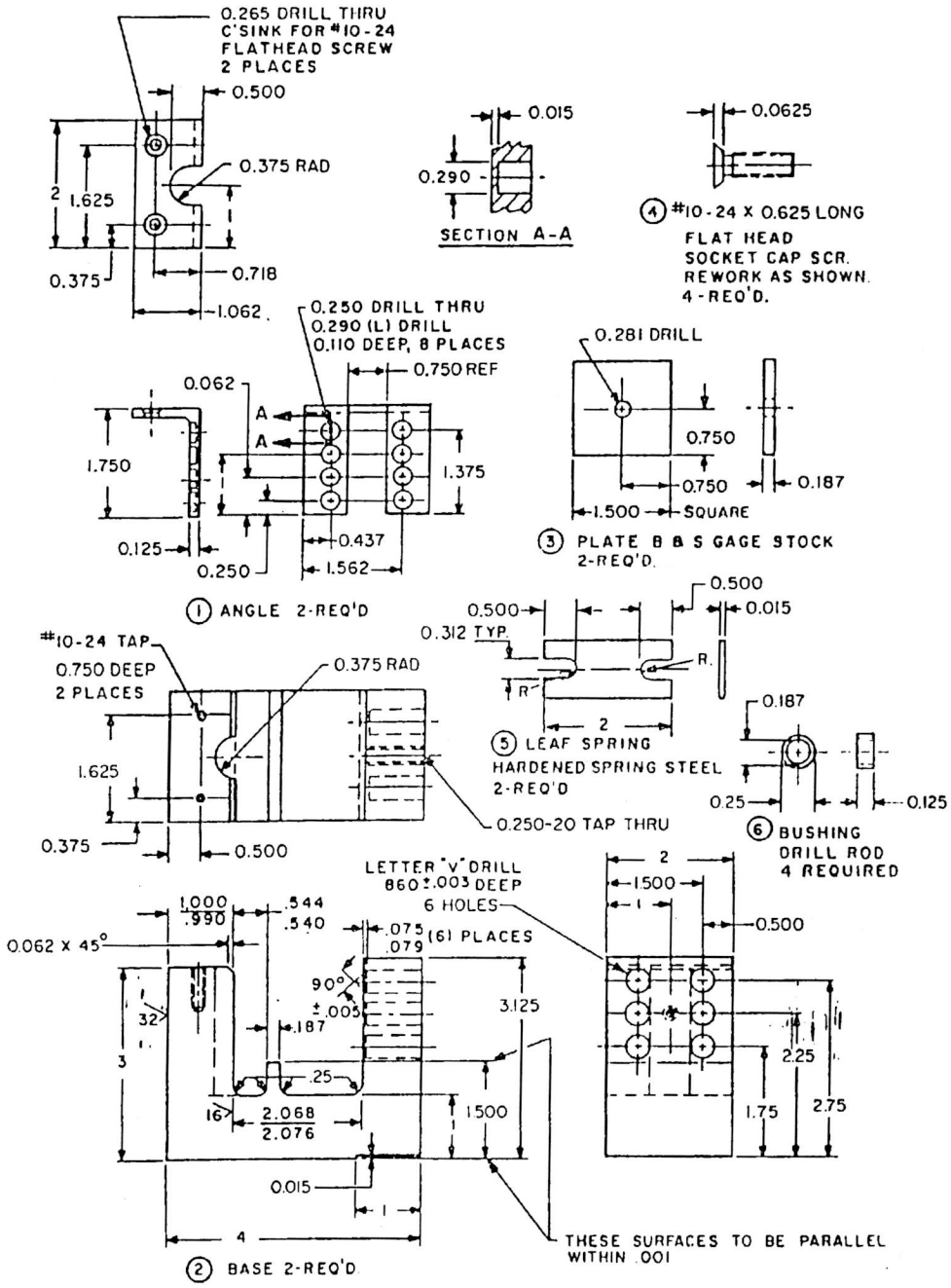


FIGURE 1b. Shear test fixture details.

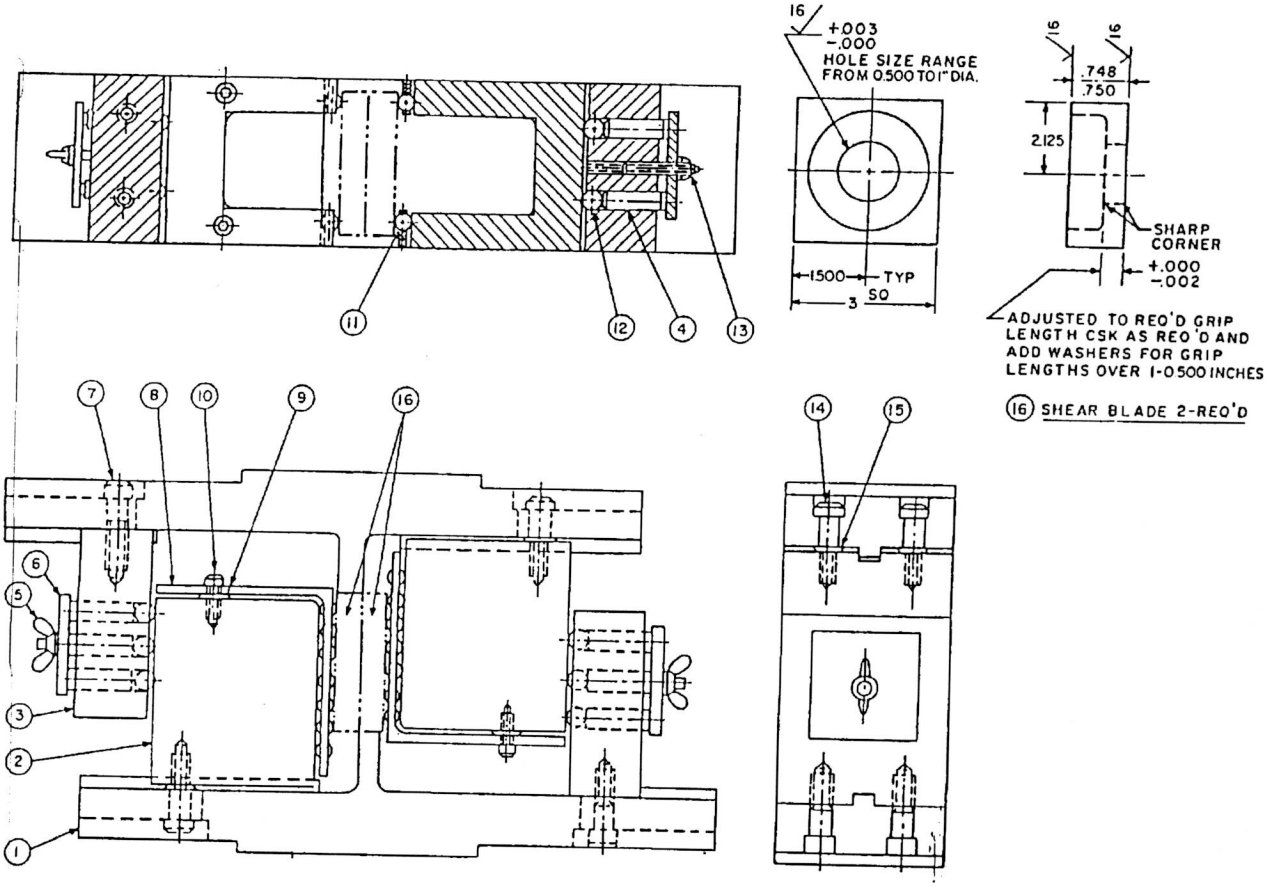


FIGURE 2a. Test fixture assembly.

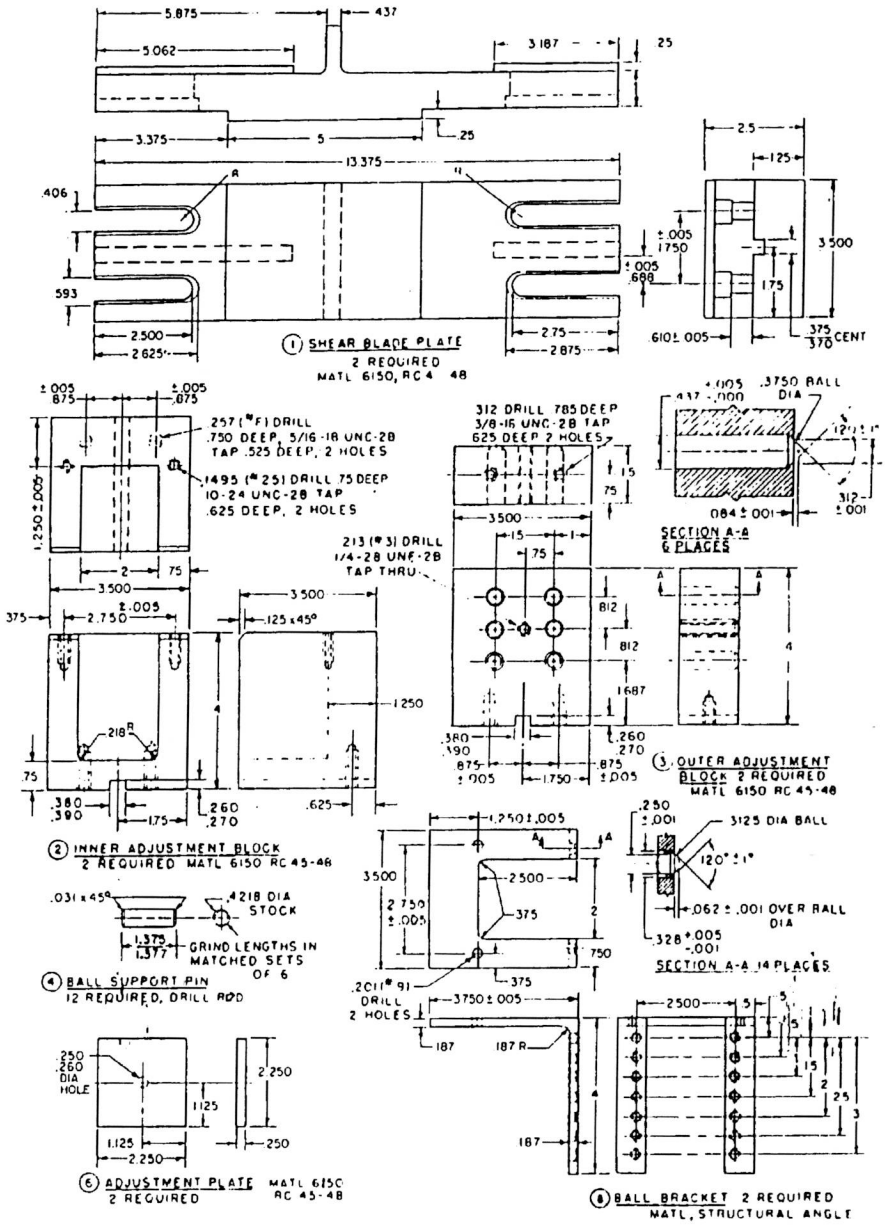


FIGURE 2b. Shear test fixture details.

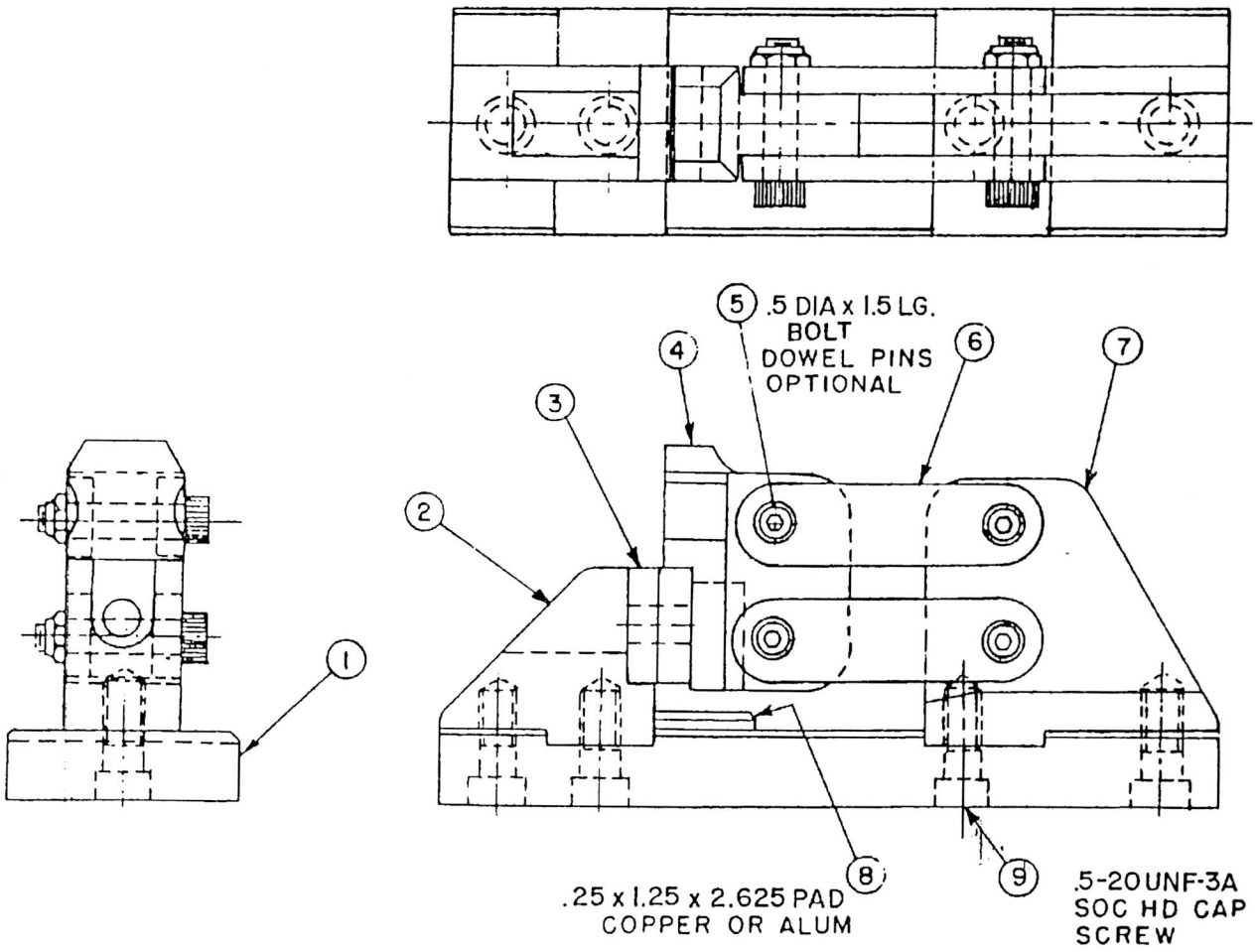


FIGURE 3a. Shear fixture assembly.

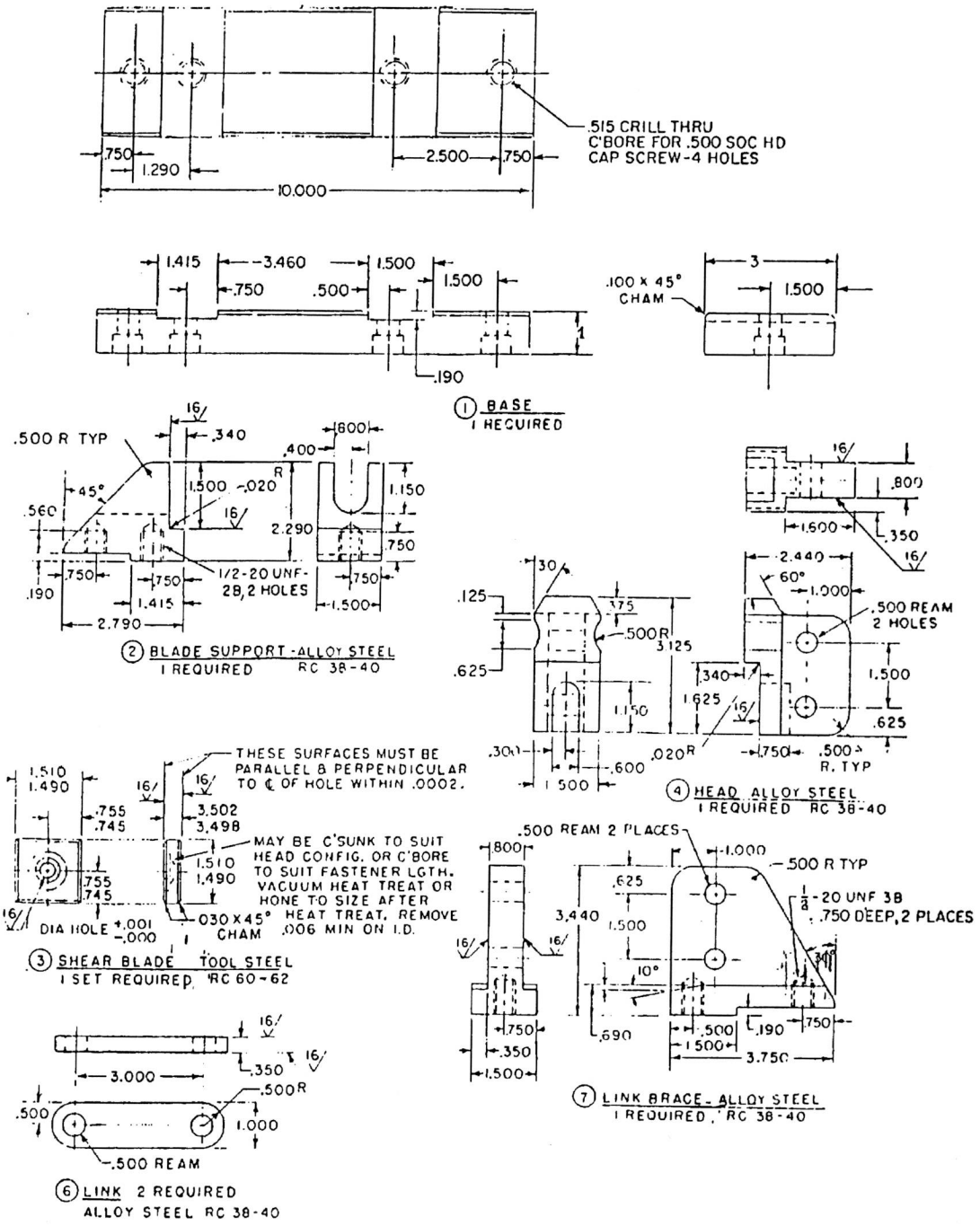


FIGURE 3b. Shear test fixture details.