

**PROCUREMENT SPECIFICATION
CHERRY SST[®]
RIVET, BLIND, ALUMINUM SLEEVE,
MECHANICALLY LOCKED SPINDLE, BULBED**

APPROVED: _____
Authorizing Signature is on FILE
DIRECTOR OF PRODUCT ENGINEERING

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1. SCOPE

1.1 Scope - The specification establishes the requirements for procurement of self-plugging blind rivets with a visual mechanically locked spindle. These blind rivets are intended for use in aircraft structural or similar applications in both thick and thin sheets. The bulbed blind head configuration makes these blind rivets especially well suited for thin sheet or double dimple applications.

1.2 Styles, Classes and Codes - Rivets are furnished in the following styles, classes and codes.

Style 'A' Nominal Shank Diameter

Class 1	-	Protruding Head Rivets (MS20470)
Code B	-	5056 Aluminum Alloy Sleeve - Alloy Steel Stem
Code E	-	5056 Aluminum Alloy Sleeve - CRES Stem

Class 2	-	100° Flush Head (MS20426)
Code B	-	5056 Aluminum Alloy Sleeve - Alloy Steel Stem
Code E	-	5056 Aluminum Alloy Sleeve - CRES Stem

Class 3	-	100° Flush Shear Head (NAS1097)
Code B	-	5056 Aluminum Alloy Sleeve - Alloy Steel Stem
Code E	-	5056 Aluminum Alloy Sleeve - CRES Stem

Style 'B' 1/64" Oversize Shank Diameter

Class 1	-	Protruding Head Rivets (MS20470)
Code B	-	5056 Aluminum Alloy Sleeve - Alloy Steel Stem
Code E	-	5056 Aluminum Alloy Sleeve - CRES Stem

Class 2	-	100° Flush Head (MS20426)
Code B	-	5056 Aluminum Alloy Sleeve - Alloy Steel Stem
Code E	-	5056 Aluminum Alloy Sleeve - CRES Stem

Class 4	-	Flanged Dome Head
Code B	-	5056 Aluminum Alloy Sleeve - Alloy Steel Stem
Code E	-	5056 Aluminum Alloy Sleeve - CRES Stem

2. APPLICABLE DOCUMENTS

2.1 Publications - The following publications of the issue in effect on date of invitation for bids shall form a part of this specification to the extent specified herein.

2.1.1 Federal Specifications

QQ-P-416 Plating, Cadmium (Electro-Deposited)

(Copies of Federal Specifications and the Federal Specifications Index may be obtained upon application, accompanied by money order, coupon or cash, to the Superintendent of Documents, Government Printing Office, Washington, DC. 20402. The price of Federal Specifications may be obtained from the Federal Specification Index of the Superintendent of Documents.)

2.1.2 Military Specifications

MIL-H-6088 Heat treatment of aluminum alloys, process for
MIL-R-85188 Riveter, power, pneumatic-hydraulic
MIL-H-6875 Heat treatment of steels, process for

(Copies of Military Specifications may be obtained upon application to the Commander, Air Materiel Command, Wright-Patterson Air Force Base, Dayton, Ohio; or to the Commanding Officer, U.S. Naval Air Development Station, Johnsville, Pennsylvania. The price may be obtained from the Index of Military Aeronautical (AN or MIL) Standards or upon applications to either of the above agencies and payments shall be made by check or money order, payable to the Superintendent of Documents or to the Treasurer of the United States.)

2.1.3 Standards

Federal

Federal Test Method Standard #151

Military

MIL-STD-105 Sampling Procedures and Tables for Inspection by Attributes

MIL-STD-129 Marking for Shipment and Storage

MIL-STD-1312 Fastener Test Methods

3. REQUIREMENTS

3.1 Qualification - The rivets furnished under this specification shall be a product which has been tested and has passed the qualification tests specified herein. The rivet manufacturer is responsible for conducting the tests of this specification. Results of these tests shall be submitted upon application for qualification.

3.2 Materials - The materials used in the manufacture of the blind rivets shall be as specified on the applicable product standards pages.

3.3 Design and construction

3.3.1 Construction - The blind rivet is of multiple piece construction, must be an integral assembly and shall include a means, other than friction or the use of adhesives, of mechanically locking the spindle to the blind rivet sleeve. The blind rivet assembly shall consist principally of a blind rivet sleeve and spindle plus any other elements required with a visible metallic locking element to lock the spindle to the blind rivet sleeve and a disposable driving anvil.

This metallic locking element must be visibly dimensionally inspectable for flushness after installation (See 3.3.6). The 1/8, 5/32 and 3/16 diameter blind rivets produced to this specification must be capable of being installed using tooling manufactured to the requirements of MIL-R-85188.

3.3.2 Installation - Installation tests shall be conducted as specified in Paragraph 4.4.6. Installation is to be accomplished with a tool conforming to MIL-R-85188. The installation tool shall be capable of installing the blind rivet and mechanically locking the spindle to the blind rivet sleeve. The excess portion of the blind rivet spindle shall be separated during the installation operation.

- 3.3.3 Spindle retention - When tested as specified in Paragraph 4.4.7, the installed blind rivet spindle shall withstand the axial pushout load values specified in Table VIII. The spindle of an uninstalled blind rivet shall be capable of withstanding the axial pushout loads specified in Table IX.
- 3.3.4 Dimensions - Blind rivets shall conform dimensionally to the applicable product standards pages.
- 3.3.5 Eccentricity of heads - The periphery of the blind rivet manufactured head shall be round within the limits specified in Table IV when tested as specified in Paragraph 4.4.2.
- 3.3.6 Installed Flushness - The installed spindle and locking element shall be flush within the limits shown in Figure 1. This means of visual inspection is provided to show that the rivet is properly installed.
- 3.3.7 Finish - The blind rivet shall be finished in accordance with the applicable product standards pages.
- 3.3.8 Heat Treatment - Heat treatment of 5056 aluminum components shall be as required to meet the performance requirements of this specification. Heat treatment of 8740 alloy steel components shall be per MIL-H-6875.
- 3.3.9 Shear strength - The single shear strength of the blind rivet shall be not less than the value specified in Table V when tested in accordance with Paragraph 4.4.3.
- 3.3.10 Tensile strength - The tensile strength of the driven blind rivet shall be not less than the value listed in Table VI when tested in accordance with Paragraph 4.4.4.
- 3.3.11 Thin sheet pull-through - The blind rivet shall exhibit not less than the minimum pull-through strength value specified in Table VII when tested as specified in Paragraph 4.4.5
- 3.3.12 Sheet take-up - The blind rivet shall be capable of closing the respective gap indicated in Table X when the total stack of thickness (not including gap) is equal to the prescribed maximum grip for the blind rivet tested. The force resisting closure of the gap shall not be less than that specified in Table X, when tested per Paragraph 4.4.8.
- 3.3.13 Lubrication - Lubrication as necessary to assure proper function of the blind rivet is permissible. The lubricant used shall pass the lubricant tests as specified in Paragraph 4.4.9 (qualification only). Cadmium shall not be used for a lubricant unless specified as a finish on the applicable standards pages. Lubricants used shall be stable and not subject to deterioration under normal handling and storage conditions not to exceed 150°F.
- 3.3.14 Workmanship - The blind rivet shall be of uniform quality and shall be finished in a workmanlike manner in accordance with high grade aircraft manufacturing practice. Discontinuities such as seams and clinch or die marks are permitted within the limits specified in Table III provided they do not affect other requirements of this specification. Rivets shall be free from fins and other defects which could cause an injury to the operator.
- 3.3.15 Head marking - The rivet shall be marked in accordance with the applicable standards pages.

3.3.16 Blind side shank expansion - The blind rivet shall be expanded by mechanical means. Expansion is to be accomplished by the action of the spindle being pulled into the blind rivet sleeve. The blind rivet sleeve shall expand a minimum of .005" adjacent the blind head when tested in accordance with paragraph 4.4.10.

4. QUALITY ASSURANCE PROVISIONS

4.1 Classification of tests - The inspection and testing of blind rivets shall be classified as follows:

(A) Qualification Tests (See 4.2)

(B) Acceptance Tests (See 4.3)

4.2 Qualification tests - Qualification tests are those tests performed on samples submitted for qualification. These samples must be manufactured on production equipment using the same methods as intended for production. Qualification of any one head style constitutes qualification of the remaining head styles except that shear and tension testing is required for all head styles.

4.2.1 Sampling instructions - Qualification test samples shall be selected in accordance with Table I and Ia. Samples shall be packaged in accordance with the requirements of Section 5 and plainly identified by securely attached labels or tags marked with the following information:

Rivet part number

Sample for qualification test

Rivets, blind, self-plugging, mechanically locked solid spindle, bulbed

Specification: PS-CMR-6000

Code: (Material)

Class: (Flush or protruding head)

Grip Length:

Diameter:

Manufactured by: (Name and symbol)

Submitted by: (Name)

4.2.2 Tests - The qualification tests of blind rivets shall consist of all the tests of this specification as described under "Test Methods" (See 4.4) and as specified in Table I.

4.3 Acceptance tests - Acceptance tests consist of all tests specified in Table II which must be applied to all lots by the manufacturer.

- 4.3.1 Sampling instructions - Acceptance tests shall consist of Sampling Plan A, Sampling Plan B, Sampling Plan C and Sampling Plan D tests. Reduced Sampling Plan may be installed after five (5) consecutive lots of the same part number have passed the acceptance criteria in accordance with MIL-STD-105.
- 4.3.2 Lot - A lot shall consist of finished blind rivets which are of the same code, class, grip and diameter, fabricated by the same process, heat treated in the same manner and produced as one continuous run or order, or part thereof. No one lot of assemblies shall be comprised of more than one lot each of stems, sleeves, lockrings, driving anvils or shear rings.
- 4.3.2.1 A lot of component members of blind rivets (such as sleeves or spindles) shall consist of those components which are of the same code, class, grip and diameter, fabricated by the same processes, heat treated in the same manner and produced as one continuous run, or order, from the same heat of raw material or part thereof. Dimensional inspection already performed on component members need not be repeated after assembly of finished blind rivets submitted as inspection lot. Lot control is required for all components, excluding driving anvils.
- 4.3.3 Sampling Plan A Tests - Samples shall be selected at random in accordance with MIL-STD-105, Level S-3, and shall be subjected to the following tests described under "Test Methods" (see 4.4):
- (A) Visual and Dimensional Inspection (4.4.1)
 - (B) Eccentricity of Head (4.4.2) (AQL 6.5)
- 4.3.4 Sampling Plan B Tests - Samples shall be selected at random in accordance with MIL-STD-105, Level S-3, and shall be subjected to the following tests described under "Test Methods" (see 4.4):
- (A) Shear Strength (4.4.3) (Acceptance Number = Ø)
 - (B) Tensile Strength (4.4.4) (Acceptance Number = Ø)
 - (C) Spindle Retention (4.4.7) (AQL = Ø)
- The number of tests to be made shall be the smallest number shown under the multiple sampling plan.
- 4.3.5 Sampling Plan C Tests - Samples shall be selected at random in accordance with MIL-STD-105, Level S-3, and shall be subjected to the following test described under "Test Methods" (see 4.4):
- (A) Installation (4.4.6) (AQL 4.0)
- 4.3.6 Sampling Plan D Tests - One sample each shall be selected at random and shall be subjected to the following test described under "Test Methods" (see 4.4):
- (A) Thin Sheet Pull-Thru (4.4.5)
 - (B) Sheet Take-up (4.4.8)

4.3.6.1 Retest - In the event of failure, test three more samples. All three samples in the retest must pass in order for the lot to be accepted.

4.3.7 Sampling Plan E Tests - one sample shall be selected at random and shall be subjected to the following test described under "Test Methods" (see 4.4).

(a) Blind side shank expansion (4.4.10)

4.3.7.1 In the event of failure, test three more samples. All samples in the re-test must pass in order for the lot to be accepted.

4.3.7.2 In the event any given lot fails to be accepted, revert to lot testing, on that part number, until such time as five (5) consecutive lots have tested successfully.

4.3.8 Resubmitted inspection lots - MIL-STD-105 shall apply.

4.4 Test Methods

4.4.1 Visual and Dimensional Examination

4.4.1.1 Sampling - Sampling for visual and dimensional attributes shall be in accordance with MIL-STD-105, Inspection Level S-3.

4.4.1.2 Procedure - Dimensional examinations may be accomplished visually. Optical aids or special gages may be used whenever appropriate to insure compliance with this specification.

4.4.1.3 Classification of defects - All dimensional characteristics are considered defective when out of tolerance.

Major

101	Shank diameter	4.0 AQL
102	Identification	1.0 AQL
103	Gage Protrusion (Flush Heads)	4.0 AQL
104	Presence of lock ring	4.0 AQL
105	Presence of driving anvil	4.0 AQL

Minor

201	Land thickness (Flush Head)	4.0 AQL
202	Head Angle (Flush Head)	4.0 AQL
203	Fillet Radius (Flush Head)	4.0 AQL

4.4.2 Eccentricity of Head

4.4.2.1 Eccentricity of heads shall be determined by observing the total variation of a dial indicator testing the periphery of the head (both flush and protruding styles) as the blind rivet is rotated with its shank as an axis. (See Table IV).

- 4.4.3 Shear strength - Blind rivets shall be installed in a fixture as shown in Figure 7 or equivalent. Specimens shall be tested at the maximum grip of the particular blind rivet under test. The actual tests of the specimens shall be in accordance with the methods specified in MIL-STD-1312-4 or equivalent. The tests need not be carried to destruction if the test specimens meet the rated strengths specified in Table V without failure. An alternate test method is MIL-STD-1312-20. In both cases, failure is defined as the highest load obtained during the test. MIL-STD-1312-20 is the referee method in the event of controversy. Load deflection curves are not required.
- 4.4.4 Tensile strength - Tensile strength of blind riveted specimens shall be tested, in the rivet's maximum grip condition, in a fixture as shown in Figure 2. Blind rivet grip lengths that will not accommodate the minimum sheet thickness specified in the Figure 2 table need not be tested. Failure is defined as the highest load obtained during the test.
- 4.4.5 Thin sheet pull-thru - The resistance to pull-thru of the blind side head shall be determined using the specimen shown in Figure 3. Test method procedure shall be per MIL-STD-1312-8. Tests shall be conducted such that the blind head bears against the thin sheet. Blind rivets shall meet the appropriate requirement in pounds of Table VII. Hole size per Figure 7. Fasteners to be tested in minimum grip only.
- 4.4.6 Installation - The blind rivet shall be installed in sheet specimens equivalent to minimum grip and maximum grip for the particular blind rivet under test in accordance with Figure 6. The blind rivets shall be installed in accordance with the manufacturer's instructions. Superficial surface cracking in the rivet blind head as the result of installation is not cause for rejection. Splits, failure to expand, improper locking element position or stem position as the result of driving are considered defective. Superficial surface cracks are those cracks whose length is less than one third the height of the blind head after upset.
- 4.4.7 Spindle retention - The blind rivets shall be installed in a test plate per Figure 4. An additional full sample shall be tested in the as received (uninstalled) condition.
- In determining the spindle retention loads, a test device shown in Figure 4 shall be used. The load shall be applied at the rate not to exceed 3.0 inch per minute to the spindle from the manufactured head side of the blind rivet. A means for accurately determining the force applied to the spindle shall be provided. Caution shall be exercised so that the push out load shall be applied directly in line with the axis of the solid spindle. The load shall not be less than the values shown in Tables VIII and IX.
- 4.4.8 Sheet take-up - The sheet material and hole sizes shall be as shown in Figure 5. One test shall be made and the rivet shall remove all of the gap. Gap removal shall be measured with the use of a 0.0015" thick gage. The gage shall not be able to penetrate the faying surface to touch the rivet shank. The force resisting the closing of the gap and the gap to be closed shall not be less than the value shown in Table X.
- 4.4.9 Suitability of lubricant coatings - Lubricant coated and unlubricated "scratch specimens" made of the same materials as the finished rivet sleeves and having the same protective or other surface finish (if any) shall be scratched through to the basic metal. Specimens may be of any convenient size and shape, but the total surface area of each should exceed 6 square inches. These specimens shall be subjected to a 96-hour salt spray test in accordance with Method 811 of the Federal Test Method Standard #151. After exposure, no significant increase in corrosion shall be found when a comparison is made between lubricated and unlubricated panels.

4.4.10 Blind side shank expansion - The rivet expansion test shall be performed using the shank expansion coupon shown in Figure 8. Measure the rivet shank diameter in the area indicated in Figure 8. After installation remove the split plate. The rivet shall have expanded a minimum of .005 in the area indicated.

5. PREPARATION FOR DELIVERY

5.1 Packaging - To the requirements of MIL-STD-129 unless otherwise specified.

6. NOTES

6.1 Intended use - This specification is intended to establish and control the quality of blind rivets for use in structural applications on items and components of military and commercial equipment.

6.2 Design information - Design and construction requirements information concerning the use of rivets for blind attachment is contained in Standard MS33522.

6.3 Installation tools - For government use only, procurement of blind rivets may be limited to those acceptable rivets which may be driven by installation tools already in the service stock system and in compliance with MIL-R-85188.

6.4 Ordering data - Procurement documents should specify the following:

- (A) Type and class of rivets by part number. (See I.2)
- (B) Quantity
- (C) Selection of applicable levels of packaging and packing. (See Section 5)

6.5 Cadmium plating - Plating, when required, shall be to the requirements of QQ-P-416 with the following exceptions:

- 1. The restriction on "Steel Fasteners RC 43 or higher shall not be plated" is waived.
- 2. Alloy steel stems shall be baked at 375°F ± 25°F (191°C ± 14°C) for a minimum of four (4) hours within (4) hours after plating.
- 3. Hydrogen Embrittlement relief testing will not be required.
- 4. The maximum plating thickness requirement is waived.

TABLE I

QUALIFICATION SAMPLING AND TEST PROCEDURE

Qualification Tests	Requirement Paragraph	Method Paragraph Table, and/or Figure	Each Diameter of Each Class Style Code (1)	Acceptance Limits
Examination	3.3.1 3.3.4 3.3.5 3.3.7 3.3.15	4.4.1, 4.4.2, Tables III & IV	For each test: Test ten fasteners for each grip length submitted	1 Defect per part number submitted
Installation Installed Flushness (2)	3.3.2 3.3.6	4.4.6, Figure 6 Figure 1	For each test: Test ten fasteners for each grip length submitted.	1/20 Total over-all defectives per part number.
Shear strength Tensile strength Spindle retention	3.3.9 3.3.10 3.3.3	4.4.3, Table V, Fig. 7 4.4.4, Table VI, Fig. 2 4.4.7, Table VIII & IX, Figure 4	For each test: Test three fasteners for each of the three grip lengths submitted.	Ø Defective
Thin Sheet Pull-Through	3.3.11	4.4.5, Table VII Figure 3	For each test: Test three fasteners for each of the three grip lengths.	Ø Defective
Sheet take-up	3.3.12	4.4.8, Table X, Figure 5	Test three fasteners of each grip length submitted.	Ø Defective
Blind Side Shank Expansion	3.3.16	4.4.10 Figure 8	Test three fasteners of the appropriate grip length	Ø Defective

- (1) The grip lengths submitted for qualification shall be as specified by the qualifying activity and shall be selected from Table Ia. Generally, 9 lots of hardware are required to qualify a given head style for a particular material combination (-4, -5 and -6 diameters).
- (2) Full sample shall be tested in both minimum and maximum grip conditions (total 20 fasteners)

TABLE Ia - QUALIFICATION RIVET SELECTION

Rivet Diameter	Range of Grip Lengths for Qualification
-4	-2 thru -8
-5	-3 thru -10
-6	-3 thru -10

TABLE II

**ACCEPTANCE TESTS
(SUMMARY)**

TEST	REQUIREMENT PARAGRAPH	METHOD PARAGRAPH	SAMPLE SIZE (MIL-STD-105)		ACCEPTANCE LIMITS (% AQL)
			NORMAL	REDUCED	
EXAMINATION	3.3.1, 3.3.4, 3.3.5, 3.3.7 3.3.15	4.4.1, 4.4.2	See Para. 4.4.1		
INSTALLATION	3.3.2 3.3.6	4.4.6	S-3	N/A	4.0
SHEAR STRENGTH	3.3.9	4.4.3	S-3	S-1	Ø DEFECTIVE
TENSILE STRENGTH	3.3.10	4.4.4	S-3	S-1	Ø DEFECTIVE
SPINDLE RETENTION	3.3.3	4.4.7	S-3	S-1	2.5
THIN SHEET PULL THRU	3.3.11	4.4.5	1 [↗] PIECE	N/A	[↗] Ø DEFECTIVE
SHEET TAKE-UP	3.3.12	4.4.8	1 [↗] PIECE	N/A	[↗] Ø DEFECTIVE
BLIND SIDE SHANK EXPANSION	3.3.16	4.4.10	1 [↗] PIECE	N/A	[↗] Ø DEFECTIVE

↗ Sample size for retest = 3 pieces. Acceptance limits on retest = Ø Defective

TABLE III**DISCONTINUITY LIMITS**

LOCATION	MAXIMUM DEPTH OF DISCONTINUITY (INCH)
SHANKS OF SLEEVES	.005
PERIPHERY OF MANUFACTURED HEADS OF SLEEVES	.020
OTHER SURFACES ON SLEEVE AND STEM	.010

TABLE IV**TOLERANCES ON CONCENTRICITY OF HEAD**

RIVET DIAMETER	TOTAL VARIATION IN INDICATOR READING (INCH)	
	CLASS 2,3,4	CLASS 1
-4	0.010	0.010
-5	0.010	0.015
-6	0.010	0.015

TABLE V

SINGLE SHEAR STRENGTH

RIVET DIAMETER & GRIP (1) DASH NUMBER		MINIMUM SHEAR STRENGTH (POUNDS)				
		STYLE A		STYLE B		
		CLASS 1 CODE B&E	CLASS 2, 3 CODE B & E	CLASS 1 CODE B&E	CLASS 2 CODE B&E	CLASS 4 CODE B&E
-4	-1	(2)	(2)	(2)	(2)	366
	-2	505	411	592	480	536
	-3	584	531	692	614	657
	-4	655	651	771	741	747
	-5	664	664	814	814	814
-5	-2	699	(2)	805	(2)	721
	-3	840	714	982	815	919
	-4	929	862	1080	977	1045
	-5	1020	1010	1175	1135	1140
	-6	1030	1030	1245	1245	1245
-6	-2	920	(2)	1015	(2)	894
	-3	1130	918	1240	1005	1140
	-4	1250	1095	1385	1200	1320
	-5	1355	1310	1505	1390	1460
	-6	1460	1455	1615	1580	1580
	-7	1480	1480	1685	1685	1685
Reference Shear Strength Level		50 KSI	50 KSI	50 KSI	50 KSI	50 KSI

Note: (1) For rivet grips greater than listed use highest value shown for the diameter, code, class and style.

* (2) Parts too short to be tested.

TABLE VI

TENSILE STRENGTH

RIVET DIAMETER	MINIMUM TENSILE STRENGTH VALUES (POUNDS)		
	STYLE A		STYLE B
	CLASS 1,2 CODE B&E	CLASS 3 CODE B&E	CLASS 1,2,4 CODE B&E
-4	285	250	345
-5	445	390	530
-6	635	560	710

Note: 4-1, 5-1, 5-2, 6-1 & 6-2 rivets are too short to be tested in tensile.

TABLE VII

THIN SHEET PULL THRU

Rivet Diameter	Thin Sheet Thickness "T" $\pm$.001	Minimum Thin Sheet Pull-Thru Loads (Pounds)	
		Style A	Style B
-4	.025	160	180
-5	.032	220	260
-6	.040	315	375

**TABLE VIII
SPINDLE RETENTION LOAD**

Style A		Style B	
RIVET DIA	MINIMUM AXIAL PUSH-OUT (LBS.) INSTALLED CONDITION	RIVET DIA	MINIMUM AXIAL PUSH-OUT (LBS.) INSTALLED CONDITION
-4	125	-4	150
-5	200	-5	250
-6	290	-6	450

**TABLE IX
SPINDLE RETENTION LOAD**

RIVET DIA	MINIMUM AXIAL PUSH-OUT (LBS.) UNINSTALLED CONDITION
-4	10
-5	10
-6	10

TABLE X
SHEET TAKE-UP

GRIP LENGTHS FOR WHICH THIS TEST IS APPLICABLE		RIVET DIA.	STYLE A		STYLE B	
			GAP G (INCH)	FORCE RESISTING CLOSURE (POUNDS)	GAP G (INCH)	FORCE RESISTING CLOSURE (POUNDS)
CLASS 1, 3 & 4	CLASS 2					
-2 AND LONGER	-2 AND LONGER	-4	.031	10	.031	15
-2 AND LONGER	-2 AND LONGER	-5	.031	25	.031	30
-2 AND LONGER	-2 AND LONGER	-6	.031	40	.031	50

Note: The -2 & -3 grip parts may not consistently close the gap in the minimum grip condition because of hole filling. The -4 grip and longer are expected to close the gap regardless of whether they are installed in minimum or maximum grip condition. Acceptance testing is performed in maximum grip only.

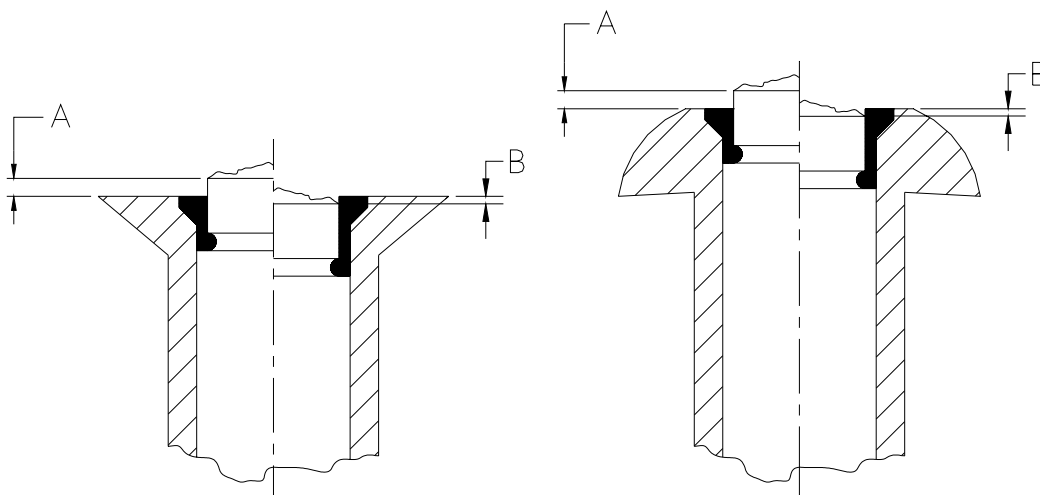


FIGURE 1 - INSTALLED RIVET

LOCKING ELEMENT AND SPINDLE FLUSHNESS LIMITS

SPINDLE FLUSHNESS LIMITS (INCH) ALL TYPES AND STYLES		
RIVET DIAMETER	A MAX. (ABOVE)	B MAX. (BELOW)
-4	0.010	0.015
-5	0.010	0.020
-6	0.010	0.020

Note: 1) Locking element shall be flush with top surface of rivet head within $\pm.005$. Slight element flash permissible .010 max. from top of rivet head.

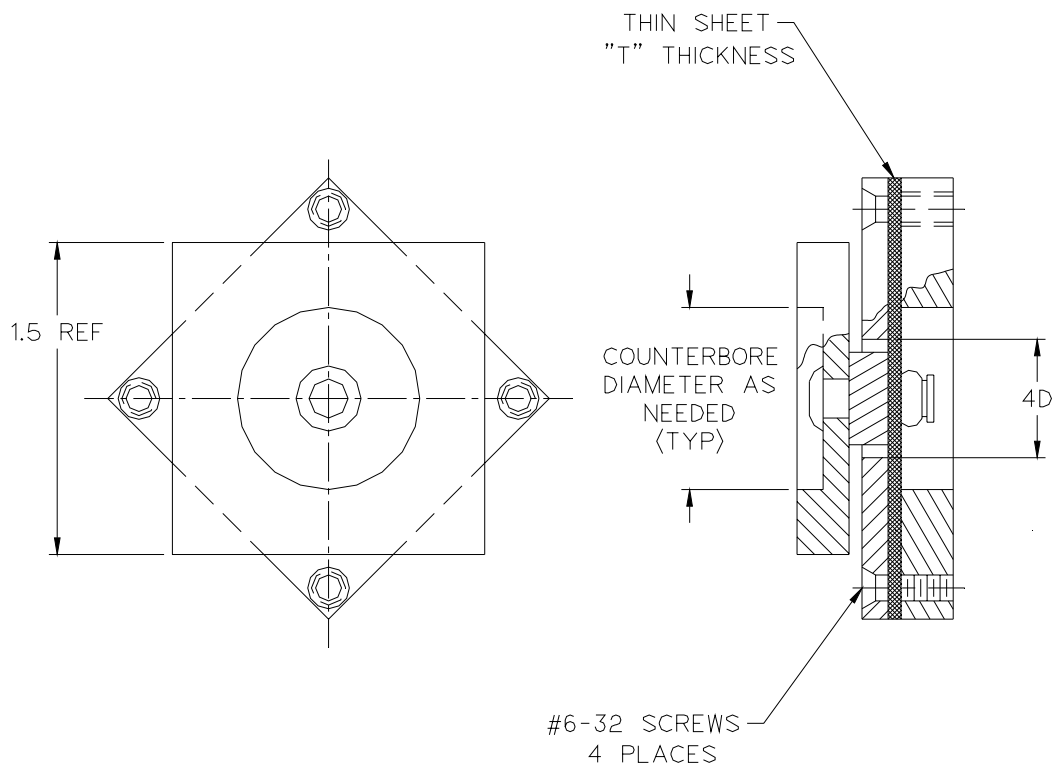
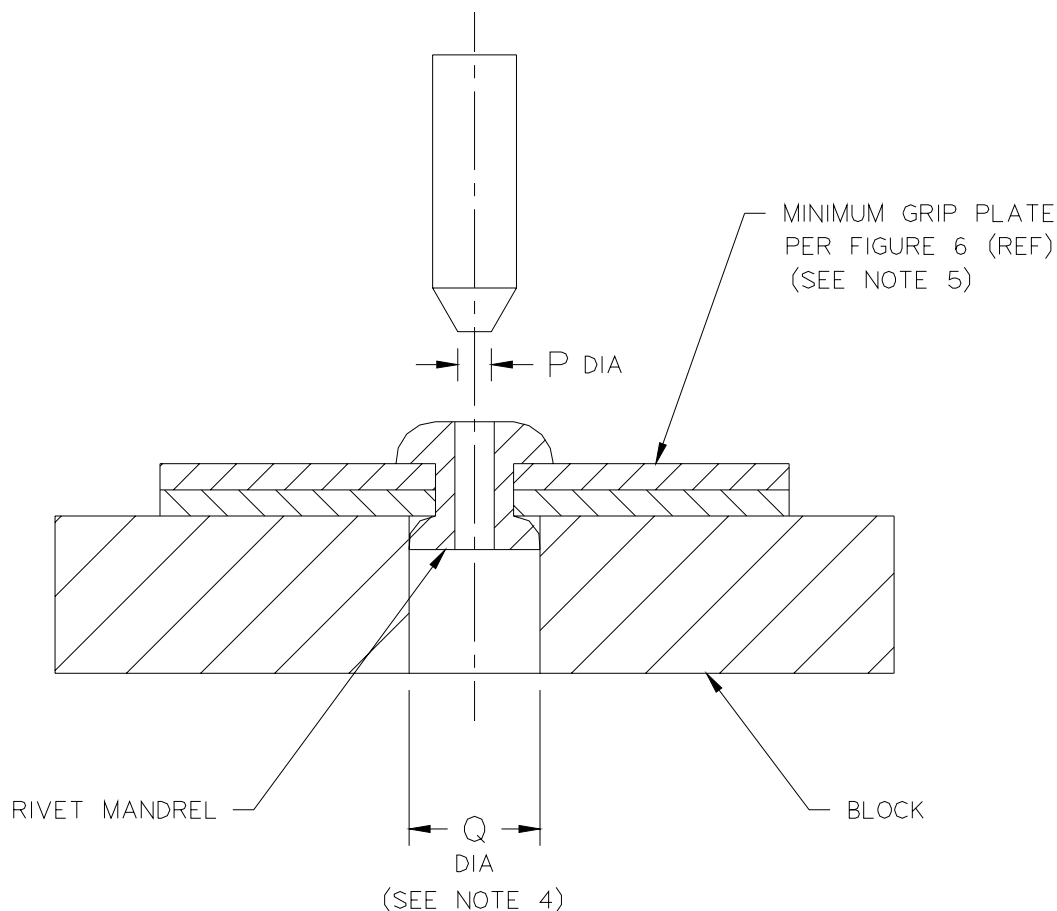


FIGURE 3

THIN SHEET PULL-THRU SPECIMEN

NOTES:

- 1) Material: Thin Sheet = 2024-T3 Aluminum (bare)
Fixtures = Alloy Steel (Rc36 Minimum)
- 2) Hole Preparation - See Figure 7.
- 3) "T" Thickness (See Table VII) Selected to produce blind head "Pull Thru".
- 4) Dimensions in inches.
- 5) Alternate fixture geometries are permissible if it is demonstrated that comparable results are achieved.
- 6) Grip lengths -1 and -2 are too short to test.



**FIGURE 4
SPINDLE RETENTION TEST**

Nominal Rivet Diameter	'P' Diameter +.000 -.005	
	STYLE A	STYLE B
-4	.063	.073
-5	.079	.090
-6	.094	.100

- Notes:
- 1) Dimensions in inches
 - 2) Countersunk dimensions to be same as Figure 7.
 - 3) Material: 2024-T3 Aluminum
 - 4) Q diameter to clear blind head.
 - 5) Except that rivets with a grip length equal to or less than their diameter shall be installed in a test plate representing maximum grip condition and having a hole size equal to that required for the minimum grip test plate of Figure 6.

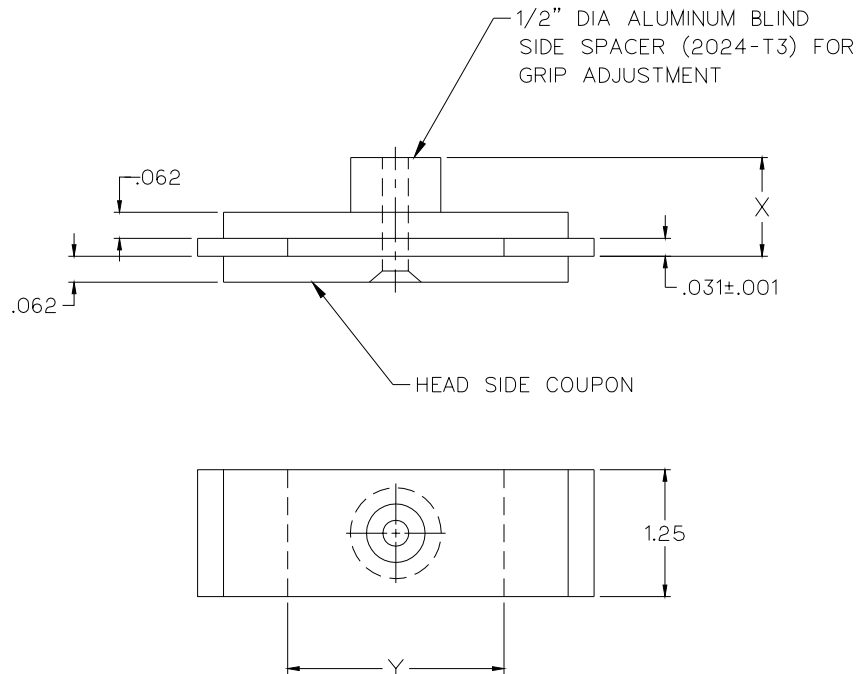
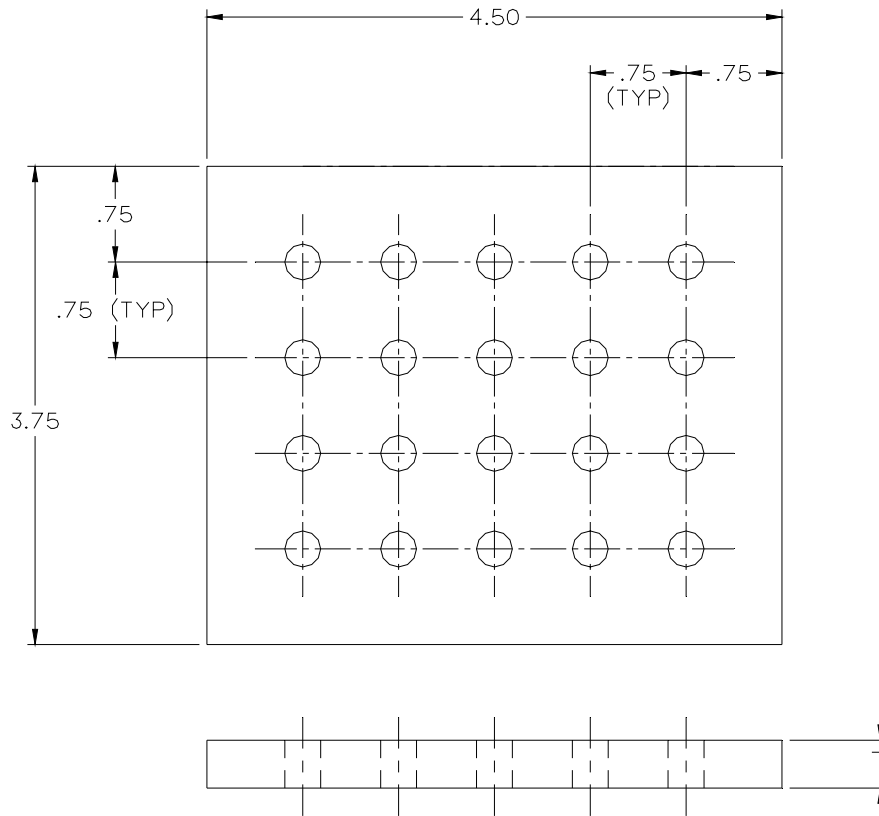


FIGURE 5

SHEET TAKE-UP SPECIMEN

- Notes:
- 1) Sheet material: Shall be 2024-T3 aluminum alloy per QQ-A-250/4 or QQ-A-250/5 (referee)
 - 2) Y dimension to be adjusted to produce closure resisting force values shown in Table X.
 - 3) X dimension +.062 shall be equivalent to maximum grip of test rivet.
 - 4) Fastener hole in specimen shall not be deburred by chamfering.
 - 5) Fastener holes per Figure 7.
 - 6) During calibration, use a .0015" thick feeler gage at hole. The load required to bring the sheets into contact with the feeler gage is defined as the force resisting closure of the gap. Calibrate with un-installed rivet in plate and apply load between the rivet and 1/2" diameter blind side spacer.
 - 7) Force shall not be measured after the sheets are closed.
 - 8) Alternate fixture geometries are permitted if it is demonstrated that comparable results are achieved.

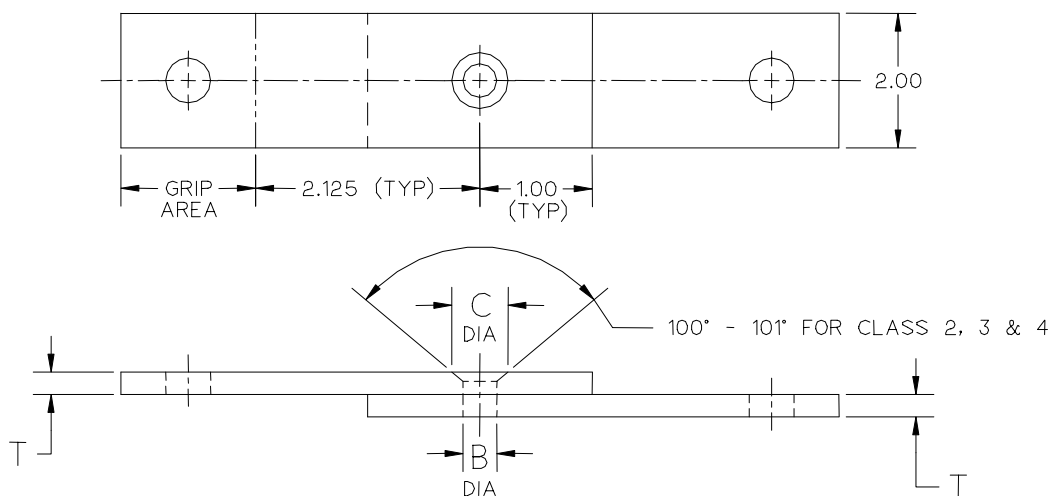


RIVET DIAMETER	HOLE DIAMETER ± .0005 MINIMUM GRIP		HOLE DIAMETER ± .0005 MAXIMUM GRIP	
	STYLE A	STYLE B	STYLE A	STYLE B
-4	.132	.146	.129	.143
-5	.164	.180	.160	.176
-6	.196	.209	.192	.205

FIGURE 6

SPECIMEN FOR INSTALLATION

- Notes:
- 1) "T" - Sheet thickness. For each specific grip length of appropriate size under evaluation, installation tests shall be conducted at total grip (T) conforming to minimum and maximum grip as indicated in applicable standard. One-half of required tests shall be in min. grip-max. hole and one-half in max. grip-min. hole.
 - 2) Material: Alloy steel or aluminum alloy (2024-T3) at manufacturers' option. (Referee material = 2024-T3).
 - 3) Dimensions in inches.
 - 4) See Figure 7 for countersink dimensions.
 - 5) This figure presents the recommended test specimen geometry. Specimens with different lengths, widths and hole patterns may be used at the rivet manufacturers option.

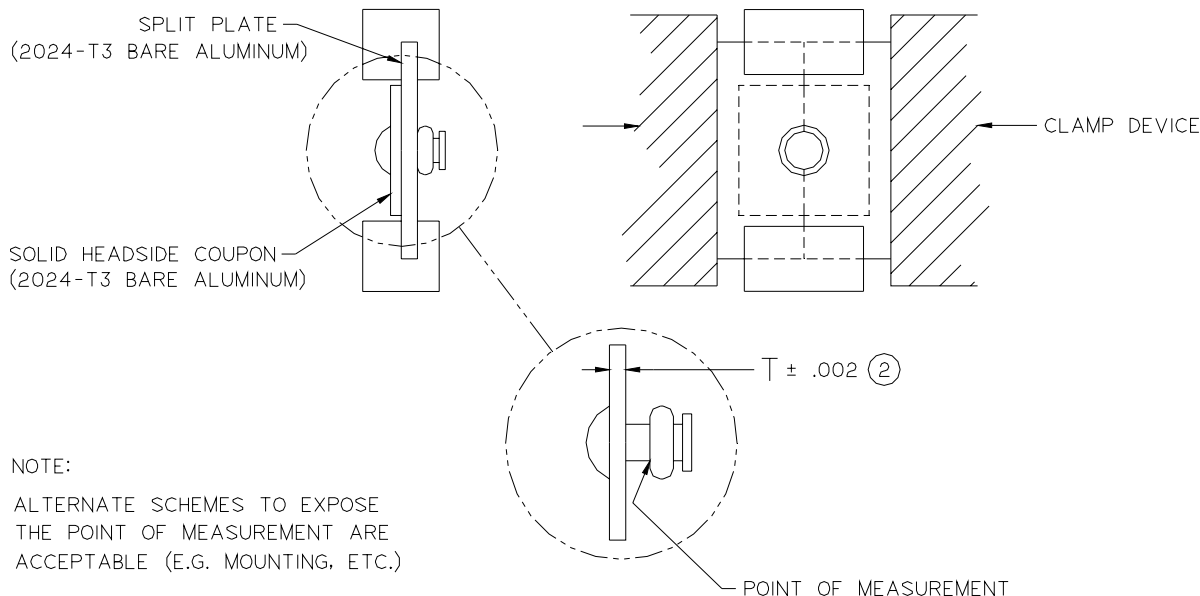


STYLE AND CLASS		-4 DIAMETER		-5 DIAMETER		-6 DIAMETER	
		B ±.0005	C ±.003	B ±.0005	C ±.003	B ±.0005	C ±.003
A	CLASS 1	0.130	---	0.162	---	0.194	---
	CLASS 2	0.130	0.225	0.162	0.286	0.194	0.353
	CLASS 3	0.130	0.192	0.162	0.243	0.194	0.299
B	CLASS 1	0.144	---	0.178	---	0.207	---
	CLASS 2	0.144	0.225	0.178	0.286	0.207	0.353
	CLASS 4	0.144	0.170	0.178	0.213	0.207	0.255

FIGURE 7

SHEAR STRENGTH TEST SPECIMEN

- Notes:
- 1) Holes to be square with both faces within 1°.
 - 2) Countersink and cylindrical holes to be concentric within .002 FIM.
 - 3) Material: Alloy Steel Rc46 min.
 - 4) All dimensions in inches.
 - 5) Alternate coupon configurations (e.g. stepped to allow testing of multiple grips) may be used.
 - 6) Alternate test method is MIL-STD-1312-20



BLIND SIDE SHANK EXPANSION SPECIMEN

FIGURE 8

RIVET DIAMETER	RIVET GRIP ① DASH NO.	HEAD SIDE COUPON		SPLIT PLATE		
		HOLE SIZE ± .0005		THICKNESS ± .001	HOLE SIZE +.0005 -.0000	
		Style A	Style B		Style A	Style B
-4	-2	.1295	.1435	.062	.1325	.1465
-5	-2	.1615	.1775	.078	.1645	.1805
-6	-3	.1935	.2065	.094	.1965	.2095

Notes: ← The blind side shank expansion test is not applicable to grip lengths shorter than those shown in the table above.

↑ "T" plus split plate thickness equals to maximum grip.