

INCH POUND

MIL-R-47195A(MI)
 25 August 1989
 SUPERSEDING
 MIL-R-47195(MI)
 12 July 1974

MILITARY SPECIFICATION

RIVETS, BLIND, SELF-PLUGGING
 PREPARATION FOR AND INSTALLATION OF

This specification is approved for use by the Army Missile Command, Department of the Army, and is available for use by all Departments and Agencies of the Department of Defense.

1. SCOPE

1.1 Scope. This specification covers the preparation for and installation of self-plugging blind rivets.

2. APPLICABLE DOCUMENTS

2.1 Government documents.

2.1.1 Specifications, standards, and handbooks. The following specifications, standards, and handbooks form a part of this document to the extent specified herein. Unless otherwise specified, the issues of these documents are those listed in the issue of the Department of Defense Index of Specifications and Standards (DODISS) and supplement thereto, cited in the solicitation (see 6.2).

SPECIFICATIONS

FEDERAL

TT-P-1757

Primer Coating Zinc Chromate,
 Low-Moisture-Sensitivity

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: Commander, US Army Missile Command, ATTN: AMSMI-RD-SE-TD-ST, Redstone Arsenal, AL 35898-5270 by using the self addressed Standardization Document Improvement Proposal (DD Form 1426) at the end of this document or by letter.

AMSC N/A

FSC 5320

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STANDARDS

MILITARY

MS20600	Rivet, Blind, Structural Pull Stem, Self-Plugging, Protruding Head, Type I
MS20601	Rivet, Blind, Structural Pull Stem, Self-Plugging, 100° Flush Head, Type II
MS20605	Rivet, Blind Nonstructural, 100° Flush Head, Class 2

(Unless otherwise indicated, copies of federal and military specifications, standards, and handbooks are available from the Naval Publications and Forms Center (ATTN: NPODS), 5801 Tabor Avenue, Philadelphia, PA 19120-5099.)

2.3 Order of precedence. In the event of conflict between the text of this document and the references cited herein (except for related associated detail specifications, specification sheets or MS standards), the text of this document takes precedence. Nothing in this document, however, shall supersede applicable laws and regulations unless a specific exemption has been obtained.

3. REQUIREMENTS

3.1 Rivets. The rivet type, size, and material shall be as specified on the engineering drawing, parts list or specification.

3.1.1 Rivet handling. The rivets, as furnished, shall be free from dust, dirt or grease. If the rivets are furnished with a special lubricant coating the coating shall not be removed by solvents or staining. Lubricant removal will result in faulty pull stem operation.

3.2 Equipment. Equipment for installation of self-plugging blind rivets shall be standard header tools as recommended by rivet manufacturer.

3.3 Rivet holes (countersunk rivets).

3.3.1 Drilling. Drilling of rivet holes shall be as follows:

- a) Oversize, oblong, and irregular shaped holes shall be cause for rejection.
- b) All holes shall be drilled normal (at 90°) to the working surface.
- c) Extreme pressure shall not be applied and holes shall not be punched through with the drill.

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- d) When drilling through more than one sheet, hold the sheets securely together so there is no misalignment of holes due to shifting or separation of the sheets.
- e) Before parts are riveted together, all chips, burrs, and foreign material shall be removed from mating surfaces. Burrs may be removed from rivet holes by chamfering to a depth not to exceed 10 percent of the stock thickness or 0.032 inch, whichever is less.

3.3.2 Hole size. Pilot drill parts in accordance with table I and held together with skin fasteners in alternate holes. After installation of fasteners, finish drilled holes not obstructed by fasteners in accordance with table I.

TABLE I. Rivet drill sizes.

Rivet Diameter (Inches)	Pilot Drill	MS20600, MS20601, MS20605	
		Pre Drill	Finish Drill and Tolerance
0.094	#49 (.073)	#43 (.089)	#40 (.096) .097 .101
0.125	#40 (.098)	#32 (.116)	#30 (.1285) .128 .132
0.156	#30 (.1285)	#26 (.147)	#20 (.161) .160 .164
0.187	#20 (.161)	#16 (.177)	#10 (.1935) .192 .196
0.250	#1 (.073)	#15/64 (.234)	#F (.257) .256 .261

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3.3.3 Countersinking. Unless otherwise specified on the engineering drawing or specification countersinking shall be used for all flush type rivets and countersinking size and dimensional limitations shall be in accordance with figure 1 and table II. Countersinks shall be produced with a tool that incorporates an automatic stop countersinking feature. The countersinking tool shall be at 90° to the work surface and held steady throughout the cutting cycle. The holes shall be clean and concentric. Countersinks shall be free of chatter marks and concentric with the rivet holes.

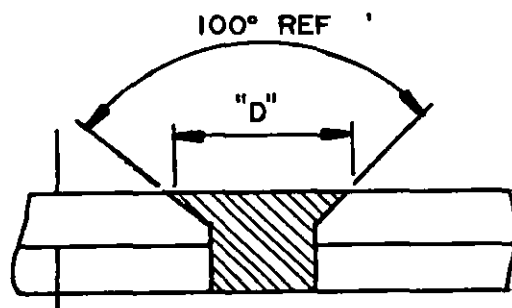


FIGURE 1. Countersink holes.

TABLE II. Countersink diameters.

Rivet Size (Inches)	"D" + .003 - .000 MS20601 MS20605	"T" Minimum MS20601 MS20605
0.094	.176	.040
0.125	.228	.050
0.56	.289	.063
0.187	.357	.071
0.250	.480	.100

See figure 1

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3.6 Flushness limits. Unless otherwise specified herein or on drawings, flushness limits shall be 0.010 inch above or 0.005 inch below the surface.

3.7 Removing improperly installed self-plugging blind rivets. Drive out the stem using a punch approximately the same diameter or smaller than the stem. Use the hole in the rivet head as a pilot and drill through the head only. Use a drill the same size as the rivet shank. Remove the rivet head. Push out the rivet shank with a punch which is the same diameter or smaller than the shank. If the shank will not push out, drill out the shank using a drill equal to the shank diameter. Exercise care to avoid enlarging the hole. If the hole is enlarged, an oversize or next larger size rivet may be installed when all of the following conditions are met:

a. Edge distance and pitch must remain within drawing limits. If drawings do not state edge distance limits, edge distance shall not be less than that specified in paragraph 3.3.5.

b. The quantity of holes to be enlarged shall be not greater than 10% of the holes in any one rivet pattern attaching two items in one finished assembly nor more than two adjacent rivets be enlarged without approval from the procuring activity.

c. Holes will be enlarged to the next larger size only (one rivet size larger than that shown on the drawing), per table I.

d. Countersink must be enlarged in accordance with table II.

e. Conditions other than those in a, b, and c must be approved by the design activity.

3.8 Removing improperly installed hollow blind rivets. Drive out the rivet using a drill the same size as the rivet hole. Use the hole in the rivet as a pilot for the drill. Exercise care to avoid enlarging the hole. If the hole is enlarged, an oversize or next larger size rivet may be installed provided the conditions of 3.7 of this specification are met.

3.9 Corrosion prevention. The rivet hole, countersink, and rivet shall be coated with zinc chromate primer conforming to TT-P-1757 prior to installation. The rivet shall be installed while the primer is in the wet condition.

3.10 Workmanship. Installation of self-plugging blind rivets shall be accomplished in a workmanlike manner. Rivet assemblies shall be of uniform quality and free from cracks, gaps, sharp edges, burrs, loose parts, or other defects which might render the assemblies unsuitable for its intended purpose.

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3.3.4 Piercing. Piercing tools which produce true and clear holes equivalent to acceptable drilled holes may be used with written approval from the procuring activity.

3.3.5 Edge margin. The rivet edge margin (the distance from the center of the rivet hole to the nearest edge of the part to be riveted) shall be not less than 2 times the diameter of the rivet unless otherwise specified on applicable drawings or specifications.

3.4 Shaving. All flush head rivets of the self-plugging blind type shall be shaved with a Shego Shaver or an equivalent shaver which will not cause loosening of the stem. All self-plugging blind rivets shall be inspected before and after shaving.

3.5 Riveting.

3.5.1 Installation grip. Verify grip length specified on drawing before installing rivet since the length is based on nominal material grip. Do not install specified rivet where actual material grip is greater than that shown on the rivet selector gage.

3.5.2 Riveting operation. Check proper functioning of rivet gun by simulating actual working conditions on scrap metal of same thickness as work piece. Make certain that the gun has the proper pulling head and the proper draw bolt installed.

- a. Insert rivet in hole and place gun over rivet, or insert rivet in gun and then into the hole, making certain that the stem of the rivet is completely inserted into the slot of the draw bolt.
- b. The sheets being riveted shall be held firmly together while installing rivets.
- c. Press on gun with sufficient pressure to hold the rivet firmly against the work. Do not increase pressure unless necessary to bring the parts being riveted into contact. The pulling head of the gun shall be properly centered on the rivet and held perpendicular to the work.
- d. Actuate gun trigger and hold until gun stroke is completed. The stroke is controlled by the sleeve and spacer installed in the pulling head. The sleeve has a visible white dot which will indicate the end of the stroke and also the grip length by becoming visible at the hole which is marked for the grip length being used. Release trigger and remove the gun. Pull the stem completely through the rivet on all hollow type rivets.
- e. When all holes that are not obstructed by fasteners have been properly riveted, remove the fasteners and finish drilling the remaining holes in accordance with 3.3.2 and rivet in accordance with a, b, c and d above.

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4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for inspection. Unless otherwise specified in the contract or purchase order, the contractor is responsible for the performance of all inspection requirements (examinations and tests) as specified herein. Except as otherwise specified in the contract or purchase order, the contractor may use his own or any other facilities suitable for the performance of the inspection requirements specified herein, unless disapproved by the Government. The Government reserves the right to perform any of the inspections set forth in the specification where such inspections are deemed necessary to assure supplies and services conform to prescribed requirements.

4.1.1 Responsibility for compliance. All items shall meet all requirements of sections 3 and 5. The inspection set forth in this specification shall become a part of the contractor's overall inspection system or quality program. The absence of any inspection requirements in the specification shall not relieve the contractor of the responsibility of assuring that all products or supplies submitted to the Government for acceptance comply with all requirements of the contract. Sampling inspection as part of manufacturing operations, is an acceptable practice to ascertain conformance to requirements, however, this does not authorize submission of known defective material, either indicated or actual, nor does it commit the Government to accept defective material.

4.2 Classification of inspections. The inspection requirements specified herein are classified as follows (see 4.3).

4.3 Quality conformance inspection.

4.3.1 Inspection requirements. To determine conformance to Section 3, installation of blind rivets shall be performed in accordance with and inspected to all the requirements of Section 3 of this specification.

4.3.1.1 Rivet hole size inspection. After holes are drilled in conformance with 3.3.2, a spot check on 10 percent of the holes on each item shall be made with a "go" and "no go" gage to insure proper tolerances. If discrepancies are found in this quantity, a 100 percent inspection shall be made on that item.

4.3.1.2 Push-out test. All self-plugging rivet stems shall, after shaving, withstand a 20 pound push-out load. The load shall be applied with a device, such as an accurately calibrated, spring loaded, hand tester, which will exert 20 pounds of pressure on the rivet stem. No loose stems shall be allowed. The center plug of structural rivets shall not be pushed out. Rivets failing to withstand the test shall be replaced in accordance with 3.7.

4.3.1.3 Loose rivets. All rivets shall fit tightly with no movement allowed. All loose rivets shall be removed in accordance with paragraph 3.7 and replaced in accordance with 3.5.

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4.3.1.4 Defects. Rivets shall be classed defective if they show evidence of defects such as:

- a. Cut or ringed heads.
- b. Deformed skin or open seams caused by pressure on rivets.
- c. Bulging skin caused by expanded rivets or trapped chips.
- d. Cut or marred skin around rivet heads.
- e. Sheet separation after riveting which allows a 0.002 inch feeler gauge to be inserted between the sheets from any direction far enough to touch the rivet shank.
- f. The occurrence of any gap around 60 percent of the circumference of the head. In the other 40 percent, gaps which allow a feeler gauge larger than 0.004 inch to be inserted.
- g. On button head rivets, if a 0.002 inch feeler gauge can be inserted far enough under the head to touch the shank.
- h. Rivets not meeting the requirements of Section 3.

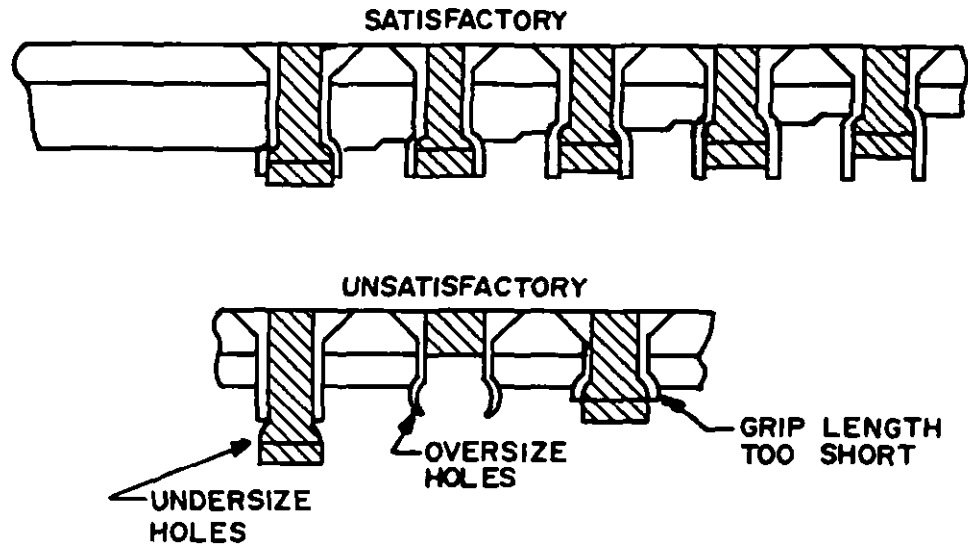
4.3.2 Visual rivet inspection.

4.3.2.1 Protrusion of rivet. When the blind side of the work is readily visible, the extension of the rivet shank beyond the material may be observed before riveting to ascertain that the shank properly protrudes through the material. The proper amount of protrusion before pulling is 0.047 inch to 0.125 inch.

4.3.2.2 Countersinking. The holes shall be inspected to insure conformance to requirements of 3.3.3, figure 1 and table II.

4.3.2.3 Proper installation. When the blind side of the work is visible, some variations of the characteristic tulip head will be noted. Figure 2 shows satisfactory and unsatisfactory installed rivets.

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FIGURE 2. Installed rivets.

4.3.3 Corrosion prevention test. The rivet hole, countersink and rivet shall be inspected to insure conformance with 3.9 and TT-P-1757.

4.4 Noncompliance. If the sample fails to pass the requirements in table I, the manufacturer shall notify the procuring activity and the cognizant inspection activity of such failure and take corrective action on the materials or processes, or both, as warranted, and on all units of production which can be corrected and which were manufactured with essentially the same materials and processes, and which are considered subject to the same failure. Acceptance and shipment of the product shall be discontinued until corrective action acceptable to the qualifying activity has been taken. After the corrective action has been taken, inspection shall be repeated on additional sample units. In the event of failure after the manufacturer's corrective action, information concerning the failure shall be furnished to the cognizant inspection activity and the procuring activity (see 6.2.2).

5. PACKAGING

Not applicable.

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6. NOTES

6.1 Intended use. The material covered by this specification is intended for the preparation and installation of self-plugging blind rivets.

6.2 Ordering data.

6.2.1 Acquisition requirements. Acquisition documents must specify the following:

a. Title, number and date of this specification.

b. Issue of DODISS to be cited in the solicitation, and if required, the specific issue of individual documents referenced (see 2.1.1).

6.3 Part or Identifying Number (PIN). The part or identifying number for this specification shall consist of the letter "M", designating a military item and the number of this specification.

6.4 Subject term (keyword) listing.

Countersink
Drills
Header Tools

6.5 Metric application. Whenever inch/pound dimensions are used in this document, metric equivalents in accordance with FED-STD-376 shall be acceptable.

6.6 Changes from previous issue. Asterisks (or vertical lines) are not used in this revision to identify changes with respect to the previous issue due to the extensiveness of the changes.

Custodian:
Army - MI

Preparing Activity:
Army - MI
Project No. 5320-A011

STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL

(See Instructions - Reverse Side)

1. DOCUMENT NUMBER MIL-R-47195		2. DOCUMENT TITLE Rivet, Blind, Self-Plugging, Preparation for and Installation of	
3a. NAME OF SUBMITTING ORGANIZATION		4. TYPE OF ORGANIZATION (Mark one)	
b. ADDRESS (Street, City, State, ZIP Code)		<input type="checkbox"/> VENDOR <input type="checkbox"/> USER <input type="checkbox"/> MANUFACTURER <input type="checkbox"/> OTHER (Specify): _____	
5. PROBLEM AREAS			
a. Paragraph Number and Wording:			
b. Recommended Wording:			
c. Reason/Rationale for Recommendation:			
6. REMARKS			
7a. NAME OF SUBMITTER (Last, First, MI) - Optional		b. WORK TELEPHONE NUMBER (Include Area Code) - Optional	
c. MAILING ADDRESS (Street, City, State, ZIP Code) - Optional		8. DATE OF SUBMISSION (YYMMDD)	