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STRUCTURAL SPLITTING SELF-PLUGGING PULL MANDREL BLIND RIVETS

BLIND RIVETS

1. Scope.

1.1 Scope. This standard establishes the dimensional, mechanical and performance requirements for structural splitting self-plugging pull mandrel blind rivets suitable for use in engineering assemblies where load transmitting capability by the rivet is a design requirement.

1.2 Definitions.

1.2.1 *Blind Rivet.* A blind rivet is a blind fastener which has a self-contained mechanical or other feature which permits the formation of an upset on the blind end of the rivet during rivet setting to join the component parts of an assembly.

1.2.2 A structural splitting self-plugging pull mandrel blind rivet (hereinafter called rivet) is a two piece assembly consisting of a rivet body and a mandrel. During the setting operation the mandrel is pulled against and into the rivet body causing the rivet blind end to split axially into three or more segments. The mandrel breaks at a point within or above the rivet head with the entrapped length of the mandrel being retained in the rivet body.

1.2.3 Definitions of other terms used in this standard are given in IFI-110, "Glossary of Terms Relating to Blind Rivets," page K-40.

2. Designation.

2.1 Styles. The two styles of rivets are designated as protruding head and flush head. Protruding head rivets are available in two styles designated as regular head and large head. Flush head rivets are available in one style designated as 100 degree countersunk head.

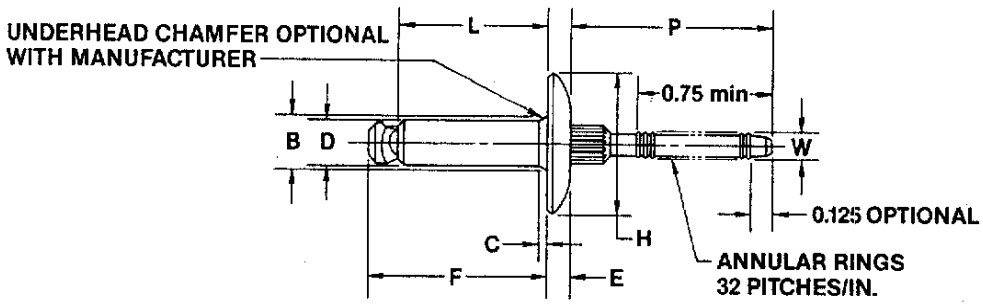

Table 1 Dimensions of Regular and Large Head Structural Splitting Self-Plugging Pull Mandrel Blind Rivets

Rivet Series No.	Nom Rivet Size	D		H		E		H		E		B	C	W	P	F	L
		Body Diameter		Style 1 Regular Head				Style 2 Large Head				Hole Filling Chamfer	Chamfer Length	Mandrel Dia	Mandrel Protrusion	Blind Side Protrusion	Rivet Body Length
				Head Dia		Head Height		Head Dia		Head Height							
		Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Max	Nom	Min	Max	Max
6	3/16 0.1875	0.191	0.185	0.405	0.375	0.103	0.083	0.587	0.537	0.103	0.083	0.201	0.035	0.116	1.000	L + 0.125	See Table 2
8	1/4 0.2500	0.255	0.248	0.535	0.485	0.126	0.106	0.775	0.725	0.126	0.106	0.269	0.045	0.151	1.000	L + 0.165	

NOTES:

1. All dimensions are in inches.
2. For application data see Table 2.
3. Rivet series numbers represent the nominal size in 1/32 inch.
4. Maximum body diameter may be increased by 0.001 inch within 0.100 inch of underside of head.
5. When computing the blind side protrusion (F), the maximum length of rivet body (L) as given in Table 2 for the applicable grip shall be used. Minimum blind side clearance may be calculated by subtracting the actual grip (G) (i.e. total thickness of the material to be joined), from the specified blind side protrusion (F). (Example: To join two plates, each 0.100 inch thick, with a 3/16 inch rivet, a No. 64 rivet would be used. Minimum blind side clearance necessary to permit proper rivet setting would be L + 0.125 – G, which is 0.602 + 0.125 – 0.200, and equals 0.527 inch.)

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2.2 Grades. The material combinations of rivets are designated as grades with each grade representing a different combination of rivet body material and mandrel material as given in Table 5.

2.3 Design. The design of rivets shall be in accordance with the practice of the manufacturer.

3. Requirements.

3.1 Materials and Processes.

3.1.1 *Materials.* Rivet bodies and mandrels shall be made of the material specified for the grade in Table 5.

3.1.2 *Heat Treatment.* Rivet components shall be heat treated as necessary to meet the mechanical and performance requirements specified for the grade. Heat treatment shall be in accordance with good commercial practice.

3.1.3 *Finish.* Unless otherwise specified, rivets may be coated at the option of the manufacturer.

Table 2 Application Data for Protruding Head Style Structural Splitting Self-Plugging Pull Mandrel Blind Rivets

Rivet Series No.	Nom Rivet Size	Recommended Drill Size	Recommended Hole Size		Rivet No.	Grip Range	Rivet Body Length L
			Max	Min			Max
6	3/16 0.1875	#11	0.196	0.192	61	0.032 – 0.062	0.415
					62	0.063 – 0.125	0.477
					63	0.126 – 0.187	0.540
					64	0.188 – 0.250	0.602
					65	0.251 – 0.312	0.665
					66	0.313 – 0.375	0.727
					67	0.376 – 0.437	0.790
					68	0.438 – 0.500	0.852
					69	0.501 – 0.562	0.915
					610	0.563 – 0.625	0.977
					611	0.626 – 0.687	1.040
					612	0.688 – 0.750	1.102
8	1/4 0.2500	F	0.261	0.257	82	0.063 – 0.125	0.520
					83	0.126 – 0.187	0.582
					84	0.188 – 0.250	0.645
					85	0.251 – 0.312	0.707
					86	0.313 – 0.375	0.770
					87	0.376 – 0.437	0.832
					88	0.438 – 0.500	0.895
					89	0.501 – 0.562	0.957
					810	0.563 – 0.625	1.020
					811	0.626 – 0.687	1.082
					812	0.688 – 0.750	1.145
					813	0.751 – 0.812	1.207
					814	0.813 – 0.875	1.270
					815	0.876 – 0.937	1.332
					816	0.938 – 1.000	1.395

NOTES:

1. All dimensions are in inches.
2. The first numeral in the rivet number designates the rivet series number, the last one or two numerals give the maximum grip in 1/16 in. which the rivet is capable of joining.
3. Recommended drill sizes are those which normally produce holes within the specified hole size limits.

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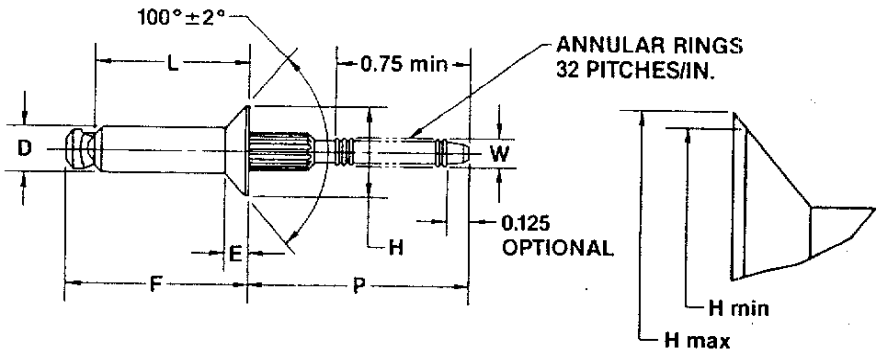

Table 3 Dimensions of 100° Flush Head Structural Splitting Self-Plugging Pull Mandrel Blind Rivets

Rivet Series No.	Nom Rivet Size	D		H		E	W	P	F	L
		Body Diameter		Head Diameter		Head Height	Mandrel Dia	Mandrel Protrusion	Blind Side Protrusion	Rivet Body Length
		Max	Min	Max	Min	Ref	Nom	Min	Max	
6	3/16 0.1875	0.191	0.185	0.391	0.361	0.081	0.116	1.000	L + 0.125	See Table 4
8	1/4 0.2500	0.255	0.248	0.512	0.482	0.104	0.151	1.000	L + 0.165	

NOTES:

1. All dimensions are in inches.
2. For application data see Table 4.
3. Rivet series numbers represent the nominal size in 1/32 inch.
4. Maximum body diameter may be increased by 0.001 inch within 0.100 inch of underside of head.
5. When computing the blind side protrusion (F), the maximum length of rivet body (L) as given in Table 4 for the applicable grip shall be used. Minimum blind side clearance may be calculated by subtracting the actual grip (G) (i.e. total thickness of the material to be joined), from the specified blind side protrusion (F). (Example: To join two plates, each 0.180 inch thick, with a 3/16 inch rivet, a No. 66 rivet would be used. Minimum blind side clearance necessary to permit proper rivet setting would be L + 0.125 − G, which is 0.727 + 0.125 − 0.360 and equals 0.492 inch.)

3.2 Dimensional Requirements.

3.2.1 *Rivet Dimensions.* Protruding and 100 degree flush head rivets shall conform to the dimensions given in Tables 1 and 3, respectively.

3.2.2 *Application Data.* Recommendations on the selection and application of protruding and 100 degree flush head rivets are given in Tables 2 and 4, respectively.

3.3 Mechanical and Performance Requirements.

3.3.1 *Shear Strength.* Rivets, except those described in 3.3.3, shall have ultimate shear strengths not less than the minimum specified for the applicable size and grade given in Table 6 when tested in accordance with 2.1 of IFI-135.

3.3.2 *Tensile Strength.* Rivets, except those described in 3.3.3, shall have ultimate tensile strengths not less than the minimum specified for the applicable size and grade given in Table 6 when tested in accordance with 2.2 of IFI-135.

3.3.3 Protruding head rivets with specified maximum grip lengths shorter than 1.0 times the nominal rivet diameter, and flush head rivets with specified maximum grip lengths shorter than 1.5 times the nominal rivet diam-

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eter shall not be subject to either shear or tensile testing.

3.3.4 *Mandrel Break Load.* While the rivet is being set, the axially applied load necessary to break the mandrel shall be within the limits specified for the applicable rivet size and grade in Table 7, when tested in accordance with 2.3 or IFI-135.

3.3.5 *Mandrel Retention.* Mandrels of properly set rivets shall withstand, without apparent movement of the mandrel in the rivet body, the axial push-out loads specified for the appli-

Table 4 Application Data for 100° Flush Head Style Structural Splitting Self-Plugging Pull Mandrel Blind Rivets

Rivet Series No	Nom Rivet Size	Recommended Drill Size	Recommended Hole Size		Rivet No.	Grip Range	Rivet Body Length L
			Max	Min			Max
6	3/16 0.1875	#11	0.196	0.192	64	0.187 – 0.250	0.602
					65	0.251 – 0.312	0.665
					66	0.313 – 0.375	0.727
					67	0.376 – 0.437	0.790
					68	0.438 – 0.500	0.852
					69	0.501 – 0.562	0.915
					610	0.563 – 0.625	0.977
					611	0.626 – 0.687	1.040
8	1/4 0.2500	F	0.261	0.257	84	0.187 – 0.250	0.645
					85	0.251 – 0.312	0.707
					86	0.313 – 0.375	0.770
					87	0.376 – 0.437	0.832
					88	0.438 – 0.500	0.895
					89	0.501 – 0.562	0.957
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					811	0.626 – 0.687	1.082
					812	0.688 – 0.750	1.145
					813	0.751 – 0.812	1.207
					814	0.813 – 0.875	1.270
					815	0.876 – 0.937	1.332
					816	0.938 – 1.000	1.395

NOTES:
1. All dimensions are in inches.
2. The first numeral in the rivet number designates the rivet series number, the last one or two numerals give the maximum grip in 1/16 in. which the rivet is capable of joining.
3. Recommended drill sizes are those which normally produce holes within the specified hole size limits.

Table 5 Grades of Structural Splitting Self-Plugging Pull Mandrel Blind Rivets

Designation	Rivet Body Material	Mandrel Material
12	Aluminum Alloy 5056	Aluminum Alloy
19	Aluminum Alloy 5056	Carbon Steel

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Table 6 Ultimate Shear and Tensile Strengths of Structural Splitting Self-Plugging Pull Mandrel Blind Rivets

Nom Rivet Size in	Rivet No.	Ultimate Shear Strength lbs min		Ultimate Tensile Strength lbs min	
		GRADE 12	GRADE 19	GRADE 12	GRADE 19
3/16 0.1875	63	*	900	*	600
	64	*	1050	*	600
	65	*	1125	*	600
	66	*	1200	*	600
	67	*	1275	*	600
	68	*	1350	*	600
	69	*	1350	*	600
	610	*	1350	*	600
	611	*	1350	*	600
	612	*	1350	*	600
1/4 0.2500	84	*	1500	*	1100
	85	*	1600	*	1100
	86	*	1750	*	1100
	87	*	1900	*	1100
	88	*	2000	*	1100
	89	*	2100	*	1100
	810	*	2100	*	1100
	811	*	2100	*	1100
	812	*	2100	*	1100
	813	*	2100	*	1100
	814	*	2100	*	1100
	815	*	2100	*	1100
	816	*	2100	*	1100

*Values are under development.

Table 7 Mandrel Break Loads of Structural Splitting Self-Plugging Pull Mandrel Blind Rivets

GRADE		12	19
Nom Rivet Size	Rivet Body Material	Aluminum	Aluminum
	Mandrel Material	Aluminum	Steel
3/16	Min	*	1200
	Max	*	1600
1/4	Min	*	2000
	Max	*	2400

*Values are under development.

NOTES:

1. All loads in pounds.
2. Mandrel break load is defined as the load in pounds necessary to break the mandrel when setting structural splitting self-plugging types of pull mandrel blind rivets.

Table 8 Mandrel Retention Loads of Structural Splitting Self-Plugging Break Mandrel Blind Rivets

Nom Rivet Size in	Mandrel Retention Load lbs min
3/16 0.1875	25
1/4 0.2500	25

cable size in Table 8 when tested in accordance with 2.5 of IFI-135.

4. Test Methods.

Tests shall be conducted in accordance with the test methods specified in IFI-135, page K-89.

5. Inspection.

Rivets shall be inspected to determine conformance with dimensional, mechanical, and performance requirements. Inspection shall be as agreed upon between manufacturer and purchaser.

In case of dispute following shipment of rivets, acceptability shall be determined in accordance with the procedures given in IFI-137, page K-93.