IFI-110/550
1999

BLIND RIVETS GLOSSARY OF TERMS

BLIND RIVETS

IFI NOTE:

1. ***This specification is under the jurisdiction of the IFI Standards and Technical Practices Committee and directly under the Technical Committee of IFI's Division I. First published in 1982 it has been revised and reissued in 1999. Sizes in this document are based on a "soft" conversion from inch practice and reflect the needs of major users.***

1. Scope

This glossary presents preferred nomenclature and definitions of terms relating to blind rivets.

It is intended that this glossary serve as a guide to users and producers to assist them toward the use of a single system of terminology for the characteristics and properties of blind rivets and other related terms descriptive of their function, application, and performance as component parts in engineered assemblies.

2. General

2.1 Blind Fastener. A blind fastener is a mechanical device which has the capability to join component parts in an assembly where access for fastener installation and activation is available from one side only.

2.2 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 and expansion of the rivet shank during rivet setting to join the component parts of an assembly. The upset end and blind end of a blind rivet are one and the same. It is the end of the blind rivet that enters the hole in the workpiece first. In many applications it cannot be seen after it enters the setting hole, thus the term "blind".

3. Classification of Blind Rivets

3.1 Types

3.1.1 *Pull Mandrel.* A pull mandrel blind rivet is a multiple piece assembly consisting of at least a rivet body and a mandrel. In the setting operation the rivet is inserted into the components to be joined, the mandrel is gripped, pulled axially, and its head upsets the rivet body forming a blind head. Pull mandrel blind rivets are further classified as follows:

3.1.1.1 *Pull Through Mandrel.* A pull through mandrel rivet is a pull mandrel type of blind rivet where during the setting operation the mandrel is pulled completely through the rivet body thus leaving a hollow rivet. Refer to page I–21.

3.1.1.2 *Break Mandrel.* A break mandrel rivet is a pull mandrel type of blind rivet where during the setting operation the mandrel is pulled into or against the rivet body and breaks at or near the junction of the mandrel and its upset end. Refer to page I–8.

3.1.1.3 *Structural Flush Break Pull Mandrel.* A structural flush break pull mandrel is a pull mandrel type of blind rivet where during the setting operation the mandrel is pulled into or against the rivet body and breaks at a point within or above the rivet head. Flush break means that

the break plane of the mandrel occurs above the junction of rivet shank and head, thus the shear plane(s) of the joint will occur through rivet shank and mandrel.

3.1.1.4 *Multi-Grip Flush Break Pull, Positive Lock Mandrel.* A multi-grip flush break, positive lock pull mandrel is a pull mandrel type of blind rivet where during the setting operation the mandrel is pulled into the rivet body and breaks essentially flush with the top of the rivet head. Because the break plane of the mandrel occurs above the junction of rivet shank and head, the shear plane(s) of the joint will occur through rivet shank and mandrel. Multi-grip means the rivet has the design capability to join component parts having a broad range of thicknesses. Positive lock means that during rivet setting an intentional deformation occurs in the rivet mandrel and/or body which provides a mechanical resistance to mandrel removal from the body.

3.1.1.5 *Break Mandrel Closed End.* Break mandrel closed end blind rivets are pull mandrel type blind rivets that have the head of the mandrel captured and enclosed in the closed upset end rivet body. During the setting operation, the mandrel is pulled within the rivet body and breaks at or near the junction of the mandrel shank and its upset end. Refer to page I–15.

3.1.1.6 *Structural Splitting Self-Plugging Pull Mandrel Blind Rivet.* A break pull mandrel, when pulled against and into the rivet body, causes the blind rivet 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. Refer to page I–32.

3.1.2 *Drive Pin.* A drive pin rivet is a blind rivet consisting of a rivet body and a pin which is contained in the rivet body and which projects above the rivet head. In the setting operation the rivet is inserted into the components to be joined and the pin is forced into the rivet body until the pin end is flush with the top of the rivet head. This action flares or spreads the end of the rivet body forming a blind head.

3.1.3 *Threaded.* A threaded blind rivet is generally an assembly consisting of an internally threaded rivet body and an externally threaded mandrel. In the setting operation the rivet is inserted into the components to be joined and the mandrel is torqued, or pulled. This action causes the walls of the rivet body to expand outward forming a blind head.

3.2 Body Styles

3.2.1 *Closed End.* The end of the rivet, as manufactured, is solid and remains closed on the blind side after setting.

3.2.2 *Open End.* The end of the rivet, as manufactured, is open, i.e., the rivet body is hollow through its full length.

3.2.3 *Split End.* A portion of the rivet body, as manufactured, is split axially into two or more segments.

3.2.4 *Slotted Shank.* The shank of the rivet as manufactured has one or more axial slots which extend from the underside of the head and terminate short of the open end. The remaining portion of the shank is a hollow cylinder similar to an open end type.

3.3 Core Styles

3.3.1 *Filled.* After setting, the rivet body still retains enough of the mandrel or pin so that the break point of the mandrel, or the end of the pin, is essentially flush with the top of the rivet head.

3.3.2 *Semi-Filled.* During rivet setting, the mandrel breaks within the rivet body so that a

short length of the mandrel is retained within the rivet body.

3.3.3 *Hollow.* After rivet setting, the core of the rivet body is completely empty.

4. Characteristics and Features of Blind Rivets

4.1 Rivet Body. The rivet body is that part of a blind rivet assembly which incorporates the manufactured head, the shank, and the end. The cross section of the rivet body is usually round, and its outside diameter establishes the rivet size.

4.2 Core. The core is the axially located hole in the rivet body. The core may or may not extend the full length of the rivet body, depending on rivet and style.

4.3 Head. The head is the manufactured upset portion of the rivet body. After setting, the head is always located on the access side of the joint. There are many available head styles, e.g., round, truss, countersunk, brazier, domed, etc. Flush heads are those styles where, after setting, the top of the rivet head is essentially flush with the surface of the assembly. Protruding heads are those where, after setting, the rivet head projects beyond the surface of the assembly.

4.4 Shank. The shank is that part of the rivet extending from the underside of the head to the end of the body.

4.5 End. The end is that part of the rivet body located at the extremity of the shank opposite the head, and may be closed, open or split.

4.6 Blind Head. The blind head is the upset portion of the rivet body on the blind side after the rivet has been set. There are many styles of blind head.

4.7 Mandrel. The mandrel is that portion of a pull mandrel or threaded type blind rivet that is preassembled in the rivet body. During rivet setting the pulling or torquing of the mandrel is the action which forms the blind head. Mandrels usually are upset and may be smooth, serrated, or threaded.

4.8 Pin. A pin is that part of a drive pin type blind rivet which is preassembled in the rivet body, and that when forced completely into the body spreads the walls of the rivet end forming a head on the blind side.

4.9 Rivet Body Length. Rivet body length is the distance, measured parallel to the axis of the rivet, from the largest diameter of the bearing surface of the head to the extreme end of the rivet body.

4.10 Mandrel Protrusion. Mandrel protrusion is the distance, measured parallel to the axis of the rivet, from the top of the head to the extreme end of the mandrel on the access side prior to rivet setting.

4.11 Blind Side Protrusion. Blind side protrusion is the distance, measured parallel to the axis of the rivet, from the largest diameter of the bearing surface of the head to the extreme end of the upset on the mandrel.

4.12 Grip Range. Grip range is the minimum to maximum total thickness of material which can be joined properly with a blind rivet of a given length.

5. Mechanical and Performance Properties of Blind Rivets

5.1 Ultimate Tensile Strength. The ultimate tensile strength of a blind rivet is the maximum

tensile load in pounds or newtons which the rivet is capable of attaining prior to failure.

5.2 Ultimate Shear Strength. The ultimate shear strength of a blind rivet is the maximum shear load in pounds or newtons which the rivet is capable of attaining prior to failure.

5.3 Break Load. Break load is the load in pounds or newtons necessary to break the mandrel when setting break mandrel type rivets.

5.4 Pull-Together. Pull-together is the ability of the rivet to close a gap between the components to be joined while working against the rivet setting load.

5.5 Pre-Load. Pre-load is the residual axial tensile load in the blind rivet after setting.

5.6 Clamping Force. Clamping force is the compressive load applied to the joint by a blind rivet after setting.

5.7 Mandrel Retention. Mandrel retention is the ability of the rivet body to retain the entrapped length of mandrel.

5.8 Sealing. Sealing is the ability of the rivet to prevent the escape of gas, liquid, or solid after rivet setting.

6. Joints and Joint Design

6.1 Lap Joint. A lap joint is one in which the parts to be joined overlap each other a sufficient amount for riveting.

6.2 Butt Joint. A butt joint is one in which the parts to be joined are in the same plane, butt against each other, and are joined by a splice, gusset or strapplate either on one or both sides of the members to be joined.

6.3 Gage Lines. Gage lines are reference lines passing through the centers of lines of rivets in a riveted joint. Gage lines are generally parallel to the direction of the external load which will be applied to the joint in service. The transverse distance between adjacent gage lines is rivet gage.

6.4 Pitch. Pitch is the distance between centers of adjacent rivets located on the same gage line.

6.5 Diagonal Pitch. Diagonal pitch is the distance between the centers of rivets on adjacent gage lines when the rivets in adjacent rows are offset in a stagger pattern.

6.6 Edge Distance. Edge distance is the minimum distance from the center of a rivet to any edge of the connected material.

6.7 Grip. Grip is the total thickness of the material to be joined.

6.8 Hole Size. Hole size is the diameter of the hole in the members to be joined.

6.9 Blind Side Clearance. Blind side clearance is the minimum distance, as measured normal to the joined material, which is required on the blind side to permit proper rivet setting.

6.10 Tool Clearance. Tool clearance is the minimum distance, both normal and parallel to the joined material, which is required on the access side to permit sufficient room for rivet tool placement and rivet setting.

7. Rivet Setting

7.1 Setting. Setting is the operation of placing and activating the rivet in the members to be joined.

7.2 Hole Fill. Hole fill is the lateral expansion of the rivet shank during rivet setting. Hole fill can be controlled or free.

7.3 Dress. Dress is the secondary operation of clipping the end of a mandrel projecting beyond the head of the rivet on the access side following rivet setting. If a flush surface is required, a further operation may be necessary.

8. Rivet Setting Equipment

8.1 Setting Tool. A setting tool is a special piece of equipment used to set rivets. Setting tools may be powered manually, pneumatically, hydraulically, electrically, or by a combination of power sources.

8.2 Nose Assembly-Pulling Head. The nose assembly or pulling head is that part of the setting tool containing the gripping and/or activating mechanism.

8.3 Mandrel Catcher. The mandrel catcher is an accessory to a setting tool with a function of collecting and retaining the remains of the mandrel following rivet setting.

8.4 Mandrel Collection System. The mandrel collection system is an accessory to a setting tool which utilizes air to assist the spent mandrel to collect in a receptacle.