

gage metals and low-strength materials. Open end breakstems assemble thousands of products and components in virtually every manufacturing industry. These include computer chassis, wood-to-metal truck trailers, automotive mouldings, and exterior lighting.

Closed end breakstems seal holes by closing off the tail end of the rivet body and capturing the mandrel inside the rivet bore. They seal liquid containers such as hydraulic pumps and attach reflectors in sealed beam headlights. Closed end breakstems are not used as extensively as they once were, replaced by open end designs that seal the rivet body bore with equal effectiveness.

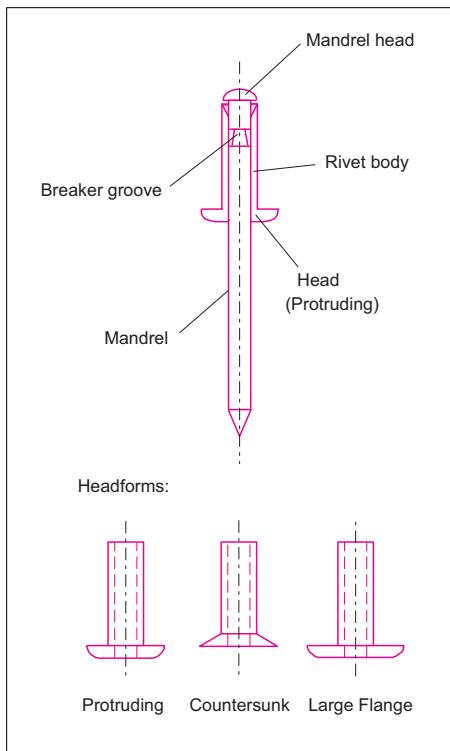
Design Considerations

Selecting and installing the right blind rivet in the right hole is a systematic process that carefully evaluates a range of factors affecting quality and durability of the final joint. Among these are rivet diameters, grip ranges, hole preparation, head styles, and corrosion resistance. Let's take a look at each of them.

Rivet Diameters: As noted, blind rivets are available in diameters ranging from 3/32" to 1/4", with 1/32" incremental increases available to provide a deep menu of selections for specific applications. Diameter selection is based on space, strength and material thickness. The larger the diameter the higher the shear and tensile strength, which is derived from the thickness of the rivet body and its material.

Grip Range: Parent material thickness must fall within a specified fastener grip range – the allowable tolerance of rivet length versus material thickness. Grip ranges are increased in 1/16" increments, with each fractional addition producing greater stem retention. A 1/2" grip range is usually the maximum length attained by standard breakstems, but special designs can stretch this to an inch. Standard size blind rivets join materials as thick as 0.750". Specials install in materials as thin as 0.020" for cell phones and computer chassis, and for assemblies as thick as 2.0" to bridge gaps in tubular assemblies – lawn chairs, for example.

Hole Preparation: The rivet must completely fill the hole, and principal factors for doing this are material thickness, grip range, and rivet diameter. If a hole is too big, it will not be filled and the result is loose rivets. If the hole is too small, the rivet won't fit. Otherwise, no special preparation is required as long as holes are free of excessive burrs.



Head Styles: There are three basic breakstem head styles: protruding, large flange, and countersunk. Protruding heads (also called dome or button head) and large flange versions are set on the top side of the material. The only difference between them is that large flange designs have heads four to five times the size of rivet body diameter for increased bearing surface. Countersunk heads are flush to top side material. Designers specify them for product surface appearance and to reduce wind drag – in aircraft fuselage assembly, for example.

Corrosion Protection: To prevent corrosion, rivet bodies and mandrels are often made from identical materials, including low carbon steels, nickel-copper alloys, aluminum alloys, and stainless steel. Protective coatings and sleeves prevent galvanic corrosion in breakstems when joining dissimilar

materials, or when rivets do not have the same physical and mechanical properties as parent materials. Stainless steel breakstems offer the best corrosion protection in such adverse environments as swimming pool ladders and city buses exposed to salt.

Installation Tools

There are many types of breakstem fastener installation tools, including hand held, lightweight, and semi-automated. All of them consist of a pulling head that grips and holds the mandrel during rivet body expansion.



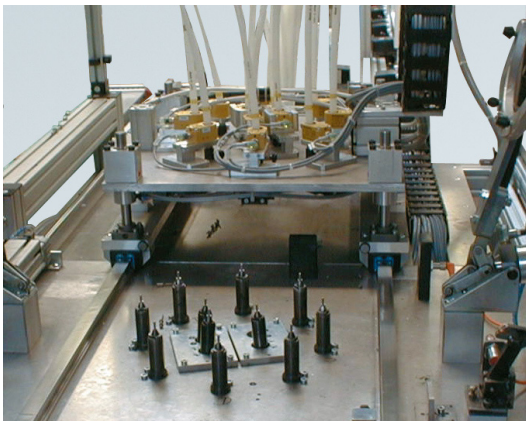
Hand held tools install fasteners with lower break loads, typically 1,000 pounds or less. They are portable, fast operating and permit quick interchange of pulling heads to adapt to different rivet sizes and configurations. Hydro-pneumatic hand tools are most commonly used for blind rivet installations. Others include pneumatic, manual and electric powered. Special nose assemblies

adapt tools for placements in narrow spaces, channels, insets, and right angles to the rivet body.

Up to the mid-1980s most hand tools were made of steel and weighed a hefty 15 pounds or more. Modern versions are lighter and more powerful than their bulky ancestors.

Hydropneumatic tools made from plastic and aluminum weigh an ergonomic four pounds and set one breakstem per second. Older versions installed blind rivets within a couple seconds, but operators slowed down lugging the heavier weight throughout a shift.

Multihead workstations fasten any number of assembly points in a single operation, applying as many as 268 breakstems simultaneously. Semiautomatic and fully automatic riveting machines paired with sophisticated monitors and foolproof sensors and controls assure proper riveting placement.



In this assembly station 12 blind rivets are placed simultaneously. The rivets are fed automatically. Positioning devices can be omitted, because the presented rivets serve as component take-up. By using this machine the assembly time was reduced by 75 %.

Avdel[®], an Acument[™] Global Technologies company, is a leader of blind-fastening products and associated installation tools. Thanks to a long period as a technology leader, Avdel's range of blind-fastening technologies is one of the widest available in the market. Avdel offers its customers world-wide availability with production facilities and sales networks in Europe, America and Asia/Pacific.

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