Cotter pins are wire formed pins with two prongs that separate during installation. They are used as a locking device to hold pins or castle nuts in place. These low-cost and highly versatile fasteners are used virtually everywhere.

**Design Considerations**

- **Easy to Install**
  
  Cotter pins can be installed quickly with no special tools.

- **Easy Locking**
  
  Designed to be easily locked in place, cotter pins provide secure fastening.

- **Reusable**
  
  Most cotter pins are easily removed and reused, saving time and money.

- **Extended Prong**
  
  Extended prong makes separation of the prongs easier.

- **Specialized Forms**
  
  Specialized cotter pins provide unique design possibilities and eliminate bending to install.

**Installation Considerations**

**Installation of a Hammerlock Pin**

- Insert
- Pound

Prongs are forced apart to lock the pin in place.

**Installation of a Clinch Pin**

- End springs open to lock clinch pin into place.
Cotter Pin Types

**Cotter Pins**

- **Standard**
  - Cotter pins are available in imperial and metric sizes. Standard materials are steel, zinc plated steel, and stainless in extended prong style. Metric is manufactured to DIN 94 specifications.

- **Hammerlock**
  - Used with castle nuts, this design allows for fast and accurate assembly. Available in 3/64" through 1/2" diameters.

- **T-Head**
  - Same function as standard cotter pins, but designed for use in applications with limited clearance. Available in plain steel, zinc plated steel, and stainless steel.

- **Wedgefast**
  - Heavier-duty style with self-locking mechanism incorporated into the design. Available in 5/16" and 3/8" diameters only.

- **Clinch**
  - Clinch pins are self-locking reducing installation time by eliminating additional bending after insertion.

- **Bow Tie**
  - Unique double-end design allows pin to be pulled or pushed into hole from either side. Dual ends provide stronger locking mechanism vs. conventional styles.

- **Ring**
  - This light/medium duty pin automatically locks into place when the ring slides over the pin. Bending the straight prong after insertion provides additional locking protection.

- **Circle**
  - Sharp point is internal to part, thus circle cotters are often used where sharp points are not desirable. Examples include fabric and rubber-sealed environments.

- **Split Ring**
  - Heavy duty wire with an off-set or “kickout” to ease installation. Generally made from heavier gauge wire than circle cotters.
Cotter pins are manufactured from a single strand of half-round wire that is passed through a series of dies and shaped to have a loop at one end to create the head. The formed pin is then inserted into a drilled hole of a clevis pin, shaft, or other mating assembly. Once the prongs are spread apart, the cotter pin becomes the locking mechanism. Specialized designs do not require bending to lock in place.

<table>
<thead>
<tr>
<th>COMMON NAMES</th>
<th>COTTER</th>
<th>HAMMERLOCK</th>
<th>WEDGEFAST</th>
<th>CLINCH</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Common names</strong></td>
<td>Castle Key, Cotter Key, Split Pin, Wire Pin</td>
<td>Castle Key, Castle Nut Cotter</td>
<td>Self-locking Cotter Pin</td>
<td>Single Action Cotter, Self-locking Cotter Pin</td>
</tr>
<tr>
<td><strong>Applicable standards</strong></td>
<td>ASME B18.8.1, MS 24665, MS 9245, DIN 94, ASME B18.8.6</td>
<td>ASME B18.8.1, MS 24665, MS 9245, DIN 94, ASME B18.8.6</td>
<td>None known.</td>
<td>None known.</td>
</tr>
<tr>
<td><strong>Fabrication</strong></td>
<td>Wire formation.</td>
<td>Wire formation.</td>
<td>Wire formation, and then assembly.</td>
<td>Wire formation.</td>
</tr>
<tr>
<td><strong>How to identify</strong></td>
<td>Style × nominal diameter × effective length.</td>
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<td>Style × nominal diameter × effective length.</td>
</tr>
<tr>
<td><strong>Common uses</strong></td>
<td>Simple attachment of pins with holes. Common in agricultural and outdoor power equipment where simple design is desired.</td>
<td>Use in castellated nuts, where cotter is used as a locking mechanism. End is intended to “pound” into place.</td>
<td>Use in heavier duty applications. Limited size range of just two diameters, 5/16&quot; and 3/8&quot;.</td>
<td>Light duty and special applications. Part is driven into hole and humped design at end combined with spring action of prongs self-locks the part.</td>
</tr>
<tr>
<td><strong>Comments</strong></td>
<td>Most common problems are end design, head design, or burrs. Extended prong with square cut is most common. Head design of metric is more rounded than ANSI.</td>
<td>Cotter pins are not heat treated making the pin pliable to retain bent form rather than springing back to original shape.</td>
<td>Requires a tap hammer or similar tool to drive the wedge after installation into hole.</td>
<td>Appeared on the market as a special use pin, but usage is more widespread because of self-locking feature.</td>
</tr>
</tbody>
</table>
## Quick Reference Guide

<table>
<thead>
<tr>
<th></th>
<th>Bow Tie</th>
<th>Ring</th>
<th>Circle</th>
<th>Split Ring</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Common Names</strong></td>
<td>Double Bridge Pin, Bow Tie</td>
<td>Rue Ring</td>
<td>Cotter Ring</td>
<td>Key Ring, Circle Ring</td>
</tr>
<tr>
<td><strong>Applicable Standards</strong></td>
<td>None known.</td>
<td>None known.</td>
<td>None known.</td>
<td>None known.</td>
</tr>
<tr>
<td><strong>How to Identify</strong></td>
<td>Nominal wire diameter ( \times ) nominal length.</td>
<td>Nominal wire diameter ( \times ) nominal length.</td>
<td>Wire diameter ( \times ) outside diameter.</td>
<td>Wire diameter ( \times ) inside diameter.</td>
</tr>
<tr>
<td><strong>Common Uses</strong></td>
<td>Extra loop provides additional security. Pin can be pushed or pulled to install.</td>
<td>Heavier duty versions use a heavier gauge wire. When installed ring encircles mating pin locking itself in place.</td>
<td>Lighter duty. Used in applications where protection from prong ends is required.</td>
<td>Heavier duty, for use as a handle for removal rather than a locking device.</td>
</tr>
<tr>
<td><strong>Comments</strong></td>
<td>More secure than a standard bridge pin.</td>
<td>Straight prong can be bent over to provide a nearly immovable lock feature.</td>
<td>Uses a round wire cross section.</td>
<td>Manufactured from heavier duty half-round wire which enhances threading through the hole of the mating part.</td>
</tr>
</tbody>
</table>