Product Guide

1. Hexagon Head Bolt (Din 931/933)
2. High Strength Bolts
   2.1 High Strength Structure Bolts ASTM A325
   2.2 High Strength F-10T and S-10T Bolts
3. Socket Screws
   3.1 Hexagon Socket Allen Cap Screws (Din 912)
   3.2 Hexagon Socket Allen Countersunk Screws (Din 7991)
   3.3 Hexagon Socket Allen Button Screws (Din 7380)
   3.4 Hexagon Socket Allen Set Screws (Din 916)
   3.5 Hexagon Socket Shoulder Screws
4. Machine Screws
   4.1 Countersunk Flat Head Machine Screws (Din 963/ 965)
   4.2 Pan Head Machine Screws (Din 85/ 7985)
5. Other Screws
   5.1 Self Tapping Screws (Din 7981/ 7982)
   5.2 Hexagon Flange Bolts
   5.3 Eye Bolts
   5.4 Wing Bolts
   5.5 Square Neck Carriage Bolts
6. Nuts
   6.1 Hexagon Nuts (Din 934)
   6.2 Nylon Lock Nuts (Din 985)
   6.3 Castle Nuts (Din 935)
   6.4 Flange Nuts (Din 623)
   6.5 Wing Nuts (Din 315)
   6.6 Coupling Long Nuts (Din 6334)
   6.7 Dome Cap Nuts
7. Washers
   7.1 Flat Round Washers
   7.2 Spring Lock Washers
   7.3 Taper Washers
   7.4 External/ Internal Tooth-Lock Washers (Din 6796A/ 6797J)
   7.5 Disc Washer (Din 17222)
   7.6 External/ Internal Overlap Washers
8. Pins, Plugs & Fittings
   8.1 Cotter Pins (Din 94)
   8.2 Spring Lock Pins (Din 1481)
   8.3 Dowel Pins
   8.4 Socket Pipe Plugs
   8.5 Drop In Anchors
   8.6 Expansion Bolts/ Sleeve Anchors
   8.7 Grease Nipple Fittings
   8.8 Retaining Rings
9. Fully Threaded Rods
Hexagon Head Bolts (Din 931/933)

<table>
<thead>
<tr>
<th>Available Grades</th>
<th>Mild Steel 4.8/ Grade 8.8/ Grade 10.9/ Stainless Steel 304/Stainless Steel 316/ Brass</th>
</tr>
</thead>
<tbody>
<tr>
<td>Finishing/ Coating</td>
<td>Black/ White Zinc Galvanised/ Cadmium Plated/ Hot Dip Galvanised/ Flouro Carbon Coated/ Brass</td>
</tr>
<tr>
<td>Threading</td>
<td>Half Thread (din931) / Full Thread (din933)Coarse Thread, UNC/ Fine Thread, UNF</td>
</tr>
<tr>
<td>Sizes Available</td>
<td>Diameter - M3-M64 (metric) 3/16 – 2” (inches) Length - 10mm – 500mm (metric) ¼ - 16” (inches)</td>
</tr>
<tr>
<td>++ Brass sizes limited to Diameter M12, Length 100mm</td>
<td></td>
</tr>
</tbody>
</table>
High Strength Structural Bolts ASTM A325

Sizes Available:

<table>
<thead>
<tr>
<th>Sizes Available</th>
<th>Diameter</th>
<th>Length</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diameter</td>
<td>½ - 1 ¼&quot;</td>
<td>1&quot; – 9&quot;</td>
</tr>
<tr>
<td>Length</td>
<td>1&quot; – 9&quot;</td>
<td></td>
</tr>
</tbody>
</table>

++ Flat Harden Washer & Load Indicating Washers Options
++Sizes in accordance to ATSM standards
High Strength F-10T & S-10T Bolts

<table>
<thead>
<tr>
<th>Sizes Available</th>
<th>Diameter</th>
<th>M12 – M36</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Length</td>
<td>30mm – 300mm</td>
</tr>
</tbody>
</table>

++Flat Harden Washer Option
++Metric sizes in accordance to JIS Standards
Hexagon Socket Allen Key Cap Screws (Din 912)

<table>
<thead>
<tr>
<th>Available Grades</th>
<th>ISO Grade 12.9 / Stainless Steel 304 / Stainless Steel 316</th>
</tr>
</thead>
<tbody>
<tr>
<td>Finishing/ Coating</td>
<td>Black/ White Zinc Galvanised/ Cadmium Plated/ Hot Dip Galvanised/ Flouro Carbon Coated</td>
</tr>
<tr>
<td>Threading</td>
<td>Half Thread / Full Thread</td>
</tr>
<tr>
<td></td>
<td>Coarse Thread, UNC/ Fine Thread, UNF</td>
</tr>
<tr>
<td>Sizes Available</td>
<td>Diameter - M3- M45 (metric)</td>
</tr>
<tr>
<td></td>
<td>3/16 – 1 ½” (inches)</td>
</tr>
<tr>
<td></td>
<td>Length - 10mm – 400mm (metric)</td>
</tr>
<tr>
<td></td>
<td>¼ - 10” (inches)</td>
</tr>
</tbody>
</table>

**Hot Dip Galvanised only available from Diameter 10mm onwards**
Hexagon Socket Allen Key Countersunk Screw (Din 7991)

<table>
<thead>
<tr>
<th>Available Grades</th>
<th>JIS Grade 10.9/ ISO Grade 12.9/ Stainless Steel 304/ Stainless Steel 316</th>
</tr>
</thead>
<tbody>
<tr>
<td>Finishing/ Coating</td>
<td>Black/ White Zinc Galvanised/ Cadmium Plated/ Hot Dip Galvanised/ Flouro Carbon Coated</td>
</tr>
<tr>
<td>Threading</td>
<td>Half Thread / Full Thread Coarse Thread, UNC</td>
</tr>
<tr>
<td>Sizes Available</td>
<td>Diameter - M3- M24 (metric) 3/16 – 1 ” (inches)</td>
</tr>
<tr>
<td></td>
<td>Length - 10mm – 200mm (metric) ¼ - 5” (inches)</td>
</tr>
</tbody>
</table>
++Hot Dip Galvanised only available from Diameter 10mm onwards
### Hexagon Socket Allen Key Button Screws (Din 7380)

<table>
<thead>
<tr>
<th>Available Grades</th>
<th>ISO Grade 12.9 / Stainless Steel 304</th>
</tr>
</thead>
<tbody>
<tr>
<td>Finishing/ Coating</td>
<td>Black/ White Zinc Galvanised/ Cadmium Plated/ Hot Dip Galvanised/ Flouro Carbon Coated</td>
</tr>
<tr>
<td>Threading</td>
<td>Half Thread / Full Thread</td>
</tr>
<tr>
<td></td>
<td>Coarse Thread, UNC</td>
</tr>
<tr>
<td>Sizes Available</td>
<td>Diameter - M3- M16 (metric)</td>
</tr>
<tr>
<td></td>
<td>3/16 –5/8 ” (inches)</td>
</tr>
<tr>
<td></td>
<td>Length - 10mm – 100mm (metric)</td>
</tr>
<tr>
<td></td>
<td>¼ - 4” (inches)</td>
</tr>
</tbody>
</table>

++Hot Dip Galvanised only available from Diameter 10mm onwards
Hexagon Socket Allen Set Screws (Din 916)

<table>
<thead>
<tr>
<th>Available Grades</th>
<th>ISO Grade 12.9 / Stainless Steel 304</th>
</tr>
</thead>
<tbody>
<tr>
<td>Finishing/ Coating</td>
<td>Black/ White Zinc Galvanised/ Cadmium Plated/ Hot Dip Galvanised/ Flouro Carbon Coated</td>
</tr>
<tr>
<td>Threading</td>
<td>Full Thread</td>
</tr>
<tr>
<td></td>
<td>Coarse Thread, UNC</td>
</tr>
<tr>
<td>Sizes Available</td>
<td>Diameter - M3- M24 (metric)</td>
</tr>
<tr>
<td></td>
<td>3/16 – 1” (inches)</td>
</tr>
<tr>
<td></td>
<td>Length - 10mm – 150mm (metric)</td>
</tr>
<tr>
<td></td>
<td>¼ - 6” (inches)</td>
</tr>
</tbody>
</table>

++Hot Dip Galvanised only available from Diameter 10mm onwards
Hexagon Socket Shoulder Screws

<table>
<thead>
<tr>
<th>Available Grades</th>
<th>ISO Grade 12.9</th>
</tr>
</thead>
<tbody>
<tr>
<td>Finishing/ Coating</td>
<td>Black</td>
</tr>
<tr>
<td>Threading</td>
<td>Coarse Thread</td>
</tr>
<tr>
<td>Sizes Available</td>
<td>Diameter - M6- M20 (metric)</td>
</tr>
<tr>
<td></td>
<td>Length - 10mm – 100mm (metric)</td>
</tr>
</tbody>
</table>
Countersunk Flat Head Machine Screws (Din 963 / 965)

<table>
<thead>
<tr>
<th>Available Grades</th>
<th>Brass / Mild Steel 4.8 / Stainless Steel 304 / Stainless Steel 316</th>
</tr>
</thead>
<tbody>
<tr>
<td>Finishing/ Coating</td>
<td>Bronze / White Zinc Galvanised/ Cadmium Plated / Stainless Steel</td>
</tr>
<tr>
<td>Threading</td>
<td>Half Thread / Full Thread</td>
</tr>
</tbody>
</table>
| Sizes Available                | Diameter - M3- M12 (metric) (+)
                                 | 3/16 – 3/8 (inches) (-)
                                 | Length - 10mm – 100mm (metric)
                                 | ¼ - 4” (inches)                |
Pan Head Machine Screws (Din 85 / 7985)

<table>
<thead>
<tr>
<th>Available Grades</th>
<th>Brass / Mild Steel 4.8 / Stainless Steel 304 / Stainless Steel 316</th>
</tr>
</thead>
<tbody>
<tr>
<td>Finishing/ Coating</td>
<td>Bronze / White Zinc Galvanised/ Cadmium Plated / Stainless Steel</td>
</tr>
<tr>
<td>Threading</td>
<td>Half Thread / Full Thread</td>
</tr>
<tr>
<td></td>
<td>Coarse Thread, UNC</td>
</tr>
<tr>
<td>Sizes Available</td>
<td>Diameter - M3- M12 (metric) (+)</td>
</tr>
<tr>
<td></td>
<td>3/16 – 3/8 (inches) (-)</td>
</tr>
<tr>
<td></td>
<td>Length - 10mm – 100mm (metric)</td>
</tr>
<tr>
<td></td>
<td>¼ - 4” (inches)</td>
</tr>
</tbody>
</table>
Self Tapping Screws (Din 7981/ 7982)

Available Grades : Nickel / Stainless Steel
Finishing/ Coating : Nickel Polished / Stainless Steel
Sizes Available : Diameter - #4 - #14
                 : Length - ½” – 3”
### Hexagon Flange Bolts

<table>
<thead>
<tr>
<th>Available Grades</th>
<th>Mild Steel</th>
</tr>
</thead>
<tbody>
<tr>
<td>Finishing/ Coating</td>
<td>Yellow Zinc Galvanised</td>
</tr>
<tr>
<td>Threading</td>
<td>Coarse Thread</td>
</tr>
<tr>
<td>Sizes Available</td>
<td>Diameter - M43- 6 (metric)</td>
</tr>
<tr>
<td></td>
<td>Length - 10mm – 50mm (metric)</td>
</tr>
</tbody>
</table>
## Eye Bolts

![Eye Bolt Image](image)

<table>
<thead>
<tr>
<th>Available Grades</th>
<th>Steel</th>
</tr>
</thead>
<tbody>
<tr>
<td>Finishing/ Coating</td>
<td>Yellow Zinc Galvanised</td>
</tr>
<tr>
<td>Threading</td>
<td>Coarse Thread</td>
</tr>
<tr>
<td>Sizes Available</td>
<td>Diameter - M6- M64 (metric)</td>
</tr>
</tbody>
</table>
Wing Bolts

Available Grades: Mild Steel / Stainless Steel
Finishing/Coating: Nickel Plated
Threading: Coarse Thread
Sizes Available:
- Diameter: M4- M6 (metric)
- Length: 10mm – 50mm (metric)
Square Neck Carraige Bolts

<table>
<thead>
<tr>
<th>Available Grades</th>
<th>Mild Steel</th>
</tr>
</thead>
<tbody>
<tr>
<td>Finishing/ Coating</td>
<td>Black / White Zinc Galvanised</td>
</tr>
<tr>
<td>Threading</td>
<td>Coarse, UNC</td>
</tr>
<tr>
<td>Sizes Available</td>
<td>Diameter - $\frac{1}{4}$ - 3/4</td>
</tr>
<tr>
<td></td>
<td>Length - 1&quot; – 5&quot;</td>
</tr>
</tbody>
</table>
Hexagon Nuts (Din 934)

<table>
<thead>
<tr>
<th>Available Grades</th>
<th>Mild Steel / High Tensile 8.8 / High Tensile 10.9 / Stainless Steel 304 / Stainless Steel 316/ Brass</th>
</tr>
</thead>
<tbody>
<tr>
<td>Finishing/ Coating</td>
<td>Black / White Zinc Galvanised / Cadmium Plated / Hot Dip Galvanised/ Bronze</td>
</tr>
<tr>
<td>Threading</td>
<td>Coarse Thread, UNC/ Fine Thread, UNF</td>
</tr>
<tr>
<td>Sizes Available</td>
<td>M64 – M100 (metric) 3/16 – 2 ½ (imperial)</td>
</tr>
<tr>
<td>Brass sizes limited to diameter</td>
<td>M 2 4</td>
</tr>
</tbody>
</table>
### Nylon Lock Nuts (Din 985)

<table>
<thead>
<tr>
<th>Available Grades</th>
<th>Mild Steel / Stainless Steel 304 / Stainless Steel 316</th>
</tr>
</thead>
<tbody>
<tr>
<td>Finishing/ Coating</td>
<td>White Zinc Galvanised / Stainless Steel</td>
</tr>
<tr>
<td>Threading</td>
<td>Coarse Thread, UNC/ Fine Thread, UNF</td>
</tr>
<tr>
<td>Sizes Available</td>
<td>M64 – M48 (metric) 3/16 – 2 (imperial)</td>
</tr>
</tbody>
</table>
Castle Nut (Din 935)

<table>
<thead>
<tr>
<th>Available Grades</th>
<th>Mild Steel</th>
</tr>
</thead>
<tbody>
<tr>
<td>Finishing/ Coating</td>
<td>Black</td>
</tr>
<tr>
<td>Threading</td>
<td>Coarse Thread</td>
</tr>
<tr>
<td>Sizes Available</td>
<td>M3 – M48 (metric)</td>
</tr>
</tbody>
</table>
Flange Nut (Din 6923)

<table>
<thead>
<tr>
<th>Available Grades</th>
<th>Mild Steel / Stainless Steel</th>
</tr>
</thead>
<tbody>
<tr>
<td>Finishing/ Coating</td>
<td>Yellow Zinc Galvanised</td>
</tr>
<tr>
<td>Threading</td>
<td>Coarse Thread</td>
</tr>
<tr>
<td>Sizes Available</td>
<td>M6 – M20 (metric)</td>
</tr>
</tbody>
</table>
**Wing Nut (Din 315)**

<table>
<thead>
<tr>
<th>Available Grades</th>
<th>Nickel / Stainless Steel / Brass</th>
</tr>
</thead>
<tbody>
<tr>
<td>Threading</td>
<td>Coarse Thread</td>
</tr>
<tr>
<td>Sizes Available</td>
<td>M4 – M12 (metric)</td>
</tr>
</tbody>
</table>
**Coupling Long Nut (Din 6334)**

<table>
<thead>
<tr>
<th>Available Grades</th>
<th>Mild Steel</th>
</tr>
</thead>
<tbody>
<tr>
<td>Finishing/ Coating</td>
<td>White Zinc Galvanised</td>
</tr>
<tr>
<td>Threading</td>
<td>Coarse Thread, UNC</td>
</tr>
<tr>
<td>Sizes Available</td>
<td>M6 – M24 (metric)</td>
</tr>
<tr>
<td></td>
<td>¼ - 1” (imperial)</td>
</tr>
</tbody>
</table>
Dome Cap Nut

<table>
<thead>
<tr>
<th>Available Grades</th>
<th>Nickel / Stainless Steel</th>
</tr>
</thead>
<tbody>
<tr>
<td>Threading</td>
<td>Coarse Thread, UNC</td>
</tr>
<tr>
<td>Sizes Available</td>
<td>M6 – M24 (metric)</td>
</tr>
<tr>
<td></td>
<td>¼ - 1” (imperial)</td>
</tr>
</tbody>
</table>
## Flat Round Washers

### Available Grades:
- Mild Steel
- Nickel
- High Tensile
- Stainless Steel 304
- Stainless Steel 316
- Nylon
- Brass

### Finishing/Coating:
- Bronze
- Black
- White Zinc Galvanised
- Cadmium Plated
- Hot Dip Galvanised
- Nickel

### Threading:
- Coarse Thread, UNC

### Sizes Available:
- M2 – M64 (metric)
- 3/16 – 2 ½” (imperial)

---

**Brass Sizes limited to diameter M24 or 1”**
# Spring Lock Washers

<table>
<thead>
<tr>
<th>Available Grades</th>
<th>High Tensile / Stainless Steel 304 / Stainless Steel 316/ Brass</th>
</tr>
</thead>
<tbody>
<tr>
<td>Finishing/ Coating</td>
<td>Black / White Zinc Galvanised / Cadmium Plated / Hot Dip Galvanised</td>
</tr>
<tr>
<td>Sizes Available</td>
<td>M2 – M64 (metric) 3/16 – 2 ½” (imperial)</td>
</tr>
<tr>
<td>Brass Sizes limited to diameter</td>
<td>M24 or 1”</td>
</tr>
</tbody>
</table>
### Taper Washers

![Taper Washer Diagram]

<table>
<thead>
<tr>
<th>Available Grades</th>
<th>High Tensile / Stainless Steel 304</th>
</tr>
</thead>
<tbody>
<tr>
<td>Finishing/ Coating</td>
<td>Black / White Zinc Galvanised</td>
</tr>
<tr>
<td>Sizes Available</td>
<td>M8 – M30 (metric)</td>
</tr>
<tr>
<td></td>
<td>5/16 – 1 1/4&quot; (imperial)</td>
</tr>
</tbody>
</table>
External Tooth-Lock Washer (Din 6796A)
Internal Tooth-Lock Washer (Din 6797J)

<table>
<thead>
<tr>
<th>Available Grades</th>
<th>Mild Steel / Stainless Steel</th>
</tr>
</thead>
<tbody>
<tr>
<td>Finishing/ Coating</td>
<td>Black/ White Zinc Galvanised / Stainless Steel</td>
</tr>
<tr>
<td>Sizes Available</td>
<td>M6 – M24 (metric)</td>
</tr>
<tr>
<td></td>
<td>¼ - 1” (imperial)</td>
</tr>
</tbody>
</table>
## Disc Washer (Din 17 222)

<table>
<thead>
<tr>
<th>Available Grades</th>
<th>Spring Steel</th>
</tr>
</thead>
<tbody>
<tr>
<td>Finishing/ Coating</td>
<td>Black/ White Zinc Galvanised</td>
</tr>
<tr>
<td>Sizes Available</td>
<td>M6 – M24 (metric)</td>
</tr>
</tbody>
</table>
Internal Overlap Washer (Din 6798J)
External Overlap Washers (Din 6798A)

<table>
<thead>
<tr>
<th>Available Grades</th>
<th>Mild Steel / Stainless Steel</th>
</tr>
</thead>
<tbody>
<tr>
<td>Finishing/ Coating</td>
<td>Black/ White Zinc Galvanised / Stainless Steel</td>
</tr>
<tr>
<td>Sizes Available</td>
<td>M6 – M24 (metric) 1/4 - 1” (imperial)</td>
</tr>
</tbody>
</table>
Cotter Pins (Din 94)

<table>
<thead>
<tr>
<th>Available Grades</th>
<th>Mild Steel / Stainless Steel</th>
</tr>
</thead>
<tbody>
<tr>
<td>Finishing/Coating</td>
<td>White Zinc Galvanised / Stainless Steel</td>
</tr>
</tbody>
</table>
| Sizes Available        | Diameter: M1.5 – M16 (metric)  
                          1/16 – ¾ (imperial)  
                          Length: 12mm – 300mm (metric)  
                          ½” – 12” (imperial) |
Spring Lock Pins (Din 1481)

Available Grades: Carbon Spring Steel / Stainless Steel
Finishing/ Coating: Black / Stainless Steel
Sizes Available:
- Diameter: M1.5 – M16 (metric)
- Length: 12mm – 100mm (metric)
Dowel Pins

Available Grades : Hardened Carbon Steel
Finishing/ Coating : White Zinc Galvanised / Stainless Steel
Sizes Available  
<table>
<thead>
<tr>
<th>Diameter</th>
<th>M2 – M12</th>
</tr>
</thead>
<tbody>
<tr>
<td>Length</td>
<td>6mm – 100mm</td>
</tr>
</tbody>
</table>
## Socket Pipe Plus

<table>
<thead>
<tr>
<th>Available Grades</th>
<th>ISO Grade 12.9</th>
</tr>
</thead>
<tbody>
<tr>
<td>Finishing/ Coating</td>
<td>Black</td>
</tr>
<tr>
<td>Threading</td>
<td>NPT / BSP</td>
</tr>
<tr>
<td>Sizes Available</td>
<td>1/16 – 1”</td>
</tr>
</tbody>
</table>
Drop In Anchors

<table>
<thead>
<tr>
<th>Available Grades</th>
<th>Mild Steel / Stainless Steel</th>
</tr>
</thead>
<tbody>
<tr>
<td>Finishing/ Coating</td>
<td>White Zinc Galvanised / Cadmium Plated / Stainless Steel</td>
</tr>
<tr>
<td>Threading</td>
<td>Coarse, UNC</td>
</tr>
<tr>
<td>Sizes Available</td>
<td>Diameter : M6 – M12 (metric)</td>
</tr>
<tr>
<td></td>
<td>¼ - ½ (imperial)</td>
</tr>
</tbody>
</table>
Expansion Bolts / Set Anchors / Sleeve Anchors

<table>
<thead>
<tr>
<th>Available Grades</th>
<th>Mild Steel / Stainless Steel</th>
</tr>
</thead>
<tbody>
<tr>
<td>Finishing/ Coating</td>
<td>White Zinc Galvanised / Cadmium Plated / Stainless Steel</td>
</tr>
<tr>
<td>Threading</td>
<td>Coarse, UNC</td>
</tr>
</tbody>
</table>
| Sizes Available        | Diameter : M6 – M16 (metric)  
                          : ¼ - ¾ (imperial)  
                          Length : 30mm – 150mm  
                          : ¼ -6” (imperial) |
Grease Fittings

<table>
<thead>
<tr>
<th>Available Grades</th>
<th>Mild Steel / Stainless Steel</th>
</tr>
</thead>
<tbody>
<tr>
<td>Finishing/ Coating</td>
<td>Nickel Plated / Stainless Steel</td>
</tr>
<tr>
<td>Threading</td>
<td>NPT / BSP / UNF</td>
</tr>
<tr>
<td>Sizes Available</td>
<td>Diameter : M6 – M10 (metric)</td>
</tr>
<tr>
<td></td>
<td>1/8 – 1/2 (imperial)</td>
</tr>
</tbody>
</table>
Retaining Rings (Din 471 / 472)

Available Grades: Hardened Steel / Stainless Steel
Sizes Available:
- A-Type (Din 471) 3mm-300mm
- B-Type (Din 472) 3mm-300mm
Fully Threaded Stud Rods

<table>
<thead>
<tr>
<th>Available Grades</th>
<th>Mild Steel/ High Tensile / Stainless Steel 304 / Stainless Steel 316 / Brass</th>
</tr>
</thead>
<tbody>
<tr>
<td>Finishing/ Coating</td>
<td>Black / White Zinc Galvanised / Stainless / Brass</td>
</tr>
<tr>
<td>Threading</td>
<td>Coarse, UNC</td>
</tr>
<tr>
<td>Sizes Available</td>
<td>M4 &amp; M5 (1 meter each length)</td>
</tr>
<tr>
<td></td>
<td>M6 – M48 (2 meter each length)</td>
</tr>
<tr>
<td></td>
<td>¼ - 2 “ (6 feet each length)</td>
</tr>
</tbody>
</table>
## High Tensile Hexagon Head Bolts and Screws

### Technical Data

<table>
<thead>
<tr>
<th>Minimum Tensile Strength</th>
<th>BS 3692 Grade 8.8</th>
<th>BS 1758 Grade S</th>
<th>BS 1683 Grade R</th>
</tr>
</thead>
<tbody>
<tr>
<td>785 N/mm² (88 kg/lin m)</td>
<td>50 ton ftn²</td>
<td>45 ton ftn²</td>
<td></td>
</tr>
</tbody>
</table>

| Minimum Stress at Permanent Set Limit R₂ | 628 N/mm² (64 kg/lin m) | 38 ton ftn² |
| Minimum Yield Stress | 34 ton ftn² |

<table>
<thead>
<tr>
<th>Minimum Effective Thread Length</th>
<th>BS 3692 Grade 8.8</th>
<th>BS 1758 Grade S</th>
<th>BS 1683 Grade R</th>
</tr>
</thead>
<tbody>
<tr>
<td>Up to 125 mm long = 2 x dia. + 6 mm</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Over 125 mm = 200 mm long = 2 x dia. + 12 mm</td>
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<tr>
<td>Over 300 mm = 2 x dia. + 25 mm</td>
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<tr>
<td>Up to 6&quot; long = 2 x dia. + 12&quot;</td>
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</tr>
<tr>
<td>Over 6&quot; long = 2 x dia. + 25&quot;</td>
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</table>

<table>
<thead>
<tr>
<th>Dia.</th>
<th>Pitch (course)</th>
<th>Tensile Stress Area (mm²)</th>
<th>Bolt Preload (ton)</th>
<th>Approx. Torque (ft lb)</th>
<th>Dia.</th>
<th>Pitch (course)</th>
<th>Tensile Stress Area (mm²)</th>
<th>Bolt Preload (ton)</th>
<th>Approx. Torque (ft lb)</th>
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<tbody>
<tr>
<td>M5</td>
<td>0.8</td>
<td>14.2</td>
<td>6.0</td>
<td>6.0</td>
<td>M5</td>
<td>0.8</td>
<td>14.2</td>
<td>6.0</td>
<td>6.0</td>
</tr>
<tr>
<td>M6</td>
<td>1.0</td>
<td>20.1</td>
<td>8.8</td>
<td>11.7</td>
<td>M6</td>
<td>1.0</td>
<td>20.1</td>
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<td>11.7</td>
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<tr>
<td>M8</td>
<td>1.25</td>
<td>36.0</td>
<td>17.8</td>
<td>28</td>
<td>M8</td>
<td>1.25</td>
<td>36.0</td>
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<tr>
<td>M10</td>
<td>1.5</td>
<td>58.0</td>
<td>28.1</td>
<td>36</td>
<td>M10</td>
<td>1.5</td>
<td>58.0</td>
<td>28.1</td>
<td>36</td>
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<tr>
<td>M12</td>
<td>1.75</td>
<td>84.3</td>
<td>40.9</td>
<td>38</td>
<td>M12</td>
<td>1.75</td>
<td>84.3</td>
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<tr>
<td>M16</td>
<td>2.0</td>
<td>157.0</td>
<td>76.2</td>
<td>244</td>
<td>M16</td>
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<tr>
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<td>115.0</td>
<td>476</td>
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<tr>
<td>M24</td>
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<td>363.0</td>
<td>170.8</td>
<td>822</td>
<td>M24</td>
<td>3.0</td>
<td>363.0</td>
<td>170.8</td>
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<tr>
<td>M30</td>
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<td>272.0</td>
<td>1630</td>
<td>M30</td>
<td>3.5</td>
<td>561.0</td>
<td>272.0</td>
<td>1630</td>
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</tbody>
</table>

(1) Based on 85% of Proof Load or theoretical Proof Lead
(2) The Torque figures quoted are experimental approximations and are for guidance only. They apply to fasteners in the lightly oiled and self-colour (untreated) condition.

ALWAYS REMEMBER THAT THE BEST METHOD OF MAINTAINING BOLT TENSION IS BY CORRECT TIGHTENING.
# Thread Size Comparison

<table>
<thead>
<tr>
<th>METRIC PRODUCTS</th>
<th>UNIFIED INCH PRODUCTS</th>
<th>B.S. INCH PRODUCTS</th>
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<td><strong>Major Dia. mm</strong></td>
<td><strong>Thread Pitch mm</strong></td>
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<tr>
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<tr>
<td><strong>M42</strong></td>
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## STANDARD PRODUCTION RANGE

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<th>Illustration</th>
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<td>1</td>
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<td>Taper pins</td>
</tr>
<tr>
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<td>Dowel pins</td>
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<tr>
<td>84</td>
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<td>Slotted cheese head machine screws</td>
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<td>Slotted pan head machine screws</td>
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<tr>
<td>93</td>
<td></td>
<td>Tab washers with long tab</td>
</tr>
<tr>
<td>94</td>
<td></td>
<td>Cotter pins</td>
</tr>
<tr>
<td>95</td>
<td></td>
<td>Slotted raised countersunk head woodscrews</td>
</tr>
<tr>
<td>96</td>
<td></td>
<td>Slotted round head woodscrews</td>
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<td>97</td>
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<td>Slotted countersunk head woodscrews</td>
</tr>
<tr>
<td>124</td>
<td></td>
<td>Round head rivets</td>
</tr>
<tr>
<td>125</td>
<td>A B</td>
<td>Flat washers Form A without chamfer Form B with chamfer</td>
</tr>
<tr>
<td>126</td>
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<td>Flat washers without chamfer</td>
</tr>
<tr>
<td>127</td>
<td>A B</td>
<td>Spring lock washers Form A with bent ends (only to order) Form B with flat ends (ex stock)</td>
</tr>
<tr>
<td>128</td>
<td>A B</td>
<td>Spring lock washers Form A curved Form B crinkle</td>
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<tr>
<td>137</td>
<td>A B</td>
<td>Spring washers Form A curved Form B crinkle</td>
</tr>
<tr>
<td>186</td>
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<td>Tee-head bolts with square neck</td>
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<td>188</td>
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<td>Tee-head bolts with double nip</td>
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<td>Taper pins with external thread</td>
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<td>Tee-head bolts</td>
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<td>Countersunk head rivets, nominal dia, 10-36 mm</td>
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<tr>
<td>315</td>
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<td>Wing nuts American standard</td>
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<tr>
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<td></td>
<td>Wing nuts German standard</td>
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<tr>
<td>316</td>
<td></td>
<td>Wing screws American standard</td>
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<tr>
<td>316</td>
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<td>Wing screws German standard</td>
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<tr>
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<td>Slotted drilled filler head screws</td>
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<tr>
<td>417</td>
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<td>Slotted grobscrews with full dog point</td>
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<td>427</td>
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<td>Slotted headless screws with chamfered end</td>
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<tr>
<td>431</td>
<td></td>
<td>Pipe threaded nuts Form A</td>
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<tr>
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<td>External tab washers</td>
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<td>Flat washers with reduced o. D.</td>
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<td>Square taper washers: 8%</td>
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<td>Square taper washers: 14%</td>
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<tr>
<td>DIN</td>
<td>Illustration</td>
<td>Designation</td>
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<td>------</td>
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<tr>
<td>436</td>
<td></td>
<td>Square washers</td>
</tr>
<tr>
<td>438</td>
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<td>Slotted grub screws with cup point</td>
</tr>
<tr>
<td>439</td>
<td></td>
<td>Hexagon lock nuts ~ 0.5 d Form A chamfered</td>
</tr>
<tr>
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<td>Hexagon lock nuts ~ 0.5 d Form B chamfered</td>
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<tr>
<td>440</td>
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<td>Round washers for wood construction Form R = round (ex stock) Form V = square (only to order)</td>
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<tr>
<td>444</td>
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<td>Eye bolts</td>
</tr>
<tr>
<td>462</td>
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<td>Internal tab washers</td>
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<td>463</td>
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<td>Tab washers with long and short tab</td>
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<td>Knurled thumb screws</td>
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<tr>
<td>466</td>
<td></td>
<td>Knurled nuts with full collar</td>
</tr>
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<td>467</td>
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<td>Flat knurled nuts</td>
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<tr>
<td>471</td>
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<td>External retaining rings</td>
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<tr>
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<td>Square head bolts with collar</td>
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<td>479</td>
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<td>Square head bolts with half dog point</td>
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<td>Square head bolts with collar and half dog point with rounded end</td>
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<tr>
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<td>Weld studs</td>
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<tr>
<td>529</td>
<td></td>
<td>Masonry bolts Form A</td>
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<td>Masonry bolts Form C</td>
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<td>Masonry bolts Form D</td>
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<td>546</td>
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<td>Slotted round nuts</td>
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<td>547</td>
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<td>Round nuts with drilled holes in one face</td>
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<td>Round nuts with set pin hole inside</td>
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<tr>
<td>551</td>
<td></td>
<td>Slotted grub screws with flat point</td>
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<td>553</td>
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<td>Slotted grub screws with cone point</td>
</tr>
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<td>Hexagon nuts ~ 0.8 d (only in DIN 343 ex stock)</td>
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<tr>
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<td>Square nuts</td>
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<td>558</td>
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<td>Hexagon head screws (only in DIN 433 ex stock)</td>
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<td></td>
<td>Hexagon set screws with full dog point Form A with undercut</td>
</tr>
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<td>561</td>
<td></td>
<td>Hexagon set screws with full dog point Form B with runout</td>
</tr>
<tr>
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<td>Square thin nuts</td>
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<td>564</td>
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<td>Hexagon set screws with half dog point and cone end Form A with undercut</td>
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<td>Hexagon set screws with half dog point and cone end Form B with runout</td>
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<td>Hexagon coach screws</td>
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<td>Eye bolts</td>
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<td>Eye nuts</td>
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<td>Hexagon bolts Form B (only in DIN 911 ex stock)</td>
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<td>Carriage bolts</td>
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<tr>
<td>935</td>
<td>A B</td>
<td>Hexagon slotted and castle nuts Form A up to M 10 Form B from M 12</td>
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<td>Hexagon lock nuts (only in DIN 439 ex stock)</td>
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<td>Hexagon thin slotted and castle nuts Form A up to and incl. 10 mm nominal thread dia. Form B from 12 mm nom. thread dia.</td>
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<td>Engineering studs metal end ~ 1 d</td>
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<td>Engineering studs metal end ~ 1.25 d</td>
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<td>Engineering studs metal end ~ 2.5 d</td>
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<td>Hexagon head bolts metric fine thread</td>
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<td>Hexagon head set screws metric fine thread</td>
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<td>Sloted countersunk head machine screws</td>
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<td>964</td>
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<td>Sloted raised countersunk (oval) machine screws</td>
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<td>Cross recessed countersunk head machine screws</td>
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<td>Cross recessed raised countersunk (oval) head machine screws</td>
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<td>Stud bolts Form A without chamfer Form B with chamfer</td>
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<td>Nylon inserted self-locking nuts (Form P)</td>
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<td>Nylon inserted self-locking nuts (Form T)</td>
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<td>Clevis pins without head Form A without split pin holes Form B with split pin holes (replacement for DIN 1443)</td>
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<td>A B</td>
<td>Clevis pins with head Form A without split pin holes Form B with split pin holes (replacement for DIN 1434, 1435, 1436)</td>
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<td>Clevis pins with head and threaded portion (replacement for DIN 1438)</td>
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<td>Grooved pins with half length groove and circlip groove end</td>
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<td>Full length parallel grooved pins with pilot end</td>
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<td>Full length taper grooved pins</td>
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<td>Pins with half length taper groove</td>
</tr>
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<td>Full length parallel grooved pins</td>
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<td>1474</td>
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<td>Pins with half length reverse groove</td>
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<td>Pins with center groove</td>
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<td>Round head grooved pins</td>
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<td>Countersunk head grooved pins</td>
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<td>Turnbuckles</td>
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<td>Spring pins, heavy duty</td>
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<td>Hexagon domed nuts, full pattern</td>
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<td>Slotted round nuts for hook spanner</td>
</tr>
<tr>
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<td>Designation</td>
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<td>1816</td>
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<td>Round nuts with set pin holes</td>
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<tr>
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<td>Disc springs</td>
</tr>
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<td>Double end studs</td>
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<td>Hexagon cap nuts for double end studs</td>
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<td>Knurled nuts</td>
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<td>Heavy series hexagon nuts with spherical face</td>
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<tr>
<td>6331</td>
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<td>Hexagon nuts with collar</td>
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<tr>
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<td>Grub screws with trust point</td>
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<td>External tooth lock washers</td>
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<td>Internal tooth lock washers</td>
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<td></td>
<td>External tooth lock washers Form V (A 4 only to enquiry)</td>
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<td>6798</td>
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<td>Serrated lock washers Form A</td>
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<td>Serrated lock washers Form J</td>
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<td>90° Countersunk serrated lock washers Form V</td>
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<td>Retaining rings for shafts</td>
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<td>6885</td>
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<td>Parallel keys square-ended round-ended</td>
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<td>6900</td>
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<td>Screw and washer assemblies</td>
</tr>
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<td>Screw and washer assemblies</td>
</tr>
<tr>
<td>6901</td>
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<td>Tapping screw and washer assemblies</td>
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<td>Tapping screw and washer assemblies</td>
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<td>6902</td>
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<td>Washers for screw and washer assemblies</td>
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<tr>
<td>6908</td>
<td></td>
<td>Hexagon socket head cap screws, shallow head, with pilot recess for wrench key</td>
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<td>6912</td>
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<td>Rivet pins Form A</td>
</tr>
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<td>7341</td>
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<td>Rivet pins Form B</td>
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<td>7341</td>
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<td>Rivet pins Form B</td>
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<td>7343</td>
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<td>Spiral pins</td>
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<td>7349</td>
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<td>Washers for bolts with heavy type spring pin</td>
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<td>Hexagon head thread cutting screws Form A</td>
</tr>
<tr>
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<td>Slotted cheese head thread cutting screws Form B</td>
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<tr>
<td>7513</td>
<td></td>
<td>Slotted countersunk head thread cutting screws Form F</td>
</tr>
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<td>7513</td>
<td></td>
<td>Slotted raised countersunk head thread cutting screws Form G</td>
</tr>
<tr>
<td>7516</td>
<td></td>
<td>Pan head thread cutting screws Form A cross recessed</td>
</tr>
<tr>
<td>7516</td>
<td></td>
<td>Countersunk head thread cutting screws Form D cross recessed</td>
</tr>
<tr>
<td>7516</td>
<td></td>
<td>Raised countersunk head thread cutting screws Form E cross recessed</td>
</tr>
<tr>
<td>7604</td>
<td></td>
<td>Hexagon head pipe plugs up to M16, From M18</td>
</tr>
</tbody>
</table>
The design strength of a high strength friction grip bolted joint is calculated from the design tensile strength of the bolt. Because of tightening variations, the standard tensile strength is taken as 10% more than the standard tensile strength.

### Torque Coefficient of Set

<table>
<thead>
<tr>
<th>Division</th>
<th>Class of set according to torque coefficient</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>A</td>
</tr>
<tr>
<td></td>
<td>B</td>
</tr>
<tr>
<td>Mean of torque coefficient value of one manufacturing lot (1)</td>
<td>0.075 mm. 0.125 mm.</td>
</tr>
<tr>
<td>Standard deviation of torque coefficient value of one manufacturing lot (2)</td>
<td>0.015 max. 0.023 max.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Bolt tension (t)</th>
<th>Standard Torque Coefficient</th>
<th>Standard Torque (kg fm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>M12</td>
<td>6.3</td>
<td>B (0.165)</td>
</tr>
<tr>
<td>M16</td>
<td>11.7</td>
<td>B (0.165)</td>
</tr>
<tr>
<td>M20</td>
<td>18.2</td>
<td>B (0.165)</td>
</tr>
<tr>
<td>M22</td>
<td>22.6</td>
<td>A (0.130) B (0.165)</td>
</tr>
<tr>
<td>M24</td>
<td>26.2</td>
<td>A (0.130) B (0.165)</td>
</tr>
<tr>
<td>M27</td>
<td>34.1</td>
<td>A</td>
</tr>
<tr>
<td>M30</td>
<td>41.7</td>
<td>A</td>
</tr>
</tbody>
</table>

The torque coefficient shall be obtained from the following formula:

\[ K = \frac{T}{d \times N} \times 1000 \]

where

- \( K \): torque coefficient
- \( T \): torque (moment to fasten nut) (kgf-m) (N-m)
- \( d \): basic thread outside diameter of bolt (mm)
- \( N \): axial force of bolt (1) (kgf) (N)

Notes:

1. The axial force mentioned above means a tensile force to act in axial direction of the bolt caused by a torque to fasten the bolt.
2. The one manufacturing lot mentioned above means the lot of set which the bolt, nut and washers of each identical lot constitute.

### Determination of bolt length

<table>
<thead>
<tr>
<th>Nominal bolt size</th>
<th>Length added to grip. (( m_{L} ))</th>
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<tbody>
<tr>
<td>M12</td>
<td>25</td>
</tr>
<tr>
<td>M16</td>
<td>30</td>
</tr>
<tr>
<td>M20</td>
<td>35</td>
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<td>M22</td>
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</tr>
<tr>
<td>M24</td>
<td>45</td>
</tr>
<tr>
<td>M27</td>
<td>50</td>
</tr>
<tr>
<td>M30</td>
<td>55</td>
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</table>
MECHANICAL PROPERTIES

Mechanical properties of Machined Test Piece, Nut and Washer

<table>
<thead>
<tr>
<th>Bolt Grade</th>
<th>Yield strength kg/mm²</th>
<th>Tensile strength kg/mm²</th>
<th>Elongation %</th>
<th>Reduction of area %</th>
</tr>
</thead>
<tbody>
<tr>
<td>F10G</td>
<td>90 min</td>
<td>100-120</td>
<td>14 min</td>
<td>40 min</td>
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<table>
<thead>
<tr>
<th>Bolt Grade</th>
<th>Tensile load (min)</th>
<th>Hardness</th>
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<tbody>
<tr>
<td>M12</td>
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<td>M24</td>
<td>35.3</td>
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</tr>
<tr>
<td>M27</td>
<td>45.8</td>
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<tr>
<td>F10G</td>
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<td>HRC 27-38</td>
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<table>
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<tr>
<th>Nut Grade</th>
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<td>HRB 95-HRC 35</td>
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<table>
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<tr>
<th>Washer Grade</th>
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<td>HRC 35-45</td>
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DIMENSIONS AND TOLERANCES

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<th>M 16</th>
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<th>M 22</th>
<th>M 24</th>
<th>M 27</th>
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<tbody>
<tr>
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<td>12</td>
<td>16</td>
<td>20</td>
<td>22</td>
<td>24</td>
<td>27</td>
<td>30</td>
</tr>
<tr>
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<td>+0.08</td>
<td>+0.08</td>
<td>+0.09</td>
<td>+0.09</td>
<td>+0.09</td>
<td>+0.09</td>
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<tr>
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<td>22</td>
<td>27</td>
<td>32</td>
<td>36</td>
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<td>31.2</td>
<td>37</td>
<td>41.6</td>
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<td>30</td>
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<tr>
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<td>1.2-2.0</td>
<td>1.2-2.0</td>
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