
























































# WASHERS

<p>Red Fibre HEC</p>  <p>METRIC FLAT ROUND</p> <p>WRRFPM</p>	<p>Z/P AS1237:1973 Mild Steel</p>  <p>METRIC ENGINEERS WASHER</p> <p>WEMSZM</p>	<p>HDG HEC Mild Steel</p>  <p>METRIC FLAT ROUND</p> <p>WRMSGM</p>	<p>Z/P HEC Mild Steel</p>  <p>METRIC FLAT ROUND</p> <p>WRMSZM</p>	<p>PLN HEC Mild Steel</p>  <p>METRIC FLAT ROUND</p> <p>WRMSPM</p>	<p>Z/P HEC Mild Steel</p>  <p>IMPERIAL FLAT ROUND</p> <p>WRMSZ</p>	<p>ZYP DIN 125A Mild Steel</p>  <p>METRIC FLAT ROUND</p> <p>WRMSYM</p>
<p>SS 304 HEC</p>  <p>METRIC FLAT ROUND</p> <p>WR04PM</p>	<p>SS 304 DIN 125A</p>  <p>METRIC FLAT ROUND</p> <p>WR04TM</p>	<p>SS 304 HEC</p>  <p>IMPERIAL FLAT ROUND</p> <p>WR04P</p>	<p>SS 316 HEC</p>  <p>METRIC FLAT ROUND</p> <p>WR16PM</p>	<p>SS 316 DIN 125A</p>  <p>METRIC FLAT ROUND</p> <p>WR16TM</p>	<p>SS 316 HEC</p>  <p>IMPERIAL FLAT ROUND</p> <p>WR16P</p>	<p>Brass HEC BS 3410</p>  <p>IMPERIAL FLAT ROUND</p> <p>WRBRP</p>
<p>HDG AS1237.1-2002 Mild Steel</p>  <p>METRIC X LARGE FLAT ROUND</p> <p>WXMSGM</p>	<p>Z/P AS1237.1-2002 Mild Steel</p>  <p>METRIC X LARGE FLAT ROUND</p> <p>WXMSZM</p>	<p>Z/P AS 1237.1-2002 Mild Steel</p>  <p>METRIC PANEL</p> <p>WPMSZM</p>	<p>Z/P HEC Mild Steel</p>  <p>IMPERIAL MUDGUARD</p> <p>WRMSZU</p>	<p>SS 304 DIN 9021</p>  <p>METRIC MUDGUARD</p> <p>WR04MM</p>	<p>SS 316 DIN 9021</p>  <p>METRIC MUDGUARD</p> <p>WR16MM</p>	<p>Brass HEC AS 1237</p>  <p>METRIC FLAT ROUND</p> <p>WRBRPM</p>
<p>Z/P HEC Mild Steel</p>  <p>LARGE FLAT RND SUPA® WASHER</p> <p>WRMSZLM</p>	<p>PLN HEC Mild Steel</p>  <p>LARGE FLAT RND SUPA® WASHER</p> <p>WRMSPLM</p>	<p>HDG HEC Mild Steel</p>  <p>LARGE FLAT RND SUPA® WASHER</p> <p>WRMSGLM</p>	<p>SS 304 ANSI B18.21.1</p>  <p>IMPERIAL SPRING FLAT SECTION</p> <p>WR04S0</p>	<p>SS 304 HEC 127B</p>  <p>METRIC SPRING FLAT SECTION</p> <p>WR04SM</p>	<p>SS 316 ANSI B18.21.1</p>  <p>IMPERIAL SPRING FLAT SECTION</p> <p>WR16S</p>	<p>SS 316 HEC 127B</p>  <p>METRIC SPRING FLAT SECTION</p> <p>WR16SM</p>



# WASHERS

<p><b>HDG HEC 127B Spring Steel</b></p>  <p><b>METRIC SPRING FLAT SECTION</b></p> <p><b>WRMSGSM</b></p>	<p><b>Z/P HEC 127B Spring Steel</b></p>  <p><b>METRIC SPRING FLAT SECTION</b></p> <p><b>WRMSZSM</b></p>	<p><b>ZYP HEC 127B Spring Steel</b></p>  <p><b>METRIC SPRING FLAT SECTION</b></p> <p><b>WRMSYSM</b></p>	<p><b>Z/P ANSI B18.21.1 Spring Steel</b></p>  <p><b>IMPERIAL SPRING FLAT SECTION</b></p> <p><b>WRMSZS</b></p>	<p><b>Z/P HEC 7980 Spring Steel</b></p>  <p><b>METRIC SPRING SQ SECTION</b></p> <p><b>WRMSZSQM</b></p>	<p><b>ZYP HEC 7980 Spring Steel</b></p>  <p><b>METRIC SPRING SQ SECTION</b></p> <p><b>WRMSYSQM</b></p>	<p><b>HDG ANSI B18.21.1 Spring Steel</b></p>  <p><b>IMPERIAL SPRING SQ SECTION</b></p> <p><b>WRMSGSQ</b></p>
<p><b>Z/P ANSI B18.21.1 Spring Steel</b></p>  <p><b>IMPERIAL SPRING SQ SECTION</b></p> <p><b>WRMSZSQ</b></p>	<p><b>Z/P IFI 532 Type A</b></p>  <p><b>LOCK INTERNAL TOOTH</b></p> <p><b>WLMSZTIM</b></p>	<p><b>Z/P IFI 532 Type A</b></p>  <p><b>LOCK EXTERNAL TOOTH</b></p> <p><b>WLMSZTEM</b></p>	<p><b>Z/P ASME B18.21.1 Type A</b></p>  <p><b>LOCK INTERNAL TOOTH</b></p> <p><b>WLMSZTI</b></p>	<p><b>Z/P ASME B18.21.1 Type A</b></p>  <p><b>LOCK EXTERNAL TOOTH</b></p> <p><b>WLMSZTE</b></p>	<p><b>SS 304 DIN 6797 Type A</b></p>  <p><b>LOCK EXTERNAL TOOTH</b></p> <p><b>WL04TEM</b></p>	<p><b>SS 304 DIN 6797 Type J</b></p>  <p><b>LOCK INTERNAL TOOTH</b></p> <p><b>WL04TIM</b></p>
<p><b>SS 316 DIN 6798 Type A</b></p>  <p><b>LOCK EXT SERR TOOTH</b></p> <p><b>WL16SEM</b></p>	<p><b>SS 304 DIN 6798 Type A</b></p>  <p><b>LOCK EXT SERR TOOTH</b></p> <p><b>WL04SEM</b></p>	<p><b>SS 304 DIN 6798 Type J</b></p>  <p><b>LOCK INT SERR TOOTH</b></p> <p><b>WL04SIM</b></p>	<p><b>SS 304 HEC</b></p>  <p><b>CUP WASHER</b></p> <p><b>WR04C</b></p>	<p><b>SS 304 HEC</b></p>  <p><b>METRIC BELLEVILLE WASHER</b></p> <p><b>WR04BM</b></p>	<p><b>SS 316 HEC</b></p>  <p><b>METRIC SQUARE</b></p> <p><b>WS16PM</b></p>	<p><b>HDG HEC Mild Steel</b></p>  <p><b>METRIC SQUARE</b></p> <p><b>WSMSGM</b></p>
<p><b>ZYP HEC Mild Steel</b></p>  <p><b>METRIC SQUARE</b></p> <p><b>WSMSYM</b></p>	<p><b>HOBKOTE® HEC Mild Steel</b></p>  <p><b>METRIC SQUARE</b></p> <p><b>WSMSHM</b></p>	<p><b>HDG HEC Mild Steel</b></p>  <p><b>SQUARE WASHER SQUARE HOLE</b></p> <p><b>WSMSGQ</b></p>	<p><b>PLN HEC 38-45 HRC</b></p>  <p><b>METRIC FLAT ROUND SAMPSON™</b></p> <p><b>WR43PM</b></p>	<p><b>Z/P ASTM F436M 38-45 HRC</b></p>  <p><b>METRIC FLAT ROUND SAMPSON™</b></p> <p><b>WR43ZM</b></p>	<p><b>PLN ASTM F436 38-45 HRC</b></p>  <p><b>IMPERIAL FLAT ROUND SAMPSON™</b></p> <p><b>WR43P</b></p>	<p><b>ZYP ASTM F436 38-45 HRC</b></p>  <p><b>IMPERIAL FLAT ROUND SAMPSON™</b></p> <p><b>WR43Y</b></p>



# WASHERS

**Xylan Blue HEC**  
38-45 HRC

**IMPERIAL FLAT ROUND SAMPSON™**  
WR43B

**HDG AS 1237**  
35-41 HRC

**METRIC FLAT ROUND HARDENED**  
WRHTGM

**H9 IMPACT™**  
43-49 HRC

**PLN HEC**  
43-49 HRC

**IMPERIAL FLAT ROUND**  
WRH9P

**ZYP HEC**  
43-49 HRC

**IMPERIAL FLAT ROUND**  
WRH9Y

**PLN AS 1085.7**

**FISHBOLT SPRING WASHER**  
DWRHTPSM

**HDG HEC**  
Mild Steel

**METRIC SECURITY MESH CLIP**  
HWCMSGM

**SS 316 HEC**

**VOLUTE SPRING WASHER**  
WV16PM

## Other Washers

Hobson Engineering have a wide variety of specialised Washers, more of which can be found here:

**Structural** **p10**

**Bumax** **p34**

**Nord-Lock** **p36**

**Schnorr** **p38**

**Nylon** **p44**










## Washers Gauge Converter

gauge no.	inch	mm
8	0.1570"	3.988
9	0.1398"	3.551
10	0.1250"	3.175
12	0.0991"	2.517
14	0.0785"	1.994
16	0.0625"	1.588
18	0.0495"	1.257
19	0.0420"	1.0668
20	0.0350"	0.8890
21	0.0320"	0.8128
22	0.0290"	0.7366
30	0.0123"	0.3124



# WASHERS

## Types of Washers

	<p><b>Standard Washers</b></p> <p>A standard washer is a thin plate typically round or square with a hole that is normally in the centre. They are used for two main reasons:</p> <ol style="list-style-type: none"> <li>1. To minimise scouring or scratch damage to mating material as a result of nut rotation.</li> <li>2. To increase the effective bearing surface of the bolt and or nut. That is, to distribute the load of a threaded fastener over a larger area and prevent deformation of the bearing surfaces.</li> </ol>		<p><b>Belleville Washer</b></p> <p>A Belleville washer, also known as a coned-disc spring or conical washer and cupped spring washer, is a type of spring shaped like a washer. It has a frusto-conical shape which gives the washer a spring characteristic. The Belleville name comes from the inventor Jullian F. Belleville. In the initial tightening, the effect on the joint is similar to a split type spring washer. However, as the tightening continues and the washer is flattened, it actually reduces the applied load in the bolt assembly. In this way, if the joint is loosened, the load will increase and hence counteract the loosening of the joint.</p> <p>Multiple Belleville washers may be stacked to modify the spring constant or amount of deflection.</p>
	<p><b>Squitter Washers (DTIs)</b></p> <p>Direct tension indicating (DTI) washers are used to ensure the required pre-load tension in a joint is achieved. They are hardened washers with protruding lugs or bumps on the bearing face. When the bolt assembly is tightened, these lugs are deformed to a prescribed level and hence indicate that the required tension in the assembly has been achieved. During the lug deformation process, silicone is squeezed out, giving a visible sign of correct tension in the bolt assembly.</p>		<p><b>Spherical Washers</b></p> <p>Spherical washers are designed to accommodate a 10-15 degree variation in the alignment of a joint. A cone washer fits inside a cup washer and they slide against each other to reduce bending stresses in the bolt. One application for these washers is in racing kart seats where the chassis twists dramatically.</p>
	<p><b>Load Indicating Washers (LIWs)</b></p> <p>Work much the same as Squitter Washers (DTIs) minus the silicone process.</p>		<p><b>Lock Washers</b></p> <p>A toothed lock washer, also known as a star washer, has teeth or prongs which extend radially inward and/or outward. This maintains tension and opposes any loosening influence on the fastener. The flexed teeth absorb shock, vibration and slipping. These washers are designed to retain fasteners by achieving an increased friction between the fastener and the mating material through mechanical interlocking or interference. They also provide some tension, as with spring washers but at a vastly reduced magnitude. There are two main types, teeth twisted out of plane (Type A) and edges of the teeth folded in opposite directions (Type B).</p>
	<p><b>Split type</b></p> <p>Developed 110 years ago, the split type spring washer was the first washer that offered a solution to the loosening of bolted assemblies. These are hardened washers that are split with out of plane deformations. They should be used under the head of the bolt with the assembly being tensioned by rotating the nut. If they need to be used on the nut side, another hardened flat round washer should be used between the nut and the split washer.</p> <p>When the washers are flattened, a prescribed tension is achieved in the assembly. Naturally, these washers do not indicate any over-tightening of the bolt assembly. The split-lock washers are made from hardened spring steel that strongly resists compression. When the threaded fasteners are tightened, the protruding corner edges of the split-lock washers bite into both compressing surfaces in a manner that resists counter-clockwise rotation to vibration in a manner similar to a ratchet .</p>		<p><b>Lock Washers - 2 piece type (Nord-Lock)</b></p> <p>Two piece lock washers that are designed to prevent bolt assemblies loosening through vibration. They consist of two disks with interposing ramps. "Sharp ridges on the upper and lower surfaces of the disks grab the nut and joint surfaces. If the nut backs off a little it drags its disc along with it; the ramps on its disk climb the ramps on the lower disk. The interaction of these ramp or cam surfaces prevent loss of tension in the bolt"<sup>2</sup>.</p>
	<p><b>Spring Washers</b></p> <p>"Threaded assemblies inherently involve the mating of inclined planes under load. These inclined planes consist of the lead and flank angle of the screw or bolt thread and the angle of the mating thread in the nut plate. There is a natural tendency for these mating threads to slide "downhill" until tension is lost in an assembly. If assembled materials are soft or yield under load, or if thermocycling causes expansion and contraction of the materials, essential tension dissipates fairly quickly"<sup>1</sup>. There are various types of spring washers that are designed to prevent loosening of bolted assemblies.</p>	<p>References:</p> <p>Ajax technical note AFI/02/007</p> <p><sup>1</sup> Charles F Jacobs. American Fastener Journal 1997</p> <p><sup>2</sup> An Introduction to the design and behaviour of bolted joints. John H Bickford Nuts, Bolts, Fasteners and Plumbing Handbook. Carroll Smith Wikipedia</p>	