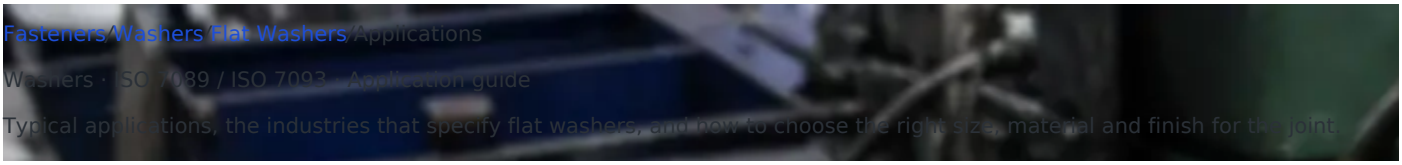
What Are Flat Washers Used For?

Engineering Hardware & Fasteners · engineeringhardware.com/applications/flat-washers



Flat Washers are used for load distribution and anti-loosening under a bolt or nut. They are manufactured to ISO 7089 / ISO 7093, and selection is driven by the nominal bolt size, the fit and tolerance the assembly requires, and the service environment.

Primary duty
: Load distribution and anti-loosening under a bolt or nut

Governing standard
: ISO 7089 / ISO 7093

Nominal bolt size range
: M1.6 to M64

Category
: Washers

Application notes are general engineering guidance. Verify the property class and any approval requirement against your own design calculation.

Flat Washers are selected when an assembly calls for load distribution and anti-loosening under a bolt or nut. This application guide to the ISO 7089 / ISO 7093 type covers concrete end-uses, the specification checklist, correct installation, and where an alternative fastener performs better. Stocked across roughly M1.6 to M64, they cover general to heavy-duty work.

Typical Applications for Flat Washers

The most common settings where these are specified:

- **Vibration applications:** spring and serrated types that maintain tension under cyclic load.
- **Timber & soft materials:** large-OD types that prevent pull-through.
- **General machine building:** fastening covers, brackets, motors and sub-assemblies on production equipment.
- **Maintenance & repair (MRO):** a stocked size for servicing existing plant where the original fastener spec must be matched.
- **Fabrication & metalwork:** bench and on-site assembly of steel frames, enclosures and weldments.

How to Specify Flat Washers for Your Application

- **Size:** Match the nominal size to the mating thread or hole. This product spans M1.6–M64; check the full table below for the exact dimensions of each size.
- **Type & OD:** Select flat for load spreading, spring/serrated for anti-loosening, or fender/large-OD for soft or oversized holes.

- **Environment:** For damp, coastal or chemical exposure prefer A4/316 stainless or a suitable coating; indoors, plated steel or A2 is usually sufficient.
- **Standard:** This product is supplied to ISO 7089 / ISO 7093. Quoting the standard on your order guarantees interchangeable dimensions between suppliers.

Installation & Assembly Practice

- Place the washer under the rotating element (usually the nut) so tightening does not score the surface.
- Chamfered-hole side of a hardened washer faces the bolt head fillet.
- On serrated-flange hardware, do not add a plain washer — it defeats the serrations.

Common Selection Mistakes with Flat Washers

- Relying on a spring washer for locking on class 8.8+ joints — at high preload it flattens and adds nothing.
- Choosing an OD too small for soft material, so the head pulls through or embeds.

Where Flat Washers Are Not the Right Choice

A washer does not replace a locking feature on its own in severe vibration, and a spring washer adds little clamp on high-strength joints.

Technical Drawing

Customize the parameters below — every spec field is editable, and the drawing redraws to match the values you choose. Changing the size will snap the other fields to that size's standard values; you can then override any individual value.

Sends the selected values to the quote form below.

Request a Quote

The form below follows the current technical drawing configuration. Change the drawing values above and the request details update automatically.

Dimensions & Specifications (ISO 7089 / ISO 7093)

For bolt size	Inner diameter d1 min (mm)	Outer diameter d2 max (mm)	Thickness h (mm)	Reference standard
M1.6	1.7	4.0	0.3	ISO 7089
M2	2.2	5.0	0.3	ISO 7089
M2.5	2.7	6.0	0.5	ISO 7089
M3	3.2	7.0	0.5	ISO 7089
M3.5	3.7	8.0	0.5	ISO 7089
M4	4.3	9.0	0.8	ISO 7089
M5	5.3	10.0	1.0	ISO 7089
M6	6.4	12.0	1.6	ISO 7089
M7	7.4	14.0	1.6	ISO 7089
M8	8.4	16.0	1.6	ISO 7089
M10	10.5	20.0	2.0	ISO 7089
M12	13.0	24.0	2.5	ISO 7089
M14	15.0	28.0	2.5	ISO 7089
M16	17.0	30.0	3.0	ISO 7089
M18	19.0	34.0	3.0	ISO 7089
M20	21.0	37.0	3.0	ISO 7089
M22	23.0	39.0	3.0	ISO 7089
M24	25.0	44.0	4.0	ISO 7089
M27	28.0	50.0	4.0	ISO 7089
M30	31.0	56.0	4.0	ISO 7089
M33	34.0	60.0	5.0	ISO 7089
M36	37.0	66.0	5.0	ISO 7089
M39	40.0	72.0	6.0	ISO 7089
M42	43.0	78.0	7.0	ISO 7089

For bolt size	Inner diameter d1 min (mm)	Outer diameter d2 max (mm)	Thickness h (mm)	Reference standard
M45	46.0	85.0	7.0	ISO 7089
M48	50.0	92.0	8.0	ISO 7089
M52	54.0	98.0	8.0	ISO 7089
M56	58.0	105.0	9.0	ISO 7089
M60	62.0	110.0	9.0	ISO 7089
M64	66.0	115.0	9.0	ISO 7089
M5	5.3	15.0	1.0	ISO 7093 large series
M6	6.4	18.0	1.6	ISO 7093 large series
M8	8.4	24.0	2.0	ISO 7093 large series
M10	10.5	30.0	2.5	ISO 7093 large series
M12	13.0	37.0	3.0	ISO 7093 large series
M16	17.0	50.0	3.0	ISO 7093 large series
M20	21.0	60.0	4.0	ISO 7093 large series
M24	25.0	72.0	5.0	ISO 7093 large series

Inside the plant

Manufactured in our own plant

This part is cold-formed, threaded, heat-treated and finished in-house. The stages below are where its class and finish are actually decided.

1. 

01

Cold heading

Wire rod is drawn to size and cold-formed into blanks. Forming rather than cutting keeps the grain flow continuous around the head, which is where a bolt is most likely to fail.

Head dimensions and under-head radius checked at set-up and per shift.

2. 

02

Thread rolling

Threads are rolled between hardened dies rather than cut. Rolled threads are stronger in fatigue than cut threads and hold pitch and flank angle far more consistently across a batch.

Go / no-go ring gauges to ISO 965 tolerance class 6g.

3. 

03

Heat treatment

Quench-and-temper brings carbon and alloy steel to the property class ordered — 8.8, 10.9 or 12.9 — with the furnace charge tracked so a finished lot can be traced back to it.

Core hardness and tensile tested per lot to ISO 898-1.

4. 

04

Surface treatment

Zinc, zinc-nickel, hot-dip galvanizing, black oxide, phosphate and Dacromet, selected against the service environment rather than against the price list.

Coating thickness and neutral salt spray hours to ISO 9227.

Frequently Asked Questions

What material should Flat Washers be for outdoor use?
For damp, coastal or chemical environments specify A4 (316) stainless or a suitably coated steel. For indoor or dry use, A2 (304) stainless or zinc-plated steel is normally adequate.

Are Flat Washers made to a recognized standard?
Yes — they are manufactured to ISO 7089 / ISO 7093, so dimensions are interchangeable between suppliers when you quote the standard on your order.

What are Flat Washers used for?
Load distribution and anti-loosening under a bolt or nut. They are supplied to ISO 7089 / ISO 7093.

Which industries use Flat Washers?

They are commonly specified in general machine building, maintenance & repair (mro) and fabrication & metalwork, among other sectors.

Can I get a quote for Flat Washers in the size and material I need?
Yes. Use the technical drawing and quote form on this page to set the size and options, then send the exact configuration to our team for pricing and lead time.

Related Pages

Product page: Flat Washers — specifications & sizes

Flat Washers Specification Guides

- M1.6 Flat Washers size guide
- A4 stainless Flat Washers

Related Fastener Applications

- Bearing Lock Washers (MB Series) applications
- Bonded Sealing Washers applications
- Conical Spring Washers (HV) applications
- Cup Washers applications
- Disc Springs (Belleville Washers) applications
- EPDM Sealing Washers applications