Möller Metall-Dichtungen GmbH

Quality Is Our Passion

Washers

for screwed connections on flanges, valves and pressure vessels

All washers with identification. Avoid corrosion in the flange.

date of: 18.01.2021 | Rev.: 02

MMD Washers

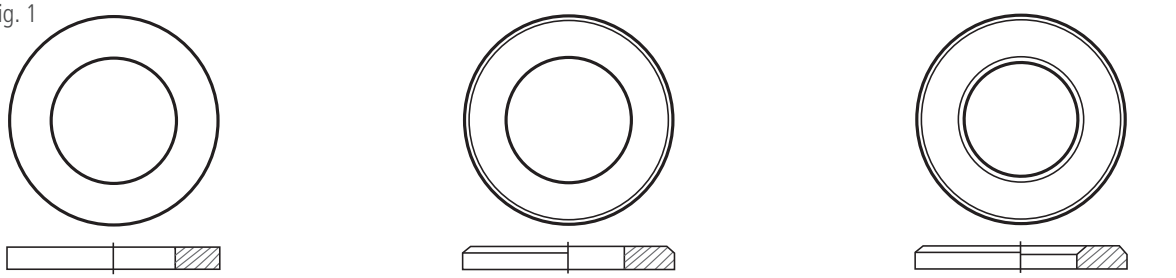
The usual use of washers is to protect surfaces and/or surface coatings. Often washers are used to create force transmission surfaces in case of bolt holes that are too large and in order to tightly fasten „soft" flange components.

VDI 2200:2007-07 requires in principle the use of washers (see paragraph 6.1).
According to ASME PCC-1-2010 the use is optional. For fastening components with low strength, washers with larger diameters can be used, e.g. according to ISO 7093-1+2 (ex DIN 9021 or ISO 7094 (ex DIN 440). Washers are available in various designs (Fig.1).

The use of standard washers ISO 7089 and 7090 (ex DIN 125) is common.
It is often better to use the HV washers EN 14399-6 (ex DIN 6916) because of their higher strength and greater thickness.
The use of surface-hardened washers should be avoided due to creep relaxation.
For this reason the MMD washers are through-hardened!

Shapes of MMD-W (MMD-washer)

Fig. 1



(DIN 125) ISO 7089 | (DIN 125) ISO 7090 | (DIN 6916) EN 14399-6

Washers without chamfer, with outer chamfer and with 2 chamfers (HV-U-discs)

Through-hardened - no creep relaxation

The identification on the MMD-W washer is outside the contact surface of the nut.

We manufacture washers made from customary bolt materials with detailed labeling. So, we close the gap to the requirements of Directive 97/23 / EC (PED). In contrast to usual washers (non-HV-washers) which are according to standards unmarked, our washers are labelled with regard to manufacturer's trademark, nominal size (metric / imperial), material and batch.
In addition to the usual dimensions of the various standards, we have developed the MMD-W with a larger outer diameter. This allows visible marking after installation and thus is a very useful method for installation inspection.

Marking:

The marking is made near the outer edge with the following information.
- Manufacturer's mark
- Nominal size of the thread in metric and/or inch
- Material identification
- Hardness HV
- Batch or batch designation (number of the production lot)

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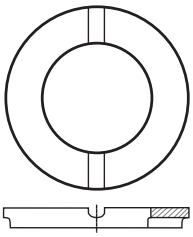
Washer shape: MMD-W-CP

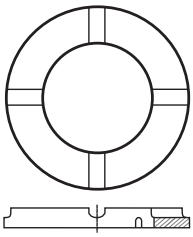
(MMD-washer-corrosion-protect)

MMD-W-CP is a washer with additional milled grooves for drainage, for use in horizontal flanges in outdoor installations or very humid environment. Depth of the milling cutout is 6.0 mm, width is 6.0 mm, radius is 3.0 mm.

The consequences of corrosion in horizontal flange connections are difficult or impossible to detect from the outside. Often, by corrosion protection a part of the screw shaft in the gap is protected, while corrosion at the screws in the holes remains undetected and severely damages the screw. The screws corrode particularly strongly in the screw holes of the lower flange.
Washers with drainage grooves can help here!



≤M48 / 1 7/8"



≤M52 / 2"

Marking of the MMD-W-CP as with MMD-W.

Identification of MMD-W-CP as for MMD-W.

Number of drainage grooves
M6 to M48 - 2 grooves per side
Top and bottom side offset by 90°
From M52 - 4 grooves per side
Top and bottom sides offset by 45°

Tolerances

According to DIN EN ISO 7089 or 7090

Marking:

The marking is made near the outer edge with the following information.
- Manufacturer's mark
- Nominal size of the thread in metric and/or inch
- Material identification
- Hardness HV
- Batch or batch designation (number of the production lot)

Assembly instruction

When mounting with torque methods, the side on which the drainage washer is inserted must only be locked, not turned or twisted. This is because the grooves have a negative influence on the coefficients of friction. The desired preload force would not be achieved.

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Dimensions

Overview of the dimensions of various washers and classification accordung to the thread nominal size					
Thread nominal size		Standard	Dimensions A) (nominal dimensions. tolerances according to respective standard. deviations to old standards in brackets)		
metric	imperial (inch)	old norms in brackets standard norm bold printed	Øinside mm	Øoutside mm	thickness mm
M6		**DIN EN ISO 7089 o. 7090 (DIN 125)** 1) Factory standard MMD-W Factory standard MMD-W-CP (drainage)	6.4 6.4 6.4	12 18 18	1.6 2.0 10
M8		**DIN EN ISO 7089 o. 7090 (DIN 125)** 1) Factory standard MMD-W Factory standard MMD-W-CP (drainage)	8.4 8.6 8.6	16 24 24	1.6 2 10
M10		**DIN EN ISO 7089 o. 7090 (DIN 125)** 1) Factory standard MMD-W Factory standard MMD-W-CP (drainage))	10.5 10.6 10.6	20 30 30	2.0 2 10
M12		**DIN EN ISO 7089 o. 7090 (DIN 125)** 1) Factory standard MMD-W Factory standard MMD-W-CP (drainage)	13 13 13	24 34 34	2.5 3 10
M14 2)	1/2"	**DIN EN ISO 7089 o. 7090 (DIN 125)** 1) Factory standard MMD-W Factory standard MMD-W-CP (drainage)	15 15 15	28 38 38	2.5 3 10
M16	5/8"	**DIN EN ISO 7089 o. 7090 (DIN 125)** 1) Factory standard MMD-W Factory standard MMD-W-CP (drainage)	17 17 17	30 40 40	3 3 10
M18 2)		**DIN EN ISO 7089 o. 7090 (DIN 125)** 1) Factory standard MMD-W Factory standard MMD-W-CP (drainage)	19 19 19	34 44 44	3 3 10
M20	3/4"	**DIN EN ISO 7089 o. 7090 (DIN 125)** 1) Factory standard MMD-W Factory standard MMD-W-CP (drainage)	21 21 21	37 47 47	3 3 10
M22 2)		**DIN EN ISO 7089 o. 7090 (DIN 125)** 1) Factory standard MMD-W Factory standard MMD-W-CP (drainage)	23 23 23	39 49 49	3 3 10
M24	7/8"	**DIN EN ISO 7089 o. 7090 (DIN 125)** 1) Factory standard MMD-W Factory standard MMD-W-CP (drainage)	25 25 25	44 54 54	4 4 10
M27 2)	1"	**DIN EN ISO 7089 o. 7090 (DIN 125)** 1) Factory standard MMD-W Factory standard MMD-W-CP (drainage)	28 28 28	50 60 60	4 4 10
M30	1 1/8"	**DIN EN ISO 7089 o. 7090 (DIN 125)** 1) Factory standard MMD-W Factory standard MMD-W-CP (drainage)	31 31 31	56 66 66	4 4 10
M33 2)	1 1/4"	**DIN EN ISO 7089 o. 7090 (DIN 125)** 1) Factory standard MMD-W Factory standard MMD-W-CP (drainage)	34 34.5 34.5	60 70 70	5 5 10
M36	1 3/8"	**DIN EN ISO 7089 o. 7090 (DIN 125)** 1) Factory standard MMD-W Factory standard MMD-W-CP (drainage))	37 37 37	66 76 76	5 5 10
M39 2)	1 1/2"	**DIN EN ISO 7089 o. 7090 (DIN 125)** 1) Factory standard MMD-W Factory standard MMD-W-CP (drainage)	42 (40) 41 41	72 82 82	6 6 10
M42	1 5/8"	**DIN EN ISO 7089 o. 7090 (DIN 125)** 1) Factory standard MMD-W Factory standard MMD-W-CP (drainage)	43 44 44	78 88 88	8 (7) 8 10
M45 2)	1 3/4"	**DIN EN ISO 7089 o. 7090 (DIN 125)** 1) WFactory standard MMD-W Factory standard MMD-W-CP (drainage)	48 (46) 48 48	85 95 95	8 (7) 8 10
M48	1 7/8"	**DIN EN ISO 7089 o. 7090 (DIN 125)** 1) Factory standard MMD-W Factory standard MMD-W-CP (drainage)	52 (50) 52 52	92 102 102	8 8 10

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Overview of the dimensions of various washers and classification accordung to the thread nominal size					
Thread nominal size		Standard	Dimensions [A] (nominal dimensions. tolerances according to respecti-ve standard. deviations to old standards in brackets)		
metric	imperial (inch)	old norms in brackets standard norm bold printed	Øinside mm	Øoutside mm	thickness mm
M52[2]	2"	**DIN EN ISO 7089 o. 7090 (DIN 125)** [1] Factory standard MMD-W Factory standard MMD-W-CP (drainage)	56 (54) 56 56	98 108 108	8 8 10
M56	2 1/4"	**DIN EN ISO 7089 o. 7090 (DIN 125)** [1] Factory standard MMD-W Factory standard MMD-W-CP (drainage)	62 (58) 60 60	105 105 105	10 (9) 10 10
M60[2]		**DIN EN ISO 7089 o. 7090 (DIN 125)** [1] Factory standard MMD-W Factory standard MMD-W-CP (drainage)	66 (62) 64 64	110 (105) 120 120	10 (9) 10 10
M64	2 1/2"	**DIN EN ISO 7089 o. 7090 (DIN 125)** [1] Factory standard MMD-W Factory standard MMD-W-CP (drainage)	70 (66) 68 68	115 125 125	10 (9) 10 10
M68		**DIN 125** Factory standard MMD-W Factory standard MMD-W-CP (drainage)	70 72 72	120 130 130	10 10 10
M72	2 3/4"	**DIN 125** Factory standard MMD-W Factory standard MMD-W-CP (drainage)	74 76 76	125 135 135	10 10 10
M76		**DIN 126** Factory standard MMD-W Factory standard MMD-W-CP (drainage)	78 80 80	125 135 135	10 10 10
M80	3"	**DIN 125** Factory standard MMD-W Factory standard MMD-W-CP (drainage)	82 84 84	140 150 150	12 12 12
-	3 1/4"	**ASME PCC-1-2010, Anhang M, Tab. M-4** Factory standard MMD-W Factory standard MMD-W-CP (drainage)	85.7 86 86	149.2 160 160	6.4 12 12
M82		**ASME PCC-1-2010, Anhang M, Tab. M-3** Factory standard MMD-W Factory standard MMD-W-CP (drainage)	88 86 86	145 160 160	6.0 12 12
M90	3 1/2"	**DIN 125** Factory standard MMD-W Factory standard MMD-W-CP (drainage)	93 94 94	160 170 170	12 12 12
-	3 3/4"	**ASME PCC-1-2010, Anhang M, Tab. M-4** Factory standard MMD-W Factory standard MMD-W-CP (drainage)	98.4 98 98	173.1 185 185	6.4 12 12
M95		**ASME PCC-1-2010, Anhang M, Tab. M-3** Factory standard MMD-W Factory standard MMD-W-CP (drainage)	101 99 99	165 185 185	6.0 12 12
M100	4"	**DIN 125** Factory standard MMD-W Factory standard MMD-W-CP (drainage)	104 104 104	175 180 180	14.0 12 12

[A] The most suitable washer with the smallest possible diameter was selected
[1] Washers according to DIN EN ISO 7089 are without chamfer, the washers according to DIN EN ISO 7090 have a chamfer, the dimension of the chamfer is either 1/4 or 1/2 of the thickness. These are the rules for the usual standard, they may be too small for flanges made of soft materials. Care must be taken to ensure sufficient strength.
[2] The general use of washers according to this standard is recommended by us. Due to the larger outside diameter, it must be checked whether there is sufficient space for the assembly.
[3] Sizes to be avoided according to the respective standard, but these are required for flanged joints.

Notes
1. washers according to DIN EN ISO 7089, DIN EN ISO 7090 and DIN EN ISO 7093-1 are available in the strength classes 200 HV (200 to 300 HV) and 300 HV (300 to 370 HV), stainless steel 200 HV (200 to 300 HV).
2. washers according to DIN 7989-1+2, DIN EN ISO 7091 and DIN EN ISO DIN 7093-2 have a strength class of 100 HV (100 to 200 HV) and are not suitable for use in flanged joints, or only for screws of lower strength class ≤ 6.8
3. washers according to DIN EN ISO 7093-1 are suitable for soft flange materials and/or too large bolt holes
4. if used for too large holes, check the thickness.

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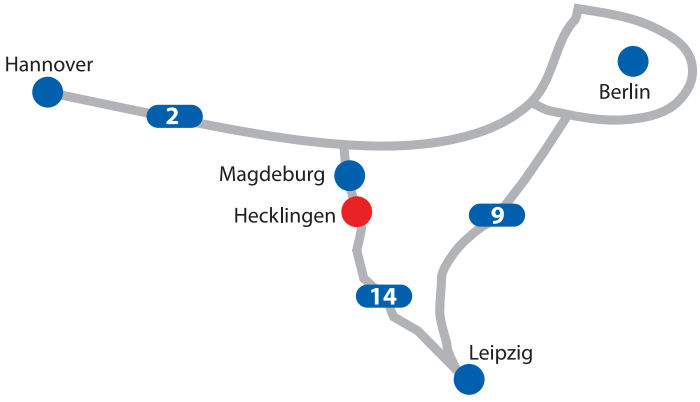
- all orders shipped within 24 hours
- fast assembly due to high fitting accuracy
- All gaskets are guaranteed Made in Germany!

Use our ...

- experience
- technologies
- designs and calculations
- trainings
- cooperation partners



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