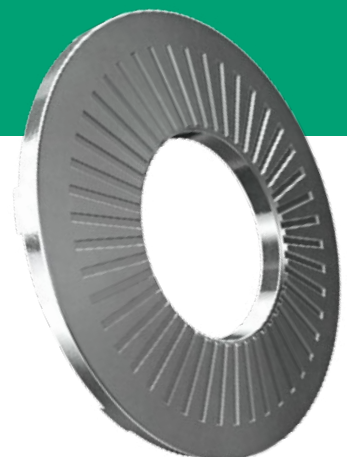




Conical Contact washers



Description

Growermetal's range of elastic conical Contact washers is designed to create an elastic pre-load in a bolted joint connection to reduce the risk of unwanted loosening.

Growermetal's Contact washers are the ideal product in applications requiring vibration resistance, with temperature variations and oversized or oval holes.

The combination of the conical geometry and radial ribs on the washer's upper surface provides high

resistance to loosening of the bolted connection, whilst avoiding damage to the bearing surface.

The broad range of Growermetal's elastic conical Contact washers includes washers that are ideal for applications with hexagonal bolt head screws, flanged bolt head, cylinder bolt head and oversized or oval holes.

Growermetal's Contact conical washers can be used with bolts of property class 6.8, 8.8 and 10.9.



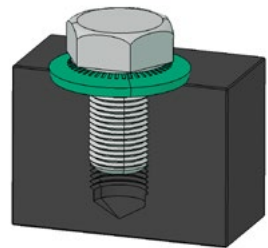
Materials

- Carbon steel C60 EN 10132, hardness 420–510 Hv 10 after heat-treatment (hardening and tempering).
- Stainless steel AISI 304 (Inox A2) EN 10088, N°1.4301 cold rolled at high resistance.
- Stainless steel AISI 316 (Inox A4) EN 10088, N°1.4401 cold rolled at high resistance.

Surface treatments

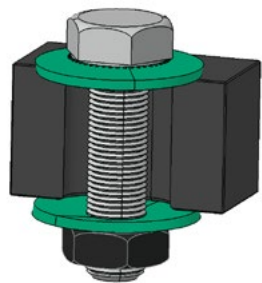
- Burnished with slightly protective oiling.
- Mechanical Zinc Plating DELTA-PROTEKT® and Geomet®.
- Other coatings upon customer request.





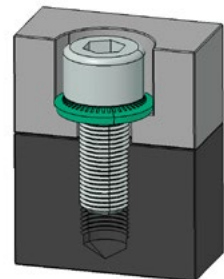
MEDIUM SERIES

Contact washer according to **NF E 25-511 M** standard.
To be used with hexagonal screw heads of resistance classes 8.8 and 10.9.



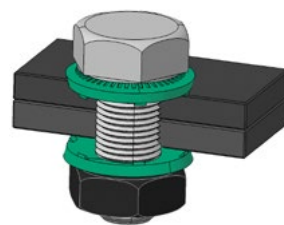
LARGE SERIES

Contact washer according to **NF E 25-511 L** standard.
To be used with oval bores and "soft" underlying surfaces (aluminium, plastic materials, etc.) with screws of resistance classes 6.8 e 8.8.



NARROW SERIES

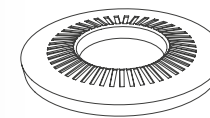
Contact washer according to **NF E 25-511 N** standard.
To be used with cylindrical screw head of resistance class ≤ 8.8 and applications with counter bores.



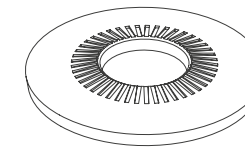
TOOTHED SERIES

Contact washer with teeth according to **SN 70093** Siemens standard.
Ideally suited for improving the electrical conductivity of the bolted joint connection.
The six teeth have to be directed towards the underlying surface in order to penetrate into the surface and facilitate the electrical conductivity. To be used with screws of resistance classes 6.8, 8.8 and 10.9.

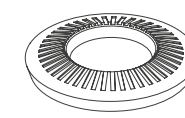
Dimensions and features



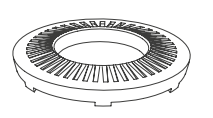
NF E 25-511 M
MEDIUM SERIES



NF E 25-511 L
LARGE SERIES



NF E 25-511 N
NARROW SERIES



SN 70093
TOOTHED SERIES

BOLT SIZE	INTERNAL DIAMETER MIN.-MAX.	EXTERNAL DIAMETER MIN.-MAX.	THICKNESS MIN.-MAX.	HEIGHT MIN.-MAX.	N° OF RIBS	KG/1000 PIECES	LOADING TEST [N]	RESIDUAL DEFLECTION AFTER LOADING TEST	N° PIECES STANDARD PACKAGING	N° PIECES BULK PACKAGING	N° PIECES MICRO PACKAGING
NF E 25-511 M (MEDIUM SERIES)											
M 3	3.10 - 3.35	7.71 - 8.29	0.57 - 0.63	0.80 - 1.00	28	0.180	2.400	0.15	2.000	60.000	500
M 4	4.10 - 4.40	9.71 - 10.29	0.86 - 0.94	1.15 - 1.40	32	0.430	4.200	0.15	2.000	25.000	500
M 5	5.10 - 5.40	11.65 - 12.35	1.06 - 1.14	1.45 - 1.80	36	0.720	6.800	0.20	1.000	15.000	200
M 6	6.10 - 6.40	13.65 - 14.35	1.26 - 1.34	1.75 - 2.10	45	1.150	9.500	0.25	1.000	10.000	200
M 8	8.20 - 8.56	17.65 - 18.35	1.36 - 1.44	1.90 - 2.35	45	2.000	17.500	0.35	1.000	5.000	100
M 10	10.20 - 10.56	21.58 - 22.42	1.55 - 1.65	2.25 - 2.75	45	3.600	27.500	0.45	1.000	3.000	100
M 12	12.40 - 12.83	26.58 - 27.42	1.75 - 1.85	2.60 - 3.10	45	6.010	40.000	0.60	500	1.750	50
M 14	14.40 - 14.83	29.58 - 30.42	2.34 - 2.46	3.20 - 3.70	45	9.700	55.000	0.60	250	1.000	
M 16	16.40 - 16.83	31.50 - 32.50	2.74 - 2.86	3.60 - 4.10	60	12.100	75.000	0.65	250	900	
M 20	20.50 - 21.02	39.50 - 40.50	3.14 - 3.26	4.30 - 4.90	60	22.100	100.000	0.70	100	500	
NF E 25-511 L (LARGE SERIES)											
M 3	3.10 - 3.35	9.65 - 10.35	0.57 - 0.63	0.95 - 1.20	28	0.325	2.400	0.25	2.000	30.000	500
M 4	4.10 - 4.40	13.65 - 14.35	0.96 - 1.04	1.40 - 1.80	32	1.102	4.200	0.30	2.000	13.000	500
M 5	5.10 - 5.40	15.65 - 16.35	1.16 - 1.24	1.70 - 2.10	36	1.568	6.800	0.35	1.000	6.500	200
M 6	6.10 - 6.40	17.65 - 18.35	1.36 - 1.44	2.10 - 2.50	45	2.466	9.500	0.40	1.000	5.000	200
M 8	8.20 - 8.56	21.58 - 22.42	1.55 - 1.65	2.20 - 2.70	45	3.760	17.500	0.50	1.000	3.000	200
M 10	10.20 - 10.56	26.58 - 27.42	1.75 - 1.85	2.60 - 3.10	45	6.938	27.500	0.70	500	1.750	100
M 12	12.40 - 12.83	31.50 - 32.50	1.95 - 2.05	3.10 - 3.60	45	10.694	40.000	0.90	250	1.100	50
NF E 25-511 N (NARROW SERIES)											
M 3	3.10 - 3.35	5.76 - 6.24	0.47 - 0.53	0.70 - 0.90	28	0.070	2.400	0.10	2.000	17.5000	500
M 4	4.10 - 4.40	7.71 - 8.29	0.77 - 0.83	1.00 - 1.20	32	0.200	4.200	0.12	2.000	45.000	500
M 5	5.10 - 5.40	9.71 - 10.29	0.96 - 1.04	1.25 - 1.50	36	0.400	6.800	0.15	1.000	25.000	500
M 6	6.10 - 6.40	11.65 - 12.35	1.16 - 1.24	1.55 - 1.85	45	0.707	9.500	0.20	1.000	12.500	500
M 8	8.20 - 8.56	15.65 - 16.35	1.36 - 1.44	1.80 - 2.20	45	1.500	17.500	0.25	1.000	7.000	200
M 10	10.20 - 10.56	19.58 - 20.42	1.55 - 1.65	2.10 - 2.60	45	2.640	27.500	0.35	1.000	3.500	200
M 12	12.40 - 12.83	23.58 - 24.42	1.75 - 1.85	2.40 - 2.90	45	4.350	40.000	0.40	500	2.000	100

BOLT SIZE	INTERNAL DIAMETER MIN.-MAX.	EXTERNAL DIAMETER MIN.-MAX.	THICKNESS MIN.-MAX.	HEIGHT MIN.-MAX.	N° OF RIBS	N° of teeth	KG/1000 PIECES	LOADING TEST [N]	RESIDUAL DEFLECTION AFTER LOADING TEST	N° PIECES STANDARD PACKAGING	N° PIECES BULK PACKAGING	N° PIECES MICRO PACKAGING
SN 70093 (TOOTHED SERIES)												
M 3	3.10 - 3.35	5.80 - 6.20	0.57 - 0.63	0.80 - 0.95	28	6	0.20 - 0.40	0.70 - 0.90	0.087	2.000	100.000	200
M 4	4.10 - 4.40	7.80 - 8.20	0.77 - 0.83	1.00 - 1.15	32	6	0.20 - 0.40	1.10 - 1.30	0.200	2.000	50.000	200
M 5	5.10 - 5.40	9.80 - 10.20	0.97 - 1.03	1.25 - 1.50	36	6	0.30 - 0.70	1.90 - 2.10	0.410	1.000	22.000	100
M 6	6.10 - 6.40	11.80 - 12.20	1.16 - 1.24	1.50 - 1.80	45	6	0.30 - 0.70	2.00 - 2.20	0.680	1.000	12.000	100
M 8	8.20 - 8.50	15.80 - 16.20	1.36 - 1.44	1.95 - 2.40	45	6	0.30 - 0.70	2.00 - 2.20	1.500	1.000	6.000	100
M 10	10.20 - 10.56	19.75 - 20.25	1.56 - 1.64	2.15 - 2.60	45	6	0.30 - 0.70	2.00 - 2.20	2.680	1.000	3.500	100
M 12	12.40 - 12.80	23.75 - 24.25	1.56 - 1.64	2.15 - 2.60	45	6	0.30 - 0.70	2.00 - 2.20	3.850	500	2.250	100
M 14	14.40 - 14.83	23.75 - 24.25	1.56 - 1.64	2.05 - 2.50	60	6	0.30 - 0.70	2.00 - 2.20	3.210	500	2.250	100
M 16	16.40 - 16.80	31.70 - 32.30	2.44 - 2.56	3.50 - 3.95	60	6	0.30 - 0.70	4.50 - 4.70	10.900	100	1.000	100
M 20	20.50 - 21.00	39.70 - 40.30	2.94 - 3.06	4.20 - 4.65	60	6	0.40 - 0.80	4.50 - 4.70	21.300	100	400	

TORQUE OF CONICAL CONTACT WASHERS NF E 25-511 M (MEDIUM SERIES) - MECHANICAL ZINC PLATED^A									
INTERNAL DIAMETER X EXTERNAL DIAMETER [MM]	BOLT SIZE	BOLT 8.8 ^B OILED		BOLT 8.8 ^B DRY		BOLT 10.9 ^C OILED		BOLT 10.9 ^C DRY	
		TORQUE [Nm]	LOAD ^D [KN]	TORQUE [Nm]	LOAD ^D [KN]	TORQUE [Nm]	LOAD ^D [KN]	TORQUE [Nm]	LOAD ^D [KN]
3.10 x 8.00	M 3	1.5	2.4	1.7	2.4	1.8	3.4	2.0	3.4
4.10 x 10.00	M 4	3.1	4.2	3.6	4.2	4.2	5.9	4.5	5.9
5.10 x 12.00	M 5	7.3	6.8	7.5	6.8	8.2	9.6	9	9.6
6.10 x 14.00	M 6	13	9.7	13.6	9.7	14	13.6	16.5	13.6
8.20 x 18.00	M 8	27	18	29	18	40	25	46	25
10.20 x 22.00	M 10	74	28	79	28	89	39	95	39
12.40 x 27.00	M 12	98	40	101	40	113	57	121	57
14.40 x 30.00	M 14	153	55	161	55	181	78	190	78
16.40 x 32.00	M 16	245	75	254	75	282	106	301	106
20.50 x 40.00	M 20	452	118	477	118	498	165	517	165

TORQUE OF CONICAL CONTACT WASHERS SN 70093 (TOOTHED SERIES) - MECHANICAL ZINC PLATED^A									
INTERNAL DIAMETER X EXTERNAL DIAMETER [MM]	BOLT SIZE	BOLT 8.8 ^B OILED		BOLT 8.8 ^B DRY		BOLT 10.9 ^C OILED		BOLT 10.9 ^C DRY	
		TORQUE [Nm]	LOAD ^D [KN]	TORQUE [Nm]	LOAD ^D [KN]	TORQUE [Nm]	LOAD ^D [KN]	TORQUE [Nm]	LOAD ^D [KN]
3.10 x 6.00	M 3	1.4	2.4	1.5	2.4	1.5	3.4	1.8	3.4
4.10 x 8.00	M 4	3.3	4.2	3.4	4.2	3.6	5.9	4.2	5.9
5.10 x 10.00	M 5	10.5	6.8	11	6.8	11.2	9.6	13	9.6
6.10 x 12.00	M 6	14	9.7	15.6	9.7	16	13.6	19	13.6
8.20 x 16.00	M 8	36	18	36	18	39	25	45	25
10.20 x 20.00	M 10	68	28	70	28	73	39	81	39
12.40 x 24.00	M 12	90	40	101	40	106	57	124	57
14.40 x 24.00	M 14	160	55	164	55	180	78	210	78
16.40 x 32.00	M 16	253	75	290	75	314	106	337	106
20.50 x 40.00	M 20	427	118	472	118	502	165	524	165

Dimensions in mm

Remarks

Test conditions according to ISO 16047, bearing surface hardness 200-250 Hv, roughness Ra 0.6 uncoated and degreased.

^A Mechanical zinc plating 11-13my + passivation Cr6 free.

^B Bolt class 8.8 DIN 931 / DIN 933 uncoated + Nut DIN 934 uncoated, coarse pitch thread.

^C Bolt class 10.9 DIN 931 / DIN 933 uncoated + Nut DIN 934 uncoated, coarse pitch thread.

^D 75% of nominal yield point (stress at 0.2% non-proportional elongation Rp0,2) according to ISO 898-1.

The abovementioned information, which has been obtained following empirical laboratory tests, are to be considered as a mere information, provided by Growermetal S.p.A. at the sole purpose to improve the assembling of the product. Growermetal S.p.A. refuses any responsibility related to the terms of use of the product, which fall under the single user's responsibility.

Our Products

Over **4.500** standard washers according to DIN, ASME, NFE and other international standards.

More than **2.500** special items manufactured according to customer's specifications or drawings.



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RIBBED CONICAL ELASTIC WASHERS

COILED SPRING WASHERS

COILED SPRING WASHERS FOR RAILWAY TRACKS

CONVEXED AND CORRUGATED ELASTIC WASHERS

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ELECTRIC TERMINAL WASHERS

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WEDGE-LOCK WASHERS

SPECIAL PRODUCTS ACCORDING TO CUSTOMER DRAWING

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Growermetal

Around ideas



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