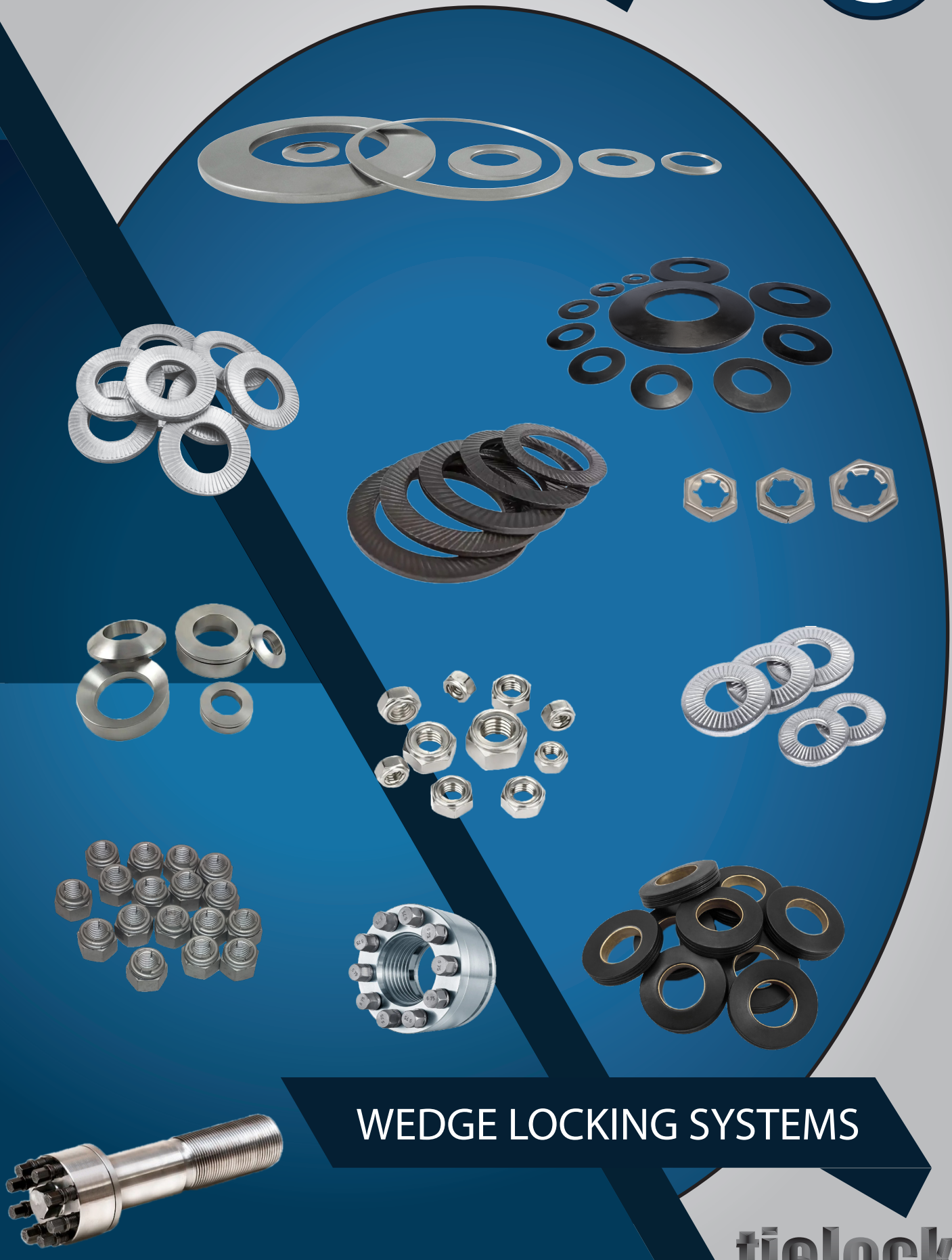
INNOVATIVE

TECHNOLOGY

TWIN WASHERS®



WEDGE LOCKING SYSTEMS

tielock®

TIEIG® Industrial Products GmbH

ABOUT US

Since its establishment, our company has been serving with expert engineers in tiespring® Disc Springs (DIN 2093), Industrial Maintenance Chemicals and Special Connection Component, as well as tielock® Twin Washers (DIN 25201), tiechem® Metal Adhesives (Aluminum & Stainless Steel), tienut® Special Nuts and Washers.
By making engineering calculations on disc spring, we support you in choosing the appropriate disc springs. We strive to carry forward the philosophy of customer satisfaction and the right product supply every day by taking advantage of all the opportunities offered by the latest technology. We will never give up on our principles as a company that believing importance of quality since the first years of its establishment and has been serving the world in the service sector in a short time and has become a sought and known brand in the international market thanks to its determination to achieve the challenge.

VISION

Our VISION, which expresses the future that our company wants to establish and the point that our company aims to reach is our products Disc Spring, Metal Adhesives and Twin Washers to become products used in every project as well as being a quality, reliable and known company with our own brands all over the world.

MISSION

Our mission is defining the reason for the existence of our company and what values are produced for our customers to promote our brands tiespring® Tie Spring, tiechem® Tie Chem and tielock® Twin Washer by satisfying our customers at every step they need to be supported. To ensure the use of our products in all projects in the world and to analyse the needs of our customers in the best way so we can provide our products and services

ISO 14001:2015 ISO 9001:2015



tielock®
tiespring®
tiechem®
tiebolt®
tienut®
tieinox®
tiemarine®

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DIN 25201 - SELF LOCKING WASHER tielock ®

Features and Applications

TWIN WASHERS® has developed a unique security system using tension method instead of friction. DIN 25201 is a norm of wedge-lock system. TWIN WASHERS® cam height is greater than the bolt pitch. In addition, there are radial teeth on the opposite side. The both cams are faced each other. Radial teeth are used under the bolt and the connection surface.



TWIN WASHERS® are tightened under the bolt and/or nut. TWIN WASHERS® loosening happens too little through angle differences and wedge effect blocks it. Even a very low torque when tightening the bolt connection and it creates a wedge effect which can provide to be blocked connection.

Advantages

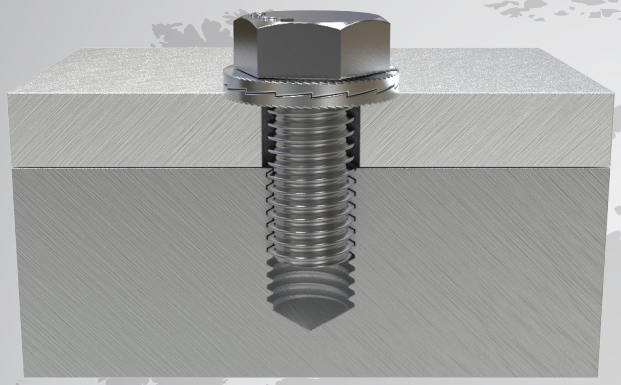
TWIN WASHERS® security system uses geometrically to lock bolted connections in the most critical applications. This offers a unique wedgelocking system following advantages:

- Providing maximum safety,
- Provides superior resistance to loosening due to vibration and dynamic loads,
- Ease of assembly and disassembly,
- The locking function is not affected by lubrications,
- Low and high preloads positive locking,
- Preload Control,
- The same temperature characteristics as standard nut & bolt,
- Reusability.

How is resistant to be removed?

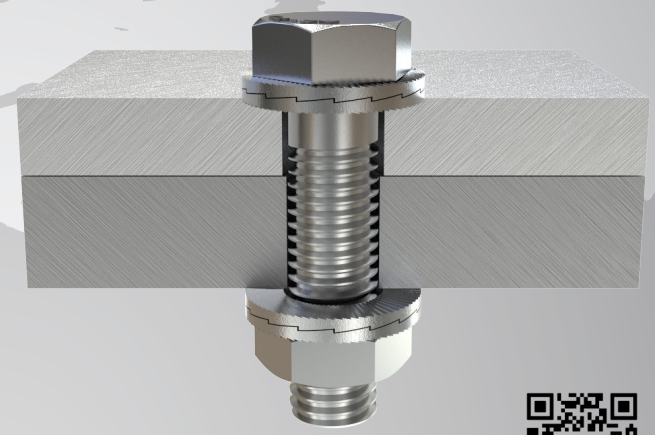
Cam angle of TWIN WASHERS® “a” is greater than the thread pitch angle “b”. Both of slope angles are different. Since angle of the double washer system is larger than thread angle, for this reason it displays extra resistance to removing.
When the TWIN WASHERS® exposed to extreme vibration or dynamic loads bolt creates a wedge effect on the connection.

DIN 25201 -TWIN WASHERS STAINLESS STEEL SERIES



Tapped Holes

TWIN WASHERS® safely lock the bolt against the underlying surface.



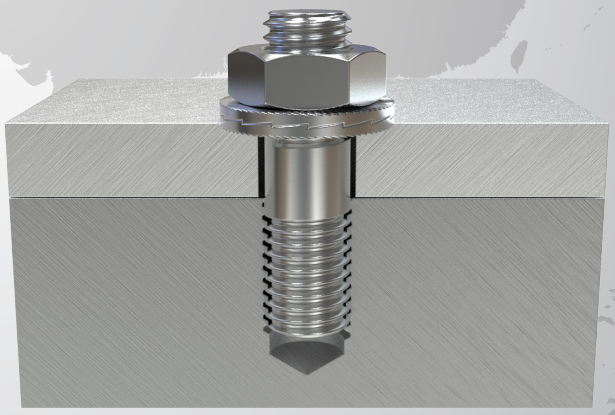
Through Holes

Through holes require two pairs of TWIN WASHERS® - one pair for securing the bolt and one pair for securing the nut.



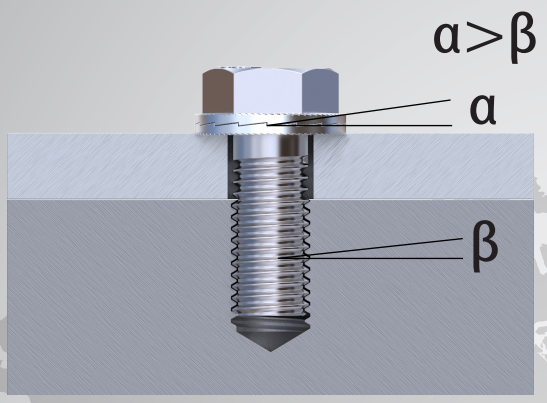
Counter Bores

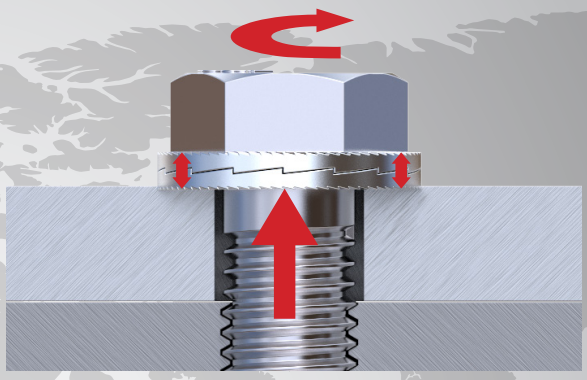
The outer diameter of regular TWIN WASHERS® is designed for counter-bore holes according to DIN 974.



Stud Bolts

TWIN WASHERS® safely lock the nut on stud bolts and eliminate the need for adhesives.





Pre-glued

Twin washers® are pre-glued in pairs upon delivery to facilitate first time mounting. The glue will no longer be effective after first use.

Reused

It is possible to reuse Twin washers®. Visually inspect the cams and serrations for obvious defects before re-installation.
Make sure the washers are installed in pairs, cam face to cam face. Reusability depends on conditions of use.
Please notethat the Lifetime Warranty is not applicable during reuse.

Thread

Twin washers® are designed for Metric/UNC coarse pitch threads.
They can also be used with fine pitch threads (Metric/UNC), but the increased difference in pitch between the thread and the washer needs to be considered.
Higher difference in pitch leads to higher tension load and required torque during untightening.
This can lead to exceeding the elastic limit of the bolt.
Make sure the washers are installed in pairs, cam face to cam face.
Reusability depends on conditions of use. Please note that the Lifetime Warranty is not applicable during reuse.

Functional Principles

The Twin washers® System is a pre-assembled pair of washers that have inclined clams on the inside and radial teeth/ridges on the opposite sides.

Tightening of the bolt and/or nut leads to a gripping action of the teeth thus seating the surfaces. Tightening locks the Heico-Lock washers in place. Movement is only possible across the face of the cams. Working together, both sides of the lock washers combine into a fastening system that prevents loosening of joints by shock and vibration.

-A high quality, high value bolt securing system for demanding bolted fastening applications
-A certified fastening system, working at low and high preload levels.
-A bolt securing system providing exceptional resistance to vibration loosening and dynamic loads- safe in both dry and lubricated conditions.
-Consistent reusability without loss of function and quality Ease of assembly and disassembly (already pre-assembled pair of washers)
-Working with structural grade and high tensile bolts and nuts (8.8, 10.9 an 12.9) Readily available in steel and stainless steel - other materials available on request
-Available in two versions - standard and enlarged outside diameters.

DIN 25201 - SELF LOCKING WASHER tielock ®
Steel Series

Material / Werkstoff: EN 1.7182 or equiualont alloy
Hardness / Härte: 420-490 HV
Coating / Beschichtung: White Zinc Plated
Self-Locking Washer / Keilsicherungsscheibe



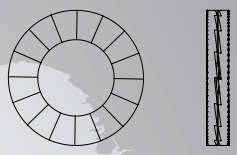
Product Code	Screw Size	Washer Size	Dimension in mm Abmessungen in mm			Min. package	weight/kg per 100 pcs
Produkt	Schraubengröße	Scheibe Größe	Inner Diameter	Outer Diameter	Thickness	pairs	Gewicht/kg pro 100 stück
1994	M3	TW3	3,4	7,0	1,8	200	0,03
1995	M3,5	TW3,5	3,9	7,6	1,8	200	0,04
1996		TW3,5sp	3,9	9,0	1,8	200	0,06
1997	M4	TW4	4,4	7,6	1,8	200	0,04
1998		TW4sp	4,4	9,0	1,8	200	0,06
1999	M5	TW5	5,4	9,0	1,8	200	0,05
2000		TW5sp	5,4	10,8	1,8	200	0,11
2001	M6	TW6	6,5	10,8	1,8	200	0,07
2002		TW6sp	6,5	13,5	2,5	200	0,20
2005	M8	TW8	8,7	13,5	2,5	200	0,15
2006		TW8sp	8,7	16,6	2,5	200	0,28
2009	M10	TW10	10,7	16,6	2,5	200	0,22
2010		TW10sp	10,7	21,0	2,5	200	0,47
2011	M11	TW11	11,4	18,5	2,5	200	0,29
2012	M12	TW12	13,0	19,5	2,5	200	0,29
2013		TW12sp	13,0	25,4	3,4	100	0,93
2016	M14	TW14	15,2	23,0	3,4	100	0,56
2017		TW14sp	15,2	30,7	3,4	100	1,41
2018	M16	TW16	17,0	25,4	3,4	100	0,67
2019		TW16sp	17,0	30,7	3,4	100	1,28
2020	M18	TW18	19,5	29,0	3,4	100	0,85
2023		TW18sp	19,5	34,5	3,4	100	1,58
2024	M20	TW20	21,4	30,7	3,4	100	0,95
2025		TW20sp	21,4	39,0	3,4	100	2,03
2026	M22	TW22	23,4	34,5	3,4	100	1,29
2027		TW22sp	23,4	42,0	4,6	50	3,31
2028	M24	TW24	25,3	39,0	3,4	100	1,68
2031		TW24sp	25,3	48,5	4,6	50	4,51
2032	M27	TW27	28,4	42,0	5,8	50	3,29
2033		TW27sp	28,4	48,5	5,8	25	5,39
2034	M30	TW30	31,4	47,0	5,8	50	4,20
2035		TW30sp	31,4	58,5	6,6	25	8,96
2036	M33	TW33	34,4	48,5	5,8	25	3,97
2037		TW33sp	34,4	58,5	6,6	25	8,31
2038	M36	TW36	37,4	55,0	5,8	25	5,59
2039		TW36sp	37,4	63,0	6,6	25	9,15
2040	M39	TW39	40,4	58,5	5,8	25	6,28
2041	M42	TW42	43,2	63,0	5,8	25	7,47
2042	M45	TW45	46,2	70,0	7,0	25	10,20
2043	M48	TW48	49,6	75,0	7,0	25	12,00
2044	M52	TW52	53,6	80,0	7,0	25	13,00
2045	M56	TW56	59,1	85,0	7,0	10	13,50

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DIN 25201 - SELF LOCKING WASHER tielock ®
Stainless Steel Series 316L A4

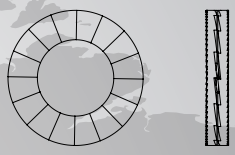
Material / Werkstoff: EN 1.4404 or equiualont alloy
Hardness / Härte: 480-520 HV
Coating / Beschichtung: Stainless Steel Series 316L A4
Self-Locking Washer / Keilsicherungsscheibe



Product Code	Screw Size	Washer Size	Dimension in mm Abmessungen in mm			Min. package	weight/kg per 100 pcs
Produkt	Schraubengröße	Scheibe Größe	Inner Diameter	Outer Diameter	Thickness	pairs	Gewicht/kg pro 100 stück
2062	M3	TW3ss	3,4	7,0	2,2	200	0,04
2063	M3,5	TW3,5ss	3,9	7,6	2,2	200	0,04
2064		TW3,5spss	3,9	9,0	2,2	200	0,07
2065	M4	TW4ss	4,4	7,6	2,2	200	0,04
2066		TW4spss	4,4	9,0	2,2	200	0,07
2067	M5	TW5ss	5,4	9,0	2,2	200	0,06
2068		TW5spss	5,4	10,8	2,2	200	0,11
2069	M6	TW6ss	6,5	10,8	2,2	200	0,09
2070		TW6spss	6,5	13,5	2,0	200	0,16
2073	M8	TW8ss	8,7	13,5	2,0	200	0,12
2074		TW8spss	8,7	16,6	2,0	200	0,22
2077	M10	TW10ss	10,7	16,6	2,0	200	0,18
2078		TW10spss	10,7	21,0	2,0	200	0,37
2079	M11	TW11ss	11,4	18,5	2,2	200	0,26
2080	M12	TW12ss	13,0	19,5	2,0	200	0,23
2081		TW12spss	13,0	25,4	3,0	100	0,82
2084	M14	TW14ss	15,2	23,0	3,0	100	0,49
2085		TW14spss	15,2	30,7	3,2	100	1,31
2086	M16	TW16ss	17,0	25,4	3,0	100	0,59
2087		TW16spss	17,0	30,7	3,2	100	1,13
2088	M18	TW18ss	19,5	29,0	3,2	100	0,80
2089		TW18spss	19,5	34,5	3,2	100	1,56
2092	M20	TW20ss	21,4	30,7	3,0	100	0,82
2093		TW20spss	21,4	39,0	3,2	100	2,06
2094	M22	TW22ss	23,4	34,5	3,2	100	1,23
2095		TW22spss	23,4	42,0	3,2	50	2,23
2096	M24	TW24ss	25,3	39,0	3,2	100	1,52
2097		TW24spss	25,3	48,5	3,2	50	3,50
2100	M27	TW27ss	28,4	42,0	6,8	50	3,45
2101		TW27spss	28,4	48,5	6,8	25	5,85
2102	M30	TW30ss	31,4	47,0	6,8	50	4,43
2103		TW30spss	31,4	58,5	6,8	25	9,53
2104	M33	TW33ss	34,4	48,5	6,8	25	4,25
2105	M36	TW36ss	37,4	55,0	6,8	25	5,96
2106	M39	TW39ss	40,4	58,5	6,8	25	6,74
2107	M42	TW42ss	43,2	63,0	5,8	25	7,96
2108	M45	TW45ss	46,2	70,0	7,0	25	10,20
2109	M48	TW48ss	49,6	75,0	7,0	25	12,00
2110	M52	TW52ss	53,6	80,0	7,0	1	20,10
2111	M56	TW56ss	59,1	85,0	7,0	1	21,30

DIN 25201 - SELF LOCKING WASHER tielock ®
Stainless Steel Series 254-SMO

Material / Werkstoff: EN 1.4547 or equiualont alloy
Hardness / Härte: > 600 HV
Coating / Beschichtung: Stainless Steel Series 254-SMO
Self-Locking Washer / Keilsicherungsscheibe



Product Code	Screw Size	Washer Size	Dimension in mm Abmessungen in mm			Min. package	weight/kg per 100 pcs
Produkt	Schraubengröße	Scheibe Größe	Inner Diameter	Outer Diameter	Thickness	pairs	Gewicht/kg pro 100 stück
2201	M3	TW3ss-254	3,4	7,0	2,2	200	0,04
2202	M3,5	TW3,5ss-254	3,9	7,6	2,2	200	0,04
2203		TW3,5spss-254	3,9	9,0	2,2	200	0,07
2204	M4	TW4ss-254	4,4	7,6	2,2	200	0,04
2205		TW4spss-254	4,4	9,0	2,2	200	0,07
2206	M5	TW5ss-254	5,4	9,0	2,2	200	0,06
2207		TW5spss-254	5,4	10,8	2,2	200	0,11
2208	M6	TW6ss-254	6,5	10,8	2,2	200	0,09
2209		TW6spss-254	6,5	13,5	2,0	200	0,16
2210	M8	TW8ss-254	8,7	13,5	2,0	200	0,12
2211		TW8spss-254	8,7	16,6	2,2	200	0,22
2212	M10	TW10ss-254	10,7	16,6	2,0	200	0,18
2213		TW10spss-254	10,7	21,0	2,2	200	0,37
2214	M11	TW11ss-254	11,4	18,5	2,2	200	0,26
2215	M12	TW12ss-254	13,0	19,5	2,0	200	0,23
2216		TW12spss-254	13,0	25,4	3,2	100	0,83
2217	M14	TW14ss-254	15,2	23,0	3,0	100	0,49
2218		TW14spss-254	15,2	30,7	3,2	100	1,13
2219	M16	TW16ss-254	17,0	25,4	3,0	100	0,59
2220		TW16spss-254	17,0	30,7	3,2	100	1,13
2221	M18	TW18ss-254	19,5	29,0	3,2	100	0,80
2222		TW18spss-254	19,5	34,5	3,2	100	1,56
2223	M20	TW20ss-254	21,4	30,7	3,0	100	0,83
2224		TW20spss-254	21,4	39,0	3,2	100	1,98
2225	M22	TW22ss-254	23,4	34,5	3,2	100	1,19
2226		TW22spss-254	23,4	42,0	3,2	50	2,44
2227	M24	TW24ss-254	25,3	39,0	3,2	100	1,65
2228		TW24spss-254	25,3	48,5	4,5	50	4,47
2229	M27	TW27ss-254	28,4	42,0	5,8	50	3,10
2230		TW27spss-254	28,4	48,5	5,8	25	5,34
2231	M30	TW30ss-254	31,4	47,0	5,8	50	4,04
2233	M33	TW33ss-254	34,4	48,5	5,8	25	3,86
2234	M36	TW36ss-254	37,4	55,0	5,8	25	5,50
2235	M39	TW39ss-254	40,4	58,5	5,8	25	6,74

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TWIN WASHERS TORQUE GUIDE

Bolt Grade 8.8 Steel Washers — Twin Washers® Steel Series

Washer Size	Bolt Size	Pitch (mm)	Oil, GF=75% μth= 0,15, μh= 0,19		Cu/C paste, GF=75% μth = 0,13, μh = 0,18	
			Torque [Nm]	Clamp load [kN]	Torque [Nm]	Clamp load [kN]
TW3	M3	0,5	1,7	2,4	1,5	2,4
TW4	M4	0,7	3,8	4,2	3,6	4,2
TW5	M5	0,8	7,5	6,8	6,9	6,8
TW6	M6	1,0	13	9,7	12,1	9,7
TW8	M8	1,25	32	18	29	18
TW10	M10	1,5	62	28	57	28
TW12	M12	1,75	107	40	99	40
TW14	M14	2,0	170	55	157	55
TW16	M16	2,0	260	75	240	75
TW18	M18	2,5	364	92	336	92
TW20	M20	2,5	510	118	470	118
TW22	M22	2,5	696	146	642	146
TW24	M24	3,0	878	169	809	169
TW27	M27	3,0	1284	221	1183	221
TW30	M30	3,5	1750	269	1613	269

*with electro zinc plated bolt

Bolt Grade 10.9 Steel Washers — Twin Washers® Steel Series

Washer Size	Bolt Size	Pitch (mm)	Oil, GF=75% μth= 0,15, μh= 0,19		Cu/C paste, GF=75% μth = 0,13, μh = 0,18	
			Torque [Nm]	Clamp load [kN]	Torque [Nm]	Clamp load [kN]
TW3	M3	0,5	1,7	2,4	1,5	2,4
TW4	M4	0,7	3,8	4,2	3,6	4,2
TW5	M5	0,8	7,5	6,8	6,9	6,8
TW6	M6	1,0	13	9,7	12,1	9,7
TW8	M8	1,25	32	18	29	18
TW10	M10	1,5	62	28	57	28
TW12	M12	1,75	107	40	99	40
TW14	M14	2,0	170	55	157	55
TW16	M16	2,0	260	75	240	75
TW18	M18	2,5	364	92	336	92
TW20	M20	2,5	510	118	470	118
TW22	M22	2,5	696	146	642	146
TW24	M24	3,0	878	169	809	169
TW27	M27	3,0	1284	221	1183	221
TW30	M30	3,5	1750	269	1613	269

*with non plated bolt

Bolt Grade 12.9 Steel Washers — Twin Washers® Steel Series

Washer Size	Bolt Size	Pitch (mm)	Oil, GF=75% μth= 0,15, μh= 0,19		Cu/C paste, GF=75% μth = 0,13, μh = 0,18	
			Torque [Nm]	Clamp load [kN]	Torque [Nm]	Clamp load [kN]
TW3	M3	0,5	1,7	2,4	1,5	2,4
TW4	M4	0,7	3,8	4,2	3,6	4,2
TW5	M5	0,8	7,5	6,8	6,9	6,8
TW6	M6	1,0	13	9,7	12,1	9,7
TW8	M8	1,25	32	18	29	18
TW10	M10	1,5	62	28	57	28
TW12	M12	1,75	107	40	99	40
TW14	M14	2,0	170	55	157	55
TW16	M16	2,0	260	75	240	75
TW18	M18	2,5	364	92	336	92
TW20	M20	2,5	510	118	470	118
TW22	M22	2,5	696	146	642	146
TW24	M24	3,0	878	169	809	169
TW27	M27	3,0	1284	221	1183	221
TW30	M30	3,5	1750	269	1613	269

*with non plated bolt

Bolt A2-70 /A2-80 Stainless Steel Washers — Twin Washers® Stainless Steel Series

Washer Size	Bolt Size	Pitch (mm)	Oil, GF=75% μth= 0,15, μh= 0,19		Cu/C paste, GF=75% μth = 0,13, μh = 0,18	
			Torque [Nm]	Clamp load [kN]	Torque [Nm]	Clamp load [kN]
TW3	M3	0,5	1,7	2,4	1,5	2,4
TW4	M4	0,7	3,8	4,2	3,6	4,2
TW5	M5	0,8	7,5	6,8	6,9	6,8
TW6	M6	1,0	13	9,7	12,1	9,7
TW8	M8	1,25	32	18	29	18
TW10	M10	1,5	62	28	57	28
TW12	M12	1,75	107	40	99	40
TW14	M14	2,0	170	55	157	55
TW16	M16	2,0	260	75	240	75
TW18	M18	2,5	364	92	336	92
TW20	M20	2,5	510	118	470	118
TW22	M22	2,5	696	146	642	146
TW24	M24	3,0	878	169	809	169
TW27	M27	3,0	1284	221	1183	221
TW30	M30	3,5	1750	269	1613	269

Twin Washers® stainless steel washers with stainless steel bolt, lubricated with copper/graphite paste (Sogelub®).

TIEIG Industrial Products GmbH

DIN 2093 SPRING WASHERS tiespring ®

Features and Applications

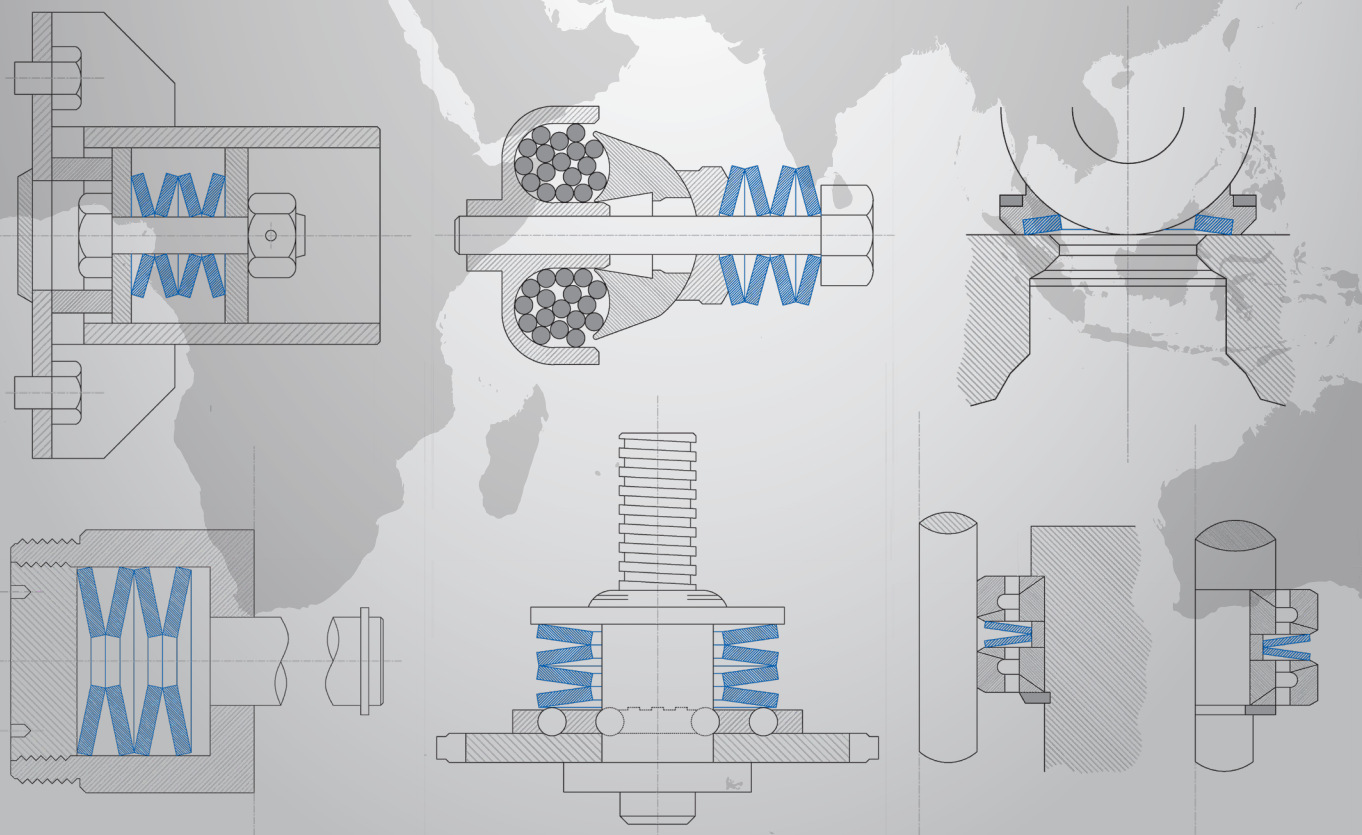
Disc Springs are conically formed angular discs, which are loaded in the axial direction. Disc Springs have a unique combination of high force in small space with customized deflection combinations.

Disc Springs offer a well-developed solution to many engineering problems. Disc Springs can be used as single disc or arranged in stacks. A Disc Spring stack can consist of disc springs either used in Series or Parallel sets. Disc Springs are available with or without contact flats.



Advantages of Disc Springs:

- No Deformation or Fatigue under normal loads.
- High Energy Storage Capacity.
- Long Service Life.
- Stock keeping is minimized as the individual spring sizes can be combined universally.
- Space Saving.
- Largely Self-damping, giving good shock absorption and energy dissipation.
- Efficient use of space and high spring force with small deflections.
- Adaptable to stacking in numerous configurations.
- Combination use as a modular spring element.
- Low Maintenance cost & Greater Security
- Low height/thickness ratio employed reduces stresses



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DIN 2093 SPRING WASHERS tiespring ®

GROUP-1 - Thickness t < 1.25mm

Material / Werkstoff: Spring Steel
Hardness / Härte: 420-520 HV
Coating / Beschichtung: Phosphate & Oil Finish.
Spring Washers / Unterlegscheiben DIN 2093



Product Code	Dimension in mm Abmessungen in mm			
Produkt	Outer Diameter	Inner Diameter	Material Thickness	Total Thickness
100010	8	3,20	0,30	0,55
100020			0,40	0,60
100030			0,50	0,70
100040		4,20	0,20	0,45
100050			0,30	0,55
100060			0,40	0,60
100070	10	3,20	0,30	0,65
100080			0,40	0,70
100090			0,50	0,85
100100		4,20	0,40	0,70
100110			0,50	0,75
100120			0,60	0,85
100130		5,20	0,25	0,55
100140			0,40	0,70
100150			0,50	0,75
100160	12	4,20	0,40	0,80
100170			0,50	0,90
100180			0,60	1,00
100190		5,20	0,50	0,90
100200			0,60	0,95
100210		6,20	0,50	0,85
100220			0,60	0,95
100230	12,50	6,20	0,35	0,80
100240			0,50	0,85
100250			0,70	1,00
100260	14	7,20	0,35	0,80
100270			0,50	0,90
100280			0,80	1,10

Product Code	Dimension in mm Abmessungen in mm			
Produkt	Outer Diameter	Inner Diameter	Material Thickness	Total Thickness
100290	15	5,20	0,40	0,95
100300			0,50	1,00
100310			0,60	1,05
100320			0,70	1,25
100330		6,20	0,50	1,00
100340			0,60	1,05
100350			0,70	1,10
100360		8,20	0,70	1,10
100370			0,80	1,20
100380	16	8,20	0,40	0,90
100390			0,60	1,05
100400			0,90	1,25
100410	18	6,20	0,40	1,00
100420			0,50	1,10
100430			0,60	1,20
100440			0,70	1,40
100450			0,80	1,50
100460		8,20	0,70	1,25
100470			0,80	1,30
100480			1,00	1,50
100490		9,20	0,45	1,05
100500			0,70	1,20
100510			1,00	1,40
100520	20	8,20	0,50	1,15
100530			0,60	1,30
100540			0,70	1,35
100550			0,80	1,40
100560			0,90	1,50

Product Code	Dimension in mm Abmessungen in mm			
Produkt	Outer Diameter	Inner Diameter	Material Thickness	Total Thickness
100570	20	8,20	1,00	1,60
100580		10,20	0,40	0,90
100590			0,50	1,15
100600			0,80	1,35
100610			0,90	1,45
100620			1,00	1,55
100630			1,10	1,55
110631			1,50	1,75
100640	22,5	11,20	0,60	1,40
100650			0,80	1,45
100660	23	8,20	0,70	1,50
100670			0,80	1,55
100680			0,90	1,70
100690		10,20	0,90	1,65
100700			1,00	1,70
100710		12,20	1,00	1,60
100720	25	12,20	0,70	1,60
100730			0,90	1,60
100740	28	10,20	0,80	1,75
100750			1,00	2,00
100760		12,20	1,00	1,95
100770		14,20	0,80	1,80
100780			1,00	1,80
100790	31,5	16,30	0,80	1,85
100800	34	12,30	1,00	2,20
100810	35,5	18,30	0,90	2,05
100820	40	20,40	1,00	2,30

DIN 2093 SPRING WASHERS tiespring ®
GROUP-2 - Thickness t = 1.25 to 6mm

Material / Werkstoff: Spring Steel
Hardness / Härte: 420-520 HV
Coating / Beschichtung: Phosphate & Oil Finish.
Spring Washers / Unterlegscheiben DIN 2093



Product Code	Dimension in mm Abmessungen in mm			
Produkt	Outer Diameter	Inner Diameter	Material Thickness	Total Thickness
200010	22,5	11,20	1,25	1,75
200020	23	12,20	1,25	1,85
200030			1,50	2,10
200035	25	12,20	1,25	1,95
200040			1,50	2,05
200065			2,00	2,15
200050	28	10,20	1,25	2,25
200060			1,50	2,20
200070		12,20	1,25	2,10
200080			1,50	2,25
200090		14,20	1,25	2,10
200100			1,50	2,15
200110	31,5	16,30	1,25	2,15
200120			1,50	2,40
200130			1,75	2,45
200140			2,00	2,75
200150	34	12,30	1,25	2,45
200160			1,50	2,70
200170		14,30	1,25	2,40
200180			1,50	2,55
200190		16,30	1,50	2,55
200200			2,00	2,85
200210	35,5	18,30	1,25	2,25
200220			2,00	2,80
200230	40	14,30	1,25	2,65
200240			1,50	2,80
200250			1,75	3,05
200260			2,00	3,05
200270		16,30	1,50	2,80
200280			1,75	3,10
200290			2,00	3,10
200300		18,30	2,00	3,15

Product Code	Dimension in mm Abmessungen in mm			
Produkt	Outer Diameter	Inner Diameter	Material Thickness	Total Thickness
200310	40	20,40	1,50	2,65
200320			2,00	3,10
200330			2,25	3,15
200340			2,50	3,45
200350	45	22,40	1,25	2,85
200360			1,75	3,05
200370			2,50	3,50
200380	48	16,30	1,50	3,00
200390	50	18,40	1,25	2,85
200400			1,50	3,15
200410			2,00	3,65
200420			2,50	4,15
200430			3,00	4,20
200440		20,40	2,00	3,50
200450			2,50	3,85
200460		22,40	2,00	3,60
200470			2,50	3,90
200480		25,40	1,25	2,85
200490			1,50	3,10
200500			2,00	3,40
200510			2,25	3,75
200520			2,50	3,90
200530			3,00	4,10
200540	56	28,50	1,50	3,45
200550			2,00	3,60
200560			2,50	4,20
200570			3,00	4,30
200580	60	20,50	2,00	4,20
200590			2,50	4,70
200600			3,00	5,20
200610		25,50	2,50	4,40
200620			3,00	4,65

Product Code	Dimension in mm Abmessungen in mm			
Produkt	Outer Diameter	Inner Diameter	Material Thickness	Total Thickness
200630	60	30,50	2,50	4,50
200640			2,75	4,75
200650			3,00	4,70
200660			3,50	5,00
200670	63	31,00	1,80	4,15
200680			2,50	4,25
200690			3,00	4,70
200700			3,50	4,90
200710	70	24,50	3,00	5,30
200720			3,50	6,00
200730		25,50	2,00	4,50
200740		30,50	2,50	4,90
200750			3,00	5,10
200760		35,50	3,00	5,10
200770			3,50	5,30
200780			4,00	5,80
200790			3,75 (t')	5,80
200800		40,50	4,00	5,70
200810			3,75 (t')	5,70
200820			5,00	6,40
200830			4,70 (t')	6,40
200840	71	36,00	2,00	4,60
200850			2,50	4,50
200860			4,00	5,60
200870			3,75 (t')	5,60
200880	80	30,50	2,50	5,30
200890		31,00	3,00	5,50
200900			4,00	6,10
200910			3,75 (t')	6,10
200920		35,50	4,00	6,20
200930			3,75 (t')	6,20
200940		36,00	3,00	5,70

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GROUP-2 - Thickness t = 1.25 to 6mm

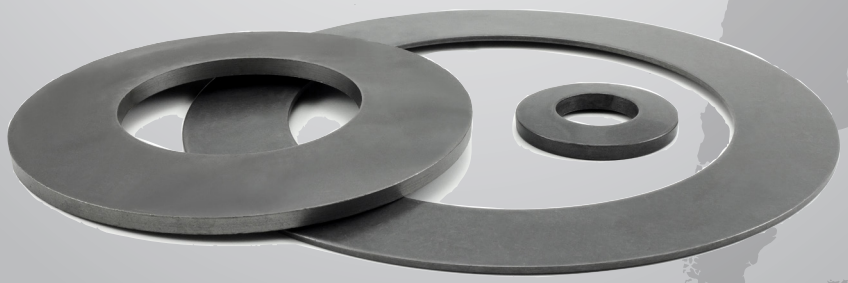
Material / Werkstoff: Spring Steel
Hardness / Härte: 420-520 HV
Coating / Beschichtung: Phosphate & Oil Finish.
Spring Washers / Unterlegscheiben DIN 2093



Product Code	Dimension in mm Abmessungen in mm			
Produkt	Outer Diameter	Inner Diameter	Material Thickness	Total Thickness
200950	80	41,00	2,25	5,20
200960			3,00	5,30
200970			4,00	6,20
200980			3,75 (t')	6,20
200990			5,00	6,70
201000			4,70 (t')	6,70
201010	90	46,00	2,50	5,70
201020			3,50	6,00
201030			5,00	7,00
201040			4,70 (t')	7,00
201050	100	41,00	4,00	7,20
201060			3,80 (t')	7,20
201070			5,00	7,75
201080			4,70 (t')	7,75
201090		51,00	2,70	6,20
201100			3,50	6,30
201110			4,00	7,00
201120			3,80 (t')	7,00
201130			5,00	7,80
201140			4,70 (t')	7,80
201150			6,00	8,20
201160			5,60 (t')	8,20

Product Code	Dimension in mm Abmessungen in mm			
Produkt	Outer Diameter	Inner Diameter	Material Thickness	Total Thickness
201170	112	57,00	3,00	6,90
201180			4,00	7,20
201190			3,75 (t')	7,20
201200			6,00	8,50
201210			5,60 (t')	8,50
201220	125	51,00	4,00	8,50
201230			3,80 (t')	8,50
201240			5,00	8,90
201250			4,75 (t')	8,90
201260			6,00	9,40
201270	125	51,00	5,65 (t')	9,40
201280		61,00	5,00	9,00
201290			4,75 (t')	9,00
201300			6,00	9,60
201310			5,60 (t')	9,60
201320		64,00	3,50	8,00
201330			5,00	8,50
201340			4,70 (t')	8,50
201350			6,00	9,60
201360			5,60 (t')	9,60
201370		71,00	6,00	9,30
201380			5,60 (t')	9,30
201390	140	72,00	3,80	8,70
201400			5,00	9,00
201410			4,70 (t')	9,00

Product Code	Dimension in mm Abmessungen in mm			
Produkt	Outer Diameter	Inner Diameter	Material Thickness	Total Thickness
201420	150	61,00	5,00	10,30
201430			4,75 (t')	10,30
201440			6,00	10,80
201450			5,70 (t')	10,80
201460		71,00	6,00	10,85
201470			5,60 (t')	10,85
201480	160	82,00	4,30	9,90
201490			4,15 (t')	9,90
201500			6,00	10,50
201510			5,60 (t')	10,50
201520	180	92,00	4,80	11,00
201530			4,60 (t')	11,00
201540			6,00	11,10
201550			5,60 (t')	11,10
201560	200	102,00	5,50	12,50
201570			5,30 (t')	12,50



DIN 2093 SPRING WASHERS tiespring ®
GROUP-3 Thickness t > 6 to 14mm

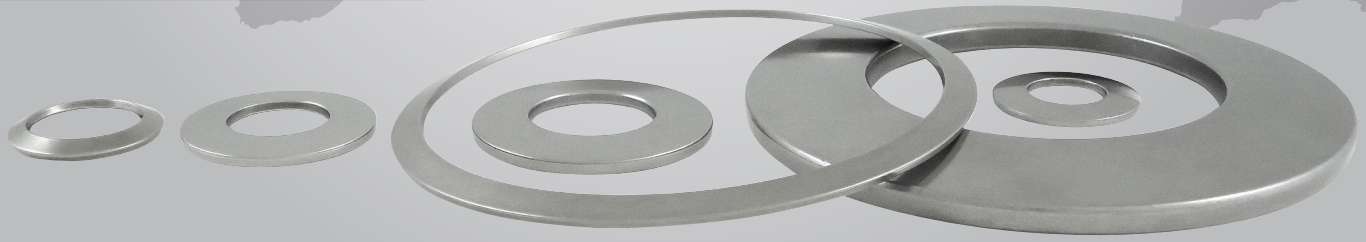
Material / Werkstoff: Spring Steel
Hardness / Härte: 420-520 HV
Coating / Beschichtung: Phosphate & Oil Finish.
Spring Washers / Unterlegscheiben DIN 2093



Product Code	Dimension in mm Abmessungen in mm			
Produkt	Outer Diameter	Inner Diameter	Material Thickness	Total Thickness
300010	100	51,00	7,00	9,20
300020	125	61,00	8,00	10,90
300030		64,00	7,00	10,00
300040			8,00	10,60
300050		71	8,00	10,90
300060			10,00	11,80
300070	140	72,00	8,00	11,20
300080	150	61,00	7,00	11,80
300090		71,00	8,00	12,05
300100		81,00	8,00	12,00
300110			10,00	13,40
300120	160	82,00	10,00	13,50
300130			11,00	14,50
300140	180	92,00	10,00	14,00
300150			13,00	16,50
300160	200	82,00	8,00	14,20
300170			10,00	15,50
300180			12,00	16,60
300190		92,00	10,00	15,60
300200			12,00	16,80
300210			14,00	18,10
300220		102	8,00	13,60
300230			10,00	15,60
300240			12,00	16,20
300250			14,00	18,20
300260		112	12,00	16,20
300270			14,00	17,50
300280			16,00	19,80

Product Code	Dimension in mm Abmessungen in mm			
Produkt	Outer Diameter	Inner Diameter	Material Thickness	Total Thickness
300290	225	112,00	6,50	13,60
300300			8,00	14,50
300310			12,00	17,00
300320			16,00	20,50
300330	250	102,00	10,00	18,00
300340			12,00	19,00
300350		127,00	7,00	14,80
300360			8,00	16,00
300370			10,00	17,00
300380			12,00	19,30
300390			14,00	19,60
300400			16,00	21,80
300410	270	127,00	10,65	18,00
300420		142,00	22,00	26,90

Product Code	Dimension in mm Abmessungen in mm			
Produkt	Outer Diameter	Inner Diameter	Material Thickness	Total Thickness
300430	280	127,00	12,00	21,40
300440			19,00	25,00
300450		142,00	12,00	21,00
300460			15,00	21,40
300470			16,60	23,25
300480			17,45	23,90
300490			18,00	24,00
300500			18,90	24,60
300510			20,30	25,40
300520			22,00	26,35
300530		152,00	12,80	19,80
300540			15,00	21,40
300550			18,50	23,60



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DIN 2093 SPRING WASHERS tiespring ®

Materials and Corrosion Protection

Designation	Material number	Modulus of elasticity (kN/mm2) at							
		20°C	100°C	200°C	300°C	400°C	500°C	600°C	700°C
Ck 67	1.1231	206	202						
50 CrV 4	1.8159	206	202	196					
51 CrMo 4	1.7701	206	202	196					
X 12 CrN i 17 7	1.4310	190	185	178					
X 7 CrNiAl 17 7	1.4568	200	195	190					
X 5 CrNiMo 18 10	1.4401	190	185	178					
X 35 CrMo 17	1.4122	209	205	199	192				
X3oWCrV5 3	1-2567	206	202	196	189	178			
X 22 CrMoV 12 1	1-4923	209	205	200	193				
Cu Be 2	2-1247	135	131	126					
Ni Be 2	2.4132	200	195	189	182	176			
Inconel 718 (Ni Cr 19 Nb Mo)	2.4668	200	196	190	186	179	172		
Inconel X 750 (Ni Cr 15 Fe 7Ti Al)	2.4669	214	207	198	190	179	170		
Nimonic 90 (Ni Cr 20 Co 18 Ti)	2.4969	206	201	195	189	181	175	167	160

Process	Coating structure	Layer thickness (µm)	Salt spray test result to DIN 50 021
Phosphating	Zinc phosphate+ oil	10-15	0 200 400 600 800 1000
Phosphating waxed	Phosphate de zinc+cire	10-40	
Electrolytic zinc plating	Zinc	≥ 8	
Electrolytic zinc plating	Zinc	≥ 12	
Electrolytic zinc plating + yellow chromating	Zinc + Chrome	≥ 8	
Electrolytic zinc plating + yellow chromating	Zinc + Chrome	≥ 12	
Mechanical zinc plating	Zinc	≥ 12	
Mechanical zinc plating + yellow chromating	Zinc + Chrome	≥ 12	
Delta-Tone	Zinc phosphate-i-zinc powder	10-15	
Delta-Seal	Zinc phosphate organic layer + oil	10-15	
Dacromet 500-A	Chromated zinc strips	≥ 5	
Dacromet 500-B	Chromated zinc strips	≥ 8	
Chemical nickel plating	Nickel	ca.25	

General tolerances

	Spring washer thickness	Spring washer thickness tolerance	Free height tolerances	Force tolerances for F by l0-s with S= 0.75 h0	Hardness
	t or t' (mm)	t (mm)	lo (mm)	(%)	(HRC)
Group 1 without support surfaces	0,2 to 0,6	+ 0,02 - 0,06	+ 0,10 - 0,05	+ 25 - 7,5	42-52
	Above 0.6 to below 1,25	+ 0,03 - 0,09			
Group 2 without support surfaces	1,25 to 2,0	+ 0,04 - 0,12	+ 0,15 - 0,08	+15 - 7,5	
	Above 2,0 to 3,0		+ 0,20 - 0,10		
	Above 3,0 to 3,8		+ 0,30 - 0,15	+10 - 5	
	Above 3,8 to 6,0	+ 0,05 - 0,15			
Group 3 with support surfaces	Above 6,0 to 15	± 0,10	± 0,30	±5	
	Above 15 to 25	± 0,12	± 0,50'		
	Above 25 to 40	±0.15	± 1.0		

The permissible tolerances specified in tables 4.i and 4.2 for Rondelles spring geometry, strength and hardness are valid for the entire manufacturing program.

In standard production, the tolerance for outside or inside diameter corresponds to h12 or H12. If tighter tolerances are required in special cases, please consult Tieig.

Outside diameter De, Inside diameter Dj			
De or Dj (mm)	Permissible tolerances		
	De h12 (mm)	Dj H12 (mm)	Concentricity at De (mm)
3 to 6	0 to - 0,12	0 to + 0,12	0,15
> 6 to 10	0 to - 0,15	0 to + 0,15	0,18
> 10 to 18	0 to - 0,18	0 to + 0,18	0,22
> 18 to 30	0 to - 0,21	0 to + 0,21	0,26
> 30 to 50	0 to - 0,25	0 to + 0,25	032
> 50 to 80	0 to - 0,30	0 to + 0,30	0,60
> 80 to 120	0 to - 0,35	0 to + 0,35	0,70
> 120 to 180	0 to - 0,40	0 to + 0,40	0,80
> 180 to 250	0 to - 0,46	0 to + 0,46	0,92
> 250 to 315	0 to - 0,52	0 to + 0,52	1,04
> 315 to 400	0 to - 0,57	0 to + 0,57	1,14
> 400 to 500	0 to - 0,63	0 to + 0,63	1,26
> 500 to 600	0 to - 0,68	0 to + 0,68	1,36

In the case of a De/t ratio > 20, a modification of the total height is possible. In this case, consult Tieig.

BALL BEARING PRELOAD SPRINGS tiespring ®
TYPE “K“, non-slotted

Features and Applications

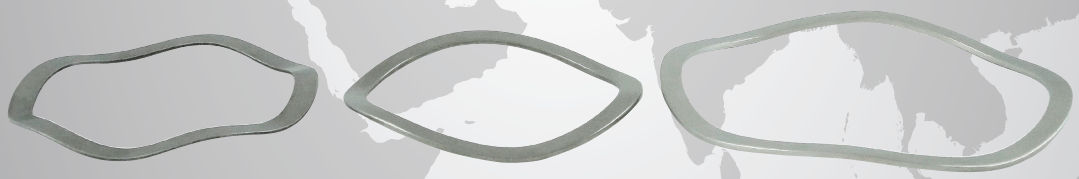
Ball Bearing Pre-Load Disc Springs are basically designed to use with radial Ball Bearings.

They help with maintaining accuracy and positioning of the Bearing with no end play. They also assist with vibration and shaft deflections. Using this type of Disc, will help increase the rigidity of a Bearing and help reduce noises.

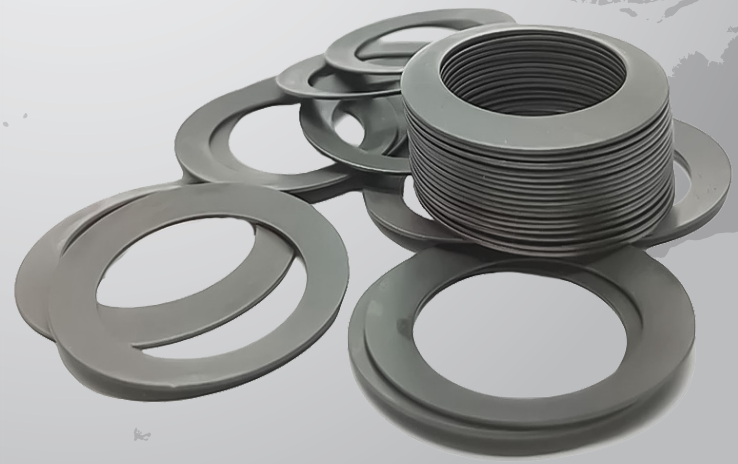
Preload disc springs can also be useful in other applications. The relatively low forces of the preloaded disc springs means they could act as light duty linkages or mechanisms.

Advantages of Ball Bearing Disc Springs

- Significant increase or decrease in applied force even with small variation in deflection.
- Backlash compensation & regressive curves help reduce preload variations changes
- Very low force characteristics with very large deflection range
- Multiplication of force by stacking of two or more in parallel
- Elimination of noise and play in Ball Bearings.
- Round shape ensures equal distribution of load around the bearing ring.







tiespring®

USE THE BEST

BALL BEARING PRELOAD SPRINGS tiespring ®

TYPE "K", non-slotted

Material / Werkstoff: Carbon Spring Steel
Hardness / Härte: 420-490 HV
Coating / Beschichtung: Phosphate & Oil Finish
Ball bearing preload springs / Kugellager-Vorspannfedern



Ball Bearing Type	Product Code	Dimension in mm Abmessungen in mm				Spring Deflection in mm and Spring Load F in N Federeinfederung in mm und Federkraft F in N		weight/kg per 1000 pcs
Kugellager Typ	Produkt	Inner Diameter	Outer Diameter	Material Thickness	Total Height	N	F	Gewicht/kg pro 1000 stück
623 (EL3)	101301	6,20	9,80	0,20	0,40	0,15	23	0.068
624 (EL4)	101303	7,20	12,80	0,25	0,50	0,19	29	0.170
625 (EL5) 634 (R4)	101305	8,20	15,80	0,25	0,55	0,23	23	0.275
626 (EL6) 635(R5)	101306	9,20	18,80	0,30	0,65	0,26	31	0.487
607 (EL7)	101307	10,20	18,80	0,35	0,70	0,26	51	0.526
608 (EL8) 627 (R7)	101308	12,30	21,80	0,35	0,75	0,30	46	0.684
609 (EL9)	101310	14,30	23,70	0,40	0,90	0,38	81	0.862
6000 629(R9)	101311	14,30	25,70	0,40	0,90	0,38	63	1.105
6001	101312	17,30	27,70	0,40	1,00	0,45	80	1.130
6200	101314	17,40	29,70	0,40	1,10	0,53	83	1.406
6002 6201	101315	20,40	31,70	0,40	1,10	0,53	81	1.422
R-10	101316	25,40	34,50	0,50	1,20	0,53	155	1.720
6300	101317	20,40	34,60	0,40	1,10	0,53	61	1.894
6003 6202	101318	22,40	34,60	0,50	1,20	0,53	118	2.103
6301	101319	20,40	36,60	0,50	1,30	0,60	110	2.805
6203	101320	25,50	39,60	0,50	1,30	0,60	110	2.783
6004 6302	101321	25,50	41,60	0,50	1,40	0,68	113	3.282
6005 6204 6303	101322	30,50	46,50	0,60	1,50	0,68	153	4.486
6205 6304	101323	35,50	51,50	0,60	1,50	0,68	135	5.059
6006	101324	40,50	54,50	0,60	1,50	0,68	141	4.822
6007 6206 6305	101325	40,50	61,50	0,70	1,80	0,83	176	9.121
6008	101326	50,50	67,50	0,70	1,70	0,75	161	8.505
6306	101327	45,50	71,50	0,70	2,10	1,05	185	13
6207	101328	50,50	71,50	0,70	2,10	1,05	218	11
6009	101329	55,50	74,50	0,80	1,90	0,83	211	12
6307	101330	50,50	79,50	0,80	2,30	1,13	228	18
6010 6208	101331	55,50	79,50	0,80	2,30	1,13	263	16
6209	101332	60,50	84,50	0,90	2,50	1,20	359	19
6308	101333	60,50	89,50	0,90	2,50	1,20	288	24
6011 6210	101334	65,50	89,50	0,90	2,50	1,20	335	20
6309	101336	65,50	99,00	1,00	2,60	1,20	292	33.64
6013 6211	101337	70,50	99,00	1,00	2,60	1,20	332	29.44
6310	101338	70,50	109,00	1,25	2,70	1,09	357	52.8
6014 6212	101339	75,50	109,00	1,25	2,70	1,09	398	47.17

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BALL BEARING PRELOAD SPRINGS tiespring ®
TYPE "K", non-slotted

Material / Werkstoff: Carbon Spring Steel
Hardness / Härte: 420-490 HV
Coating / Beschichtung: Phosphate & Oil Finish
Ball bearing preload springs / Kugellager-Vorspannfedern



Ball Bearing Type	Product Code	Dimension in mm Abmessungen in mm				Spring Deflection in mm and Spring Load F in N Federeinfederung in mm und Federkraft F in N		weight/kg per 1000 pcs
Kugellager Typ	Produkt	Inner Diameter	Outer Diameter	Material Thickness	Total Height	N	F	Gewicht/kg pro 1000 stück
6015	101340	90,50	114,00	1,25	2,45	0,90	398	36.49
6311	101341	75,50	119,00	1,25	2,80	1,16	320	64.71
6213	101342	85,50	119,00	1,25	2,80	1,16	393	52.28
6016 6214	101343	90,50	124,00	1,25	3,00	1,31	445	54.75
6312	101344	85,50	129,00	1,25	3,20	1,46	405	71.28
6017 6215	101345	95,50	129,00	1,25	3,20	1,46	500	57.31
6313	101346	90,50	139,00	1,25	3,25	1,50	354	85.11
6018 6216	101347	101,00	139,00	1,25	3,25	1,50	429	69.58
6314	101348	95,50	149,00	1,50	3,20	1,28	379	120.1
6020 6217	101349	106,00	149,00	1,50	3,20	1,28	450	100.5
6315	101350	101,00	159,00	1,50	3,50	1,50	412	138.5
6021 6218	101351	111,00	159,00	1,50	3,50	1,50	477	118.9
6316	101352	111,00	169,00	1,50	3,80	1,73	470	149.2
6022 6219	101353	121,00	169,00	1,50	3,80	1,73	546	127.7
6317	101354	121,00	179,00	2,00	4,20	1,65	864	213.1
6024 6220	101355	126,00	179,00	2,00	4,20	1,65	928	197.8
6318	101356	121,00	189,00	2,00	4,30	1,73	759	258.3
6221	101357	131,00	189,00	2,00	4,30	1,73	858	227.1
6319	101358	131,00	198,00	2,00	4,50	1,88	812	270.0
6026 6222	101359	141,00	198,00	2,00	4,50	1,88	923	236.4
6024 6320	101360	151,00	213,00	2,25	4,50	1,69	941	310.9
6030 6321	101361	161,00	223,00	2,25	4,60	1,76	942	328.0
6226	101362	161,00	228,00	2,25	4,95	2,03	1036	359.2
6032 6322	101363	161,00	238,00	2,25	5,25	2,25	1021	423.8
6228	101364	171,00	248,00	2,50	5,00	1,88	1005	494.5
6034 6324	101365	171,00	258,00	2,50	5,50	2,25	1106	572.2
6230	101366	181,00	268,00	2,50	5,70	2,40	1155	598.7
6036 6236	101367	181,00	278,00	2,50	6,00	2,63	1155	682.7
6038 6232	101368	191,00	288,00	2,75	5,75	2,25	1145	783.7
6328	101369	191,00	298,00	2,75	6,35	2,70	1307	883.0
6040 6234	101370	202,00	308,00	3,00	6,10	2,33	1300	995.2
6236 6330	101371	212,00	318,00	3,00	6,20	2,40	1302	1.034
6044 6238 6332	101372	232,00	338,00	3,00	6,60	2,70	1415	1.112
6048 6240 6334	101373	242,00	358,00	3,00	7,00	3,00	1424	1.281

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DIN 6796 CONICAL SPRING WASHERS tiespring ®

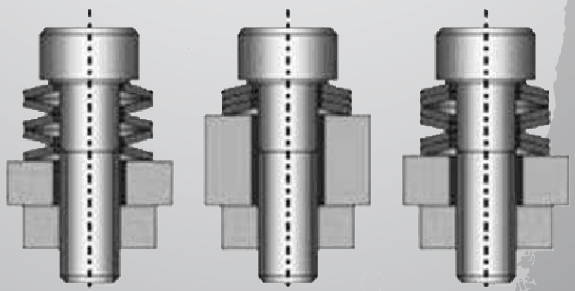
Features and Applications

Metric DIN 6796 Conical Spring Washers for bolted connections are conical shaped washers that act as heavy duty spring discs when loaded in the axial direction.

They are designed to be used in bolted connections where they help prevent loosening or unfastening of the connection due to thermal expansion/contraction and/or vibrational forces.

Spring washers described in DIN 6796 standard are circular conical washers which offer resistance to compression in the axial direction. Its elastic capacity is intended for offering clamping/crushing load in the displacement direction.
They are not designed to withstand dynamic loads.





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DIN 6796 CONICAL SPRING WASHERS tiespring ®

Material / Werkstoff: Carbon Spring Steel
Hardness / Härte: 420-490 HV
Coating / Beschichtung: Phosphate & Oil Finish
Conical Spring Washers / Spannscheiben DIN 6796



Screw Size	Product Code	Dimension in mm Abmessungen in mm						Weight/kg per 1000 pcs
Schraubengröße	Produkt	Inner Diameter	Outer Diameter	Material Thickness	Total Thickness max. - min.		F	Gewicht/kg pro 1000 stück
M2	100500	2,20	5,00	0,40	0,60	0,50	630	0.05
M2.5	100501	2,70	6,00	0,50	0,72	0,61	950	0.09
M3	100502	3,20	7,00	0,60	0,85	0,72	1320	0.14
M3.5	100503	3,70	8,00	0,80	1,06	0,92	2400	0.25
M4	100504	4,30	9,00	1,00	1,30	1,12	3800	0.38
M5	100505	5,30	11,00	1,20	1,55	1,35	5500	0.68
M6	100506	6,40	14,00	1,50	2,00	1,70	8600	1.42
M7	100507	7,40	17,00	1,75	2,30	2,00	11300	2.51
M8	100508	8,40	18,00	2,00	2,60	2,24	14900	3.10
M10	100509	10,50	23,00	2,50	3,20	2,80	22100	5.13
M12	100510	13,00	29,00	3,00	3,95	3,43	34100	12.35
M14	100511	15,00	35,00	3,50	4,65	4,04	46000	21.44
M16	100512	17,00	39,00	4,00	5,25	4,58	59700	30.19
M18	100513	19,00	42,00	4,50	5,80	5,08	74400	38.68
M20	100514	21,00	45,00	5,00	6,40	5,60	93200	48.52
M22	100515	23,00	49,00	5,50	7,05	6,15	114000	63.07
M24	100516	25,00	56,00	6,00	7,75	6,77	131000	92.30
M27	100517	28,00	60,00	6,50	8,35	7,30	154000	112.13
M30	100518	31,00	70,00	7,00	9,20	8,00	1720000	168.92
M33	100519	34,00	76,00	7,50	10,00	8,50	226000	213.52
M36	100520	37,20	83,00	8,00	10,50	9,20	276000	271.39
M42	100521	43,50	96,00	8,50	12,00	10,50	290000	383.61
M48	100522	49,50	110,00	9,00	12,50	11,00	261000	535.18
M56	100523	58,00	128,00	9,50	13,50	12,00	260000	762.21
M64	100524	66,00	136,00	10,00	14,00	12,80	277000	871.34
M72	100525	74,00	145,00	10,50	15,00	13,00	327000	1006.08
M90	100526	92,50	160,00	11,00	16,00	14,00	378000	1151.31
M100	100527	102,50	180,00	11,50	17,00	15,00	370000	1551.52
M125	100528	128,00	220,00	12,00	19,00	16,50	365000	2367.49

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TREP 3L / 4L tiespring ®

Features and Applications

Tiespring 3L/4L is manufactured in compliance with RoHS and ELV directives.

Tiespring 3L/4L washers are made from carbon steel C>0.55%

Their spring characteristics are obtained after core hardening.

Tieinoxspring 3L/4L washers are made from tempering stainless steel X8 CrNiMoAl.

Their spring characteristics are obtained after precipitation hardening heat treatment.
Whichever version is chosen, our Tiespring 3L/4L and Tieinoxspring 3L/4L perform the same duties and achieve the same results in a compact format.

High-temperature resistance

The high-temperature resistance of Tiespring 3L/4L and Tieinoxspring 3L/4L is identical to that exhibited by bolts and nuts of similar materials. Mechanical characteristics are guaranteed up to 200° C. Contact us for applications up to 700° C.

Corrosion resistance / salt spray resistance

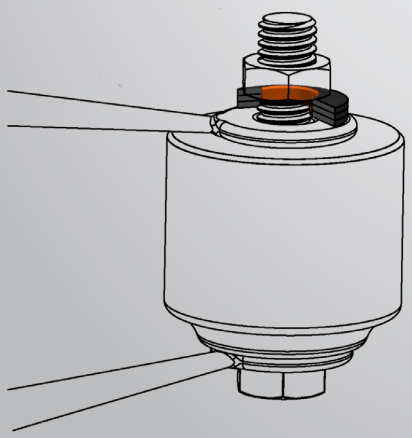
Tiespring 3L/4L and Tieinoxspring 3L/4L are available in different finishes for different environments and stresses. Depending on requirements, their resistance can vary from 96 to 1000 hours in salt spray as per standart ISO 9227.

No lubrication needed!

If you use Tiespring 3L/4L in your assemblies, tightening is quarenteed regardless of the friction coefficients. No lubrication is required and no chemical additives are necessary.

Quality tests

All mechanical characteristics of Tiespring 3L/4L and Tieinoxspring 3L/4L comply with our in-house quality requirements.
All batches of electrolytically coated items are tested for fragility in accordance with standart NFE 25 510.





TREP 3L tiespring ®

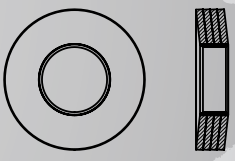
Material / Werkstoff: Steel C75
Hardness / Härte: 388-490 HV
Coating / Beschichtung: Electrolytic zinc plating
Spherical Washers / Kugelscheiben



Screw Size	Product Code	Dimension in mm Abmessungen in mm				Calculated Flat Load	weight kg per 1000 pcs
Schraubengröße	Produkt	Inner Diameter	Outer Diameter	Thickness	Total Thickness	N	Gewicht/kg pro 1000 stück
M4	502100	4,50	10,00	1,50	0,50	2700	0,70
M5	502101	5,50	12,00	2,40	0,30	5300	1,50
M6	502102	6,50	14,00	2,40	0,60	7800	2,10
M8	502103	8,50	18,00	3,60	0,56	14600	5,20
M10	502104	10,50	22,00	4,50	0,60	20600	10,00
M12	502105	12,50	27,00	5,40	0,80	29800	18,00
M14	502106	15,00	30,00	6,00	1,05	45000	25,00
M16	502107	17,00	33,00	6,60	1,25	55200	35,00
M18	502108	19,00	36,00	7,50	1,09	66200	42,00
M20	502109	21,00	40,00	9,00	1,15	99000	60,00

TREP 4L tiespring ®

Material / Werkstoff: Steel C75
Hardness / Härte: 388-490 HV
Coating / Beschichtung: Electrolytic zinc plating
Spherical Washers / Kugelscheiben



Screw Size	Product Code	Dimension in mm Abmessungen in mm				Calculated Flat Load	weight kg per 1000 pcs
Schraubengröße	Produkt	Inner Diameter	Outer Diameter	Thickness	Total Thickness	N	Gewicht/kg pro 1000 stück
M6	501100	6,50	17,00	2,40	0,80	3300	3,60
M8	501101	8,50	20,00	2,80	0,95	4600	5,60
M10	501102	10,50	23,00	3,20	1,05	600	7,90
M12	501103	12,50	26,00	4,00	1,30	5800	13,00
M14	501104	15,50	29,00	4,80	1,30	12200	18,00
M16	501105	17,00	33,00	4,80	1,40	17000	24,00
M18	501106	19,00	37,00	6,00	1,52	14100	35,00
M20	501107	21,00	41,00	6,00	1,85	23400	45,00
M22	501109	23,00	45,00	7,20	1,67	31600	60,00
M24	501110	25,00	50,00	7,20	1,84	26900	81,00
M27	501111	28,50	56,00	8,00	1,80	28700	112,00
M30	501112	32,00	60,00	8,80	2,30	44300	135,00
M33	501113	35,00	64,00	10,00	2,57	66300	170,00
M36	501114	38,00	68,00	10,00	2,50	50800	190,00
M39	501115	41,00	72,00	10,00	2,45	43800	210,00
M42	501116	44,00	76,00	10,00	3,20	57800	223,00
M45	501117	47,00	80,00	10,00	2,75	47400	240,00
M48	501118	50,00	85,00	10,00	2,85	41300	280,00
M52	501119	54,00	90,00	12,00	3,55	81800	370,00
M56	501120	58,00	95,00	12,00	3,22	67600	405,00
M60	501121	62,00	100,00	12,00	3,25	62500	441,00

tielock®
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NFE 25-511 SELF LOCKING WASHER tielock ®

Features and Applications



Elastic washer that has a round knurled ring with resistance to loosening on the surface in contact with the screw's underhead. The conical Contact washers of tiefasteners are produced according to the standarts NFE 25-511.

Material

- Carbon Steel C60S DIN EN 10132, hardness 420-510 Hv 10 after heat-treatment for hardening and tempering
- Stainless Steel AISI 304 (InoxA2) EN 10088, No1.4301 cold rolled at high resistance.
- Stainless Steel AISI 316 (InoxA4) EN 10088, No1.4401 cold rolled at high resistance.

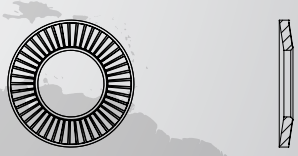
Surface Treatments



- Burnished with slightly protective oiling.
- Mechanical zinc plating Cr6 free.
- Geomet.
- Other surface treatments on request, according to the minimum delivery quantities.

NFE 25-511 SELF LOCKING WASHER tielock ®
Narrow Series

Material / Werkstoff: Carbon Steel C60S
Hardness / Härte: 420-510 HV10
Self-Locking Washer / Selbstsichernde Unterlegscheibe



Screw Size	Product Code	Dimension in mm Abmessungen in mm				Inner Dia. of Knurl	Outer Dia. of Knurl	Number of Knurls	Number per Package
Schrauben-größe	Produkt	Inner Diameter	Outer Diameter	Material Thickness min.-max.	Total Thickness min.-max.	min.-max.	min.	Anzahl der Rändelun-gen	Anzahl pro Packstück
M3	401100	3,10 - 3,35	5,76 - 6,24	0,47 - 0,53	0,70 - 0,90	3,60 - 4,10	5,50	28	500
M4	401101	4,10 - 4,40	7,71 - 8,29	0,77 - 0,83	1,00 - 1,20	4,70 - 5,20	7,00	32	500
M5	401102	5,10 - 5,40	9,71 - 10,29	0,96 - 1,04	1,25 - 1,50	5,70 - 6,20	8,00	36	200
M6	401103	6,10 - 6,40	11,65 - 12,35	1,16 - 1,24	1,55 - 1,85	6,80 - 7,40	10,00	45	200
M8	401104	8,20 - 8,56	15,65 - 16,35	1,36 - 1,44	1,80 - 2,20	9,20 - 9,80	13,00	45	100
M10	401105	10,20 - 10,56	19,58 - 20,42	1,55 - 1,65	2,10 - 2,60	11,20 - 11,90	16,00	45	100
M12	401106	12,40 - 12,83	23,58 - 24,42	1,75 - 1,85	2,40 - 2,90	13,70 - 14,40	18,00	45	50

NFE 25-511 SELF LOCKING WASHER tielock ®
Large Series

Material / Werkstoff: Carbon Steel C60S
Hardness / Härte: 420-510 HV10
Self-Locking Washer / Selbstsichernde Unterlegscheibe



Screw Size	Product Code	Dimension in mm Abmessungen in mm				Inner Dia. of Knurl	Outer Dia. of Knurl	Number of Knurls	Number per Package
Schrauben-größe	Produkt	Inner Diameter	Outer Diameter	Material Thickness min.-max.	Total Thickness min.-max.	min.-max.	min.	Anzahl der Rändelun-gen	Anzahl pro Packstück
M3	402100	3,10 - 3,35	9,65 - 10,35	0,57 - 0,63	0,95 - 1,20	3,60 - 4,10	5,50	28	500
M4	402101	4,10 - 4,40	13,65 - 14,35	0,96 - 1,04	1,40 - 1,80	4,70 - 5,20	7,00	32	500
M5	402102	5,10 - 5,40	15,65 - 16,35	1,16 - 1,24	1,70 - 2,10	5,70 - 6,20	8,00	36	200
M6	402103	6,10 - 6,40	17,65 - 18,35	1,36 - 1,44	2,10 - 2,50	6,80 - 7,40	10,00	45	200
M8	402104	8,20 - 8,56	21,58 - 22,42	1,55 - 1,65	2,20 - 2,70	9,20 - 9,80	13,00	45	100
M10	402105	10,20 - 10,56	26,58 - 27,42	1,75 - 1,85	2,60 - 3,10	11,20 - 11,90	16,00	45	100
M12	402106	12,40 - 12,83	31,50 - 32,50	1,95 - 2,05	3,10 - 3,60	13,70 - 14,40	18,00	45	50

NFE 25-511 SELF LOCKING WASHER tielock ®
Medium Series

Material / Werkstoff: Carbon Steel C60S
Hardness / Härte: 420-510 HV10
Self-Locking Washer / Selbstsichernde Unterlegscheibe



Screw Size	Product Code	Dimension in mm Abmessungen in mm				Inner Dia. of Knurl	Outer Dia. of Knurl	Number of Knurls	Number per Package
Schrauben-größe	Produkt	Inner Diameter	Outer Diameter	Material Thickness min.-max.	Total Thickness min.-max.	min.-max.	min.	Anzahl der Rändelun-gen	Anzahl pro Packstück
M3	401100	3,10 - 3,35	7,71 - 8,29	0,57 - 0,63	0,80 - 1,00	3,60 - 4,10	5,50	28	500
M4	401101	4,10 - 4,40	9,71 - 10,29	0,86 - 0,94	1,15 - 1,40	4,70 - 5,20	7,00	32	500
M5	401102	5,10 - 5,40	11,65 - 12,35	1,06 - 1,14	1,45 - 1,80	5,70 - 6,20	8,00	36	200
M6	401103	6,10 - 6,40	13,65 - 14,35	1,26 - 1,34	1,75 - 2,10	6,80 - 7,40	10,00	45	200
M8	401104	8,20 - 8,56	17,65 - 18,35	1,36 - 1,44	1,90 - 2,35	9,20 - 9,80	13,00	45	100
M10	401105	10,20 - 10,56	21,58 - 22,42	1,55 - 1,65	2,25 - 2,75	11,20 - 11,90	16,00	45	100
M12	401106	12,40 - 12,83	26,58 - 27,42	1,75 - 1,85	2,60 - 3,10	13,70 - 14,40	18,00	45	50
M14	401107	14,40 - 14,83	29,58 - 30,42	2,34 - 2,46	3,20 - 3,70	15,70 - 16,40	21,00	45	50
M16	401108	16,40 - 16,83	31,50 - 32,50	2,74 - 2,86	3,60 - 4,10	17,70 - 18,40	24,00	60	50
M20	401109	20,50 - 21,02	39,50 - 40,50	3,14 - 3,26	4,30 - 4,90	22,80 - 23,10	24,00	60	50

tielock®
USE THE BEST

SAFETY LOCKING WASHER tielock ®

Features and Applications

DIN 9250 Safety Lock Washers is a high-quality product from Tieig with excellent performance and reliable quality.

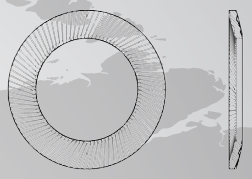
DIN 9250S Safety Lock Washers is a fastener accessory widely used in mechanical equipment and automobile manufacturing fields. Its double-sided diagonal printing design can effectively increase the friction with nuts or bolts, prevent fasteners from loosening, and ensure the safe operation of equipment.

At the same time, the product has also undergone a precise heat treatment process to ensure that its hardness and strength meet international standards and can withstand high pressure and heavy-load working conditions, ensuring the stability and reliability of the equipment.



SAFETY LOCKING WASHER tielock ®
S - Series

Material / Werkstoff: Spring Steel.
Hardness / Härte: 420-490 HV
Coating / Beschichtung: Phosphate & Oil Finish
Safety locking washer / Sicherheits-Sicherungsscheibe

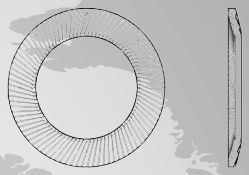


Screw Size	Product Code	Dimension in mm Abmessungen in mm					Weight/kg pcs
Schraubengröße	Produkt	Inner Diameter	Outer Diameter	Material Thickness	Total Thickness max. - min.		Gewicht/kg pro
M1,6	101400	1,70	3,20	0,35	0,38	0,60	0,013
M2	101401	2,20	4,00	0,35	0,39	0,60	0,021
M2.5	101402	2,70	4,80	0,45	0,49	0,90	0,039
M3	101403	3,20	5,50	0,45	0,51	0,90	0,049
M3.5	101404	3,70	6,00	0,45	0,52	0,91	0,055
M4	101405	4,30	7,00	0,50	0,59	1,00	0,085
M5	101406	5,30	9,00	0,60	0,73	1,10	0,167
M6	101407	6,40	10,00	0,70	0,82	1,20	0,200
M6,35	101408	6,70	9,50	0,70	0,79	1,20	0,150
M7	101409	7,40	12,00	0,70	0,89	1,30	0,355
M8	101410	8,40	13,00	0,80	0,98	1,40	0,392
M10	101411	10,50	16,00	1,00	1,21	1,60	0,750
M11	101412	11,60	15,90	1,00	1,18	1,60	0,595
M12	101413	13,00	18,00	1,10	1,31	1,70	0,879
M12,7	101414	13,70	19,00	1,10	1,33	1,80	0,976
M14	101415	15,00	22,00	1,20	1,52	2,00	1,641
M16	101416	17,00	24,00	1,30	1,63	2,10	1,984
M18	101417	19,00	27,00	1,50	1,85	2,30	2,970
M19	101418	20,00	30,00	1,50	1,98	2,50	4,100
M20	101419	21,00	30,00	1,50	1,94	2,50	3,742
M22	101420	23,00	33,00	1,50	2,08	2,70	4,507
M24	101421	25,60	36,00	1,80	2,32	2,90	5,910

tielock®
USE THE BEST

SAFETY LOCKING WASHER tielock ®
VS - Series

Material / Werkstoff: Spring Steel.
Hardness / Härte: 420-490 HV
Coating / Beschichtung: Phosphate & Oil Finish
Safety locking washer / Sicherheits-Sicherungsscheibe



Screw Size	Product Code	Dimension in mm Abmessungen in mm					Weight/kg pcs
Schraubengröße	Produkt	Inner Diameter	Outer Diameter	Material Thickness	Total Thickness max. - min.		Gewicht/kg pro
M5	101455	5,30	9	1,00	1,07	1,30	0,273
M6	101456	6,40	10	1,00	1,08	1,40	0,300
M8	101457	8,40	13	1,20	1,32	1,70	0,615
M10	101458	10,50	16	1,50	1,64	2,00	0,167
M12	101459	13,00	18	1,50	1,65	2,10	1,223
M14	101460	15,00	22	1,50	1,76	2,20	2,089
M16	101461	17,00	24	2,00	2,21	2,60	3,142
M18	101462	19,00	27	2,00	2,27	2,70	4,041
M20	101463	21,00	30	2,00	2,34	2,80	5,066
M22	101464	23,00	33	2,00	2,42	3,00	6,117
M24	101465	25,60	36	2,50	2,87	3,40	8,865
M25,4	101466	27,00	38	2,50	2,95	3,40	9,001
M27	101467	28,60	39	2,50	2,91	3,50	9,731
M30	101468	31,60	45	2,50	3,12	3,80	14,380
M33	101469	34,60	50	3,00	3,65	4,50	15,130
M36	101470	38,00	54	3,00	3,72	4,50	16,205

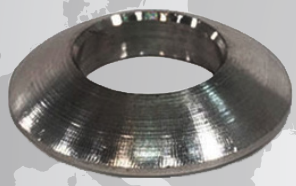
DIN 6319 - CONICAL SEAT & SPHERICAL WASHERS tiespring ®

Features and Applications

Spherical washers DIN 6319 are used for clamping on non-parallel surfaces.
Thanks to the material used, the spherical washers and dished washers are generally suited for aggressive environmental conditions.

Female washers Type G are mainly used on elongated holes.
When utilizing hexagon nuts with spherical seating DIN 6330 type B the male washer is redundant.

TYPE - C



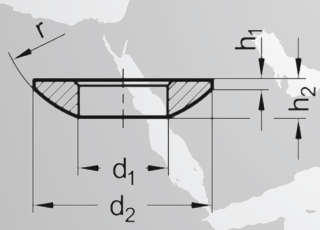
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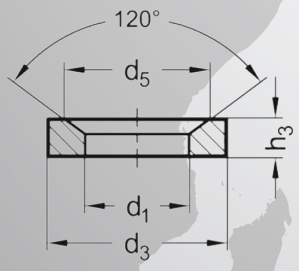
TYPE - G



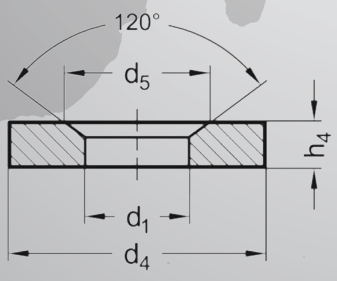
Form **C**

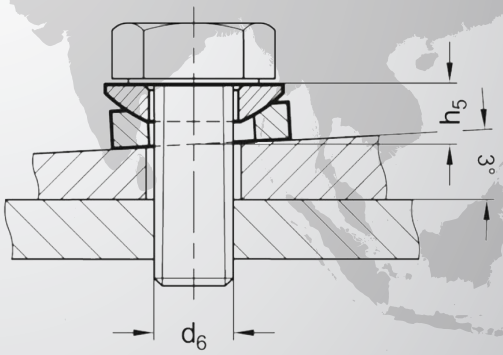


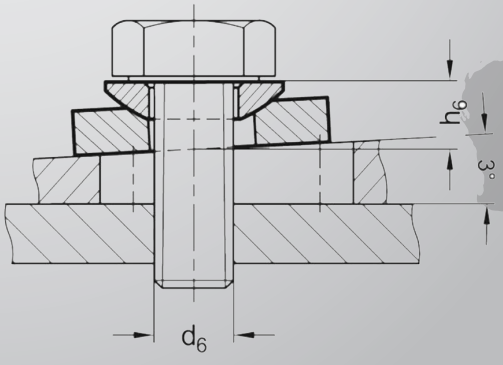
Form **D**



Form **G**







tiespring®

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DIN 6319 CONICAL SEAT & SPHERICAL WASHERS tiespring ®
TYPE - C

Material / Werkstoff: Steel C15
Hardness / Härte: 550+100 HV 10
Coating / Beschichtung: Phosphate & Oil Finish
Spherical Washers / Kugelscheiben DIN 6319-C



Screw Size	Product Code	Dimension in mm Abmessungen in mm				Transferable static bolt force	VE packaging unit	weight/kg per 1000 pcs
Schrauben-größe	Produkt	Inner Diameter	Outer Diameter	Thickness	Ball Radius	kN max.	a	Gewicht/kg pro 1000 stück
M6	700301	6,40	12,00	2,30	9,00	9,00	200	0,90
M8	700302	8,40	17,00	3,20	12,00	17,00	200	2,50
M10	700303	10,50	21,00	4,00	15,00	26,00	200	4,70
M12	700304	13,00	24,00	4,60	17,00	38,00	100	7,10
M14	700305	15,00	28,00	5,00	22,00	53,00	100	10,00
M16	700306	17,00	30,00	5,30	22,00	73,00	100	12,30
M20	700307	21,00	36,00	6,30	27,00	117,00	100	20,80
M24	700308	25,00	44,00	8,20	32,00	168,00	50	42,00
M30	700309	31,00	56,00	11,20	41,00	269,00	50	87,00
M36	700310	37,00	68,00	14,00	50,00	394,00	50	184,00
M42	700311	43,00	78,00	17,00	58,00	542,00	25	297,00
M48	700312	50,00	92,00	21,00	67,00	714,00	25	525,00

tiespring®
USE THE BEST

DIN 6319 CONICAL SEAT & SPHERICAL WASHERS tiespring ®
TYPE - G

Material / Werkstoff: Steel C15
Hardness / Härte: 550+100 HV 10
Coating / Beschichtung: Phosphate & Oil Finish
Spherical Washers / Kugelscheiben DIN 6319-G



Screw Size	Product Code	Dimension in mm Abmessungen in mm				Transferable static bolt force	VE packaging unit	weight/kg per 1000 pcs
Schrauben-größe	Produkt	Inner Diameter	Outer Diameter	Thickness	Ball Radius	kN max.	a	Gewicht/kg pro 1000 stück
M6	700501	7,10	17,00	4,00	9,00	9,00	200	5,00
M8	700502	9,60	24,00	5,00	12,00	17,00	200	11,50
M10	700503	12,00	30,00	5,00	15,00	26,00	200	17,00
M12	700504	14,20	36,00	6,00	17,00	38,00	100	33,00
M14	700505	16,50	40,00	6,00	22,00	53,00	100	43,00
M16	700506	19,00	44,00	7,00	22,00	73,00	100	62,50
M20	700507	23,20	50,00	8,00	27,00	117,00	100	84,00
M24	700508	28,00	60,00	10,00	32,00	168,00	100	151,00
M30	700509	35,00	68,00	12,00	41,00	269,00	50	238,00
M36	700510	42,00	80,00	15,00	50,00	394,00	50	350,00
M42	700511	49,00	100,00	15,00	58,00	542,00	50	700,00
M48	700512	56,00	110,00	22,00	67,00	714,00	50	830,00

tiespring®

USE THE BEST

DIN 6319 CONICAL SEAT & SPHERICAL WASHERS tiespring ®
TYPE - D

Material / Werkstoff: Steel C15
Hardness / Härte: 550+100 HV 10
Coating / Beschichtung: Phosphate & Oil Finish
Spherical Washers / Kugelscheiben DIN 6319-D



Screw Size	Product Code	Dimension in mm Abmessungen in mm				Transferable static bolt force	VE packaging unit	weight/kg per 1000 pcs
Schrauben-größe	Produkt	Inner Diameter	Outer Diameter	Thickness	Ball Radius	kN max.	a	Gewicht/kg pro 1000 stück
M6	700401	7,10	12,00	2,80	9,00	9,00	200	1,40
M8	700402	9,60	17,00	3,50	12,00	17,00	200	3,80
M10	700403	12,00	21,00	4,20	15,00	26,00	200	6,50
M12	700404	14,20	24,00	5,00	17,00	38,00	100	10,60
M14	700405	16,50	28,00	5,60	22,00	53,00	100	18,00
M16	700406	19,00	30,00	6,20	22,00	73,00	100	18,70
M20	700407	23,20	36,00	7,50	27,00	117,00	100	32,00
M24	700408	28,00	44,00	9,50	32,00	168,00	100	63,00
M30	700409	35,00	56,00	12,00	41,00	269,00	50	133,00
M36	700410	42,00	68,00	15,00	50,00	394,00	50	236,00
M42	700411	49,00	78,00	18,00	58,00	542,00	25	365,00
M48	700412	56,00	92,00	22,00	67,00	714,00	25	641,00

DIN 7967 SELF LOCKING COUNTER NUT tienut ®

Features and Applications

Pal nuts are made to DIN 7967 and most commonly referred to as a Counter Nut, stamped sheet metal Check-Nuts or self locking Counter Nuts.

These locknuts are made from a spring-like steel which allows them to distort under load pressure, before returning to their original shape in the threaded area.

They are very lightweight and host a low profile and the ability to be tightened with an internal wrench or fingers. This provides a vibration resistant locking action whilst remaining usable in small and tricky areas suffering from space restrictions.

Have to be spun down the thread until finger-tight, then locked by a quarter to half turn with a spanner. Besides the clamping force A, a simultaneous radial force B will be developed causing a locking action are often used as locknut above a hexagon nut disassembly by tighten the hexagon nut firmly.







tienut®
USE THE BEST

DIN 7967 SELF LOCKING COUNTER NUT tienut ®

Material / Werkstoff: Carbon Spring Steel
Hardness / Härte: 420-490 HV
Coating / Beschichtung: Phosphate & Oil Finish
Self Locking Counter Nut / Selbstsichernde Kontermutter DIN 7967



Product Code	Dimension in mm Abmessungen in mm						Dimensions of the hex height			Other dimensions				
Produkt	Nominal thread diameter Nenndurchmesser des Gewindes			Inner Diameter			e	s		t			u	v
	Nom. siz (series1)	Special size (series2)	Special size (series3)	Serie 1	Serie 2	Serie 3	-	h13	m	Serie 1	Serie 2	Serie 3	Min.	Min.
800101	M4	-	-	3,50	-	-	8,10	7,00	2,50	0,30	-	-	2,50	5,70
800102	M5	-	-	4,50	-	-	9,20	8,00	2,50	0,40	-	-	2,50	6,50
800103	M6	-	-	5,30	-	-	11,50	10,00	3,00	0,40	-	-	3,00	8,00
800104	M8	M8 x 1	-	6,90	7,10	-	15,00	13,00	3,50	0,50	0,40	-	3,50	10,00
800105	M10	M10 x 1,25	M10 x 1	8,60	9,00	9,30	19,60	17,00	4,00	0,50	0,50	0,50	4,00	12,00
800106	M12	M12 x 1,5	M12 x 1,25	10,40	10,70	11,00	21,90	19,00	4,50	0,60	0,60	0,60	4,50	14,50
800107	M14	M14 x 1,5	-	12,00	12,70	-	25,40	22,00	5,00	0,60	0,60	-	5,00	16,00
800108	M16	M16 x 1,5	-	14,10	14,80	-	27,70	24,00	5,00	0,70	0,70	-	5,00	18,00
800109	M18	M18 x 2	M18 x 1,5	15,50	16,20	16,80	31,20	27,00	5,50	0,70	0,70	0,70	5,50	20,50
800110	M20	M20 x 2	M20 x 1,5	17,60	18,30	18,80	34,60	30,00	6,00	0,80	0,80	0,70	6,00	22,00
800111	M22	M22 x 2	M22 x 1,5	19,60	20,30	20,80	36,90	32,00	6,00	0,80	0,80	0,70	6,00	24,00
800112	M24	M24 x 2	M24 x 1,5	21,00	22,50	22,80	41,60	36,00	7,00	0,90	0,90	0,70	7,00	26,00
800113	M27	M27 x 2	-	24,20	25,50	-	47,30	41,00	7,00	1,00	1,00	-	7,00	29,00
800114	M30	M30 x 2	-	26,60	28,50	-	53,10	46,00	8,00	1,10	1,00	-	8,00	32,00
800115	M33	M33 x 2	-	29,80	31,50	-	57,70	50,00	8,00	1,20	1,00	-	8,00	34,00
800116	M36	M36 x 3	-	32,20	33,60	-	63,50	55,00	9,00	1,30	1,30	-	9,00	38,00
800117	M39	M39 x 3	-	35,20	36,60	-	69,30	60,00	9,00	1,30	1,30	-	9,00	40,00
800118	M42	M42 x 3	-	37,60	39,80	-	75,00	65,00	11,00	1,40	1,40	-	11,00	45,00
800119	M45	M45 x 3	-	40,90	42,80	-	80,80	70,00	12,00	1,50	1,50	-	12,00	48,00
800120	M48	M48 x 3	-	43,90	45,80	-	86,50	75,00	14,00	1,60	1,50	-	14,00	52,00
800121	M52	M52 x 3	-	48,20	49,80	-	92,40	80,00	16,00	1,70	1,50	-	16,00	58,00

NFE 25-411 SELF LOCKING NUT tienut ®

Features and Applications

This dual-slotted, all-metal, self-locking hex nut has impressive characteristics: extremely reliable, consistent prevailing torque, and no galling. The dual-locking slots function independently of bolt tension. The is a true single piece all metal design.

The locking feature is achieved by two self-locking slots in the turret part of the nut. Each slot is beveled using precision manufacturing techniques.

When the self-locking nut is on the screw, the threads of the screw open the slots. When installed, the turret returns to its original form and each slot grips the side of the bolt thread in two different planes and on opposite sides. This form of locking does not damage the bolt and ensures high reusability.

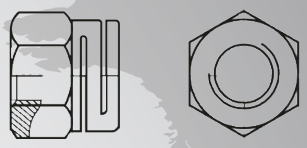
Vibration and Impact Resistant, Extreme Temperatures and Corrosion, Easy to Install/Remove, No Wear, Standard Tools and Bolts, Reusable and will not damage threads.



tienut®
USE THE BEST

NFE 25-411 SELF LOCKING NUT tienut ®

Material / Werkstoff: Class 8-10-12 Steel
Hardness / Härte: 420-490 HV
Coating / Beschichtung: Zinc Plated blue
Self Locking Counter Nut / Selbstsichernde Mutter NFE 25_411



Product Code	Dimension in mm Abmessungen in mm				
Produkt	Inner Diameter	Pitch	s	h	m
900100	M 2	0.40	4,00	4,50	2,30
900101	M 2.5	0.45	5,00	4,50	2,30
900102	M 3	0.50	5.5	4,50	2,50
900103	M 4	0.70	7,00	5,30	2,60
900104	M 5	0.80	8,00	6,30	3,00
900105	M 6	1.00	10,00	7,00	3,60
900106	M 7	1.00	11,00	8,10	4,80
900107	M 8	1.25	13,00	8,80	4,80
900108	M 10	1.50	16,00	11,00	6,00
900109	M 12	1.75	18,00	13,00	7,20
900110	M 14	2.00	21,00	15,00	8,40
900111	M 16	2.00	24,00	18,70	11,50
900112	M 18	2.50	27,00	19,50	11,50
900113	M 20	2.50	30,00	21,00	12,00
900114	M 22	2.50	32,00	22,00	12,50
900115	M 24	3.00	36,00	22,50	14,30
900116	M 27	3.00	41,00	26,00	16,00
900117	M 30	3.50	46,00	29,50	16,50
900118	M 33	3.50	50,00	32,00	18,70
900119	M 36	4.00	55,00	35,00	18,50

SELF LOCKING NUT tienut ®

Features and Applications

Tienut ® lock nuts are designed for applications in which a reliable anti-loosening performance is critical.
When tightened, the external spring is radially deformed and pressed against the nut collar which results in a reliably locked connection of the assembled parts.
Operators can apply normal tools for the assembly, as a low torque is enough to reach the desired locking effect.
Even after multiple uses the anti-loosening performance is not reduced.

Usages of Self Locking Nut

- Railway wagons
- Diesel engines
- Switching points
- Couplings
- Brake calipers
- Brake discs



Advantages of Self Locking Nut

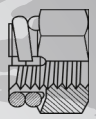
- Excellent vibration resistance
- High temperature resistant
- Maintains locking efficiency after multiple assemblies
- Easy assembly feature, no special tools required
- According to surface treatment or class level of stainless steel corrosion resistant



tienut®
USE THE BEST

SELF LOCKING NUT tienut ® - STANDART SERIES

Material / Werkstoff: Carbon Steel C8
Hardness / Härte: 420-490 HV
Coating / Beschichtung: Zinc Plated blue
Self Locking Nut / Selbsthemmende Mutter

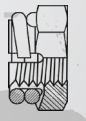




STANDART					
Product Code	Dimension in mm Abmessungen in mm				
Produkt	Metric	Pitch	s	h max.	m
900200	M5	0,80	8,00	6,30	4,00
900201	M6	1,00	10,00	8,20	4,50
900202	M8	1,25	13.00	10,80	6,70
900203	M10	1,50	17,00	12,60	8,00
900204	M12	1,75	19,00	16,00	10,60
900205	M14	2,00	22,00	18,00	12,00
900206	M16	2,00	24,00	20,60	13,50
900207	M18	2,50	27,00	22,50	14,50
900208	M20	2,50	30,00	25,50	16,90
900209	M22	2,50	32,00	29,80	20,50
900210	M24	3,00	36,00	29,90	20,60
900211	M27	3,00	41,00	33,70	24,30
900212	M30	3,50	46,00	37,00	26,60
900213	M33	3,50	50,00	40,50	28,80
900214	M36	4,00	55,00	44,20	31,50

FINE					
Product Code	Dimension in mm Abmessungen in mm				
Produkt	Metric	Pitch	s	h max.	m
900300	M6	0,75	10,00	8,20	4,40
900301	M8	1,00	13,00	10,80	6,60
900302	M10	1,25	17,00	12,60	7,90
900303	M12	1,50	19,00	16,00	10,40
900304	M12	2,50	19,00	16,00	10,40
900305	M14	1,50	22,00	18,00	11,80
900306	M16	1,50	24,00	20,60	13,30
900307	M18	1,50	27,00	22,50	14,30
900308	M20	1,50	30,00	25,50	16,50
900309	M22	1,50	32,00	29,80	19,50
900310	M24	2,00	36,00	29,90	20,00
900311	M27	2,00	41,00	33,70	23,30
900312	M30	2,00	46,00	37,00	26,40
900313	M33	2,00	50,00	40,50	28,50
900314	M36	3,00	55,00	44,20	31,20

SELF LOCKING NUT tienut ® - LOW SERIES





STANDART					
Product Code	Dimension in mm Abmessungen in mm				
Produkt	Metric	Pitch	s	h max.	m
900400	M6	1,00	10,00	6,30	2,50
900401	M8	1,25	13.00	8,10	3,90
900402	M10	1,50	17,00	9,60	4,90
900403	M12	1,75	19,00	11,40	5,80
900404	M14	2,00	22,00	13,00	6,80
900405	M16	2,00	24,00	14,60	7,30
900406	M18	2,50	27,00	16,50	8,30
900407	M20	2,50	30,00	18,10	9,10
900408	M22	2,50	32,00	20,10	10,60
900409	M24	3,00	36,00	20,70	10,70
900410	M24	3,00	41,00	22,20	11,80
900411	M30	3,50	46,00	24,70	14,10
900412	M33	3,50	50,00	27,70	15,30
900413	M36	4,00	55,00	30,00	17,10

FINE					
Product Code	Dimension in mm Abmessungen in mm				
Produkt	Metric	Pitch	s	h max.	m
900500	M6	0,75	10,00	6,30	2,50
900501	M8	1,00	13.00	8,10	3,90
900502	M10	1,25	17,00	9,60	4,90
900503	M12	1,50	19,00	11,40	5,80
900504	M12	1,25	22,00	13,00	6,80
900505	M14	1,50	22,00	13,00	6,80
900506	M16	1,50	24,00	14,60	7,30
900507	M18	1,50	27,00	16,50	8,30
900508	M20	1,50	30,00	18,10	9,10
900509	M22	1,50	32,00	20,10	10,60
900510	M24	2,00	36,00	20,70	10,70
900511	M24	2,00	41,00	22,20	11,80
900512	M30	2,00	46,00	24,70	14,10
900513	M33	2,00	50,00	27,70	15,30
900514	M36	3,00	55,00	30,00	17,10

DIN 980 M - SELF LOCKING NUT tienut ®

Features and Applications

The nut is embedded with a metal locking plate, which can prevent loosing by the locking ring. During the screwing the insert undergoes an elastic deformation and rests on the side of the thread of the screw, exerting a sufficient force to guarantee an adequate braking torque and an excellent resistance in applications with strong vibrations and dynamic stresses.
The insert, after the deformation caused by the screwing, returns to its original form, allowing repeated tightening and unscrewing, with a reduced decrease in braking torque values.
The screwing effort is limited and in any case much less than that required for other types of self-locking nuts.
tienut ® lock nuts withstand temperatures from -50 ° to + 300 ° C.

Advantages of Self Locking Nut

- Excellent vibration resistance
- High temperature resistant
- Maintains locking efficiency after multiple assemblies
- Easy assembly feature, no special tools required
- According to surface treatment or class level of stainless steel corrosion resistant

Usages of Self Locking Nut

- Railway wagons
- Diesel engines
- Switching points
- Couplings
- Brake calipers
- Brake discs



tienut®
USE THE BEST

DIN 980 M - SELF LOCKING NUT tienut ®

Material / Werkstoff: Carbon Steel C6
Hardness / Härte: 420-490 HV
Coating / Beschichtung: Zinc Plated blue
Self Locking Nut / Selbsthemmende Mutter



Product Code	Dimension in mm Abmessungen in mm			
Produkt	Metric	Pitch	s	h max.
900600	M3	0,50	5,50	3,00
900601	M4	0,70	7,00	3,80
900602	M5	0,80	8,00	4,60
900603	M6	1,00	10,00	5,30
900604	M8	1,25	13.00	7,30
900605	M10	1,50	17,00	8,30
900606	M12	1,75	19,00	10,50
900607	M14	2,00	22,00	12,50
900608	M16	2,00	24,00	14,50
900609	M18	2,50	26,50	17,00
900610	M20	2,50	30,00	17,50
900611	M22	3,00	32,00	19,50
900612	M24	3,00	36,00	21,50
900613	M30	3,00	46,00	27,00

TENSION BOLT tiesuperbolt ®

Features and Applications

As with the other mechanical tensioning products, the new tiesuperbolt® Tension Bolts are based on the same functional principle: taking a large bolted joint's hard-to-manage main thread preload requirement and dividing it into many smaller, easier-to-manage force requirements.

The tiesuperbolt® Tension Bolt's key advantages are accuracy, simplicity, reliability and safety. A worker can tighten/loosen tiesuperbolt® Tension Bolts with simple hand tools instead of other costly and complicated tensioning methods.

tiesuperbolt® Tension Bolts are specifically designed for applications with tight spaces. The outer diameter is smaller than a nut-type tensioner on a bolt, allowing to fit into tighter areas. Ideal for applications with threaded holes or where threading a bolt into a nut would be impractical.

As with the Tension Nut, the tiesuperbolt® Tension Bolt creates torsion-free preloads in the main bolt avoiding the potential for thread damage. Wherever customers face tight installation spaces or require a single, easy-to-install tensioning device, tiesuperbolt® Tension Bolts provide the best solution.

We can offer our tiesuperbolt® Tension Bolts in strength class 8.8 as a direct replacement for conventional bolts of the same strength class in the dimension range of M20-M100.

tiesuperbolt products are an innovative technology for tightening large bolts and studs. tiesuperbolt are proven as the preferred bolting solution in every major industry around the world.

SB8 - Standard bolt

SB8 bolt-style tensioners are most often used for applications with tapped holes. The diameter of the bolt-style tensioner head is smaller than a nut-style tensioner, so bolt-style tensioners can fit tighter spaces. They feature an external installation/removal hex.



SB12 - High-strength bolt

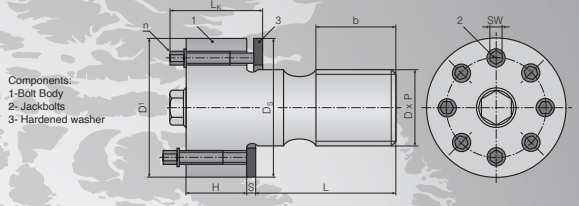
SB12 bolt-style tensioners have the same features as the SB8 bolt-style tensioners and are designed for higher strength requirements.



tiebolt®
USE THE BEST

TENSION BOLT tiesuperbolt ®
SB8 - Standard bolt

Material / Werkstoff: Carbon Steel C8-C10-C12
Hardness / Härte: 420-490 HV
Coating / Beschichtung: Zinc Plated blue
Tension Bolt / Spannbolzen



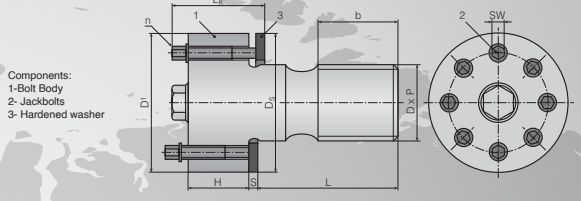
Product Code	Dimension in mm Abmessungen in mm													
	Size				Bolt body		Jackbolt		Hardened washer		Height	Preload*	Torque*	Preload capacity*
	Thread D	Available pitch			1		2		3		tot	nom	nom	max
Produkt	Metric	P1	P2	P3	D1	H	n	SW	Ds	S	Lk	F	M	
		[mm]			[mm]			[mm]	[mm]	[mm]	[mm]	[kN]	[Nm]	[kN]
TB8-M16x...x.../W	M16	2	1.5	1	31	18	4	5	30	3	32	73	14	94
TB8-M20x...x.../W	M20	2.5	1.5	1	35	18	6	5	35	4	33	109	14	140
TB8-M24x...x.../W	M24	3	2	1.5	41	18	8	5	41	4	33	146	14	187
TB8-M27x...x.../W	M27	3	2	1.5	45	23	6	6	45	5	45	190	32	250
TB8-M30x...x.../W	M30	3.5	2	1.5	50	23	6	6	50	5	45	214	36	286
TB8-M33x...x.../W	M33	3.5	2	1.5	57	28	6	8	57	5	52	285	60	380
TB8-M36x...x.../W	M36	4	3	1.5	60	28	6	8	60	5	52	333	70	443
TB8-M39x...x.../W	M39	4	3	1.5	63	28	8	8	63	5	52	406	64	540
TB8-M42x...x.../W	M42	4.5	3	1.5	66	28	8	8	66	5	52	457	72	610
TB8-M45x...x.../W	M45	4.5	3	1.5	75	37	8	10	75	6	64	535	100	720
TB8-M48x...x.../W	M48	5	3	1.5	78	37	8	10	78	6	64	605	113	800
TB8-M52x...x.../W	M52	5	3	2	82	37	10	10	82	6	64	735	110	970
TB8-M56x...x.../W	M56	5.5	4	2	86	37	10	10	86	6	64	835	125	1120
TB8-M60x...x.../W	M60	5.5	4	2	90	37	12	10	90	6	64	985	123	1310
TB8-M64x...x.../W	M64	6	4	2	103	46	8	14	103	8	83	950	235	1270
TB8-M68x...x.../W	M68	6	4	2	107	46	8	14	107	8	83	1090	270	1450
TB8-M72x...x.../W	M72	6	4	2	111	46	10	14	111	8	83	1230	245	1640
TB8-M76x...x.../W	M76	6	4	2	116	46	12	14	116	8	83	1390	230	1870
TB8-M80x...x.../W	M80	6	4	2	120	56	12	14	120	8	92	1570	260	2080
TB8-M90x...x.../W	M90	6	4	2	130	56	16	14	130	8	92	2010	250	2700
TB8-M100x...x.../W	M100	6	4	2	148	60	12	17	148	10	99	2540	520	3370
TB8-M110x...x.../W	M110	6	4	2	158	60	14	17	158	10	99	2850	500	3750
TB8-M120x...x.../W	M120	6	4	2	170	64	16	17	170	10	105	3380	520	4500
TB8-M125x...x.../W	M125	6	4	2	175	64	16	17	175	10	105	3650	560	4880
TB8-M130x...x.../W	M130	6	4	2	180	76	18	17	180	10	118	3950	540	5270
TB8-M140...x.../W	M140	6	4	2	190	76	20	17	190	10	118	4550	560	6100
TB8-M150x...x.../W	M150	6	4	2	200	76	20	17	200	10	118	4880	600	6500
TB8-M160x...x.../W	M160	6	4	-	210	76	20	17	210	10	118	5280	650	7000

tiebolt®
USE THE BEST

TENSION BOLT tiesuperbolt ®
SB12 - High-strength bolt

Material / Werkstoff: Carbon Steel C8-C10-C12
Hardness / Härte: 420-490 HV
Coating / Beschichtung: Zinc Plated blue
Tension Bolt / Spannbolzen

Components:
1-Bolt Body
2- Jackbolts
3- Hardened washer



Product Code	Dimension in mm Abmessungen in mm													
	Size				Bolt body		Jackbolt		Hardened washer		Height	Preload*	Torque*	Preload capacity*
	Thread D	Available pitch			1		2		3		tot	nom	nom	max
Produkt	Metric	P1	P2	P3	D1	H	n	SW	Ds	S	Lk	F	M	
		[mm]			[mm]			[mm]	[mm]	[mm]	[mm]	[kN]	[Nm]	[kN]
TB12-M20x...x.../W	M20	2.5	1.5	1	35	18	8	5	35	4	33	146	14	187
TB12-M24x...x.../W	M24	3	2	1.5	43	24	6	6	43	4	44	202	34	268
TB12-M27x...x.../W	M27	3	2	1.5	47	24	8	6	47	5	45	270	34	357
TB12-M30x...x.../W	M30	3.5	2	1.5	50	24	10	6	50	5	45	317	32	427
TB12-M33x...x.../W	M33	3.5	2	1.5	57	28	8	8	57	5	52	406	64	539
TB12-M36x...x.../W	M36	4	3	1.5	60	28	10	8	60	5	52	480	60	635
TB12-M39x...x.../W	M39	4	3	1.5	63	28	12	8	63	5	52	570	60	760
TB12-M42x...x.../W	M42	4.5	3	1.5	66	28	12	8	66	5	52	645	68	855
TB12-M45x...x.../W	M45	4.5	3	1.5	75	37	10	10	75	6	64	760	114	1020
TB12-M48x...x.../W	M48	5	3	1.5	78	37	10	10	78	6	64	855	128	1140
TB12-M52x...x.../W	M52	5	3	2	82	37	12	10	82	6	64	995	124	1320
TB12-M56x...x.../W	M56	5.5	4	2	86	37	12	10	86	6	64	995	124	1320
TB12-M60x...x.../W	M60	5.5	4	2	90	37	14	10	90	6	64	1160	124	1540
TB12-M64x...x.../W	M64	6	4	2	103	46	10	14	103	8	83	1310	260	1740
TB12-M68x...x.../W	M68	6	4	2	107	46	10	14	107	8	83	1480	295	1990
TB12-M72x...x.../W	M72	6	4	2	111	56	12	14	111	8	92	1690	280	2260
TB12-M76x...x.../W	M76	6	4	2	116	56	14	14	116	8	92	1900	270	2540
TB12-M80x...x.../W	M80	6	4	2	120	56	14	14	120	8	92	2110	300	2820
TB12-M90x...x.../W	M90	6	4	2	139	61	12	17	139	10	99	2740	560	3660

tienut®
USE THE BEST

TENSION NUT tiesupernut ®

Features and Applications

With tiesupernut ® tension Nuts, large bolt connections can be tightened simply by hand.

A torque wrench is all it takes to tighten the tension nut quickly and reliably. No electric, hydraulic or pneumatic tools are needed.

The uniqueness of the tiesupernut ® tension Nut is that the preload force on the thread in the large body is evenly distributed to the thrust bolts. These thrust bolts are tightened individually, thus achieving a maximum preload force. It is a marvel of time-saving and flawless technology.

Due to its compliance with ISO 898-2, the tiesupernut® Tension Nut fulfills all the requirements of any hex nut of the same quality and offers many advantages over the hand-tightened nut.

Approx. bolt stress depending on size: 450 to 700 N/mm2 (60 to 100 ksi)

tiesupernut ® lock nuts withstand temperatures from -10 ° to + 250 ° C.

Structure and mode of operation

1. The nut body is mounted on the bolt with a large thread (as in a normal nut), but is not tightened.
2. The nut body has several thrust bolts and thrust pins around the large thread. When the thrust bolts are tightened, the thrust pins, like a piston, press against the part to be tightened and at the same time pull the bolt longitudinally. The preload generated in this way is only axial, so that no harmful twisting or torsion occurs.
3. The hardened washer protects the parts to be tightened from the high pressure of the thrust studs.



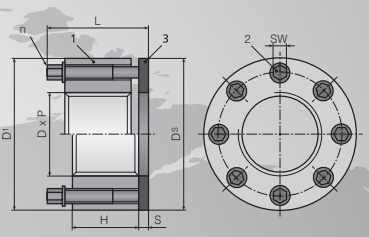


tienut®
USE THE BEST

TENSION NUT tiesupernut ®
Strenght Class C8-10

Material / Werkstoff: Carbon Steel C8-10
Hardness / Härte: 420-490 HV
Coating / Beschichtung: Zinc Plated blue
Tension Nut / Spannmutter

Components:
1-Nut Body
2- Jackbolts
3- Hardened washer



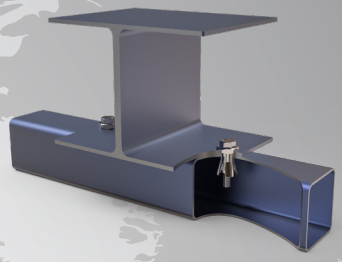
Product Code	Dimension in mm Abmessungen in mm														
	Size				Nut body		Jackbolt		Hardened washer		Height	Weight	Preload*	Torque*	Preload capacity*
	Thread D	Available pitch			1		2		3		tot	est	nom	nom	max
Produkt	Metric	P1	P2	P3	D1	H	n	SW	Ds	S	L		F	M	
		[mm]			[mm]			[mm]	[mm]	[mm]	[mm]		[kN]	[Nm]	[kN]
TN-M16x.../W	M16	2	1.5	1	34	16	4	5	32	3	33	0.11	73	14	94
TN-M20x.../W	M20	2.5	1.5	1	38	16	6	5	38	4	34	0.14	110	14	140
TN-M24x.../W	M22	2.5	1.5	1	41	16	6	5	41	4	34	0.16	110	14	140
TN-M24x.../W	M24	3	2	1.5	44	16	8	5	43	4	34	0.19	145	14	185
TN-M27x.../W	M27	3	2	1.5	50	24	6	6	50	5	45	0.35	215	36	285
TN-M30x.../W	M30	3.5	2	1.5	53	24	6	6	53	5	45	0.37	215	36	285
TN-M33x.../W	M33	3.5	2	1.5	59	24	8	6	59	5	45	0.48	285	36	380
TN-M36x.../W	M36	4	3	1.5	66	32	6	8	66	5	57	0.76	345	72	460
TN-M39x.../W	M39	4	3	1.5	70	32	8	8	70	5	57	0.90	455	72	610
TN-M42x.../W	M42	4.5	3	1.5	75	32	8	8	73	5	57	1.01	455	72	610
TN-M45x.../W	M45	4.5	3	1.5	83	38	8	10	81	6	68	1.48	700	131	935
TN-M48x.../W	M48	5	3	1.5	85	38	8	10	85	6	68	1.50	700	131	935
TN-M52x.../W	M52	5	3	2	94	38	8	10	89	6	68	1.80	700	131	935
TN-M56x.../W	M56	5.5	4	2	100	38	8	10	95	6	68	2.00	700	131	935
TN-M60x.../W	M60	5.5	4	2	107	38	10	10	100	6	68	2.30	875	131	1170
TN-M64x.../W	M64	6	4	2	113	53	8	14	112	8	92	3.65	1270	315	1690
TN-M68x.../W	M68	6	4	2	117	53	8	14	117	8	92	3.85	1270	315	1690
TN-M72x.../W	M72	6	4	2	120	56	8	14	120	8	92	4.00	1270	315	1690
TN-M76x.../W	M76	6	4	2	132	56	12	14	127	8	92	5.10	1900	315	2530
TN-M80x.../W	M80	6	4	2	132	56	12	14	127	8	92	4.80	1900	315	2530
TN-M85x.../W	M85	6	4	2	137	56	12	14	137	8	92	5.10	1900	315	2530
TN-M90x.../W	M90	6	4	2	145	59	16	14	140	8	99	6.00	2530	315	3380
TN-M100x.../W	M100	6	4	2	164	61	16	14	152	8	99	7.80	2530	315	3380
TN-M110x.../W	M110	6	4	2	177	79	12	17	172	10	125	11.40	3150	645	4200
TN-M120x.../W	M120	6	4	2	189	81	16	17	179	10	125	13.00	4200	645	5600
TN-M125x.../W	M125	6	4	2	194	81	16	17	190	10	125	13.50	4200	645	5600
TN-M130x.../W	M130	6	4	2	205	94	18	17	202	10	140	17.50	4700	645	6300
TN-M140x.../W	M140	6	4	2	215	94	20	17	215	10	140	18.70	5250	645	7000
TN-M150x.../W	M150	6	4	2	225	94	20	17	225	12	142	20.00	5250	645	7000
TN-M160x.../W	M160	6	4	-	234	107	24	17	234	12	162	24.10	6300	645	8400

tiebolt®
USE THE BEST

EXPANSION BOLT tiebolt ®

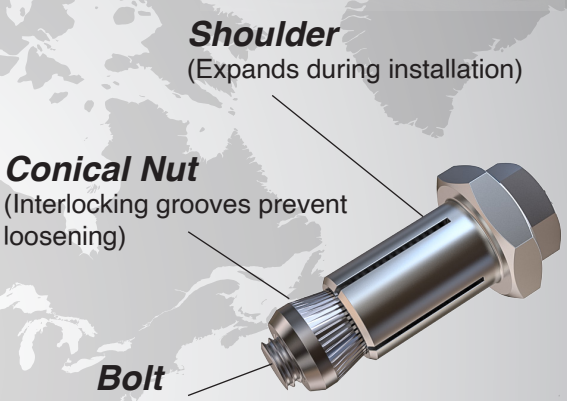
Features and Applications

Tieig's expansion bolts require installation access to only one side of the Hollow Structural Section (HSS), and offer a faster alternative to welding or through-bolting, enabling contractors to reduce construction time and labor costs.
The tiebolt® is independently approve for primary structural connections.



Hexagonal & Countersunk tiebolt ®

A typical connection is made by inserting the tiebolt® into the pre-drilled holes of the fixture and hollow section. As the bolt head is tightened, the cone is pulled up the bolt thread, causing the sleeve to expand until the cone locks the sleeve against the hollow section's inner wall.
At full tightening torque, a clamping force is established between the fixture and the steel section to form a secure connection.
Once installed, only the head and the collar are visible.



Hexagonal tiebolt®



Countersunk tiebolt®



How to Install tiebolt ®

1) Align pre-drilled fixture and section then insert the tiebolt®.
2) Grip tiebolt collar with an open ended spanner.
3) Using a calibrated torque wrench, tighten the central bolt to the recommended torque.

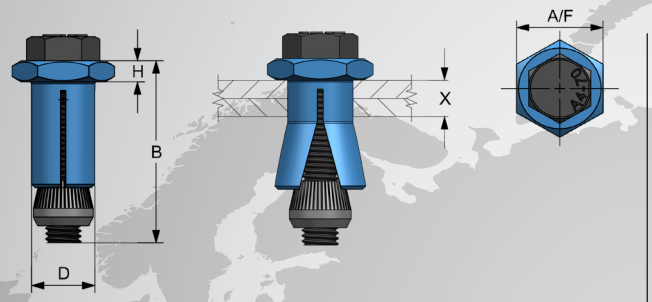
Selection:

Hot Dip Galvanized ensuring maximum corrosion protection;
Zinc finish also available;
Available in stainless steel;
Large clamping range, varying bolt sizes;
Alternative Bolt lengths available.

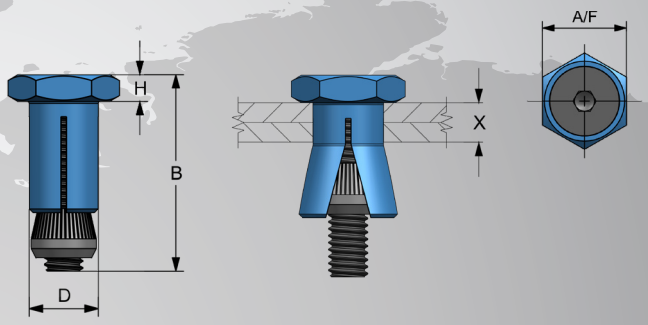
EXPANSION BOLT tiebolt ®

Working Loads & Dimension Table

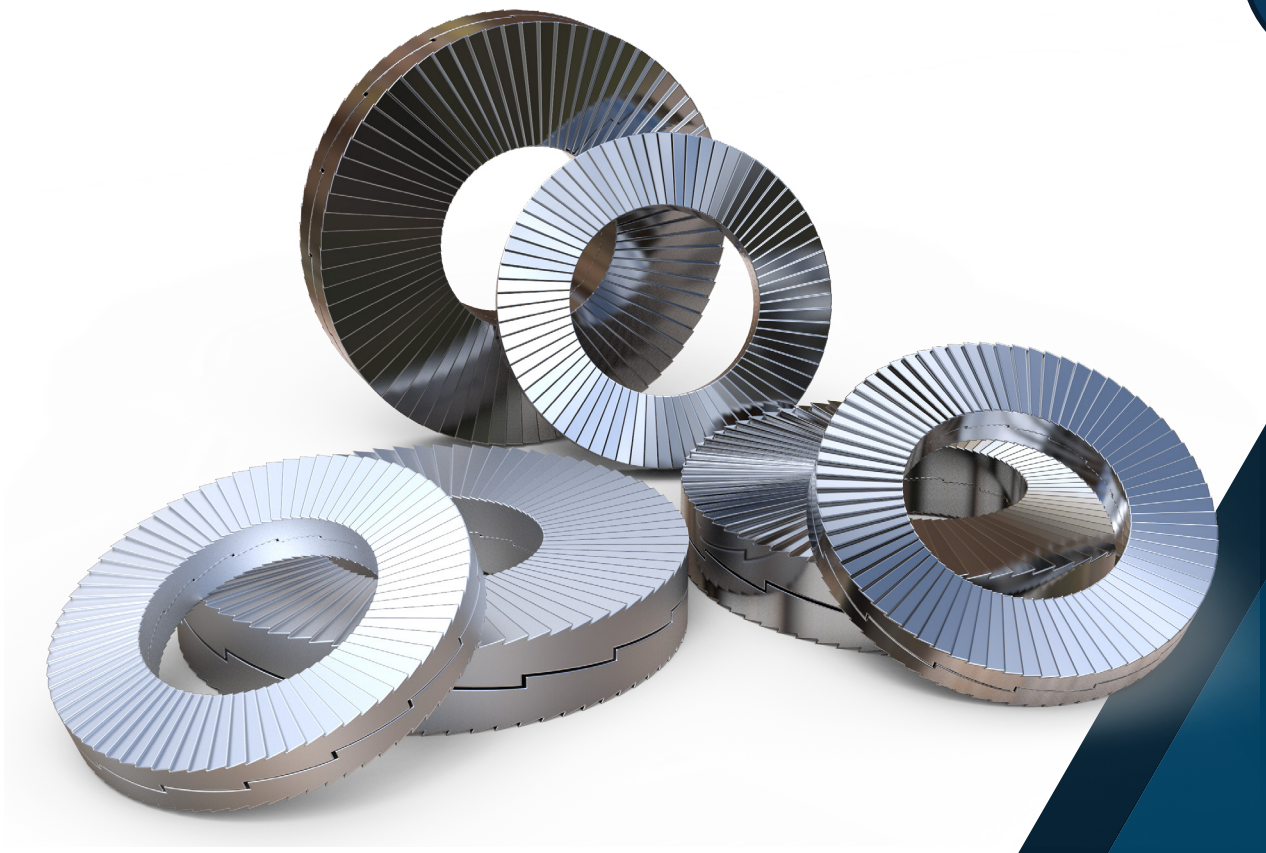
Hexagonal Head



Countersunk Head



Hexagonal		Countersunk		Fixing Range		Shoulder			Load Information						
Product Code	Bolt Length	Product Code	Bolt Length	X mm		Hole Diameter	Thick.	Key Dim.	Bolt Dim.	Safe Working Load	Torque	Galvanised / Zinc Plated		Stainless Steel	
	B mm		B mm	min.	max.	D mm	H mm	A/F mm	Metric	kN	Nm	Tensile kN	Shear kN	Tensile kN	Shear kN
TBH1-06	M6x45	TBC1-06	M6x45	5	29	$11^{+1-0.25}$	5	17	M6	5	19	5,71	16,21	/	/
TBH1-08	M8x50	TBC1-08	M8x50	5	26	$14^{+1-0.25}$	6	22	M8	7	25	12,86	21,07	13,29	26,14
TBH2-08	M8x70	TBC2-08	M8x70	18	46										
TBH3-08	M8x90	TBC3-08	M8x90	30	66										
TBH1-10	M10x50	TBC1-10	M10x50	5	23	$18^{+1-0.25}$	7	24	M10	13	45	24,07	37	21,07	47,07
TBH2-10	M10x70	TBC2-10	M10x70	18	43										
TBH3-10	M10x90	TBC3-10	M10x90	35	63										
TBH1-12	M12x55	TBC1-12	M12x55	5	25	$20^{+1-0.25}$	8	26	M12	15	80	29,43	48,29	30,64	59,86
TBH2-12	M12x80	TBH2-12	M12x80	20	50										
TBH3-12	M12x100	TBC3-12	M12x100	40	70										
TBH1-16	M16x75	TBC1-16	M16x75	5	35	$26^{+2-0.25}$	9	36	M16	35	190	52,29	88,21	57,07	108,57
TBH2-16	M16x100	TBC2-16	M16x100	30	60										
TBH3-16	M16x120	TBC3-16	M16x120	55	80										
TBH1-20	M20x100	TBC1-20	M20x100	8	42	$33^{+2-0.25}$	11	46	M20	40	300	92	145,36	89,07	181,79
TBH2-20	M20x120	TBC2-20	M20x130	35	72										
TBH3-20	M20x150	TBC3-20	M20x150	65	102										



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