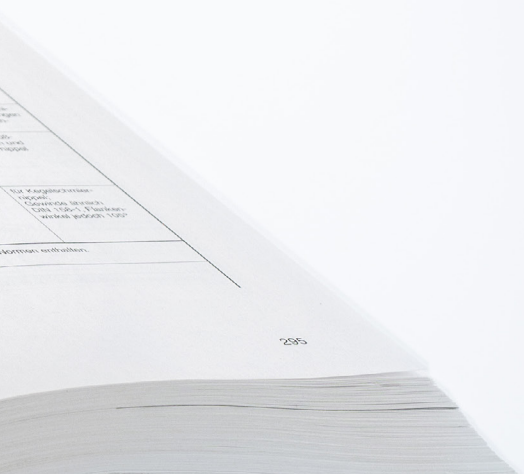


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UNITS

CONVERSION TABLE

Dimensions		
Inch (in)	in millimetres (mm)	in x 25,4 = mm
Millimetres (mm)	in inches (in)	mm x 0,03937 = in

Weight/force		
Ounces (oz)	in grammes (g)	oz x 28 = g
Grammes (g)	in ounces (oz)	g x 0,3527 = oz
Pounds (lbs)	in kilogrammes (kg)	lbs x 0,4536 = kg
Kilogrammes (kg)	in pounds (lbs)	kg x 2,205 = lbs
Kilogrammes (kg)	in Newton (N)	kg x 9,81 = N
Newton (N)	in kilogrammes (kg)	N / 9,81 = kg

Temperature		
Degree Fahrenheit (°F)	in degree Celsius (°C)	(°F - 32) x 5/9 = °C
Degree Celsius (°C)	in degree Fahrenheit (°F)	°C x 9/5 + 32 = °F

Torque		
Foot-pounds (ft-lbs)	in Newton metres (Nm)	ft/lbs x 1,35 = Nm
Newton metres (Nm)	in foot pounds (ft-lbs)	Nm x 0,74 = ft/lbs

ISO FITS

ISO 286-2 (DIN 7154 AND DIN 7155)

Values in µm

Tolerance zone	H6		H7		H8		H9		H11		H12		H13		F7		F6		E9		D12		C13		JS12		h5		g5		g6		k6		n6		h6		f7		f8		h8		h9		h11		h13	
	from 1 to 3	+6	+10	+14	+25	+60	+100	+140	+16	+12	+39	+120	+200	+50	0	-2	-2	+6	+10	0	-6	-6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
over 3 to 6	+8	+12	+18	+30	+75	+120	+180	+22	+18	+50	+150	+250	+60	0	-4	-4	+9	+16	0	-10	-10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0					
over 6 to 10	+9	+15	+22	+36	+90	+150	+220	+28	+22	+61	+190	+300	+75	0	-5	-5	+10	+19	0	-13	-13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0					
over 10 to 18	+11	+18	+27	+43	+110	+180	+270	+34	+27	+75	+230	+365	+90	0	-6	-6	+12	+23	0	-16	-16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0					
over 18 to 30	+13	+21	+33	+52	+130	+210	+320	+41	+33	+92	+275	+440	+105	0	-7	-7	+15	+28	0	-20	-20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0					
over 30 to 40	+16	+25	+39	+62	+160	+250	+390	+50	+41	+112	+330	+510	+125	0	-9	-9	+18	+33	0	-25	-25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0					
over 40 to 50	+16	+25	+39	+62	+160	+250	+390	+50	+49	+112	+330	+520	+125	0	-9	-9	+18	+33	0	-25	-25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0					
over 50 to 65	+19	+30	+46	+74	+190	+300	+460	+60	+49	+134	+400	+600	+150	0	-10	-10	+21	+39	0	-30	-30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0					
over 65 to 80	+19	+30	+46	+74	+190	+300	+460	+60	+58	+134	+400	+690	+150	0	-10	-10	+21	+39	0	-30	-30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0					
over 80 to 100	+22	+35	+54	+87	+220	+350	+540	+71	+58	+159	+470	+710	+175	0	-12	-12	+25	+45	0	-36	-36	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0					
over 100 to 120	+22	+35	+54	+87	+220	+350	+540	+71	+58	+159	+470	+720	+175	0	-12	-12	+25	+45	0	-36	-36	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			

GENERAL TOLERANCES

DIN ISO 2768, PART 1

Table 1. Limit deviations for linear sizes with the exception of cut-off edges (for radius of curvature and chamfer heights, please refer to table 2)

Values in mm

Tolerance class		Limit deviations for ranges of nominal sizes							
Symbol	Designation	von 0,5* to 3	over 3 to 6	over 6 to 30	over 30 to 120	over 120 to 400	over 400 to 1000	over 1000 to 2000	over 2000 to 4000
f	fine	± 0,05	± 0,05	± 0,1	± 0,15	± 0,2	± 0,3	± 0,5	–
m	medium	± 0,1	± 0,1	± 0,2	± 0,3	± 0,5	± 0,8	± 1,2	± 2
c	coarse	± 0,2	± 0,3	± 0,5	± 0,8	± 1,2	± 2	± 3	± 4
v	very coarse	–	± 0,5	± 1	± 1,5	± 2,5	± 4	± 6	± 8

*For nominal sizes below 0.5 mm, the limit deviations are to be indicated directly on the relevant nominal size(s).

Table 2. Limit deviations for cut-off edges (radius of curvature and chamfer heights)

Values in mm

Tolerance class		Limit deviations for ranges of nominal sizes		
Symbol	Designation	over 0,5* to 3	over 3 to 6	over 6 to 30
f	fine	± 0,2	± 0,5	± 1
m	medium	± 0,2	± 0,5	± 1
c	coarse	± 0,4	± 1	± 2
v	very coarse	± 0,4	± 1	± 2

*For nominal sizes below 0.5 mm, the limit deviations are to be indicated directly on the relevant nominal size(s).

Table 3. Limit deviations for angular dimensions

Values in mm

Tolerance class		Limit deviations for linear ranges, expressed in mm, for the shorter leg of relevant angle				
Symbol	Designation	to 10	over 10 to 50	over 50 to 120	over 120 to 400	over 400
f	fine	± 1°	± 0° 30'	± 0° 20'	± 0° 10'	± 0° 5'
m	medium	± 1°	± 0° 30'	± 0° 20'	± 0° 10'	± 0° 5'
c	coarse	± 1° 30'	± 1°	± 0° 30'	± 0° 15'	± 0° 10'
v	very coarse	± 3°	± 2°	± 1°	± 0° 30'	± 0° 20'

DIN ISO 2768, PART 2

Table 1. General tolerances for straightness and evenness

Values in mm

Tolerance class	General tolerances for straightness and evenness for ranges of nominal sizes					
	to 10	over 10 to 30	over 30 to 100	over 100 to 300	over 300 to 1000	over 1000 to 3000
H	0,02	0,05	0,1	0,2	0,3	0,4
K	0,05	0,1	0,2	0,4	0,6	0,8
L	0,1	0,2	0,4	0,8	1,2	1,6

Table 2. General tolerances for perpendicularity

Values in mm

Tolerance class	Perpendicularity tolerances for ranges of nominal sizes for the shorter leg of the angle			
	to 100	over 100 to 300	over 300 to 1000	over 1000 to 3000
H	0,2	0,3	0,4	0,5
K	0,4	0,6	0,8	1
L	0,6	1	1,5	2

Table 3. General tolerances for symmetry

Values in mm

Tolerance class	Symmetry tolerances for ranges of nominal sizes			
	up to 100	over 100 to 300	over 300 to 1000	over 1000 to 3000
H	0,05	0,05	0,05	0,05
K	0,6	0,6	0,8	1
L	0,6	1	1,5	2

SHAPE AND POSITIONING TOLERANCE

for all Halder jig and fixture systems (except V70eco)

Positioning tolerance: 0 - 500 mm \pm 0,01

Parallelism: on 500 mm 0,015

Angle precision: on 200 mm 0,01

ARTICLE BASED TORQUES

(NOT VALID FOR STAINLESS STEEL)



EH 23070.
Fixture Nuts
DIN 6330
Quality 10



EH 23080.
Collar Nuts
with collar DIN 6331
Quality 10



EH 23080.
Collar Nuts
with ball seat



EH 23090.
Extension Nuts
Quality 10

Thread		M6	M8	M10	M12	M14	M16	M18	M20	M22	M24	M27	M30	M36	M42	M48
Pitch (mm)		1	1,25	1,50	1,75	2	2	2,50	2,50	2,50	3	3	3,50	4	4,50	5
Nuts	Strength Class															
Hardness (HRC) DIN 6330/6331	10	22-32														
Test force (kN) DIN EN 20898-2	10	20,9	38,1	60	88	121	165	203	260	321	374	486	595	866	-	-



EH 23030.
T-Bolts
DIN 787
Up to M12 Quality 10.9
From M14 Quality 8.8



EH 23040.
Studs for T-Nuts
DIN 6379
Up to M12 Quality 10.9
From M14 Quality 8.8



EH 22980.
Swing Bolts
DIN 444
Quality 8.8

Thread		M6	M8	M10	M12	M14	M16	M18	M20	M22	M24	M27	M30	M36	M42	M48
Pitch (mm)		1	1,25	1,5	1,75	2	2	2,50	2,50	2,50	3	3	3,50	4	4,50	5
Nuts	Strength Class															
Permissible prestressing force with 90 % utilization yield point and friction $\mu = 0,14$	8.8 10.9	9 13	17 25	26 38	38 55	53 77	73 107	91 130	117 167	146 208	168 240	221 315	269 284	394 561	542 773	714 1018
Required tightening moment of permissible prestressing force and friction $\mu = 0,14$	8.8 10.9	10 14	25 36	46 67	82 120	130 191	206 302	284 405	407 580	542 772	698 994	1021 1455	1355 1930	2372 3378	3802 5415	5730 8162

GENERAL TORQUES STRENGTHS FOR SCREWED CONNECTIONS

Thread		M6	M8	M10	M12	M14	M16	M18	M20	M22	M24	M27	M30	M36	M42	M48
Pitch (mm)		1	1,25	1,50	1,75	2	2	2,50	2,50	2,50	3	3	3,50	4	4,50	5
Nuts	Strength Class															
Hardness (HRC) DIN 6330/6331	10	22–32														
Test force (kN) ($A_s \times S_p$) DIN EN 20898-2	10	20,9	38,1	60	88	121	165	203	260	321	374	486	595	866	–	–
Screws																
Hardness (HRC)	8.8	22–32									23–24					
	10.9	32–39														
	12.9	39–44														
Tightening values																
Specified failing load ($A_s \times R_m$) (kN)	8.8	16	29	46	67	92	125	159	203	252	293	381	466	678	930	1222
	10.9	21	38	60	88	120	163	200	255	315	367	477	583	850	1165	1531
	12.9	24	45	71	103	140	192	234	299	370	431	560	684	997	1367	1797
Permissible load on screws max. 80 % of yield point	8.8	10	19	30	43	59	80	101	129	160	186	242	296	431	591	777
	10.9	14	27	43	63	86	118	144	184	228	265	345	421	614	843	1107
	12.9	17	32	51	74	101	138	169	215	266	310	404	493	719	986	1296
Test force ($A_s \times S_p$) acc. to DIN ISO 898, part 1 (kN)	8.8	12	21	34	49	67	91	115	147	182	212	275	337	490	672	882
	10.9	17	30	48	70	96	130	159	203	252	293	381	466	678	930	1222
	12.9	20	35	56	82	112	152	186	238	294	342	445	544	792	1087	1428
Permissible prestressing force with 90 % utilization yield point and friction $\mu = 0,14$ (kN)	8.8	9	17	26	38	53	73	91	117	146	168	221	269	394	542	714
	10.9	13	25	38	55	77	107	130	167	208	240	315	384	561	773	1018
	12.9	15	29	44	65	91	125	152	196	243	281	369	449	657	904	1191
Required tightening moment for permissible prestressing force and $\mu = 0,14$ (Nm)	8.8	10	25	46	82	130	206	284	407	542	698	1021	1355	2372	3802	5730
	10.9	14	36	67	120	191	302	405	580	772	994	1455	1930	3378	5415	8162
	12.9	17	43	79	141	223	354	474	679	903	1163	1703	2258	3953	6337	9571
Required lever length to obtain the permissible prestressing force with normal manual force (mm)	8.8	30	65	125	215	330	490	650	870	1100	1350	–	–	–	–	–
	10.9	42	90	175	300	450	700	920	1200	1560	–	–	–	–	–	–
	12.9	51	110	210	360	550	830	1100	1470	1860	–	–	–	–	–	–
Possible torque with normal ring spanner and torsional force. *Presstressing force resulting thereof (Nm)	–	60	80	90	100	110	125	140	150	170	185	225	240	300	330	410
Possible torque with normal ring spanner and torsional force. *Presstressing force resulting thereof (kN)	–	54	53	48	45	43	43	43	42	42	43	45	43	45	46	50
	8.8	breaking (B)			yielding hazard (F)		danger of a loosening of clamped parts on application of operational force									
* When applying this prestressing force, there exists a	10.9	(B)		(F)		danger of a loosening of clamped parts on application of operational force										
	12.9	(B)		(F)		danger of a loosening of clamped parts on application of operational force										

A_s = nominal load cross section in mm^2 / S_p = test load in N/mm^2 / R_m = minimum tensile strength N/mm^2 / μ = coefficient of friction

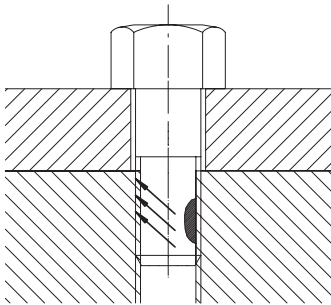
POLYAMIDE THREAD LOCKINGS

POLYAMIDE SPOT COATING AND ALL-AROUND COATING

IN COMPLIANCE WITH THE REQUIREMENTS OF DIN 267, PART 28

Description

Polyamide spot coating is a plastics material which is applied onto a part of a thread and which develops a clamping effect when screwed in. The axial play existing between the screw thread and the nut thread is filled up by the Polyamide material. Thus, a high surface pressure between the opposing uncoated flanks of the threads is achieved. This connection prevents a loosening of the threaded parts when subject to dynamic load.



Polyamide spot coating is a favourably priced method of counteracting a self-loosening and self-releasing of screws and threaded parts. By applying Polyamide spot coating, a connection is created which can be released at any time while maintaining its locking effect even after a repeated insertion or removal of the screw.

Field of application M 3 - M 16

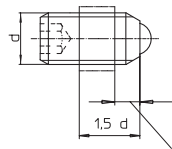
Polyamide spot coating can be applied onto screws and threaded pins made of steel or stainless steel. This method is suitable for galvanic as well as organic/ anorganic surface treatments.

Dimensions and designation

Clamping thread lockings include all-around coatings, spot coatings and strip coatings.

Standard version - DIN 267, part 28

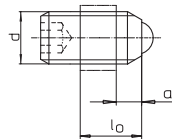
If not specified otherwise, the coating is located within a linear range of $1,5 \times d \pm 2 P$ for $P < 1$ and $1,5 \times d \pm P$ for $P \geq 1$ measured from the tip of the screw. The first 2 or 3 threads remain uncoated in order to facilitate the screwing-in procedure.



2 to 3 thread turns almost free from coating
 d = nominal diameter
 P = thread lead

Versions with coating in special length or in special place

The measurements l_0 and a must be stated in your order.



l_0 = length of coating
 a = position of coating from screw end
 P = thread lead

For l_0 and a , the tolerances $\pm 2 P$ when $P < 1$ and $\pm P$ when $P \geq 1$ apply.

Properties

- Reusable (up to 5 times).
- Temperature-resistant from $- 50^\circ \text{C}$ up to $+ 90^\circ \text{C}$, for short intervals up to $+ 120^\circ \text{C}$
- Unlimited shelf life
- The screw and the locking element form a unity
- Forgetting to apply the locking element does not happen any more
- Mounting aid (red or blue colour)
- Can be inserted immediately - no cure time
- Resistant against almost all aggressive substances (documentation can be made available on request)
- Polyamide spot coating can be adapted to suit specific requirements



In conformity with DIN 267, part 28

Thread	Test tightening moment M_A^*		Screw-in torque	Clamping torque	
	Nm	Nm		Nm	Nm
*Determined on the basis of a total coefficient of friction $f = 0,12$ with a 90% utilization of the minimum values for the yield point or the tensile yield strength of the respective lowest strength class.	5,6	8,8	1. screw. in	1. screw. out	3. screw. out
	5,8	10,9	M_{in}	M_{out}	M_{out}
	6,8	12,9	max.	min.	min.
M3	0,6	1,2	0,43	0,10	0,08
M4	1,4	2,8	0,90	0,12	0,10
M5	2,6	5,5	1,60	0,18	0,15
M6	4,5	9,5	3,00	0,35	0,23
M8 - M8 x 1	11,0	23,0	6,00	0,85	0,45
M10 - M10 x 1,25	22,0	46,0	10,50	1,50	0,75
M12 - M12 x 1,25					
M12 - M12 x 1,5	38,0	79,0	15,50	2,30	1,60
M14 - M14 x 1,5	60,0	125,0	24,00	3,30	2,30
M16 - M16 x 1,5	90,0	195,0	32,00	4,00	2,80

Requirements applicable to screwed joints with prestressing.

For spring plungers

Thread		Screwing-/clamping turning moment
		Nm M_{in} max. / M_{out} max.
M3	4-48	0,3
	5-40	
	6-32	
	6-40	
M4	8-32	0,5
	8-36	
M5	10-32	0,6
M6	1/4-20	1,2
	1/4-28	
M8	5/16-18	2
M10	3/8-16	3,5
M12	1/2-13	5
M16	5/8-11	7
M20	3/4-10	10
M24	1-8	12

MICRO-ENCAPSULATED THREAD LOCKINGS

MICRO-ENCAPSULATED ADHESIVES FOR LOCKING AND SEALING IN COMPLIANCE WITH THE REQUIREMENTS OF DIN 267, PART 27

Micro-encapsulated systems maintain their strength for a period of approx. 4 years when stored under normal conditions in a dry climate at temperatures between 20 °C and 25 °C without major fluctuations.

PRECOTE® 80

Based on the system of Omni-Technik, preCOTE is a liquid plastics material including a hardening agent both of which are encapsulated into a thin polymer layer and embedded into a lacquer-type carrier system. PreCOTE is applied onto the Thread of screws yielding a dry and non-tacky safety coating which is ready for use at any time.

FUNCTION

On assembly of Threaded parts which are coated with preCOTE material, the micro capsules are ruptured by pressure and/or shearing force. During this, the liquid plastics material and the hardening agent are set free and mixed with each other thus initiating a chemical reaction (polymerization). Due to the curing of the adhesive, a locking effect as well as an additional sealing effect is created.

Product	OT preCOTE 80
Product colour	red
Temperature range	x _i - 50 °C up to + 170 °C
Thread friction coefficient μ Thread	0,26 – 0,28
Function	high-strength universal screw locking

PROPERTIES

The cured preCOTE material serves as a locking element for joints even when subject to highest dynamic transverse stress. This means that a loss of prestressing exceeding the settling rate will not occur. The settling rate depends on the material to be clamped and its surface roughness. Besides, a corrosion within threaded assemblies is avoided. Mounting is performed according to almost the same procedures as with uncoated mating threads. Only the friction coefficient of the thread may be increased in some cases and therefore has to be compensated for by a correction of the tightening torque. Threaded joints which are locked and sealed with preCOTE material can be released without any damage being done to the threads using normal hand tools.

CURING

Curing will be initiated approx. 10 -15 minutes after mounting. Curing will be fully completed after 24 hours, however, it can be accelerated by temperature exposure.



Test without prestressing

Test torques at room temperature

Threads*	Torques in Nm		
	M _{in} max.	M _{out} min.	M _{out} max.
M 5	1	1	6,5
M 6	1,5	1,8	10
M 8 M 8 x 1	3	4	26
M 10 M 10 x 1,25	5,5	10	55
M 12 M 12 x 1,25 · M 12 x 1,5	7,5	16	95
M 14 M 14 x 1,5	11	22	160
M 16 M 16 x 1,5	14	35	250
M 18 M 18 x 1,5 · M 18 x 2	19	40	335
M 20 M 20 x 1,5 · M 20 x 2	22	45	500
M 22 M 22 x 1,5 · M 22 x 2	30	65	800
M 24 M 24 x 2	36	90	1050
M 27 M 27 x 2	42	120	1300
M 30 M 30 x 2	49	165	1700
M 33 M 33 x 2	55	210	2400
M 36 M 36 x 2	60	280	3000
M 39 M 39 x 2	70	330	4000

Requirements applicable to threaded joints without prestressing with test nut. Tolerance of thread 6 H.

*For nominal thread diameters < 5 mm and > 39 mm the testing torques have to be agreed upon between the supplier and the purchaser.