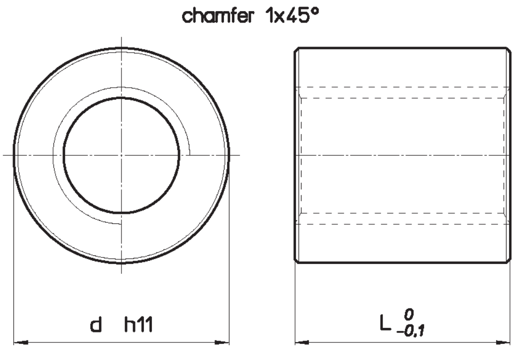
Trapezoidal nut type MLF - Cylindrical steel

Material: EN 10277-3 11 S Mn Pb 37 – 1.0737

Nut for fastening or manual movement with small load; steel-to-steel coupling tends to seize. Can be MIG welded only. Electrode welding is not recommended because of the lead.

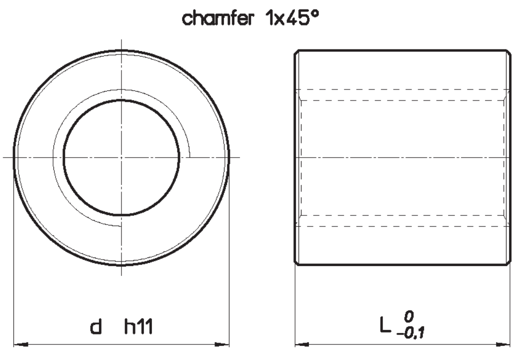


Nut Stock no. **RIGHT**	Nut Stock no. **LEFT**	**Diameter x lead**	Thread starts	**d** mm	**L** mm	**Wt.** kg/each	**At** mm^2 (1)
MLF 12 A R	MLF 12 A L	**Tr 12x3**	1	36	36	0.255	592
MLF 12 B R	--	**Tr 12x6 (P3)**	2	36	36	0.255	592
MLF 14 A R	MLF 14 A L	**Tr 14x4**	1	36	36	0.250	677
MLF 16 A R	MLF 16 A L	**Tr 16x4**	1	36	36	0.238	792
MLF 16 B R	--	**Tr 16x8 (P4)**	2	36	36	0.238	792
MLF 18 A R	MLF 18 A L	**Tr 18x4**	1	36	36	0.224	905
MLF 20 A R	MLF 20 A L	**Tr 20x4**	1	40	40	0.306	1130
MLF 20 B R	--	**Tr 20x8 (P4)**	2	40	40	0.306	1130
MLF 22 A R	MLF 22 A L	**Tr 22x5**	1	40	40	0.290	1225
MLF 25 A R	MLF 25 A L	**Tr 25x5**	1	45	45	0.40	1590
MLF 25 B R	--	**Tr 25x10 (P5)**	2	45	45	0.40	1590
MLF 28 A R	MLF 28 A L	**Tr 28x5**	1	45	45	0.36	1800
MLF 28 B R	--	**Tr 28x10 (P5)**	2	45	45	0.36	1800
MLF 30 A R	MLF 30 A L	**Tr 30x6**	1	50	50	0.52	2120
MLF 30 B R	--	**Tr 30x12 (P6)**	2	50	50	0.52	2120
MLF 35 A R	MLF 35 A L	**Tr 35x6**	1	55	55	0.65	2764
MLF 40 A R	MLF 40 A L	**Tr 40x7**	1	60	60	0.79	3440
MLF 40 B R	--	**Tr 40x14 (P7)**	2	60	60	0.79	3440
MLF 45 A R	MLF 45 A L	**Tr 45x8**	1	65	65	0.95	4186
MLF 50 A R	MLF 50 A L	**Tr 50x8**	1	70	70	1.12	5057
MLF 55 A R	--	**Tr 55x9**	1	80	80	1.78	6345
MLF 60 A R	MLF 60 A L	**Tr 60x9**	1	80	80	1.51	6975

Trapezoidal nut type MZP - Cylindrical steel

Material: EN 10277-3 11 S Mn Pb 37 – 1.0737

Nut for fastening or manual movement with small load; steel-to-steel coupling tends to seize. Can be MIG welded only. Electrode welding is not recommended because of the lead.



Nut Stock no. **RIGHT**	Nut Stock no. **LEFT**	**Diameter x lead**	Thread starts	**d** mm	**L** mm	**Wt.** kg/each	**At** mm^2 (1)
MZP 10 T R	MZP 10 T L	**Tr 10x2**	1	22	15	0.038	212
MZP 10 A R	MZP 10 A L	**Tr 10x3**	1	22	15	0.037	200
MZP 12 A R	MZP 12 A L	**Tr 12x3**	1	26	18	0.061	296
MZP 12 B R	--	**Tr 12x6 (P3)**	2	26	18	0.061	296
MZP 14 R R	MZP 14 R L	**Tr 14x3**	1	30	21	0.095	412
MZP 14 A R	MZP 14 A L	**Tr 14x4**	1	30	21	0.095	395
MZP 16 A R	MZP 16 A L	**Tr 16x4**	1	36	24	0.158	528
MZP 18 A R	MZP 18 A L	**Tr 18x4**	1	40	27	0.218	678
MZP 20 A R	MZP 20 A L	**Tr 20x4**	1	45	30	0.308	847
MZP 22 A R	MZP 22 A L	**Tr 22x5**	1	45	33	0.324	1010
MZP 24 A R	MZP 24 A L	**Tr 24x5**	1	50	36	0.440	1215
MZP 26 A R	MZP 26 A L	**Tr 26x5**	1	50	39	0.454	1440
MZP 28 A R	MZP 28 A L	**Tr 28x5**	1	60	42	0.747	1680
MZP 30 A R	MZP 30 A L	**Tr 30x6**	1	60	45	0.773	1908
MZP 32 A R	MZP 32 A L	**Tr 32x6**	1	60	48	0.790	2186
MZP 36 A R	MZP 36 A L	**Tr 36x6**	1	75	54	1.476	2800
MZP 40 A R	MZP 40 A L	**Tr 40x7**	1	80	60	1.826	3440
MZP 44 A R	MZP 44 A L	**Tr 44x7**	1	80	66	1.878	4200
MZP 50 A R	MZP 50 A L	**Tr 50x8**	1	90	75	2.680	5418
MZP 60 A R	MZP 60 A L	**Tr 60x9**	1	100	90	3.698	7847
MZP 70 A R	MZP 70 A L	**Tr 70x10**	1	110	105	4.884	10720
MZP 80 A R	MZP 80 A L	**Tr 80x10**	1	120	120	6.210	14137

(1) Total bearing surface between screw and nut teeth on plane perpendicular to axis.

TRAPEZOIDAL NUTS

Single start	**MLF** page 33 Steel 11SMnPb37		**MZP** page 33 Steel 11SMnPb37		**HDA** page 35 Stainless Steel Aisi 303 1.4305		**HSN** page 34 Bronze CuSn5Zn5Pb5-C		**HBD** page 34 Bronze CuSn7Zn4Pb7-C		**HBM** page 35 Bronze CuSn12-C	
												
THREAD	**RH**	**LH**	**RH**	**LH**	**RH**	**LH**	**RH**	**LH**	**RH**	**LH**	**RH**	**LH**
Tr 8 x 1,5												
Tr 10 x 2			■	■					■	■		
Tr 10 x 3			■	■					■	■	■	■
Tr 12 x 3	■	■	■	■	■	■	■	■	■	■	■	■
Tr 14 x 3			■	■					■	■		
Tr 14 x 4	■	■	■	■	■	■	■	■	■	■	■	■
Tr 16 x 4	■	■	■	■	■	■	■	■	■	■	■	■
Tr 18 x 4	■	■	■	■			■	■	■	■	■	■
Tr 20 x 4	■	■	■	■	■	■	■	■	■	■	■	■
Tr 22 x 5	■	■	■	■			■	■	■	■		
Tr 24 x 5			■	■	■	■			■	■		
Tr 25 x 3												
Tr 25 x 5	■	■					■	■			■	■
Tr 26 x 5			■	■					■	■		
Tr 28 x 5	■	■	■	■			■	■	■	■		
Tr 30 x 3												
Tr 30 x 4												
Tr 30 x 5												
Tr 30 x 6	■	■	■	■	■	■	■	■	■	■	■	■
Tr 32 x 6			■	■					■	■		
Tr 35 x 3												
Tr 35 x 4												
Tr 35 x 5												
Tr 35 x 6	■	■					■	■			■	■
Tr 35 x 8												
Tr 36 x 6			■	■	■	■			■	■	■	■
Tr 40 x 3												
Tr 40 x 4												
Tr 40 x 5												
Tr 40 x 6												
Tr 40 x 7	■	■	■	■	■	■	■	■	■	■	■	■
Tr 40 x 8												
Tr 40 x 10												
Tr 44 x 7			■	■					■	■		
Tr 45 x 8	■	■					■	■			■	■
Tr 50 x 3												
Tr 50 x 4												
Tr 50 x 5												
Tr 50 x 6												
Tr 50 x 8	■	■	■	■	■	■	■	■	■	■	■	■
Tr 50 x 10												
Tr 55 x 9	■						■				■	
Tr 60 x 6												
Tr 60 x 7												
Tr 60 x 9	■	■	■	■			■	■	■	■	■	■
Tr 70 x 10			■	■					■	■	■	■
Tr 80 x 10			■	■					■	■	■	■
Tr 90 x 12												
Tr 95 x 16												
Tr 100 x 12												
Tr 100 x 16												
Tr 120 x 14												
Tr 140 x 14												

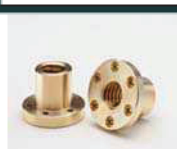
■ = Goods in stock

 We riserve the right to change sizes and features without notice.

TRAPEZOIDAL NUTS

Multiple start	**MLF** page 33 Steel 11SMnPb37		**MZP** page 33 Steel 11SMnPb37		**HSN** page 34 Bronze CuSn5Zn5Pb5-C		**HBD** page 34 Bronze CuSn7Zn4Pb7-C	
								
THREAD	**RH**	**LH**	**RH**	**LH**	**RH**	**LH**	**RH**	**LH**
Tr 10 x 4 (P2)								
Tr 12 x 6 (P3)	■		■				■	
Tr 14 x 6 (P3)							■	
Tr 16 x 8 (P4)	■				■		■	
Tr 18 x 8 (P4)								
Tr 20 x 8 (P4)	■				■			
Tr 20 x 20 (P4)								
Tr 20 x 20 (P5)								
Tr 22 x 10 (P5)								
Tr 24 x 10 (P5)								
Tr 25 x 10 (P5)	■				■			
Tr 25 x 25 (P5)								
Tr 26 x 10 (P5)								
Tr 28 x 10 (P5)	■				■			
Tr 30 x 12 (P6)	■				■		■	
Tr 30 x 30 (P5)								
Tr 32 x 12 (P6)								
Tr 36 x 12 (P6)								
Tr 40 x 14 (P7)	■				■		■	
Tr 40 x 40 (P8)								

■ = Goods in stock

Multiple start	**QOB** page 37 Brass CW614N-M		**FXN** page 41 Bronze CuSn12-C		**FMT** page 42 Bronze CuSn12-C		**HDL** page 43 Bronze CuSn12-C	
								
THREAD	**RH**	**LH**	**RH**	**LH**	**RH**	**LH**	**RH**	**LH**
Tr 10 x 4 (P2)								
Tr 12 x 6 (P3)	■		■		■			
Tr 14 x 6 (P3)								
Tr 16 x 8 (P4)			■		■		■	
Tr 18 x 8 (P4)								
Tr 20 x 8 (P4)			■		■		■	
Tr 20 x 20 (P4)			■					
Tr 20 x 20 (P5)			■					
Tr 22 x 10 (P5)								
Tr 24 x 10 (P5)								
Tr 25 x 10 (P5)			■		■		■	
Tr 25 x 25 (P5)			■				■	
Tr 26 x 10 (P5)								
Tr 28 x 10 (P5)			■				■	
Tr 30 x 12 (P6)			■		■		■	
Tr 30 x 30 (P5)			■					
Tr 32 x 12 (P6)								
Tr 36 x 12 (P6)								
Tr 40 x 14 (P7)			■		■		■	
Tr 40 x 40 (P8)			■					

 We riserve the right to change sizes and features without notice.

Trapezoidal nut specifications (also see pages for each nut type)

Diameter x lead	D 4 Major diameter tolerance H min. max. mm	D 2 Effective or pitch dia. tolerance 7 H min.	D 2 max. mm	D 1 Minor diameter tolerance 4 H min.	D 1 max. mm	Thread starts	Radial play between screw & nut min.	Radial play max.	Axial play between screw & nut min.	Axial play max.
Tr 8 x 1,5	8,300	7,250	7,474	6,500	6,690	1	0,067	0,461	0,018	0,124
Tr 10 x 2	10.500	9.000	9.250	8.000	8.236	1	0.071	0.511	0.019	0.137
Tr 10 x 3	10.500	8.500	8.780	7.000	7.315	1	0.085	0.577	0.023	0.155
Tr 10 x 4 (P2)	10.500	9.000	9.250	8.000	8.236	2	0.071	0.511	0.019	0.137
Tr 12 x 3	12.500	10.500	10.800	9.000	9.315	1	0.085	0.609	0.023	0.163
Tr 12 x 6 (P3)	12.500	10.500	10.800	9.000	9.315	2	0.085	0.609	0.023	0.163
Tr 14 x 3	14.500	12.500	12.800	11.000	11.315	1	0.085	0.609	0.023	0.163
Tr 14 x 4	14.500	12.000	12.355	10.000	10.375	1	0.095	0.715	0.025	0.192
Tr 14 x 6 (P3)	14.500	12.500	12.800	11.000	11.315	2	0.085	0.609	0.023	0.163
Tr 16 x 4	16.500	14.000	14.355	12.000	12.375	1	0.095	0.715	0.025	0.192
Tr 16 x 8 (P4)	16.500	14.000	14.355	12.000	12.375	2	0.095	0.715	0.025	0.192
Tr 18 x 4	18.500	16.000	16.355	14.000	14.375	1	0.095	0.715	0.025	0.192
Tr 18 x 8 (P4)	18.500	16.000	16.355	14.000	14.375	2	0.095	0.715	0.025	0.192
Tr 20 x 4	20.500	18.000	18.355	16.000	16.375	1	0.095	0.715	0.025	0.192
Tr 20 x 8 (P4)	20.500	18.000	18.355	16.000	16.375	2	0.095	0.715	0.025	0.192
Tr 20 x 20 (P4)	20.500	17.500	17.875	15.000	15.450	5	0.106	0.761	0.028	0.204
Tr 20 x 20 (P5)	20.500	17.500	17.875	15.000	15.450	4	0.106	0.761	0.028	0.204
Tr 22 x 5	22.500	19.500	19.875	17.000	17.450	1	0.106	0.761	0.028	0.204
Tr 22 x 10 (P5)	22.500	19.500	19.875	17.000	17.450	2	0.106	0.761	0.028	0.204
Tr 24 x 5	24.500	21.500	21.900	19.000	19.450	1	0.106	0.806	0.028	0.216
Tr 24 x 10 (P5)	24.500	21.500	21.900	19.000	19.450	2	0.106	0.806	0.028	0.216
Tr 25 x 3	25.500	23.500	23.835	22.000	22.315	1	0.085	0.670	0.023	0.180
Tr 25 x 5	25.500	22.500	22.900	20.000	20.450	1	0.106	0.806	0.028	0.216
Tr 25 x 10 (P5)	25.500	22.500	22.900	20.000	20.450	2	0.106	0.806	0.028	0.216
Tr 25 x 25 (P5)	25.500	22.500	22.900	20.000	20.450	5	0.106	0.806	0.028	0.216
Tr 26 x 5	26.500	23.500	23.900	21.000	21.450	1	0.106	0.806	0.028	0.216
Tr 26 x 10 (P5)	26.500	23.500	23.900	21.000	21.450	2	0.106	0.806	0.028	0.216
Tr 28 x 5	28.500	25.500	25.900	23.000	23.450	1	0.106	0.806	0.028	0.216
Tr 28 x 10 (P5)	28.500	25.500	25.900	23.000	23.450	2	0.106	0.806	0.028	0.216
Tr 30 x 3	30.500	28.500	28.835	27.000	27.315	1	0.085	0.670	0.023	0.180
Tr 30 x 4	30.500	28.000	28.855	26.000	26.375	1	0.095	1.215	0.025	0.326
Tr 30 x 5	30.500	27.500	27.900	25.000	25.450	1	0.106	0.806	0.028	0.216
Tr 30 x 6	31.000	27.000	27.450	24.000	24.500	1	0.118	0.903	0.032	0.242
Tr 30 x 12 (P6)	31.000	27.000	27.450	24.000	24.500	2	0.118	0.903	0.032	0.242
Tr 30 x 30 (P5)	30.500	27.500	27.900	25.000	25.450	6	0.106	0.806	0.028	0.216
Tr 32 x 6	33.000	29.000	29.450	26.000	26.500	1	0.118	0.903	0.032	0.242
Tr 32 x 12 (P6)	33.000	29.000	29.450	26.000	26.500	2	0.118	0.903	0.032	0.242
Tr 35 x 3	35.500	33.500	33.835	32.000	32.315	1	0.085	0.670	0.023	0.180
Tr 35 x 4	35.500	33.000	33.355	31.000	31.375	1	0.095	0.715	0.025	0.192
Tr 35 x 5	35.500	32.500	32.900	30.000	30.450	1	0.106	0.806	0.028	0.216
Tr 35 x 6	36.000	32.000	32.450	29.000	29.500	1	0.118	0.903	0.032	0.242
Tr 35 x 8	36.000	31.000	31.500	27.000	27.630	1	0.132	1.007	0.035	0.270
Tr 36 x 6	37.000	33.000	33.450	30.000	30.500	1	0.118	0.903	0.032	0.242
Tr 36 x 12 (P6)	37.000	33.000	33.450	30.000	30.500	2	0.118	0.903	0.032	0.242

 We riserve the right to change sizes and features without notice.

Trapezoidal nut specifications **(also see pages for each nut type)**

Diameter x lead	D 4 Major diameter tolerance **H** min. (mm)	D 4 max. (mm)	D 2 Effective or pitch dia. tolerance **7 H** min. (mm)	D 2 max. (mm)	D 1 Minor diameter tolerance **4 H** min. (mm)	D 1 max. (mm)	Thread starts	Radial play between screw & nut min.	Radial play max.	Axial play between screw & nut min.	Axial play max.
Tr 40 x 3	40.500		38.500	38.835	37.000	37.315	1	0.085	0.670	0.023	0.180
Tr 40 x 4	40.500		38.000	38.355	36.000	36.375	1	0.095	0.715	0.025	0.192
Tr 40 x 5	40.500		37.500	37.900	35.000	35.450	1	0.106	0.806	0.028	0.216
Tr 40 x 6	41.000		37.000	37.450	34.000	34.500	1	0.118	0.903	0.032	0.242
Tr 40 x 7	41.000		36.500	36.975	33.000	33.560	1	0.125	0.955	0.033	0.256
Tr 40 x 8	41.000		36.000	36.500	32.000	32.630	1	0.132	1.007	0.035	0.270
Tr 40 x 10	41.000		35.000	35.530	30.000	30.710	1	0.150	1.080	0.040	0.289
Tr 40 x 14 (P7)	41.000		36.500	36.975	33.000	33.560	2	0.125	0.955	0.033	0.256
Tr 40 x 40 (P8)	41.000		36.000	36.500	32.000	32.630	5	0.132	1.007	0.035	0.270
Tr 44 x 7	45.000		40.500	40.975	37.000	37.560	1	0.125	0.955	0.033	0.256
Tr 45 x 8	46.000		41.000	41.500	37.000	37.630	1	0.132	1.007	0.035	0.270
Tr 50 x 3	50.500		48.500	48.855	47.000	47.315	1	0.085	0.705	0.023	0.189
Tr 50 x 4	50.500		48.000	48.400	46.000	46.375	1	0.095	0.795	0.025	0.213
Tr 50 x 5	50.500		47.500	47.900	45.000	45.450	1	0.106	0.806	0.028	0.216
Tr 50 x 6	51.000		47.000	47.450	44.000	44.500	1	0.118	0.903	0.032	0.242
Tr 50 x 8	51.000		46.000	46.530	42.000	42.630	1	0.132	1.062	0.035	0.285
Tr 50 x 10	51.000		45.000	45.560	40.000	40.710	1	0.150	1.135	0.040	0.304
Tr 55 x 9	56.000		50.500	51.060	46.000	46.670	1	0.140	1.125	0.038	0.301
Tr 60 x 6	61.000		57.000	57.450	54.000	54.500	1	0.118	0.903	0.032	0.242
Tr 60 x 7	61.000		56.500	56.975	53.000	53.560	1	0.125	0.955	0.033	0.256
Tr 60 x 9	61.000		55.500	56.060	51.000	51.670	1	0.140	1.125	0.038	0.301
Tr 70 x 10	71.000		65.000	65.560	60.000	60.710	1	0.150	1.135	0.040	0.304
Tr 80 x 10	81.000		75.000	75.560	70.000	70.710	1	0.150	1.135	0.040	0.304
Tr 90 x 12	91.000		84.000	84.630	78.000	78.800	1	0.170	1.295	0.046	0.347
Tr 95 x 16	97.000		87.000	87.750	79.000	80.000	1	0.190	1.500	0.051	0.402
Tr 100 x 12	101.000		94.000	94.670	88.000	88.800	1	0.170	1.340	0.046	0.359
Tr 100 x 16	102.000		92.000	92.750	84.000	85.000	1	0.190	1.500	0.051	0.402
Tr 120 x 14	122.000		113.000	113.710	106.00	106.900	1	0.180	1.420	0.048	0.380
Tr 120 x 16	122.000		112.000	112.750	104.00	105.000	1	0.190	1.500	0.051	0.402
Tr 140 x 14	142.000		133.000	133.710	126.00	126.900	1	0.180	1.420	0.048	0.380
Tr 160 x 16	162.000		152.000	152.750	144.00	145.000	1	0.190	1.500	0.051	0.402

General choice criteria

The choice between different types of available screws and nuts is generally made considering the following:

Choice of the screw

Working environment

For work environments where there are no particular corrosive or oxidizing agents C45 screws can be used. Where these conditions are not met, we recommend using stainless steel screws A2 or A4 which are particularly suitable in the following cases:

- With relative humidity of 70/80% and above.
- Immersed in water, even in sea water.
- In presence of particular corrosive agents such as chlorides. In case of highly corrosive agents please contact our Technical Department.
- Where, due to special construction requirements, components must not oxidise, for example in the food industry, where they are coupled with nuts HDA.
- Where the screws cannot be reached for lubrication. For "maintenance free" constructions they are mainly coupled with self-lubricating plastic nuts.
- Where working temperature is relatively high because the stainless steel A2 and A4 feature a relatively high slag temperature due to the austenitic structure of the material.

Positioning accuracy

For positioning screws it is necessary to have the control of the error of the thread pitch. We provide customer screws with accuracy class 50 (50 µm/300 mm), 100 (100 µm/300 mm) and screws with class 200 (200 µm/300 mm) both in C45 and stainless steel A2. For standard carriage lead screws class 200 ones can be used.

Irreversibility

The complete irreversibility occurs with trapezoidal screw with helix angle < 2° 30'.
In all other cases, torque may be transmitted to the drive gear in a still screw condition subject to a load on the nut (especially under vibration). However, a good irreversibility is present up to 5 or 6 degrees.

Choice of the nut

Working environment

The available materials used for the production of nuts, both in bronze and stainless steel 303, are resistant to most of the oxidizing agents that occur in various applications of the trapezoidal screw/nut system. In presence of corrosive agents please contact our Technical Department.

In applications where the presence of added lubricants (grease or oil) is not allowed, we recommend to use self lubricating plastic nuts.

The use of plastics is restrained by the actual working conditions, therefore you may need to study the solution together with our technical department, and not rely on a choice based on intuition only. This because plastics have sometimes excellent self-lubrication features, but have, at the same time, restrictions on the working temperature or humidity absorption problems, as well as some mechanical properties that may not be suitable for the intended use. The preliminary study of the application, in such cases, is therefore required to achieve positive and satisfying results.

General sizing criteria

The actual sizing of a trapezoidal screw/nut system has to be done considering the following three points:

1. sizing to wear
2. sizing the critical bending load
3. sizing to the critical speed

In order to obtain a good working condition of a screw/nut system, all three above mentioned points must be respected when sizing.

Sizing to wear

The coupling screw/nut system has been used for a long time in a lot of applications to convert rotary motion into linear motion. The total power applied to the screw (Pt) is transformed into usable power (Pu) on the nut. The ratio Pu / Pt = η defines the efficiency of the system, which basically depends on the friction coefficient between the contacting surfaces of the screw and the nut, as well as on the lead angle. Because of the presence of sliding friction, part of the power is converted into heat. Just looking into this sliding friction, parameters can be given to evaluate the functioning of the system. The criterion is to limit the contact surface pressure on the side of the thread to allow a smooth glide between the two surfaces to avoid therefore heavy friction that erodes the nut. The product p ● Vst must be also limited (p = contact surface pressure and Vst = sliding speed on the effective diameter of the thread) in order to reduce the power that is dissipated into heat. This helps to reduce the temperature of the surfaces in contact. This limitation is important to avoid lubricant damages if bronze nuts are used. In case of use of self-lubricating plastic nuts, without the addition of further oil or grease, temperature should be checked as at higher temperatures the values of the product p ● Vst must be kept at low values.

Calculation of the contact surface pressure "p"

The contact surface pressure "p" is calculated using the following formula:

(1) $$p = \frac{F}{At}$$

F = Axial Force [N]
At = Total bearing surface between the teeth of the nut and the screw in the plane perpendicular to the axis. [mm^2]

(2) $$At = \pi \bullet dm \bullet Z \bullet H1$$

dm = mean diameter of the thread [mm]
H1 = support radial size between the teeth of the screw and the nut [mm]
Z = n° of gripping teeth

$$Z = \frac{h\ nut\ [mm]}{\left(\frac{real\text{ - }pitch\ [mm]}{n°\ starts}\right)}$$

For standard nuts each At value has been reported into the tables.

Calculation of the sliding speed "Vst"

The sliding speed is calculated using one of the following formulas:

- if round speed of the screw has already been defined:

(3) $$Vst = \frac{n \bullet P}{1000 \bullet sen\ \alpha}$$

n = RPM $\left[\frac{round}{min.}\right]$
P = thread pitch [mm]
α = thread helix angle

- if we have already established at which speed the nut must move:

(4) $$Vst = \frac{Vtr}{sen\alpha}$$

Vst = sliding speed on mean diametre. [m/min]
Vtr = motion speed [m/min]
α = thread helix angle

Please note that the screw RPM and the motion speed are bound as follows:

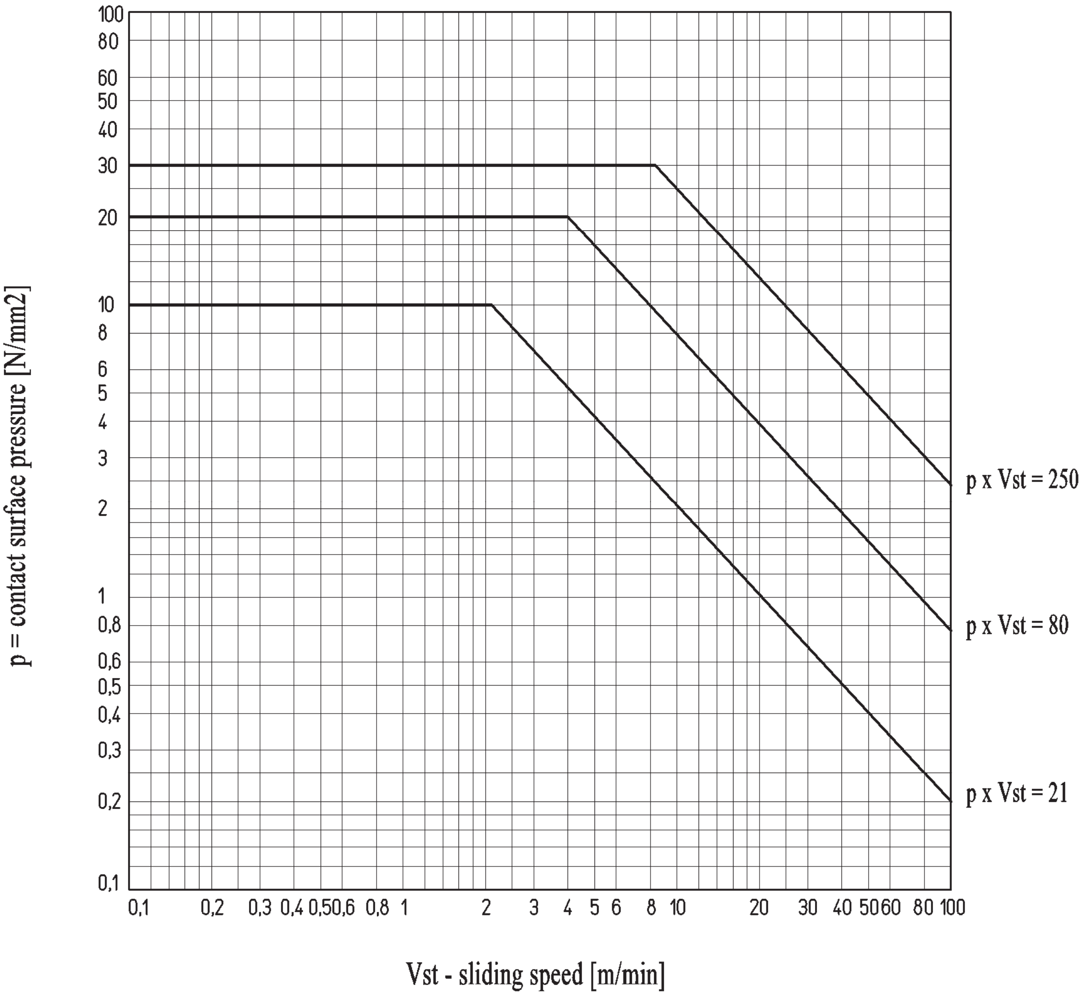
(5) $$n = \frac{1000 \bullet Vtr}{P}$$

n = RPM
Vtr = motion speed [m/min]
P = thread pitch [mm]

Bronze nut sizing

As per the bronze nut, the study of the product p•Vst allows you to plot the graph N.1 where three areas are highlighted, each of which is characterized by certain working conditions that in terms of smoothness of the surfaces in contact allow us to make evaluations based on experimental results previously obtained. A good lubrication is always necessary, possibly with oil. With little or no lubrication working condition may vary greatly.

Graph N° 1 – Sliding condition for Bronze



Area A : area A is enclosed by the limit p•Vst = 21 [N/mm^2 • m/min]
In this area, the operation is in the best conditions.
"Continuous service" is possible as the amount of heat produced within these limits p ● Vst is pretty low. Therefore the life of the nut is very good.

Area B : area B is enclosed by the limit p•Vst = 80 [N/mm^2 • m/min]
In this area, the operation is in more severe conditions.
In such conditions a steady lubrication is required to contain the erosion of the bronze nut in order to still have a good lifetime. "Continuous service" is possible for limited periods only, as the amount of heat that is produced may lead to the overheating of the nut. It also depends on the real amount of oil used because, beside the lubrication, it helps reducing the heat. The life of the nut is however limited.

Area C : area C is enclosed by the limit p•Vst = 250 [N/mm^2 • m/min]
In this area, the operation is in very heavy conditions.
With these values of p•Vst "continuous service" is certainly not possible. Even with good lubrication we face a great overheating and a very quick nut wear off, because the fiction between the surfaces in contact causes a rapid erosion of the nut.

General considerations for bronze nuts

In all three working conditions described, the bronze nut wear off is greatly affected by the real lubricating condition during operation. Giving acceptable reference values is therefore impossible during the project of the life of the nut. Pay particular attention to those applications where working room temperature is above l40/150°C, as such temperatures may damage the lubricant with consequent deterioration of operating conditions and lifetime. In such cases we recommend the use of lubricants designed to withstand high temperatures.

Safety factor for the forces of inertia "*f i*"

During the sizing process we must also check that the inertia forces present during acceleration and deceleration are relatively low so that the value of p●Vst remains within the controlled limits. Whereas this calculation is difficult, in the presence of a non-uniform movement or under great variations, safety factors reported in Chart. N°1 must be considered.

Chart. N° 1: Safety factors with respect to the forces of inertia

Load Type	*f i*
Constant loads and controlled acceleration / deceleration.	from l to 0,5
Constant loads and violent start and stop	from 0,5 to 0,33
Loads and speed greatly variable	from 0,33 to 0,25
Loads in presence of shocks and vibrations	from 0,25 to 0,17

The coefficient "*f i*" is used to correct the value of the product “ $(p \bullet Vst)_{max}$" derived from the graph N° 1, considering the maximum admissible sliding speed to the value of the contact surface pressure related to the real case in exam. Working “area” limits (A, B or C) must be considered.
To calculate p•Vst related to the case in exam admissible the following **(6)** must be used

(6) $p \bullet Vst\ am = (p \bullet Vst)_{max} \bullet f\,i$

Example of calculation with bronze nut

Size to wear a bronze nut which must operate in continuous service remaining within the maximum limit value of p•Vst = 21 (Area A), with good lubrication.
Constant axial load without relevant variations, with forces of inertia limited by controlled ramps of acceleration/deceleration.

Axial load F = 1200 N (1 Kg*f* = 9,81N)
Constant motion speed Vtr = 2, 8 m/min
Evaluation of the product p•Vst using a nut FTN 30 AR (bronze flanged nut with thread Tr 30x6 1 start, right)

Contact surface pressure is calculated with **(1)** (see page 57)

$$p = \frac{F}{At} = \frac{1200\,[N]}{2120\,[mm^2]} = 0{,}57\left[\frac{N}{mm^2}\right]$$

F = Axial Force [N]
At = Total bearing surface between the teeth of the screws and the nuts in the plane perpendicular to the axis[mm^2]

The sliding speed is calculated with **(4)** (see page 57)

$$Vst = \frac{Vtr}{sen\,\alpha} = \frac{2{,}8\left[\frac{m}{min}\right]}{sen\,4°03'} \qquad Vst \cong 39{,}6\left[\frac{m}{min}\right]$$

Vtr = motion speed $\left[\frac{m}{min}\right]$
α = thread helix angle

The value of the product p • Vst is:

$$p \bullet Vst = 0{,}57\,[N/mm^2] \bullet 39{,}6\left[\frac{m}{min}\right] \cong 22{,}57\left[\frac{N}{mm^2}\bullet\frac{m}{min}\right]$$

In order to remain within the continuous working conditions, corrected by the safety factor *fi* from table N° 1, in this case =0,77, the maximum admissible value of p•Vst is **(6)** (see page 59)

$$p \bullet Vst\ am = (p \bullet Vst)_{max} \bullet fi = 21 \bullet 0{,}77\left[\frac{N}{mm^2}\bullet\frac{m}{min}\right] \qquad p \bullet Vst\ am = 16{,}15\left[\frac{N}{mm^2}\bullet\frac{m}{min}\right]$$

As the maximum admissible value of the product p•Vst is lower than the value obtained with a nut FTN 30 AR, we shall try using a nut HDL 30 AR (bronze flanged nut with 3xTr length, Tr 30x6 thread, right)

The contact surface pressure is **(1)** (see page 57)

$$p = \frac{F}{At} = \frac{1200\,[N]}{2120\,[mm^2]} = 0{,}57\left[\frac{N}{mm^2}\right]$$

F = Axial Force [N]
At = Total bearing surface between the teeth of the screws and the nuts in the plane perpendicular to the axis[mm^2]

The sliding speed remains the same as the previous calculation

$$Vst = 39{,}6\left[\frac{m}{min}\right]$$

The value of p • Vst is now:

$$p \bullet Vst = 0{,}31\left[\frac{N}{mm^2}\right] \bullet 39{,}6\left[\frac{m}{min}\right] \cong 12{,}28\left[\frac{N}{mm^2}\bullet\frac{m}{min}\right]$$

The value obtained is now lower than the admissible one, therefore the HDL 30 AR is chosen.

Plastic Nuts sizing

In applications where silence is important or where lubrication is not allowed (grease or oil), self lubricating plastic nuts are recommended. The use of plastics is very constrained by the actual working conditions, therefore we do suggest studying the solution together with our technical office and not relying on a choice based only on intuition. This is because plastic materials have sometimes great features such as low friction and self-lubrication, but at the same time limitations caused by operating temperatures, hygroscopic problems, or some mechanical features that may not be suitable for the intended use. An advanced study of the application in this case is therefore required in order to obtain positive and satisfying results.

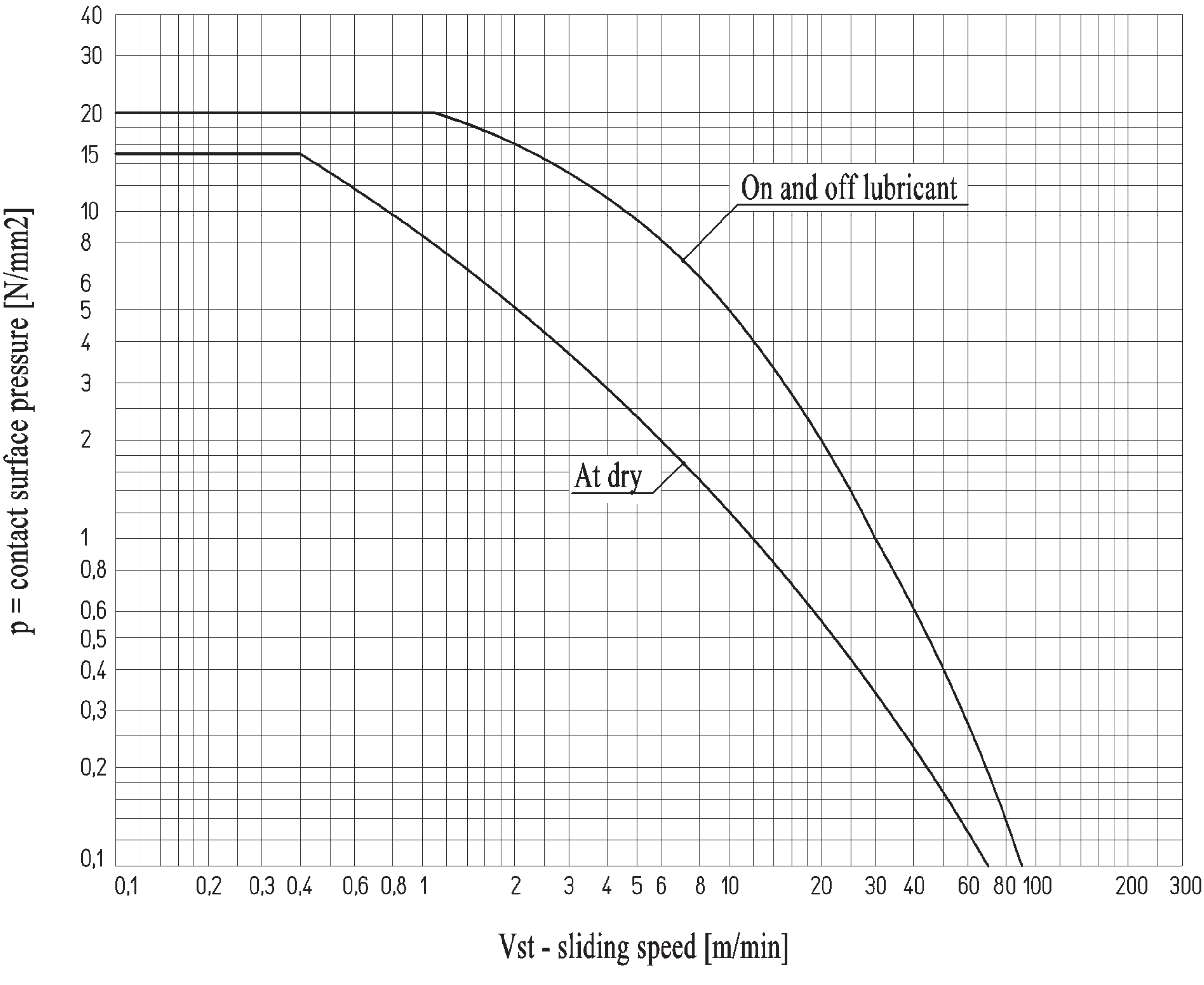
Regarding the plastic nuts, the study of the product p•Vst allows you to draw a chart which describes a curve that limits the values of p•Vst within which we have a gentle flow of the surfaces in contact with limited wearing of the nut and constant in time. Operating outside the limit drawn on the chart is not possible as in this case we would have a quick wearing of the nut due to the surface erosion caused by the contact with the screw.

Cylindrical nut MPH

Graph N° 2 shows the limit of the product p•Vst of the cylindrical nut MPH. As this plastic is resistant to wear but not self-lubricant, it's necessary to draw the limit curve relating to material used in dry conditions and intermittently lubricated material.

Graph N° 2 – Sliding condition for nuts MPH

Test condition: - continuous operation - temperature 23°C – relative humidity approx 50%



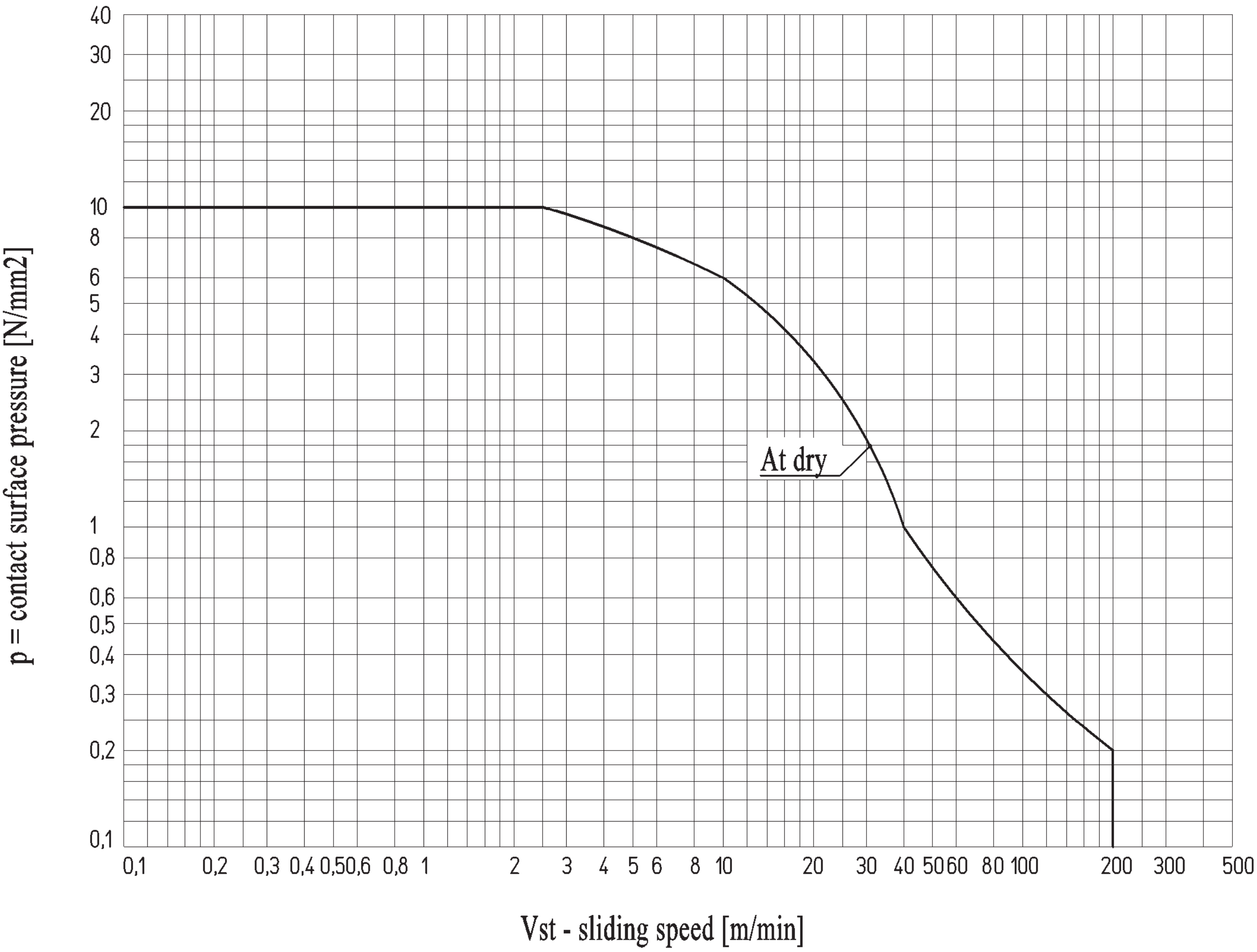
Self-lubricating plastic flanged nut with 3xTr length FCS

Graph N° 3 shows the limit of the product p•Vst of the nut FCS. The plastic used for the FCS features a strong resistance to wear and a complete self-lubricating property.

Before using the FCS, please read what stated on page 52.

Graph N° 3
Sliding conditions for nuts in self-lubricating plastic FCS

Test conditions: - continuous operation - temperature 23°C – relative humidity approx 50% with no lubrication



General considerations for plastic nuts

The use of plastics is very constrained by the actual working conditions, therefore you may need to study the solution together with our technical department, and not rely on a choice based on intuition only. This is because plastics have sometimes excellent self-lubrication features, but have, at the same time, restrictions on the working temperature or humidity absorption problems as well as some mechanical properties that may not be suitable for the intended use. The preliminary study of the application, in such cases, is therefore required to achieve positive and satisfying results.

Safety factor for the forces of inertia "*f i*"

During the sizing process we must also check that the inertia forces present during acceleration and deceleration are relatively low so that the value of p●Vst remains within the controlled limits. Whereas this calculation is difficult, in the presence of a non-uniform movement or under great variations, safety factors reported in Chart. N°2 must be considered.

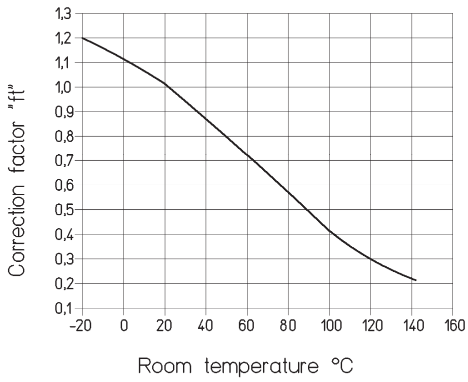
Chart. n° 2 : Safety factors with respect to the forces of inertia

Load type	*f i*
Constant loads and controlled acceleration / deceleration.	from 1 to 0,5
Constant loads and violent start and stop	from 0,5 to 0,33
Loads and speed greatly variable	from 0,33 to 0,25
Loads in presence of shocks and vibrations	from 0,25 to 0,17

Correction factor for working environment temperature

Using plastic nuts MPH o FCS, the value of p●Vst admissible must be corrected in function of the working environment temperature. Plastic becomes softer at higher temperature and withstands minor load. At lower temperatures, it becomes harder and bears heavier loads. Correction factor "*f* t" is shown in graph n° 4.

Graph N°4 - Correction factor "ft"
for nuts MPH and FCS



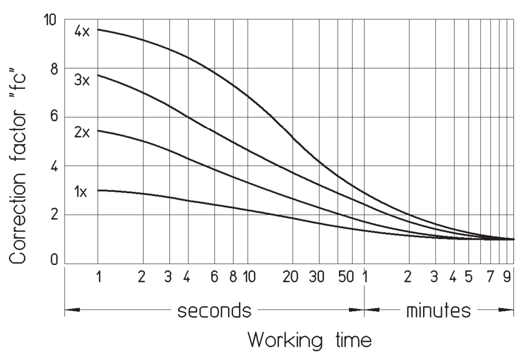
Correction factor dependent on intermittent use

Plastic nuts operating in on and off cycles for relatively short periods of time do not reach the limit of the maximum permissible temperature of the surface in contact with the screw. This temperature is a constraint that mainly contributes to limit the values of the product p●Vst in graphs N° 2 and N° 3 for the nuts MPH e FCS in continuous operation. The value of p●Vst admissible when operating in on and off cycles is higher than the value in continuous cycles. Deduce from graph N° 5 the value of the factor "*f* c". The curves of "x" represent the relationship between the downtime and the working time of the nut.

- l x represents downtime same as working time.
- 2 x represents downtime twice as much of the working time.
- 3 x represents downtime three times the working time.
- 4 x represents downtime four times the working time.

Find the working time value on the horizontal axis the working time value for the case in exam, climb vertically until intersecting the line of the relationship between the downtime and work time, then move horizontally and read the value of "*f* c".

Graph N°5 - Correction factor "fc"
for nuts MPH and FCS



The values of the three coefficients *"fi", "ft", "fc"* are used to correct the value of the product "(p●Vst)" max read from graph N° 2 (for nut MPH) or graph N° 3 (for nut FCS), considering the maximum admissible sliding speed in "test conditions" relating to the contact surface pressure value of the real case in exam.

To calculate the admissible p●Vst of the case in exam we shall use **(7) :** $p \bullet Vst\ am = (p \bullet Vst)_{max} \bullet fi \bullet ft \bullet fc$

Example of calculation with self-lubricating plastic nut

Size to wear a nut FCS flanged in self-lubricating plastic with 3xTr length which operate in the following conditions:
- Constant axial load with forces of inertia limited by controlled ramps of acceleration/deceleration of F = 1750 N
- Moving speed = 10 m / min
- Working time = 20 sec. With downtime = 60 sec.
- Working environment temperature = 50°C
- No lubricant

The nut FCS is perfectly self-lubricating and therefore suitable to operate in the considered conditions.
We choose a nut which is available among those that may be compatible with the dimensions of the motion system to be realized. Then we verify that the value of the product p•Vst is lower than the admissible value of p•Vst as per the graph N° 3 and then correct it with the coefficients "*fi*", "*ft*" and "*fc*" from the chart N° 2 and graphs N° 4 and 5.

We choose the FCS40AR (flanged nut in self-lubricating plastic with 3xTr length, Tr 40x7 right threaded)
We calculate the contact surface pressure with **(1)**

$$p = \frac{F}{At} = \frac{1750\,[N]}{6880\,[mm^2]}$$

F = Axial Force [N]
At = Total bearing surface between the teeth of the screws and the nuts in the plane perpendicular to the axis [mm^2]

$$p = 0{,}25 \left[\frac{N}{mm^2}\right]$$

The sliding speed is calculated with **(4)**

$$Vst = \frac{Vtr}{sen\ \alpha} = \frac{10\left[\frac{m}{min}\right]}{sen\ 3°30'}$$

Vtr = Motion Speed $\left[\frac{m}{min}\right]$
α = thread helix angle

$$Vst \cong 164\left[\frac{m}{min}\right]$$

The value of the product p•Vst is:

$$p \bullet Vst = 0{,}25\,[N/mm^2] \bullet 164\left[\frac{m}{min}\right] \cong 41\left[\frac{N}{mm^2} \bullet \frac{m}{min}\right]$$

Now we calculate the admissible value of the product p•Vst in the conditions in exam.
From the graph N° 3 we see that in continuous working conditions at 23°C with p = 0,25 [N/mm^2] the admissible value of Vst is ≅ 140 [m/min]

i.e. $(p \bullet Vst)_{max} = 0{,}25 \bullet 140 = 35 \left[\frac{N}{mm^2} \bullet \frac{m}{min}\right]$

- From graph N° 2 we read the value of the coefficient "*fi*". In our case "*fi*" may be = 0,75.
- From graph N° 4 we read the value of the coefficient "*ft*". In our case, in the working environment temperature of 50°C we may assume "*ft*" = 0,8
- From graph N° 5 we read the value of the coefficient "*fc*". In our case with working time of 20 sec. and downtime of 60 sec., therefore

$$\frac{downtime}{working\ time} = 3\ (curve\ 3x)$$

we assume "*fc*" = 3,7

The maximum admissible value of the product p•Vst in our case is **(7):**

$$p \bullet Vst\ am = (p \bullet Vst)_{max} \bullet fi \bullet ft \bullet fc = 35\left[\frac{N}{mm^2} \bullet \frac{m}{min}\right] \bullet 0{,}75 \bullet 0{,}8 \bullet 3{,}7 = 77{,}7\left[\frac{N}{mm^2} \bullet \frac{m}{min}\right]$$

As the value of the product p•Vst in this case is lower than the admissible value, the nut FCS 40 AR may be used for this motion.

Lifetime of the plastic nut

Using the experimental values it is possible to give an indication of the lifetime a plastic nut may have. The parameters that affect the life of a plastic nut are as follows:

- Value of the contact surface pressure p [N/mm^2]
- Value of the sliding speed Vst [m/min]
- Constant of the resistance to the wear of the plastic in exam derived from experimental tests k $\left[\frac{mm3 \bullet min}{N \bullet m \bullet hrs}\right]$
- Correction factor *f*c of the on and off cycle.

All data shown below are for coupling of plastic nuts with our precision rolled screws as we guarantee a surface roughness less than 1 µm Ra.
Coupling plastic nuts with lathed screws is not possible.
The following calculations and considerations are for screws working at a temperature of approx 20/25°C with relative humidity from 30% to 70%.
For working environment at a different temperature and humidity, you should contact our Technical Office directly.

To calculate the lifetime we use the following formula:

$$t = \frac{m \bullet fc}{p \bullet Vst \bullet k} \quad (8)$$

m = increase in the axial play between screw and nut in respect of the initial value [mm]
*f*c = correction factor from graph N° 5
p = contact surface pressure (see page 53 onward) [N/mm^2]
Vst = sliding speed (see page 53 onward) [m/min]
k = constant of resistance to wear $\left[\frac{mm3 \bullet min}{N \bullet m \bullet hrs}\right]$

Value of the constant k for plastic nuts.

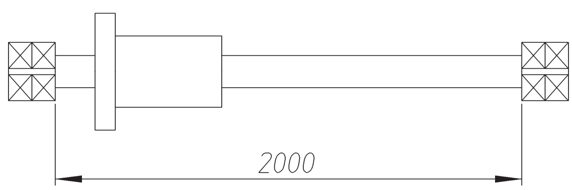
nuts MPH	$k = 10{,}5 \bullet 10^{-5}$
nuts FCS	$k = 2{,}5 \bullet 10^{-5}$

Example of lifetime calculation of a plastic nut

Size to wear and calculate the lifetime of the nut FCS operating in the following conditions:

- Constant axial load forces of inertia limited by controlled ramps of acceleration/deceleration of F = 450 N
- Motion speed = 10 m/min
- Working time = 12 sec. with downtime = 12 sec.
- Distance covered in 12 sec. at 10 m/min ≅ 2000 mm
- Working environment temperature ≅ 22°C
- Working environment mean relative humidity ≅ 40% : 60%
- No lubrication
- Minimum lifetime requested: the coupling screw/nut must work for 200.000 cycles (i.e. approx 1.330 hrs at the above conditions) increasing the axial play in respect of the initial value of 0,1 mm.

V motion =10 m/min



Nuts type FCS are perfectly self-lubricant and therefore suitable to work in the considered conditions.
Seen the good motion speed requested (10 m/min) we verify to wear the nut FCS 28 BR, with pitch 10 (2 starts at pitch 5).
To verify the product p•Vst see example on page 60.

Contact surface pressure is calculated with **(1)**.

$$p = \frac{F}{At} = \frac{450\,[N]}{3600\,[mm^2]} = 0{,}125 \left[\frac{N}{mm^2}\right]$$

The sliding speed is calculated with **(4)**.

$$Vst = \frac{Vtr}{sen\ \alpha} = \frac{10\left[\frac{m}{min}\right]}{sen\ 7°07'} = 80{,}7\left[\frac{m}{min}\right]$$

The value p•Vst is:

$$p \bullet Vst = 0{,}125\,[N/mm^2] \bullet 80{,}7\left[\frac{m}{min}\right] \cong 10\left[\frac{N}{mm^2} \bullet \frac{m}{min}\right]$$

Now we calculate the admissible value of the product p•Vst at the considered conditions.
From graph N° 3 we see that in continuous working conditions at 23°C with p = 0,125 [N/mm^2] the admissible value of Vst is ≅ 180 [m/min]

$$\text{i.e. } (p \bullet Vst)\ max = 0{,}125 \bullet 180 = 22{,}5\left[\frac{N}{mm^2} \bullet \frac{m}{min}\right]$$

- from chart N° 2 *"fi"* = 0,75
- form graph N° 4 " *ft"* = 1
- from graph N° 5 *"fc"* = 3

- the maximum admissible value of p•Vst, in this case, with **(7) :**

$$p \bullet Vst\ amm = p \bullet Vst \bullet fi \bullet ft \bullet fc = 22{,}5\left[\frac{N}{mm^2} \bullet \frac{m}{min}\right] \bullet 0{,}75 \bullet 1 \bullet 2 = 33{,}75\left[\frac{N}{mm^2} \bullet \frac{m}{min}\right]$$

As the value of p•Vst is here less than the admissible one, the nut FCS 28 BR may be use for this motion.

Verify to wear:

Now we calculate in how long we would face wear in continuous working conditions and therefore an increase of the axial play of 0,2 mm with **(8)**

$$t = \frac{m \bullet fc}{p \bullet Vst \bullet k} = \frac{0{,}1 \bullet 2}{10 \bullet 2{,}5 \bullet 10^{-5}} = 800\ hrs$$

Therefore 800 working hrs, at the speed of 10 m/min, correspond to the following distance:

800 • 60 • 10 = 480.000 m

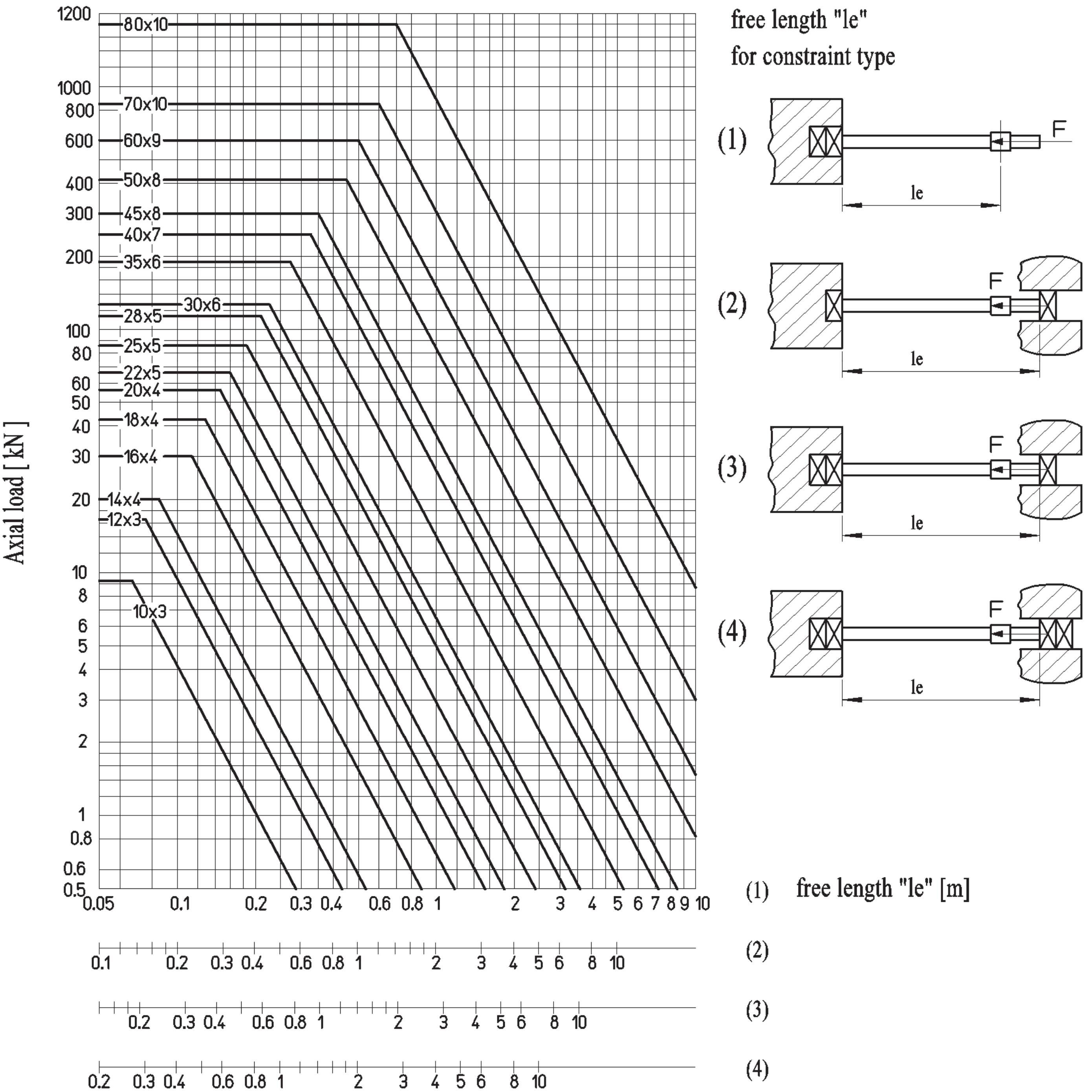
Number of cycles: $\frac{480.000}{2} = 240.000$ cycles

We have a lifetime of 1.600 hrs. at the considered conditions.

Critical Axial Load (Peak Load)

When there are compression loaded screws allowance must be made for limitations due to peak load to avoid screw bending due to excessive axial compression load. Admissible axial load depends on the core diameter (d3) of the screw, end constraints (bearings) and free length 'le'.
Regarding the values given in graph no. 6, allow a minimum safety factor ≥ 2.

Graph no. 6 - Peak Load



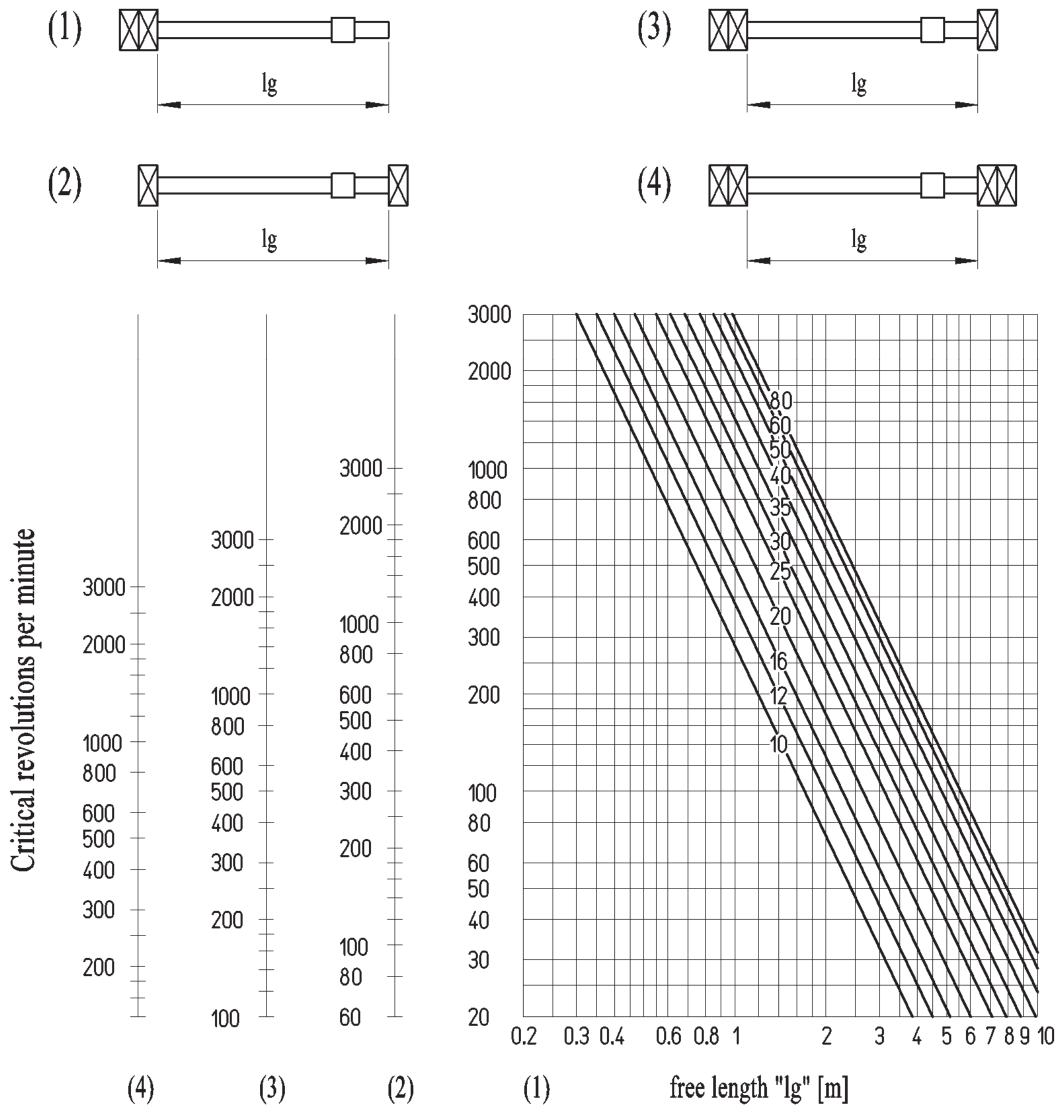
Example: find the admissible axial load of a Tr 30x6 screw 3000 mm long with constraint conditions as in drawing 4.
From graph 6 Take Fmax = 11 kN with safety factor of 2 and assume Fadm = 11/2 = 5.5 kN.

Critical revolutions per minute

The critical revolutions per minute is the rotating speed at which screw vibrations appear. This rotation speed must never be reached because the vibrations cause serious operating irregularities. Critical rpm depend on screw diameter, end constraints (bearings), free length "lg" and from the assembly accuracy.
For values shown in Graph 7 assume a minimum safety factor related to the assembly accuracy as per the following chart:

Chart n°3 Assembly accuracy coefficient:		
Assembly accuracy	**Conditions**	**Safety coefficient**
Good assembly accuracy: - Nut alignment to screw within 0.05mm	Bearing and nut seats obtained from CNC lathe onto an already finished structure.	1.3 – 1.6
Medium assembly accuracy: - Nut alignment to screw within 0.10mm	Bearing and nut seats processed on parts which are then assembled together. Alignments are checked by comparators with estreme care after mounting.	1.7 – 2.5
Low assembly accuracy: - Nut alignment to screw within 0.25mm	Bearing and nut seats processed on parts which are then assembled or welded together. Alignments are checked by comparators after mounting.	2.6 – 4.5

Graph no. 7 – Critical rpm



Example: find the critical rpm of a screw Tr 40x7 length 3000 mm with constraint conditions as in drawing 3 with average assembly accuracy. Graph 7 gives critical rotation speed ≅ 1000 rpm
From chart n°3 we calcolate the Safety coefficient = 2.2.
We can reach the working speed at a maximum round speed of: n. max = 1000/2.2 = 454 rpm.

Efficiency

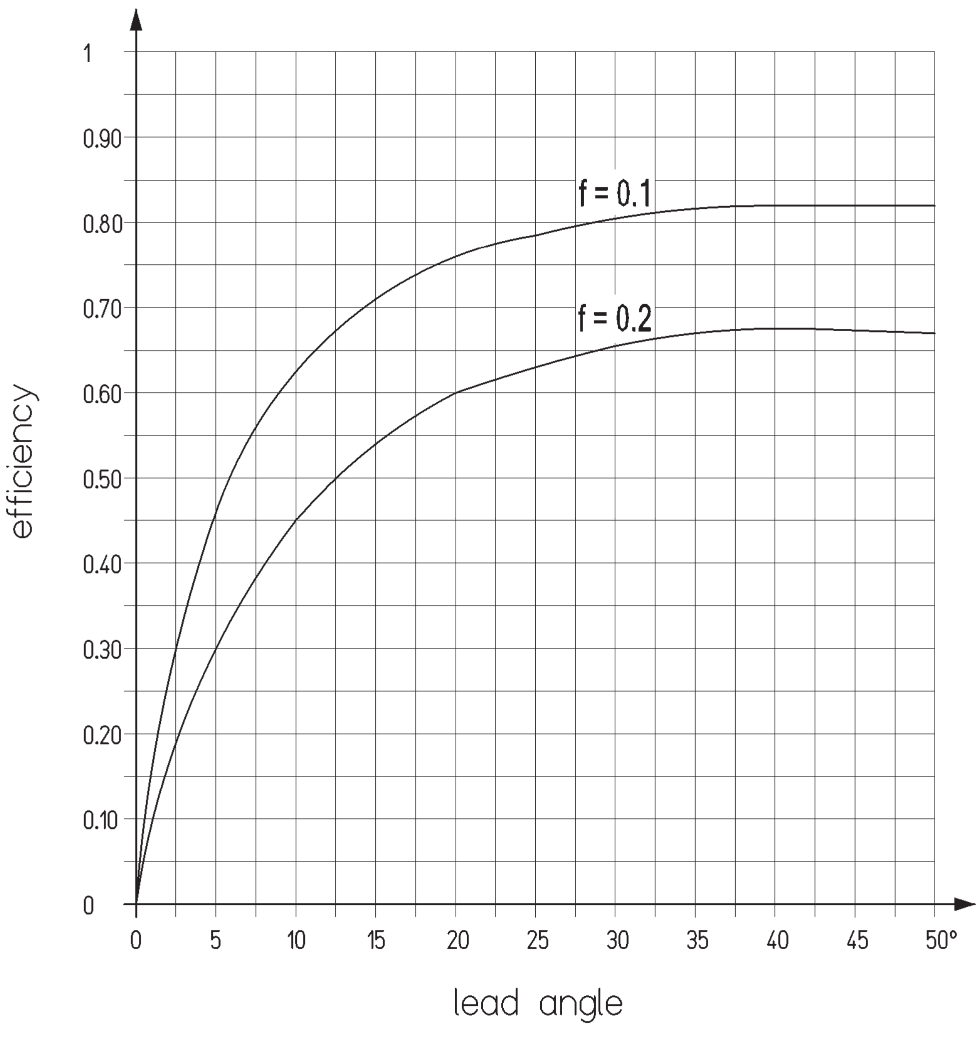
By efficiency is meant the ability of a screw & nut system to convert rotary motion into linear motion. This parameter allows appraisal of how much rotation energy is converted into useful energy for linear movement, hence how much energy is dissipated as heat.
The following formula can be used for calculation.

$$(9)\quad \eta = \frac{1 - f \bullet \text{tg}\alpha}{1 + \frac{f}{\text{tg}\alpha}}$$

η = efficiency
f = dynamic friction factor between scew and nut materials
α = lead angle of threads

The numerical efficiency values of each limit are shown in the table 'Screw Specifications' on page 54.

Graph no. 8 – Efficiency



Graph no. 8 shows that efficiency is greater if the lead angle of the screw thread is greater, hence to dissipate less energy as heat, it is recommended to use screws with lead angle as high as possible for the type of work (Pay attention if the system must be self-locking). Efficiency is inversely proportionate to the dynamic friction factor, i.e. using material with a lower friction factor there is less waste of energy. For this reason we make precision rolled trapezoidal screws with minimal roughness on the side of the tooth and always less than 1 µm Ra (usually 0.2 to 0.7 µm). We also make wear-resistant self-lubricating plastic flanged nuts which ensure very low friction factors with no need for lubrication. Dynamic friction factor $f \cong 0.1$, stiction factor $\cong 0.15$.

Torque

The Torque necessary for moving a screw & nut system is calculated by the following equation.

$$(10) \quad C = \frac{F \bullet P}{2\,\pi\,\eta\,1000}$$

C = torque (input) [N•m]
F = axial force on nut [N]
P = true lead of screw [mm]
η = efficiency (assume efficiency with stiction factor f= 0.2, Table on page 52)

Example of calculation :

Find torque necessary for movement of a screw Tr 30x6 coupled with a nut HCL Tr 30x6.

Resistant axial force = 10.000 N
Screw lead = 6 mm
η = 0.26

$$\text{Torque} = \frac{F \bullet P}{2 \bullet \pi \bullet \eta \bullet 1000} = \frac{10.000\,[N] \bullet 6\,[mm]}{2 \bullet \pi \bullet 0.26 \bullet 1000} = 36.7\ N \bullet m$$

The torque value does not consider the efficiency of mechanical parts moving together with the screw system, such as bearings, belts or other transmission components. In project phase, an increase between the 20 and 30% of the theoretical value is recommended. If electric motors with low static torque are used assume another increase of 50% to find nominal torque.

$C = 36.7\ [N \bullet m] \bullet 1.3 \bullet 1.5 \cong 71.6\ [N \bullet m]$

Power

The power necessary for moving a trapezoidal screw & nut system is calculated with the following equation.

$$(11) \quad P = \frac{C \bullet n}{9550}$$

P = power [kW]
C = torque [N•m]
n = rpm

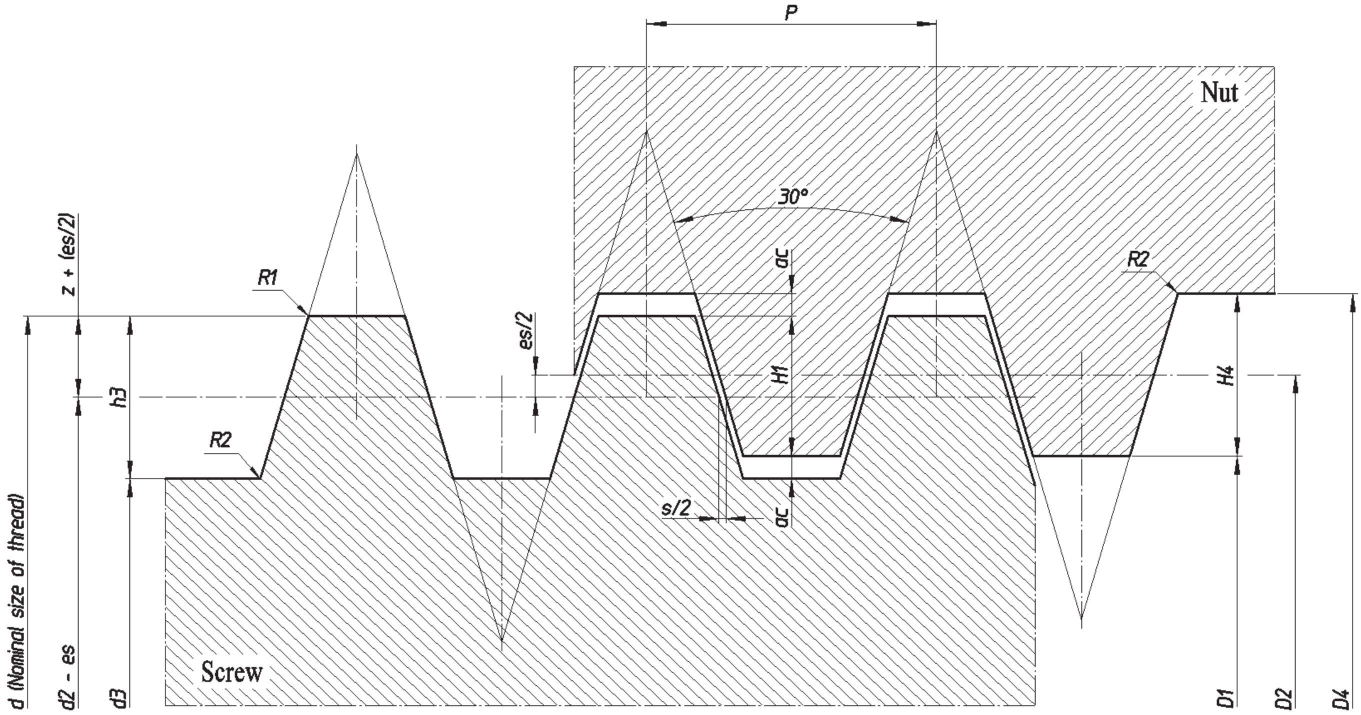
Example of calculation :

Calculate the power necessary for moving the screw Tr 30x6 of the above example at 600 rpm.

$$P = \frac{C \bullet n}{9550} = \frac{71.6\,[N \bullet m] \bullet 600\,[\text{round/min}]}{9550} \cong 4.5\ kW$$

This is the minimum useful power necessary.

PROFILE FOR METRIC TRAPEZOIDAL THREADS TO ISO STANDARD 2901 – 2902 – 2903 – 2904



$H_1 = 0,5\ P$
$h_3 = H_4 = H_1 + a_c = 0.5\ P + ac$
$z = 0,25\ P = H_1/2$
$d_3 = d - 2\ h_3$
$d_2 = D_2 = d - 2\ z = d - 0.5\ P$
$D_2 = d + 2\ a_c$
a_c = bottom play
es = top deviation for screw
s = 0,26795 es
R_1 max. = 0.5 a_c
R_2 max. = a_c

Sizes stocked. Ready reference:

Features of CONTI Trapezoidal Screws and Nuts

CONTI trapezoidal screws are precision rolled. Continuous search for improvement and many years of CONTI experience in the development of the cold plastic deformation process which characterizes rolling allow us to offer our customers trapezoidal screws with excellent features.

Materials

Steel used in trapezoidal screws:		**Surface hardness after rolling**
EN 10084 C15E - 1.1141	carbon steel	App. 160/180 HB
EN 10083-2 1C45 - 1.0503	carbon steel	App. 250 HB
Inox A2 - AISI 304 -1.4301	stainless steel	App. 260 HB
Inox A4 - AISI 316 - 1.4401	stainless steel	App. 280 HB

C45 and A2 stainless steel were chosen because in addition to their natural qualities as good construction materials, after rolling they give very good surface hardness and finish on the thread sides. A4 stainless steel also has excellent corrosion resistance. C15 is an excellent quality-price compromise.
Roughness is less than 1 µm Ra for all.
These two features are decisive factors for qualitative appraisal of trapezoidal screws because they give very small friction coefficients, much lower than those obtainable with machined screws where other conditions such as speed, load and lubrication are equal.
Our trapezoidal screws coupled with bronze nuts give the opportunity to realize translation systems whose efficiency, flowability and quietness are much lower comparing to a coupling with machined screws.
Because of the low friction coefficient the amount of heat generated during movement is limited with resulting smaller nut heating. Nut life is also increased. We make nuts with 10 kinds of material to better meet the various requirements.

Steel used in nuts:

EN 10277-3 11SMnPb37 – 1.0737	steel with sulphur, manganese and lead	
INOX A1- AISI 303 – 1.4305	stainless steel	
Brass used in nuts:		
EN 12164 CW614N-M	brass	
Bronze used in nuts:		
EN 1982 CuSn5Zn5Pb5-C – CC491K	tin bronze with zinc and lead	60-70 HB
EN 1982 CuSn7Zn4Pb7-C – CC493K	tin bronze with zinc and lead	65-75 HB
EN 1982 CuSn12-C – CC483K	tin bronze	80-100 HB
EN 1982 CuAl11Fe6Ni6-C – CC483K	aluminium bronze	160-220 HB
Plastic used in nuts:		
PA 6 + Mo S2 DIN 7728	plastic	
PA 6 + Mo S2 DIN 7728 + additives	self-lubricating plastic	

The nuts we make with length 3xTr: HDL, BIG and HAL deserve special attention.
These bronze nuts, thanks to their considerable length, distribute the load over a larger number of holding threads and this limit surface contact pressure between screw and nut. This is decisive for long nut life.
By using the 3xTr long nuts compared with bronze nuts with conventional length (approximately 1.5xTr or 2xTr), very high loads can be withstood for equal traversing speed.
In particular, with HAL aluminium bronze nuts very high loads can be born and it is recommended to apply continuous steady lubrication. HAL nuts have to be coupled with screws in C45 or in stainless steel A2 or A4; C15 screws are not recommended.
Where it is not desired to lubricate trapezoidal screws, self-lubricating plastic nuts are recommended.
It is not possible to couple plastic nuts with screws made by machining.