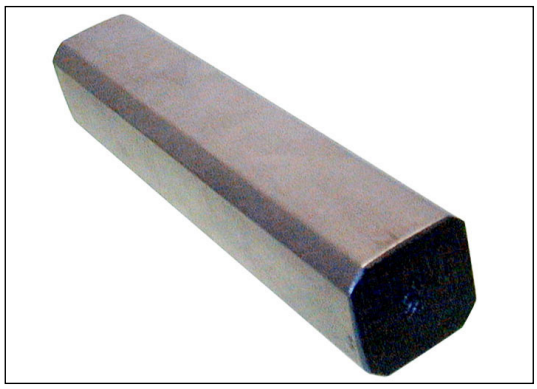
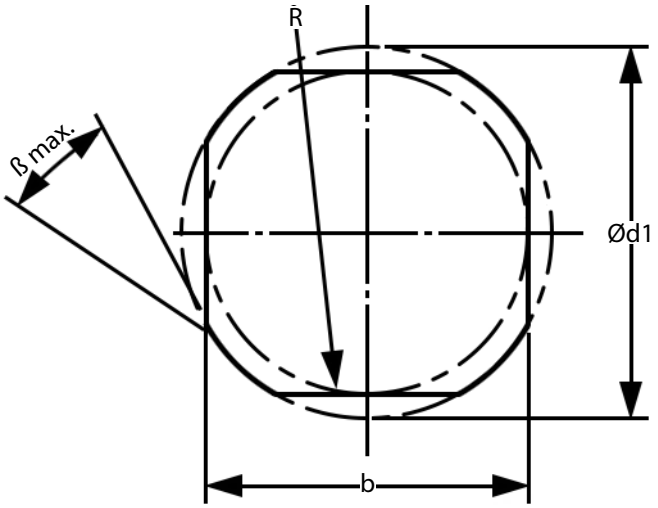
LINEAR MOTION

PW

Polygon Shafts

Cold Drawn





Part Number 500mm	Part Number 1000mm	b	Ød1	R	e	Max. ß	Section Modulus Polar Wp cm^3	Section Modulus Equatorial Wx cm^3	Cross Sec. Area A cm^2	Mass kg/m
PW14-11-500	PW14-11-1000	$11^{-0.01}_{-0.05}$	$14^{-0.060}_{-0.122}$	31.1	1.6	33.7°	0.27	0.20	1.23	0.97
PW20-17-500	PW20-17-1000	$17^{-0.01}_{-0.05}$	$20^{-0.060}_{-0.122}$	56.5	3.0	28.8°	0.98	0.74	2.69	2.11
PW25-21-500	PW25-21-1000	$21^{-0.01}_{-0.05}$	$25^{-0.060}_{-0.122}$	90.5	5.0	30.7°	1.85	1.39	4.15	3.25
PW30-25-500	PW30-25-1000	$25^{-0.01}_{-0.05}$	$30^{-0.060}_{-0.122}$	92.5	5.0	30.9°	3.13	2.34	5.94	4.66
PW35-30-500	PW35-30-1000	$30^{-0.01}_{-0.06}$	$35^{-0.060}_{-0.122}$	95.0	5.0	28.1°	5.40	4.05	8.29	6.50
PW40-35-500	PW40-35-1000	$35^{-0.01}_{-0.06}$	$40^{-0.060}_{-0.122}$	113.5	6.0	26.3°	8.58	6.43	11.04	8.66
PW45-40-500	PW45-40-1000	$40^{-0.01}_{-0.06}$	$45^{-0.060}_{-0.122}$	116.0	6.0	24.5°	12.80	9.60	14.18	11.13
PW50-43-500	PW50-43-1000	$43^{-0.01}_{-0.06}$	$50^{-0.060}_{-0.122}$	117.5	6.0	27.0°	15.90	11.93	16.97	13.32
PW60-53-500	PW60-53-1000	$53^{-0.01}_{-0.06}$	$60^{-0.060}_{-0.122}$	122.5	6.0	24.3°	29.78	22.33	25.06	19.67
PW70-60-500	PW70-60-1000	$60^{-0.01}_{-0.06}$	$70^{-0.060}_{-0.122}$	126.0	6.0	26.2°	43.20	32.40	33.17	26.00

Material

Shaft: Steel C45. Nitrided also available on request (Max. length 700mm).

Profile P4C to DIN 32712.

Other Info.

Dimension "e" is used in the calculation of the R radius which sets the form and position of the curved face of the polygon shaft.

(This is the basis of the DIN 32712 standard). R = b/2 + 16 x e Please contact Sales for lead time of 1,000mm long shafts.

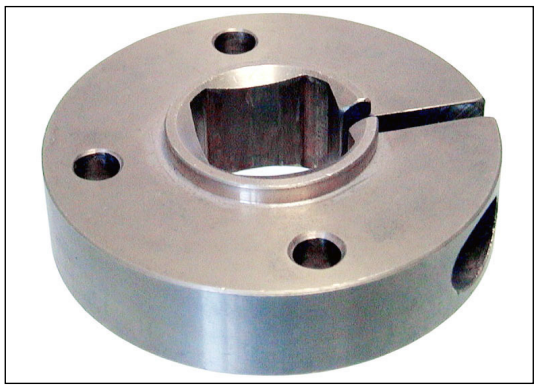
Other shaft lengths and special profiles supplied or machined to customer requirements up to 6,000mm available P.O.A.

Please note that custom lengths are sawn and not straightened unless requested at time of order.

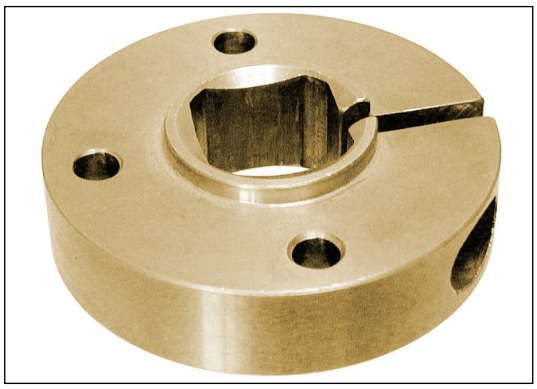
PKR

LINEAR MOTION

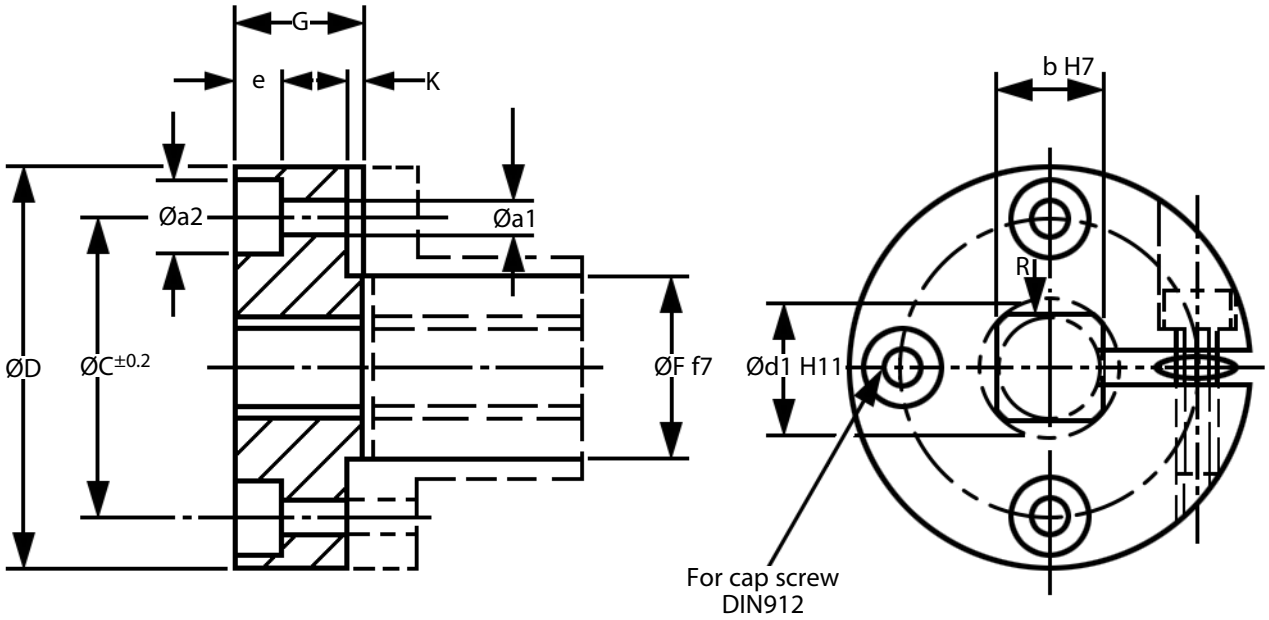
Polygon Clamping



PKR-ST: Steel



PKR-BRO: Bronze



Part Number Steel	Part Number Bronze	b H7	Ød1 H11	R	ØC±0.2	ØD	ØF f7	G	K	Øa1	Øa2	e	Mass kg
PKR14-11-ST	PKR14-11-BRO	$11^{+0.018}_{-0.000}$	$14^{+0.110}_{-0.000}$	31.1	30	42	20	14	2	5.3	10	6	0.12
PKR20-17-ST	PKR20-17-BRO	$17^{+0.018}_{-0.000}$	$20^{+0.130}_{-0.000}$	56.5	40	54	25	16	2	5.3	10	6	0.23
PKR25-21-ST	PKR25-21-BRO	$21^{+0.021}_{-0.000}$	$25^{+0.130}_{-0.000}$	90.5	50	65	30	18	3	6.4	11	7	0.34
PKR30-25-ST	PKR30-25-BRO	$25^{+0.021}_{-0.000}$	$30^{+0.130}_{-0.000}$	92.5	60	79	40	23	3	8.4	15	9	0.63
PKR35-30-ST	PKR35-30-BRO	$30^{+0.021}_{-0.000}$	$35^{+0.160}_{-0.000}$	95.0	65	84	45	23	3	8.4	15	9	0.78
PKR40-35-ST	PKR40-35-BRO	$35^{+0.025}_{-0.000}$	$40^{+0.160}_{-0.000}$	113.5	70	90	50	25	3	8.4	15	9	0.89
PKR45-40-ST	PKR45-40-BRO	$40^{+0.025}_{-0.000}$	$45^{+0.160}_{-0.000}$	116.0	75	95	55	27	3	8.4	15	9	1.03
PKR50-43-ST	PKR50-43-BRO	$43^{+0.025}_{-0.000}$	$50^{+0.160}_{-0.000}$	117.5	85	108	60	27	3	10.5	18	11	1.44
PKR60-53-ST	PKR60-53-BRO	$53^{+0.030}_{-0.000}$	$60^{+0.190}_{-0.000}$	122.5	96	118	70	29	3	10.5	18	11	1.60
PKR70-60-ST	PKR70-60-BRO	$60^{+0.030}_{-0.000}$	$70^{+0.190}_{-0.000}$	126.0	106	130	80	29	3	10.5	18	11	1.97

Material

PKR-ST: Steel C45, nitrided
PKR-BRO: Bronze Bz 12.
Profile P4C to DIN 32712.

Other Info.

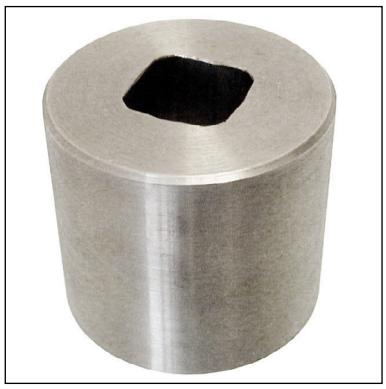
Special sizes and other qualities available on request, P.O.A.

PSH

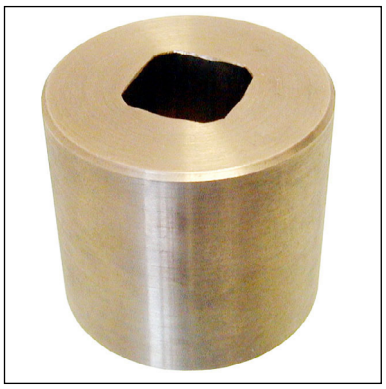
LINEAR MOTION

Polygon Plain Sliding Naves

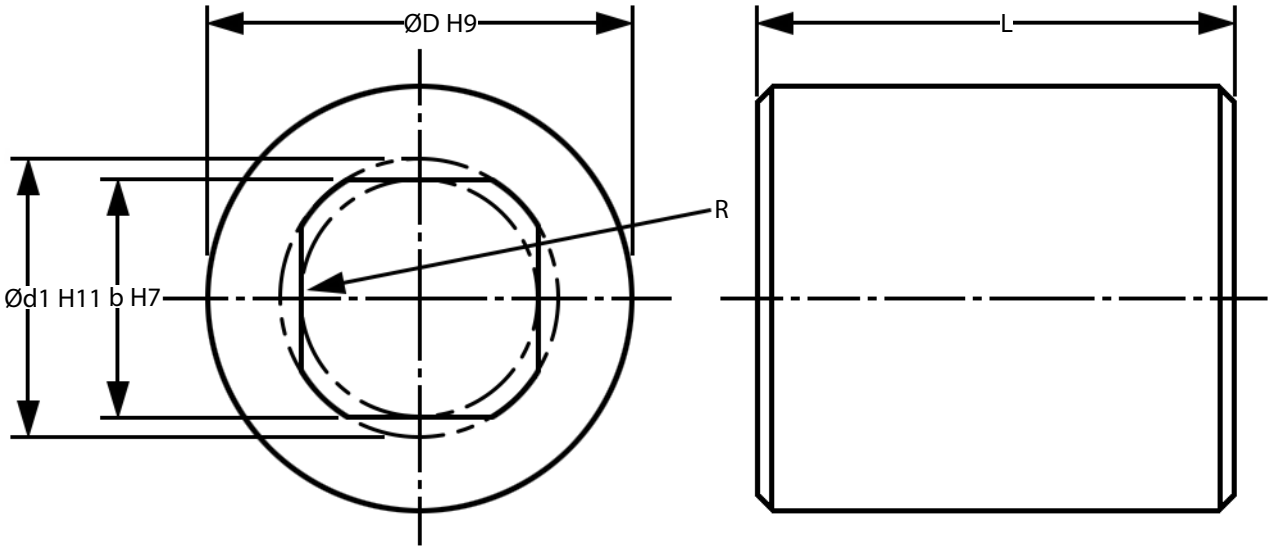
11 - 60mm Bores



PSH-ST: Steel



PSH-BRO: Bronze



Part Number Steel	Part Number Bronze	b H7	Ød1 H11	R	ØD h9	L	Mass kg
PSH14-11-ST	PSH14-11-BRO	$11^{+0.018}_{-0.000}$	$14^{+0.110}_{-0.000}$	31.1	35	28	0.19
PSH20-17-ST	PSH20-17-BRO	$17^{+0.018}_{-0.000}$	$20^{+0.130}_{-0.000}$	56.5	45	40	0.41
PSH25-21-ST	PSH25-21-BRO	$21^{+0.021}_{-0.000}$	$25^{+0.130}_{-0.000}$	90.5	55	50	0.76
PSH30-25-ST	PSH30-25-BRO	$25^{+0.021}_{-0.000}$	$30^{+0.130}_{-0.000}$	92.5	65	60	1.27
PSH35-30-ST	PSH35-30-BRO	$30^{+0.021}_{-0.000}$	$35^{+0.160}_{-0.000}$	95.0	75	65	1.80
PSH40-35-ST	PSH40-35-BRO	$35^{+0.025}_{-0.000}$	$40^{+0.160}_{-0.000}$	113.5	80	70	2.09
PSH45-40-ST	PSH45-40-BRO	$40^{+0.025}_{-0.000}$	$45^{+0.160}_{-0.000}$	116.0	85	80	2.56
PSH50-43-ST	PSH50-43-BRO	$43^{+0.025}_{-0.000}$	$50^{+0.160}_{-0.000}$	117.5	90	85	3.02
PSH60-53-ST	PSH60-53-BRO	$53^{+0.030}_{-0.000}$	$60^{+0.190}_{-0.000}$	122.5	100	95	3.80
PSH70-60-ST	PSH70-60-BRO	$60^{+0.030}_{-0.000}$	$70^{+0.190}_{-0.000}$	126.0	110	110	5.10

Material

PSH-ST: Steel C45, nitrided
PSH-BRO: Bronze Bz 12.
Profile P4C to DIN 32712.

Other Info.

Special sizes and other qualities available on request, P.O.A.

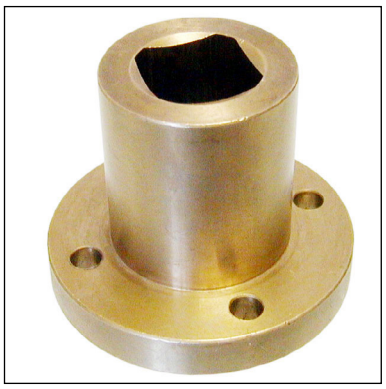
PH

LINEAR MOTION

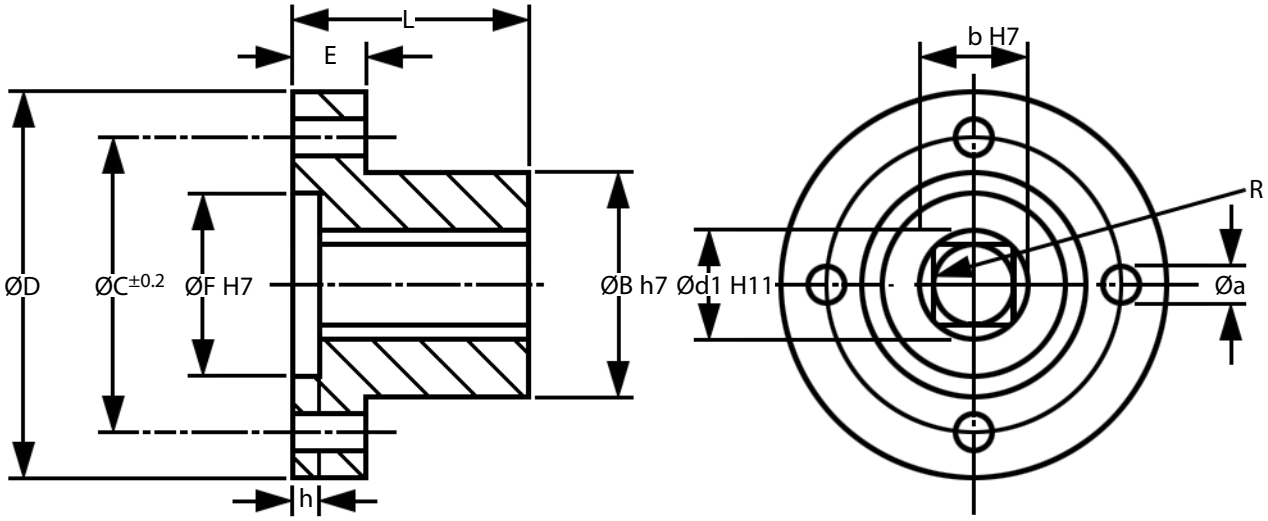
Polygon Flanged Sliding Hubs

11 - 60mm Bores

PH-ST: Steel



PH-BRO: Bronze



Part Number Steel	Part Number Bronze	b H7	Ød1 H11	R	ØB h7	ØC±0.2	ØD	E	ØF H7	L	Øa	h	Mass kg
PH14-11-ST	PH14-11-BRO	$11^{+0.018}_{-0.000}$	$14^{+0.110}_{-0.000}$	31.1	22	30	42	8	20	28	5.3	3.0	0.12
PH20-17-ST	PH20-17-BRO	$17^{+0.018}_{-0.000}$	$20^{+0.130}_{-0.000}$	56.5	30	40	54	9	25	40	5.3	3.0	0.24
PH25-21-ST	PH25-21-BRO	$21^{+0.021}_{-0.000}$	$25^{+0.130}_{-0.000}$	90.5	38	50	65	10	30	50	6.4	3.5	0.44
PH30-25-ST	PH30-25-BRO	$25^{+0.021}_{-0.000}$	$30^{+0.130}_{-0.000}$	92.5	45	60	79	12	40	60	8.4	4.0	0.77
PH35-30-ST	PH35-30-BRO	$30^{+0.021}_{-0.000}$	$35^{+0.160}_{-0.000}$	95.0	50	65	84	12	45	65	8.4	4.0	0.89
PH40-35-ST	PH40-35-BRO	$35^{+0.025}_{-0.000}$	$40^{+0.160}_{-0.000}$	113.5	55	70	90	15	50	70	8.4	4.0	1.10
PH45-40-ST	PH45-40-BRO	$40^{+0.025}_{-0.000}$	$45^{+0.160}_{-0.000}$	116.0	60	75	95	15	55	80	8.4	4.0	1.27
PH50-43-ST	PH50-43-BRO	$43^{+0.025}_{-0.000}$	$50^{+0.160}_{-0.000}$	117.5	70	85	108	16	60	85	10.5	4.0	2.00
PH60-53-ST	PH60-53-BRO	$53^{+0.030}_{-0.000}$	$60^{+0.190}_{-0.000}$	122.5	80	96	118	16	70	98	10.5	4.0	2.32
PH70-60-ST	PH70-60-BRO	$60^{+0.030}_{-0.000}$	$70^{+0.190}_{-0.000}$	126.0	90	106	130	18	80	110	10.5	4.0	3.36

Material

PH-ST: Steel C45, nitrided
PH-BRO: Bronze Bz 12.
Profile P4C to DIN 32712.

Other Info.

Special sizes and other qualities available on request, P.O.A.

LINEAR MOTION

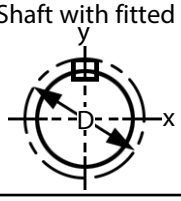
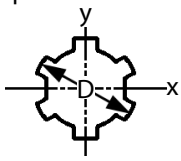
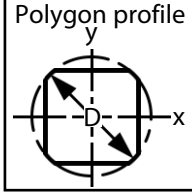
Polygon Shafts

TECHNICAL

The Polygon has no notch sensitivity, has a constant inertia and transmits torque by pure torsion.
Its fatigue limit is at least 30% higher than that of a spline.
Polygon shafts are the latest step in the adoption of polygon forms into machinery.
Polygon shafts and their related components provide real alternatives to conventional keyed connections, splines and serrations, for transmission of torque and rotary motion, particularly when this is combined with sliding.
The Polygon range consists of shafts, flanged hubs and clamp rings and plain sliding hubs.
This range offers the designer a wide choice and the ability to combine elements giving both fixed and sliding connections, plus regulation of fit when flanged hubs and clamp rings are combined.

The selection of polygon shafts

Initial selection of shafts should be on the basis of torsional effects.
The area of the minor circle on the shaft provides an approximate value.
Since the polygon profile has no edges, fatigue effects can be neglected.
The moment of resistance is high due to the lack of notch sensitivity.
The following table summarises the work done at the University of Graz, Austria, to compare inertias of shaft sections having keys, splined form and POLYGON profile P4C, all having a nominal diameter of 25mm.

Moments of Inertia	Without consideration of notch sensitivity Axial Jx; Jy cm^4	 Polar Jp cm^4	With consideration of notch sensitivity Axial ßk; Jx; Jy cm^4	 Polar ßk; Jp cm^4
Shaft with fitted key DIN6885/2  ØD = 25mm	Jx = 0,76852 Jy = 0,94673	Jp = 1,71525	ßk = 1,4 Jxßk = 0,54894 Jyßk = 0,67624	ßkt = 1,4 Jpßk = 1,22518
Splined shaft DIN5461  ØD = 25mm	Jx = Jy = 1,35865	Jp = 2,71730	ßkt = 1,7 Jxßk = Jyßk = 0,79921	ßkt = 1,7 Jpßk = 1,59842
Polygon profile P4C  D = d1 = 25mm e = 5mm b = 21mm	Jx = Jy = 1,37456	Jp = 2,74912	ßkt = 1,0 Jx = Jy = 1,37456	ßkt = 1,0 Jp = 2,74912

Features

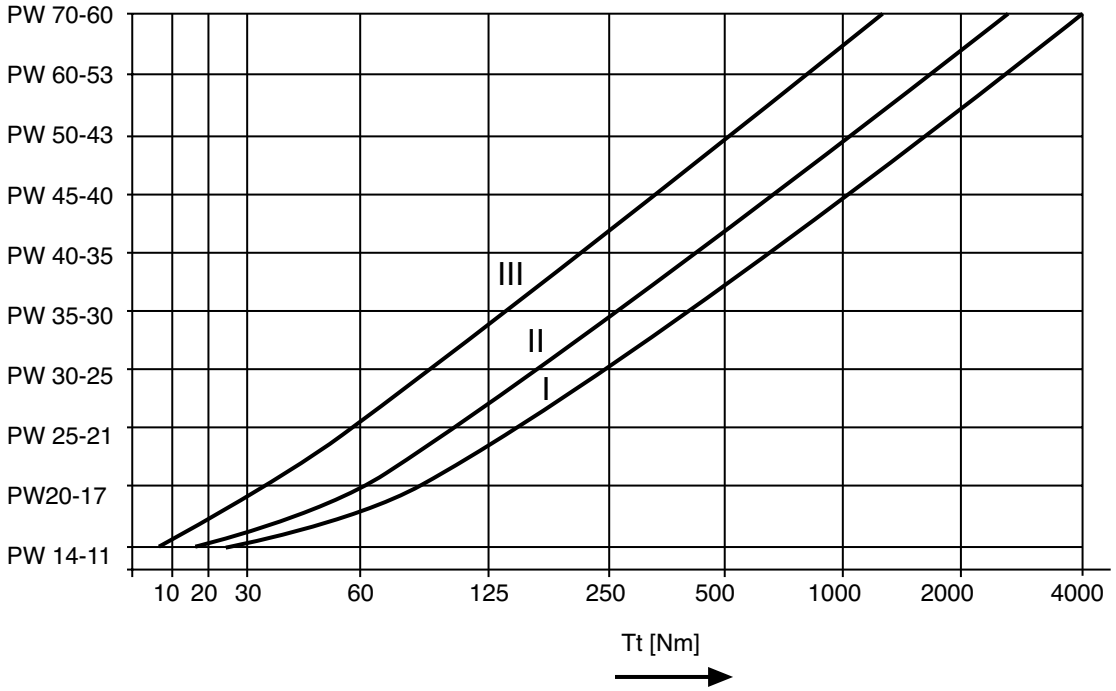
- Self locating
- Sliding maintained under torsion
- 30% higher fatigue strength than a comparable splined profile

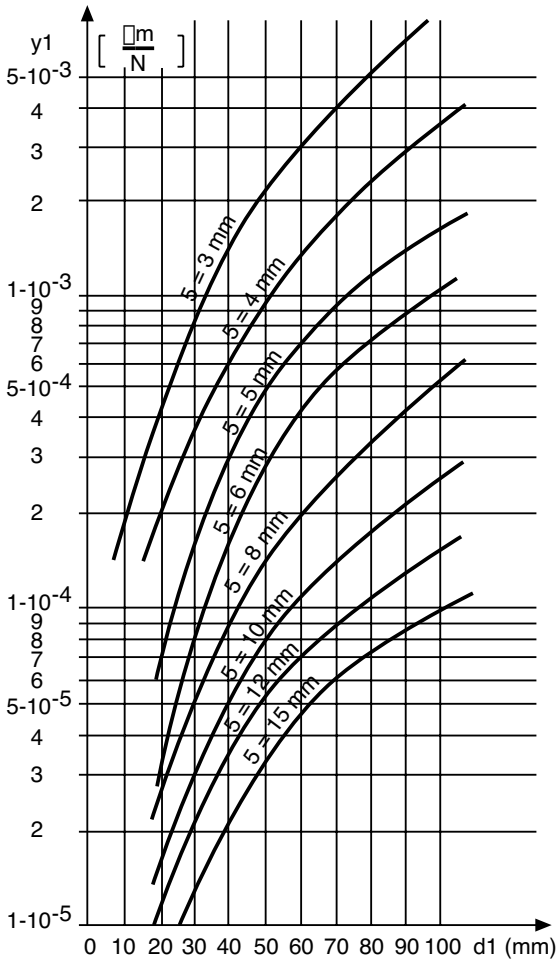
LINEAR MOTION

Polygon Shafts

Pre-selection of P4C Polygon Profile

When the transmitted torque Tt is known, the graph for the actual Polygon shaft can be used.
Curves I, II and III relate to load classes I, II and III (smooth, moderate and heavy shock).





The graph relates to steel having:

$E = 210000\ N/mm^2$

For materials having other Modulus of Elasticity E1 the above values should be multiplied by:

$$\frac{210000\ N/mm^2}{E1}$$

TECHNICAL