GREEN GEAR TRASMISSIONI SRL

UNIVERSAL SHAFT

Catalogue

2023

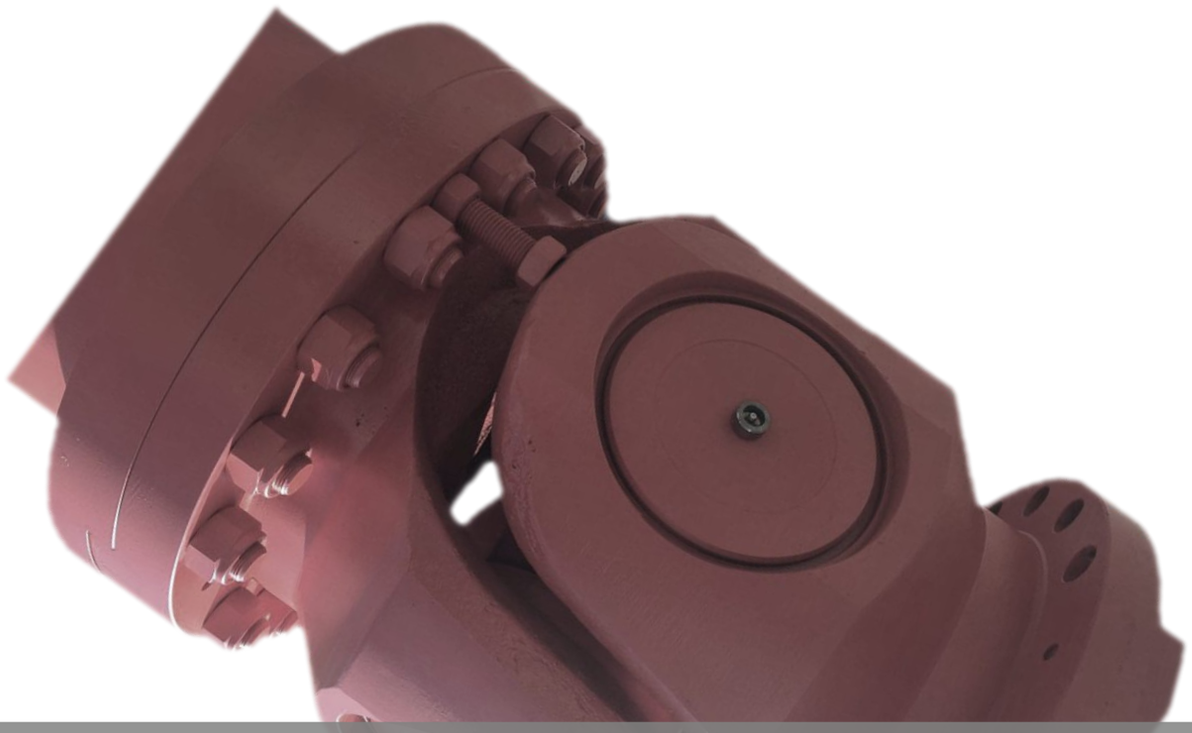
A growing company, **seeking to make your projects real**

Founded by specialists with more than **20 years of experience** in power transmission equipment

Located in a strategic point at Italy and surrounded by strategic suppliers, we are able to respond to every requirement, guaranteeing high-standard services thanks to our **flexible manufacturing process, full stock availability and skilled collaborators.**

Operating under **ISO 9001:2015 STANDARDS**, our products has arrived to more than 20 countries, principally located in **Europe, Asia and America**.

Customers are our commitment. For that purpose, GGT regularly invest in cutting edge technology equipment, looking for a constant development of their associates. Always with the aim of making **the best power transmission equipment.**



Our universal spindles are the best choice for your business, considering the following manufacturing features:

- Monolithic yoke, giving an excellent performance under the most exigent applications
- Selected heat treated materials
- First-rate weldings
- Balanced following ISO 1940-1, G-16 and higher grade on demand

GGT UNIVERSAL SHAFTS are widely selected for metalurgic industry *(Steel, Aluminum, Copper, Brass)* counting several uses:

Bar and rod mills
Continuous casters
Hot strip mills
Levelers
Pipe and tube mills

Other typical applications for our products:
Mining equipment
Marine propulsion
Paper mills
Pumps
Plastic manufacturing

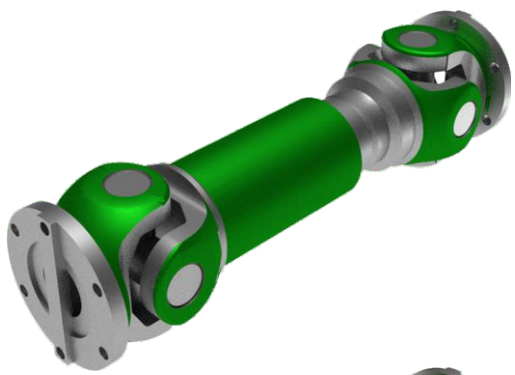
INDEX

US. A SERIE

FEATURES
Torque range up to 27 kNm
Flange diameter from 58 to 250 mm
Operating angle up to 25°

APPLICATIONS
Rolling mill plants
Paper mill plants
Marine drives
Food equipment

P7 | 8

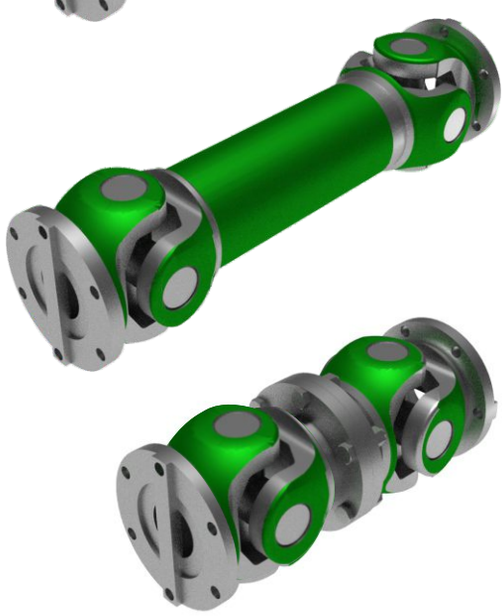


US. B SERIE

FEATURES
Torque range up to 1250 kNm
Flange diameter from 160 to 620 mm
Operating angle up to 15°

APPLICATIONS
Rolling mill plants
Bar mills
Paper mill plants
Marine drives

P9 | 12

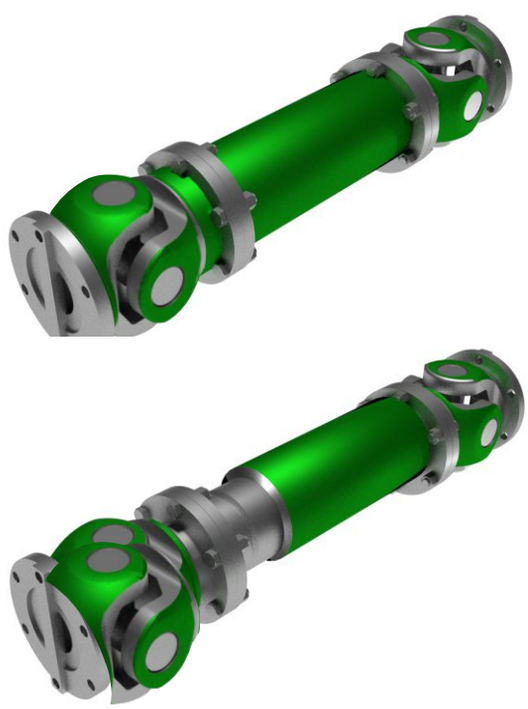


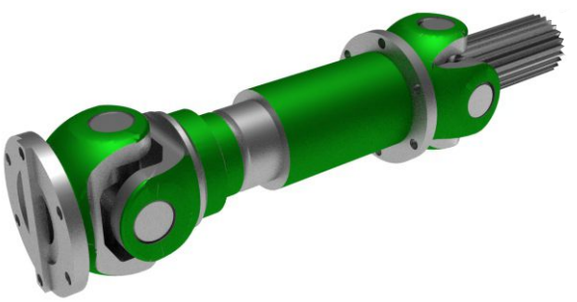
US. C SERIE

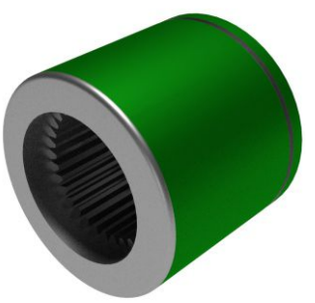
FEATURES
Torque range up to 9.000 kNm
Flange diameter from 680 to 1200 mm
Operating angle up to 10°

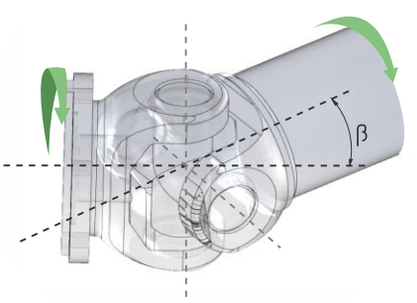
APPLICATIONS
Cold rolling mill
Hot strip mill
Edger drive

P13 | 14

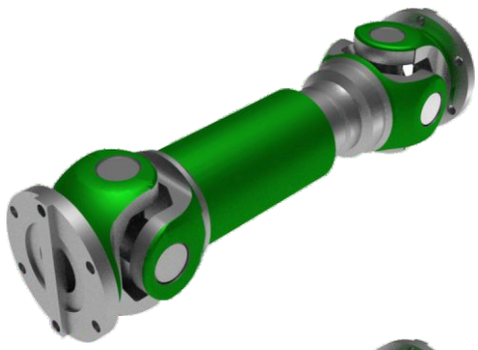


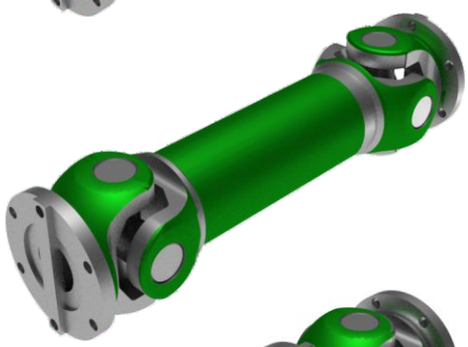


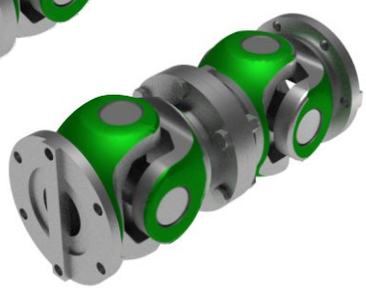




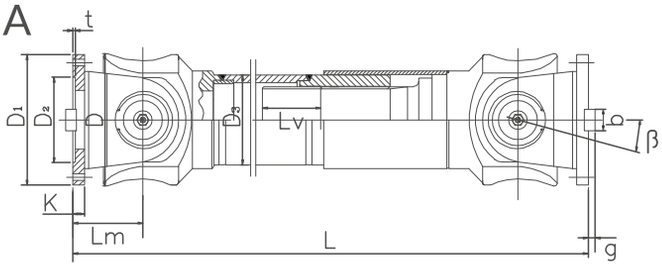
US. A SERIES







TYPE A



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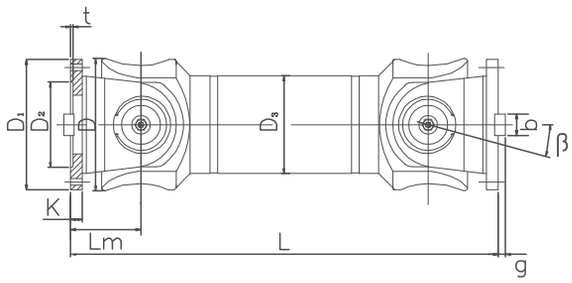
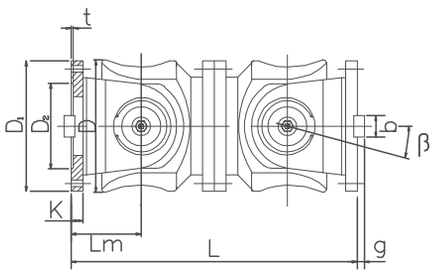


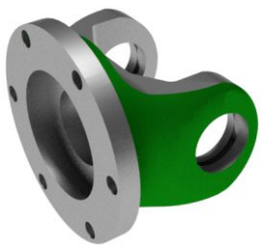
TYPE C

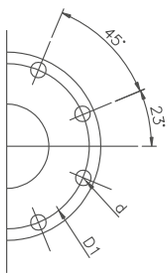


SERIES	US.A 58		US.B 65		US.A 75		US.A 90				US.A 100						US.A 120						
Lmin	225	165	285	165	335	200	285	182	226	366	445	226	296	261	366	242	500	211	294	237	261	242	286
Lv	35	15	40	15	40	30	45	30	25	100	55	25	50	5	100	15	80	25	50	5	5	15	15
Tn(Nm)	180	280	240	260	500	560	800	560	860	1800	1200	860	1100	1800		2700	2300	860	1100	1800		2700	3300
Tf(Nm)	90	180	120	180	250	280	400	280	430	900	600	430	550	900		1350	1150	430	550	900		1350	1650
B(°)	35	29	35	29	35	25	35	20	28		35	28	25	28		30	35	28	25	18	28	30	28
D	52	59	63	59	72	77	92	77	90		100	90	100	122	90	98	112	90	100	122		98	136
Df	DIN58		DIN65		DIN75		DIN90				DIN100						DIN120						
D1	47		52		62		74,5				84						101,5						
D2	30 H7		35 H7		42 H7		47 H7				57 H7						75 H7						
D3xΔmin	38x1.5	35x3	45x1.5	51x2.5	51x2.5		63.5x2.5	51x2.5		80x2.5	78x2.5	51x2.5	51x2.5	76.2x2.4		80x2.5	89x2.5	60x2.5	60x2.5	90x4		75x3	90
Lm	32	37	39	37	45	42	52	33	50,5		55	50,5	53	68	50,5	54	63	43	53	56	68	54	72
k	3,5	4	4,5	4	5,5		6	6,5	7		8	7	8	7			8		8,5			8	
t	1,5	2	1,7	2,8	2		2,5		2,8		2,5					2,6	2,5	2,7	2,5		3	2,6	3,1
n	4		4		6	4	6	4			6						8						
d	5		6,5	6	6	6	6	8,5	8,5		8,5	8					10,5	10					

Flange yokes US.A SERIES

BOLT **H**OLE (FY**BH**-FY**BH**/SP DIN15452)





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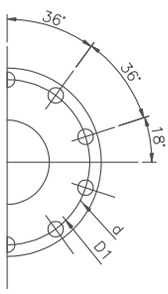
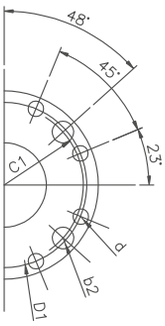


N 10



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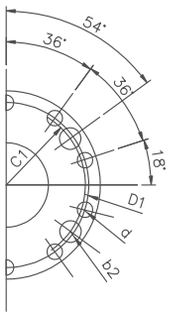
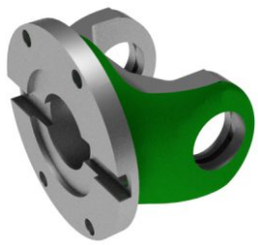
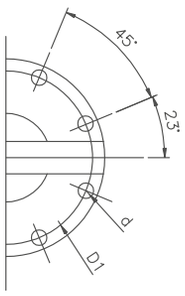


N 10

INTEGRAL / **P**ARTIAL FACE **K**EY (FY**IK**/FY**PK**)





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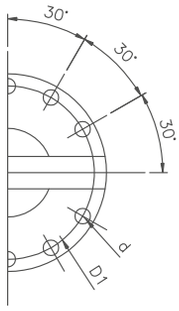

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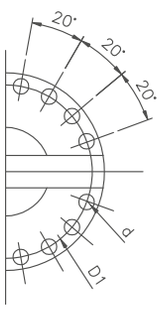


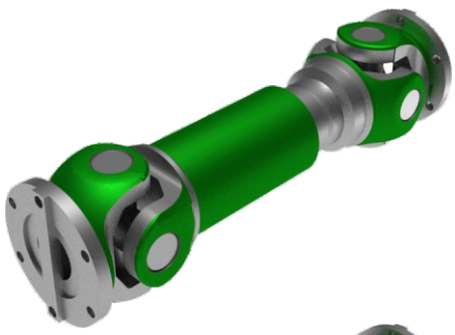
N 16

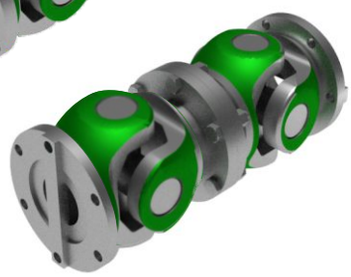
SERIES	US.A 150							US.A 180										US.A 200	US.A 225				US.A 250
Lmin	590	286	484	376	567	599	544	640	612	600	640	580	753	761	618	605	690	775	860	753	597	690	690
Lv	80	15	110	70	120	100	110	80	100		120	110	140			110		100	120	14	110	110	110
Tn(Nm)	4500	3300	5000	5200	6200	10000	10500	8400	10000		12000	13000	16000		19000		27000	16000	27000	16000	19000	27000	27000
Tf(Nm)	2250	1650	2500	2600	3100	5000	5250	4200	5000		6000	6500	8000		9500		13500	8000	13500	8000	9500	13500	13500
B(°)	35	28	30	25		35	25	25	35		30	25	25	30	25	30	25	25	25	25	25	25	25
D	142	136	125	138	141	158	160	154	158		170	172			178		204	187	204	178	178	204	204
Df		DIN150						DIN180										DIN200	DIN225				DIN250
D1		130						155,5										170	196				218
D2		90 H7						110 H7										125 H7	140 H7				140 H7
D3xΔmin	102x3	90x4	76.2x2.4	90x4	85x5	100x6	120x4	120x3		100x6		120x4	112x7		120x6		140x5	112x10	140x6.5	112x7	120x6	140x5	140x5
Lm	85	72	78	73	86	89,5	90	87	96	90	100	95	96	100	96	100	110	110	120	96	96	110	120
k		10						12							14			14	15	15	15	15	18
t	3	3,3	3,1	3		3,3		4	3,3		3		3,4				2,9	4	5	5	5	5	6
n		8						8	8	10	8		8	10	8		10	8	8	08|12	08|12	8	8
d	13	12						15	14	16	14		16					17	16	16	16	16	18

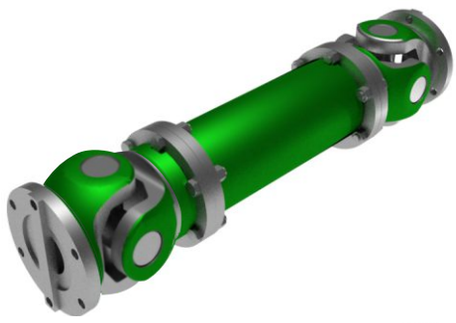
Tn=Nominal torque
Tf=Fatigue torque
L=Minimun lenght
Lv= Lenght compensation
*all dimension in millimetres(unless otherwise specified)

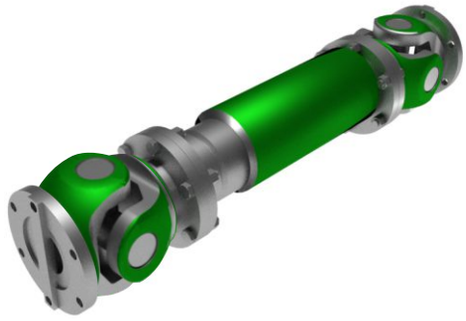
Contact us for special dimensions

US. B SERIES

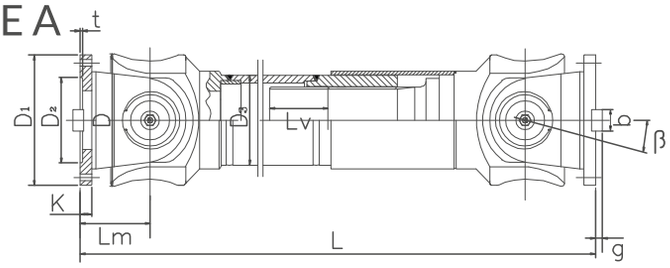




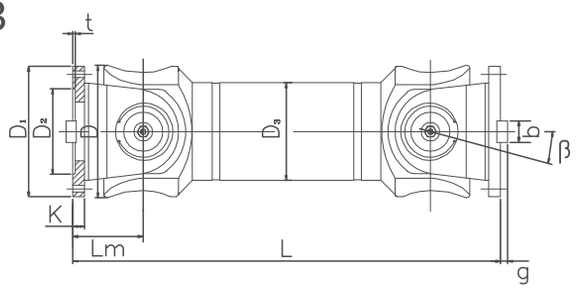




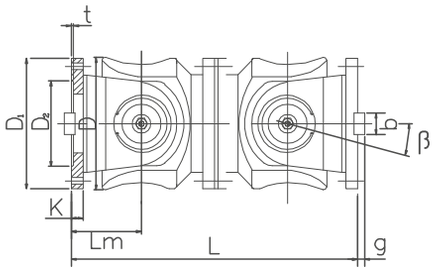
TYPE A



TYPE B



TYPE C



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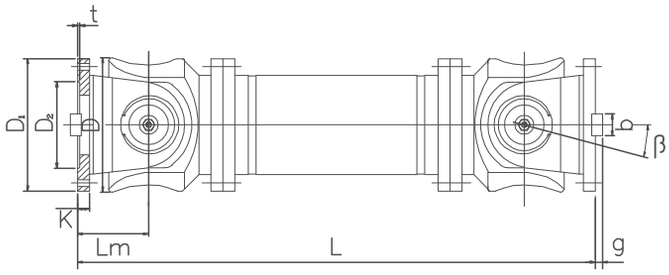
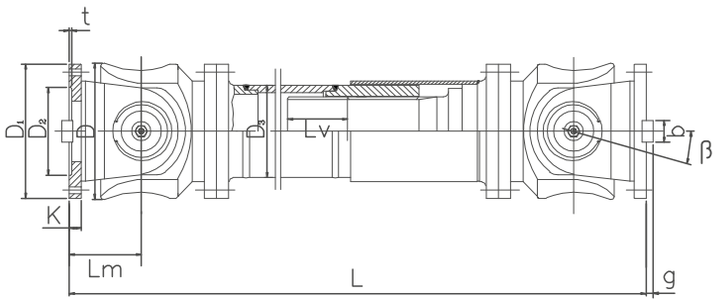


TYPE E



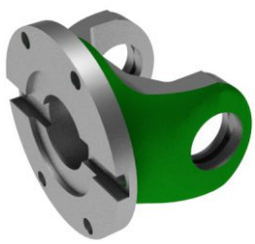
Lm			US.B 160	US.B 180	US.B 200	US.B 225	US.B 250	US.B 265	US.B 285	US.B 315	US.B 350	US.B 390	US.B 440	US.B 490	US.B 550	US.B 620
Tn(kNm)			21	28	40	56	80	100	120	160	225	320	500	700	1000	1250
Tf(kNm)			11	14	20	28	40	50	58	80	110	160	250	350	500	625
Tp(kNm)			16	21	29	41	58	73	87	116	160	232	363	508	725	907
Tcs(kNm)			28	36	52	73	106	130	156	208	292,5	416	650	910	1300	1625
			0,16	0,51	1,47	7,81	28,2	54,8	82,8	279	744	1860	8250	21450	63400	130000
TYPE	A	L	740	800	900	1000	1060	1120	1270	1390	1520	1530	1690	1850	2060	2280
		Lv	100	100	120	140	140	140	140	150	150	170	190	190	240	250
		m(Kg)	65	83	115	152	219	260	311	42	610	804	1122	1468	2154	2830
	B	L	480	530	590	640	730	790	840	930	1000	1010	1130	1240	1400	1520
		m(Kg)	44	60	85	110	160	180	226	320	440	590	820	1090	1560	2100
	C	L	380	420	440	500	560	600	640	720	780	860	1040	1160	1220	1360
		m(Kg)	35	48	66	90	130	160	189	270	355	510	780	970	1330	1865
	D	L	520	580	620	690	760	810	860	970	1030	1120	1230	1360	1550	1720
		m(Kg)	48	65	90	120	173	220	250	355	485	665	920	1240	1765	2390
	E	L	800	850	940	940	1120	1180	1320	1440	1550	1710	1880	2050	2310	2540
		Lv	100	100	120	120	140	140	140	150	150	170	190	190	240	250
		m(Kg)	70	92	126	126	238	280	340	472	660	886	1230	1625	2368	3155

SERIES	US.B 160	US.B 180	US.B 200	US.B 225	US.B 250	US.B 265	US.B 285	US.B 315	US.B 350	US.B 390	US.B 440	US.B 490	US.B 550	US.B 620
D	160	180	200	225	250	265	285	315	350	390	440	490	550	620
max(°)	15	15	15	15	15	15	15	15	15	15	15	15	15	15
D3XΔ	114x10	127x10.5	146x11.5	159x10.5	180x12.5	194x13.5	203x14.5	219x16.5	245x19	273x21	325x25	351x30	402x32	426x40
Df	160 225	180 225	200 225 250	225 250 285	250 285 315	265 285 315	285 315	315 350	350 390	390 440	440 490	490 550	550	620
D1(± 0.1)	137 196	155,5 196	170 196 218	196 218 245	218 245 280	233 245 280	245 280	280 310	310 345	345 385	385 425	425 492	492	555
D2(H7)	90 105	90 105	90 105	105 125	105 125 130	125 130	125 130	130 155	155 170	170 190	190 205	205 250	250	320
Lm	95	105	110	125	140 145	150 155	160 165	180	195 200	215	260 265	290 295	305	340
t	4 5	5	5 6	5 6 7	6 7 8	5 7 8	7 8	8	8	8	8 12	12	12	12
K	16 20	17 20	18 20 25	20 25 27	25 27 32	25 27 32	27 32	32 35	35 40	40 42	42 47	47 50	50	55
g	6 9	7 9	8 9 12,5	12,5 15	12,5 15	12,5 15	15	15 16	16 18	18 20	20 22,5	22,5	22,5	25
b(E9)	20 32	24 32	28 32 40	32 40	40	40	40	40 50	50 70	70 80	80 90	90 100	100	100
n	8	8	8	8	8 10	8 10	8 10	10	10	10 16	16	16	16	16

Tn=Nominal torque
Tf=Fatigue torque
Tp=Pulsating torque
Tcs= Limit torque
L=Minimun lenght
Lv= Lenght compensation
*all dimension in millimetres(unless otherwise specified)

Contact us for special dimensions

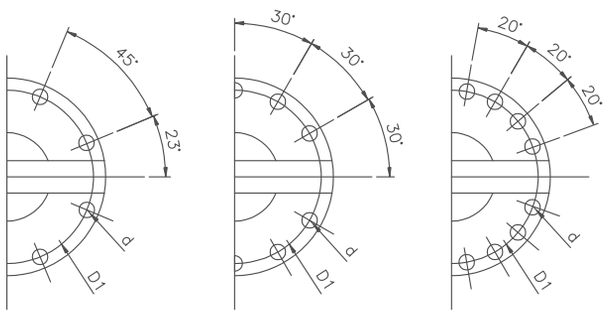
Flange yokes US.B SERIES



BOLT **H**OLE (FY**BH**-FY**BH**/SP DIN15452)

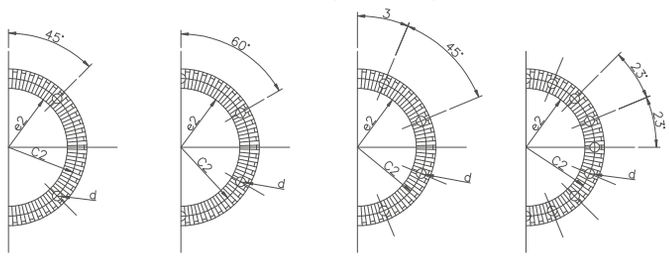
INTEGRAL/**P**ARTIAL FACE **K**EY(FY**IK**-FY**PK**)

DOG **T**EETH(FY**DT**)



N 8 **N 10** **N 16**

HIRTH **S**ERRATION(FY**HS**)



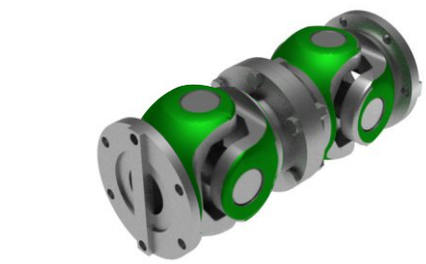
Z48 N4 **Z72 N6** **Z96 N8** **Z120 N16**

SERIES	Type	FYBH-FYBH/SP DIN15452				FYIK-FYPK			FYDT			FYHS				
	Df	d(C12)	n1	C1	b2(H12)	d	b(E9)	g	e	d2	z	C2(± 0.1)	e2	d(C12)	z	n
US.B 160	160	-	-	-	-	15	20	6	-	-	-	-	-	-	-	-
	180	16	4	192	21	17	32	9	165	15	8	196	180	18	48	4
US.B 180	180	-	-	-	-	17	24	7	130	13	8	-	-	-	-	-
	225	16	4	192	21	17	32	9	165	15	8	196	180	18	48	4
US.B 200	200	-	-	-	-	17	28	8	130	13	8	-	-	-	-	-
	225	16	4	192	21	17	32	9	165	15	8	196	180	18	48	4
	250	18	4	214	25	19	40	12,5	185	17	8	218	200	20	48	4
US.B 225	225	16	4	192	21	17	32	9	165	15	8	196	180	18	48	4
	250	18	4	214	25	19	40	12,5	185	17	8	218	200	20	48	4
	285	20	4	240	28	21	40	15	205	17	8	245	225	21	60	4
US.B 250	250	18	4	214	25	19	40	12,5	185	17	8	218	200	20	48	4
	285	20	4	240	28	21	40	15	205	17	8	245	225	21	60	4
	315	22	4	270	30	23	40	15	245	19	10	280	250	23	60	4
US.B 265	265	18	4	228	25	19	40	12,5	200	17	8	-	-	-	-	-
	285	20	4	240	28	21	40	15	205	17	8	245	225	21	60	4
	315	22	4	270	30	23	40	15	245	19	10	280	250	23	60	4
US.B 285	285	20	4	240	28	21	40	15	205	17	8	245	225	21	60	4
	315	22	4	270	30	23	40	15	245	19	10	280	250	23	60	4
US.B 315	315	22	4	270	30	23	40	15	245	19	10	280	250	23	60	4
	350	22	4	300	32	23	50	16	270	19	10	310	280	24	72	6
US.B 350	350	22	4	300	32	23	50	16	270	19	10	310	280	25	72	6
	390	24	4	340	32	25	70	18	300	21	10	345	315	25	72	6
US.B 390	390	24	4	340	32	25	70	18	300	21	10	345	315	25	72	6
	440	27	4	378	35	28	80	20	330	21	16	385	345	28	96	6
US.B 440	440	27	4	378	35	28	80	20	330	21	16	385	345	28	96	6
	490	-	-	-	-	31	90	22,5	360	23	16	425	370	31	96	8
US.B 490	490	-	-	-	-	31	90	22,5	360	23	16	425	370	31	96	8
	550	-	-	-	-	31	100	22,5	430	23	16	492	440	32	96	8
US.B 550	550	-	-	-	-	31	100	22,5	430	23	16	492	440	32	96	8
US.B 620	620	-	-	-	-	38	100	25	490	25	16	575	500	25	120	16

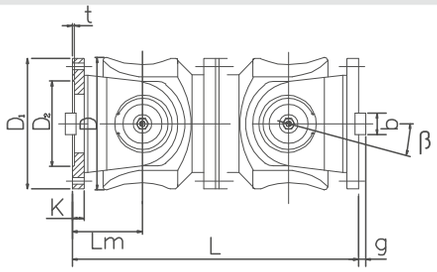
Contact us for special dimensions

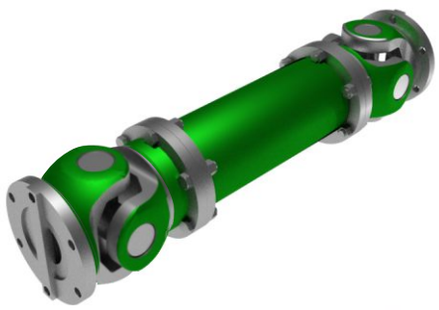
*all dimension in millimetres(unless otherwise specified)

US. C SERIES

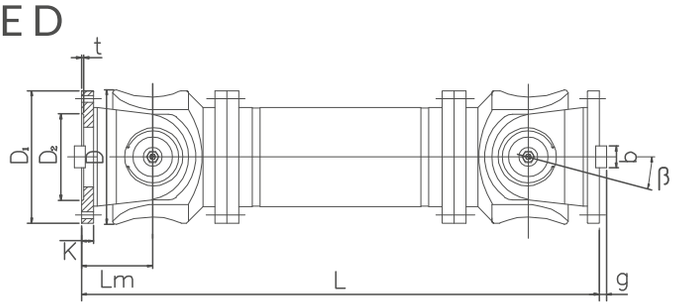


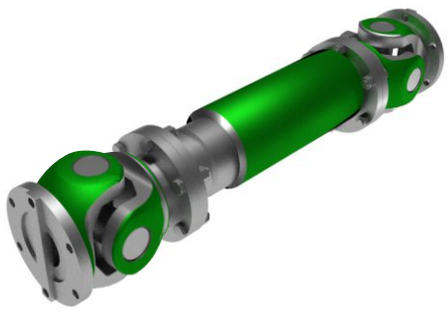
TYPE C



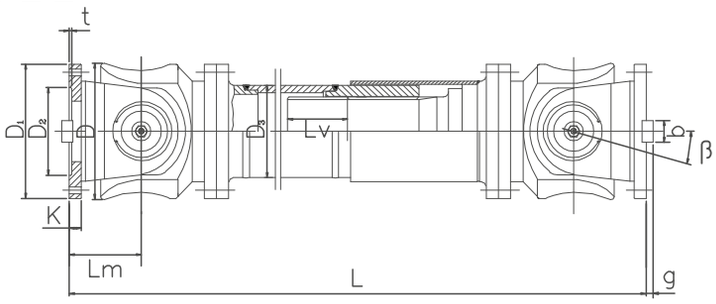


TYPE D





TYPE E

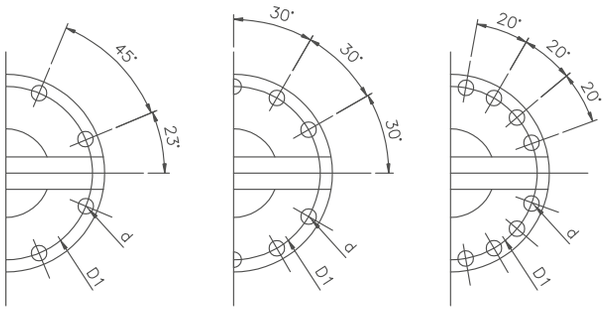


SERIES			US.C 650	US.C 700	US.C 750	US.C 780	US.C 800	US.C 840	US.C 900	US.C 960	US.C 1000	US.C 1060	US.C 1100	US.C 1200
Tn(kNm)			1800	2330	2850	3100	3420	4170	5035	6120	6710	8150	8950	11420
Tf(kNm)			1120	1450	1780	1935	2130	2610	3145	5770	4190	5085	5595	7140
TYPE	C	L	1540	1600	1840	1920	1920	2120	2280	2280	2380	2480	2500	2720
		m(Kg)	3150	3450	4300	4680	5050	6400	8420	8950	10600	12100	13500	16900
	D	L	1940	2100	2400	2500	2500	2680	2950	2950	3130	3200	3300	3570
		m(Kg)	3220	3530	4500	5400	5800	7470	9980	10500	12300	14500	15800	19500
	E	L	3230	3460	3620	4000	4000	4250	4580	4580	4770	4950	5100	5660
		Lv	200	200	200	200	200	200	300	300	300	300	300	300
		m(Kg)	4880	5400	8000	8450	9070	11800	15900	16500	19900	22000	27500	34800
TECHNICAL DATA SERIES			US.C 650	US.C 700	US.C 750	US.C 780	US.C 800	US.C 840	US.C 900	US.C 960	US.C 1000	US.C 1060	US.C 1100	US.C 1200
D			650	700	750	780	800	840	900	920	1000	1060	1100	1200
β max(°)			15											
D3			560	580	620	660			750		790	800	850	900
Df			650	700	750	780	800	840	900	920	1000	1060	1100	1200
D1(± 0.1)			635	655	695	710	740	770	825	850	915	970	1015	1100
D2(H7)			520	570	610	630	650	680	710	740	800	840	880	960
Lm			385	400	460	480	480	530	570	570	595	620	625	680
K			70			95		110	120		130			

Contact us for special dimensions

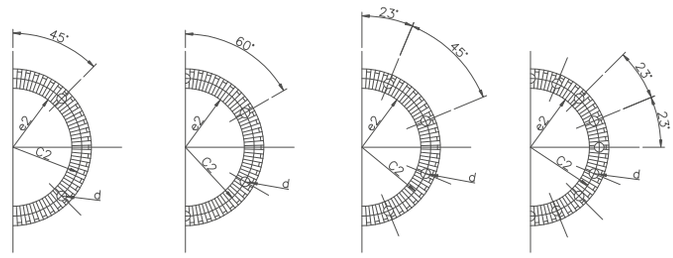
Flange yokes US.C SERIES

DOG TEETH (FY**DT**)



N 8 N 10 N 16

HIRTH SERRATION (FY**HS**)

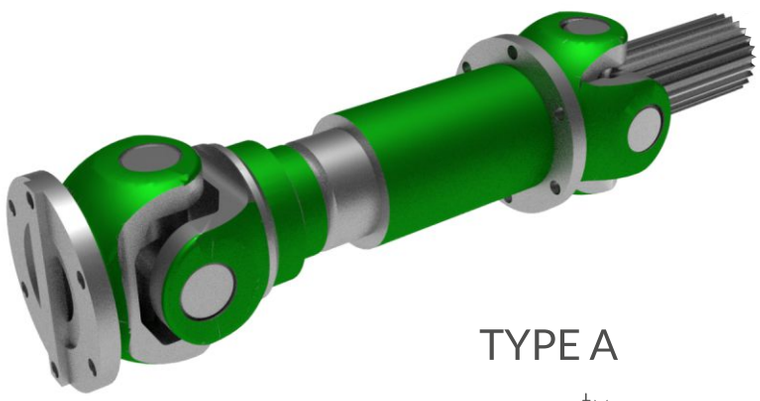


Z48 N4 Z72 N6 Z96 N8 Z120 N16

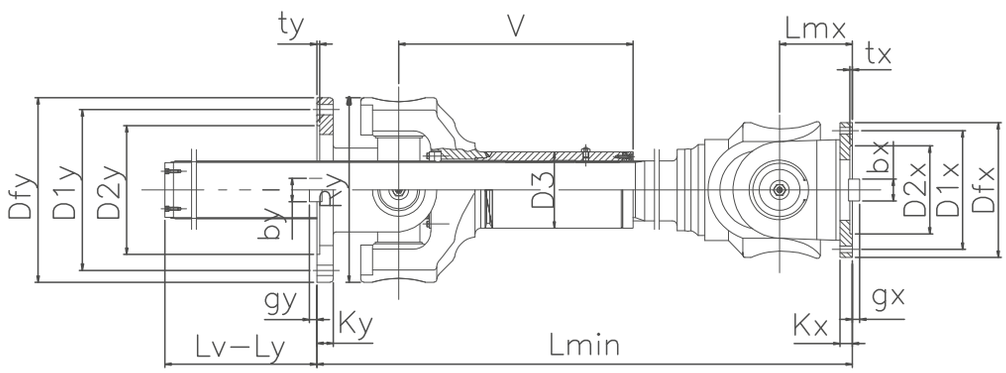
SERIES	TYPE Df	e	FYDT d2	z	C2(± 0.1)	e2	FYHS d(C12)	z	n
US.C 650	650	520	595	30	595	520	28	120	30
US.C 700	700	570	645	34	645	570	28	120	30
US.C 750	750	610	695	30	695	610	31	144	32
US.C 780	780	630	710	32	710	630	31	144	32
US.C 800	800	650	740	34	740	650	31	144	32
US.C 840	840	680	770	30	770	680	31	144	36
US.C 900	900	710	825	32	825	710	37	144	32
US.C 960	920	740	850	34	850	740	37	144	30
US.C 1000	1000	800	915	32	915	800	43	180	30
US.C 1060	1060	840	970	34	970	840	43	180	30
US.C 1100	1100	880	1015	34	1015	880	43	180	30
US.C 1200	1200	960	1100	32	1100	960	49	180	30

Tn=Nominal torque
Tf=Fatigue torque
L=Minimun lenght
Lv= Lenght compensation
*all dimension in millimetres(unless otherwise specified)

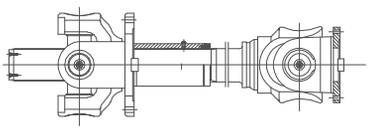
US. F SERIES



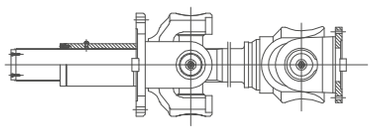
TYPE A



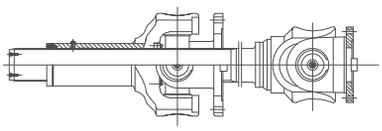
TYPE B



TYPE C



TYPE D

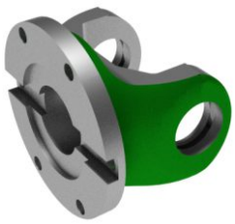


TRANSMISSIBLE TOQUE VALUES AND MAIN DIMENSIONS									
SERIES			US.F 225/315	US.F 250/330	US.F 285/390	US.F 315/435	US.F 350/480	US.F 390/520	US.F 435/600	US.F 480/650
Tn(kNm)			56	80	120	160	225	320	520	700
Tf(kNm)			28	40	58	80	110	160	260	350
TYPE	A	Lv	920	1020	1140	1300	1445	1605	1760	1955
		m(Kg)	650	700	750	750	800	800	900	900
	B	Lv	260	285	325	360	400	445	500	570
		m(Kg)	650	700	750	750	800	800	900	900
	C	Lv	610	655	750	827	885	985	1124	1225
		m(Kg)	650	700	750	750	800	800	900	900
	D	L	740	820	925	1050	1140	1250	1385	1535
		m(Kg)	650	700	750	750	800	800	900	900
S			100	120	130	150	170	185	210	220
D3			146	159	180	203	219	245	273	325

Tn=Nominal torque
Tf=Fatigue torque
L= Minimun length
Lv= Lenght compensation
*all dimension in millimetres(unless otherwise specified)

Contact us for special dimensions

Flange yokes US.F SERIES



X Side

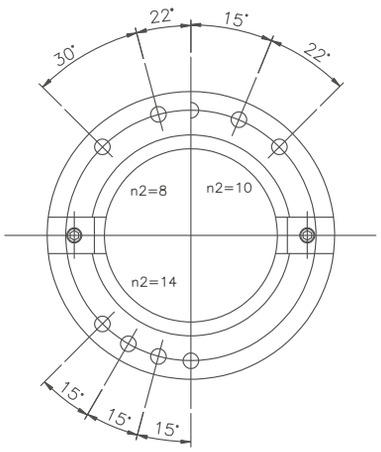
INTEGRAL
/**P**ARTIAL **F**ACE **K**EY
(FY**IK**/FY**FK**)

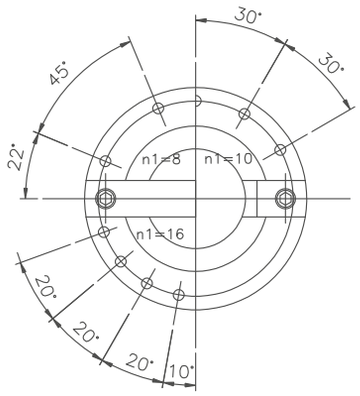
DOG **T**EETH (FY**DT**)

HIRTH **S**ERRATION (FY**HS**)

Y Side

PARTIAL **F**ACE **K**EY (FY**PF**)



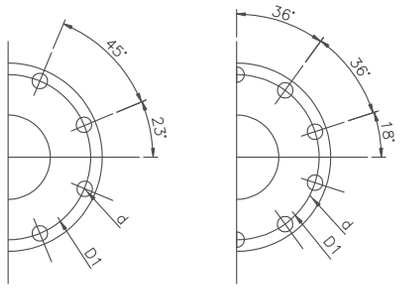


TECHNICAL DATA FLANGE SIDE X														
SERIES			US.F 225/315		US.F 250/330		US.F 285/390		US.F 315/435		US.F 350/480		US.F 390/520	US.F 435/600	US.F 480/650
βmax(°)			15		15		15		15		15		15	15	15
D			225	250	250	285	285	315	315	350	350	390	390	435	480
Dfx			225	250	250	285	285	315	315	350	350	390	390	435	480
Lmx			125	140	140	160	160	180	180	195	195	215	215	260	290
tx			5	5	5	7	7	7	7	8	8	8	8	10	12
Kx			20	25	25	27	27	32	32	35	35	40	40	42	47
TYPE	FYPK FYIK	D1x(± 0.1)	196	218	218	245	245	280	280	310	310	345	345	385	425
		D2x(H7)	105	115	115	135	135	150	150	165	165	190	190	200	225
		bx	32	40	40	40	40	40	40	50	50	70	70	80	90
		gx	9	12,5	12,5	15	15	15	15	16	16	18	18	20	22,5
		d1(C12)	196	218	218	245	245	280	280	310	310	345	345	385	425
		n1	8	8	8	8	8	10	10	10	10	10	10	16	16
	FYDT	e	165		185		205		245		270		300	330	360
		d2	15		17		17		19		19		21	21	23
		z	8		8		8		10		10		10	16	16
	FYHS	C2(± 0.1)	196		218		245		280		310		345	385	425
		e2	180		200		225		250		280		315	345	370
		d(C12)	18		20		21		23		25		25	28	31
		z	48		48		60		60		72		72	96	96
		n	4		4		4		4		6		6	6	8

TECHNICAL DATA FLANGE SIDE Y							
SERIES	US.F 225/315	US.F 250/330	US.F 285/390	US.F 315/435	US.F 350/480	US.F 390/520	US.F 435/600	US.F 480/650
βmax(°)	5/7,5	5/7,5	5/7,5	5/7,5	5/7,5	5/7,5	5/7,5	5/7,5
RY	315	330	390	435	480	520	600	650
DfY	315	330	390	435	480	520	600	650
Lmy	140	150	170	190	210	230	280	290
V	395	435	480	565	630	695	735	810
ty	5	7	8	8	10	10	12	15
Ky	28	30	40	42	47	50	60	60

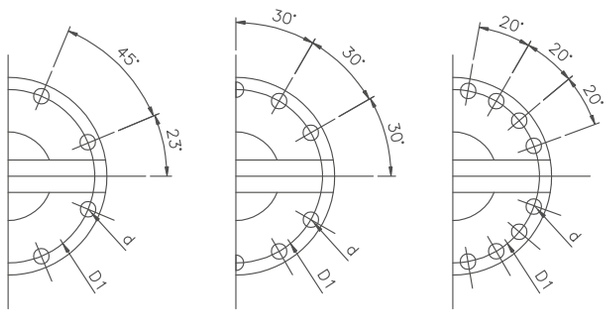
COMPANION FLANGES

FLANGE WITH **B**OLT **H**OLE (CF**BH**)

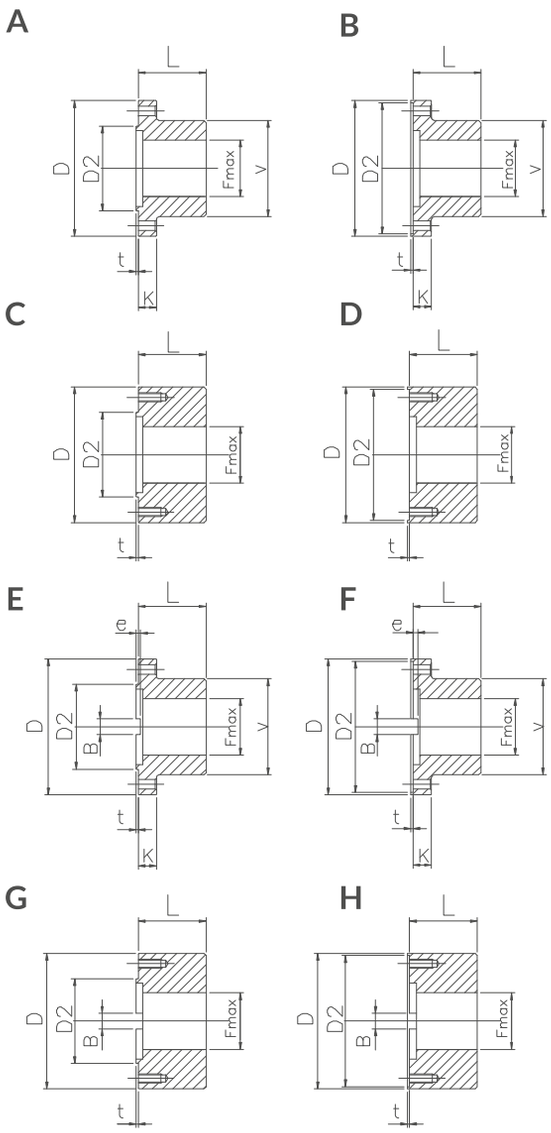


N 8 **N 10**

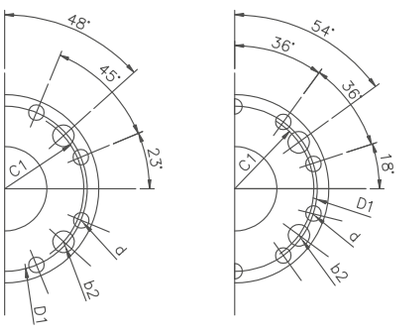
FLANGE WITH **I**NTEGRAL FACE **K**EY (CF**IK**)



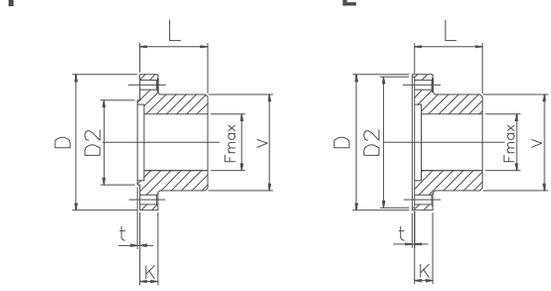
N 8 **N 10** **N 16**



FLANGE WITH **B**OLT WHIT **SL**IT SLEEVE CONNECTION ACCORDING TO **DIN 15452** (CF**BH/SP DIN15452**)



N 8 **N 10**



CFBH														
	TYPE A/C(inner centering)			TYPE B/D(outer centering)										
TYPE	D	D2	V	D	D2	V	D1	d A/d B	d C/d D	Fmax A/ Fmax B	Fmax C/ Fmax D	L	t	k
150	150	90	110	160	150	140	130	14	M14	80	110	170	4	12
180	180	110	130	190	180	150	155,5	16	M16	90	120	180	5	12
200	200	125	150	210	200	160	170	16	M16	100	140	190	5	15
225	225	140	171	235	225	170	196	16	M16	115	150	200	5	18
250	250	140	190	260	255	190	218	18	M18	125	170	210	6	20
285	285	175	214	295	285	214	245	20	M20	140	190	220	7	22
315	315	175	247	330	315	247	280	22	M22	165	210	230	8	25
350	350	220	277	365	350	277	310	22	M22	185	235	240	8	27
390	390	250	307	405	390	307	345	24	M24	205	260	250	8	32
440	440	280	342	460	440	342	385	27	M27	225	295	280	9	32

CFIK																	
	TYPE E/G(inner centering)				TYPE F/H(outer centering)												
TYPE	D	D2	V	e	D	D2	V	e	D1	d E/d F	d G/d H	Fmax E/ Fmax F	Fmax C/ Fmax D	L	t	k	B
160	160	90	110	4	170	160	140	6	137	15	M14	80	170	170	4	18	20
180	180	90	130	4	190	180	150	7	155,5	17	M16	90	180	180	5	19	24
200	200	90	150	4	210	200	160	8	170	17	M16	100	190	190	5	20	28
225	225	105	171	5	235	225	170	9	196	17	M16	115	200	200	5	22	32
250	250	105	190	12,5	260	250	190	12,5	218	19	M18	125	210	210	6	25	40
265	265	125	190	12,5	275	265	190	12,5	233	19	M18	130	210	210	6	25	40
285	285	125	214	15	295	285	214	15	245	21	M20	140	220	220	7	27	40
315	315	130	247	15	330	315	247	15	280	23	M22	165	230	230	8	32	40
350	350	155	277	16	365	350	277	16	310	23	M22	185	240	240	8	35	50
390	390	170	307	18	405	390	307	18	345	25	M24	205	250	250	8	40	70
440	440	190	342	20	460	440	342	20	390	28	M27	225	260	260	10	42	80
490	490	205	378	22,5	510	490	378	22,5	435	31	M30	255	300	300	12	47	90
550	550	250	445	22,5	570	550	445	22,5	492	31	M30	295	320	320	12	50	100
620	620	320	500	25	640	620	500		555	38	M37	330	350	350	12	55	100

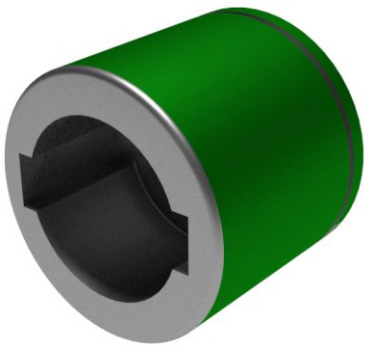
CFBH/SP DIN15452													
	TYPE I (inner centering)		TYPE L (outer centering)										
TYPE	D	D2	D	D2	D1	C1	d	B2	V	Fmax	L	t	k
150	150	100	160	150	130	126	15	19	110	50	170	4	18
180	180	105	190	180	155,5	150	17	21	130	70	180	5	19
200	200	120	210	200	170	165	17	21	150	90	190	5	22
225	225	135	235	225	196	192	17	21	165	100	200	5	22
250	250	150	260	255	218	214	19	25	175	110	210	6	25
285	285	170	295	285	245	240	21	28	205	130	220	7	27
315	315	185	330	315	280	279	23	30	225	140	230	8	32
350	350	210	365	350	310	300	23	32	260	160	240	8	35
390	390	235	405	390	345	340	25	32	290	180	250	8	40
440	440	280	455	435	385	378	27	35	310	190	280	8	42

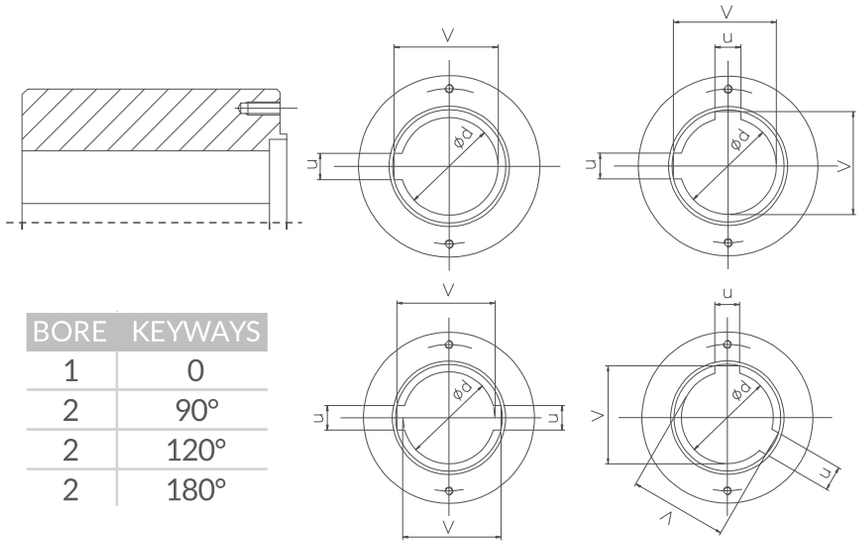
Contact us for special dimensions

*all dimension in millimetres(unless otherwise specified)

PINION END CASING DESIGN

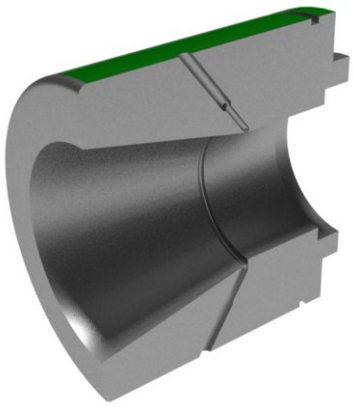
CYLINDRICAL FINISHED

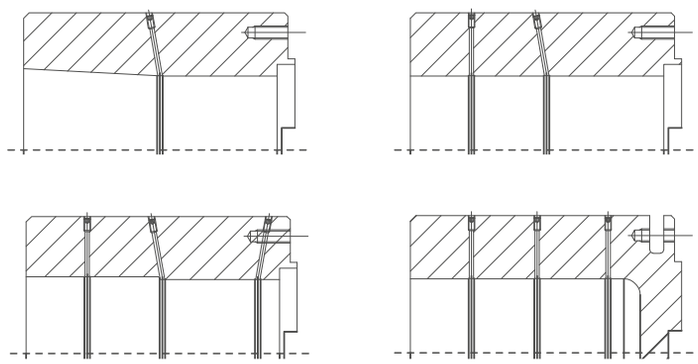


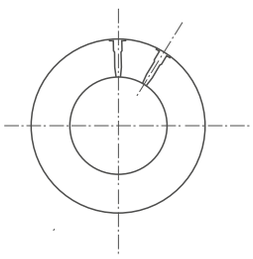


BORE	KEYWAYS
1	0
2	90°
2	120°
2	180°

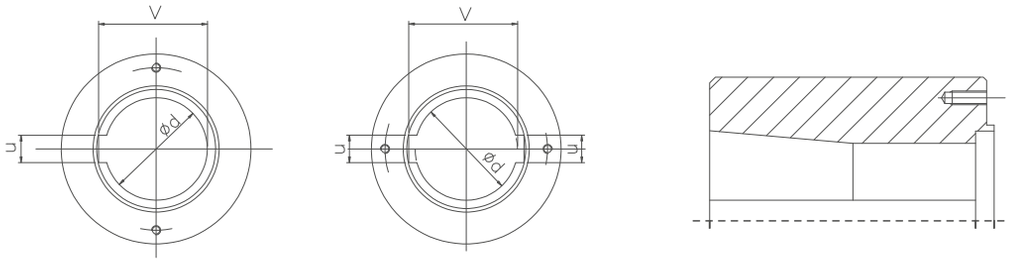
SHRINK FITTING AND OIL PRESSURE REMOVAL, TAPER FINISHED



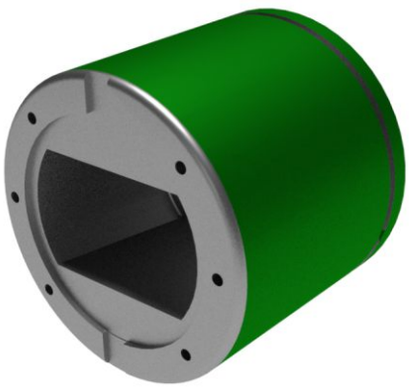




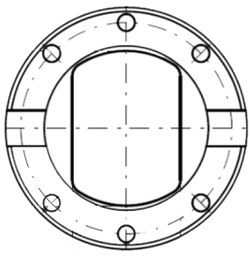
TAPER BORE AND 1 KEYWAY
TAPER BORE AND 2 KEYWAYS 90°

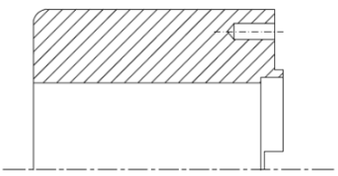


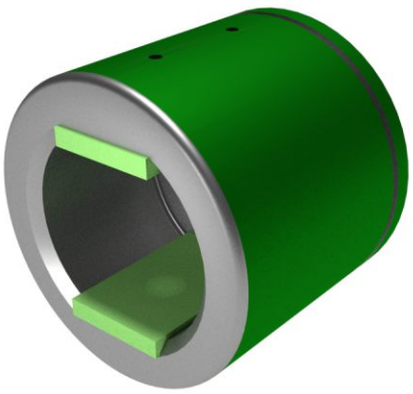
ROLL END CASING DESIGN



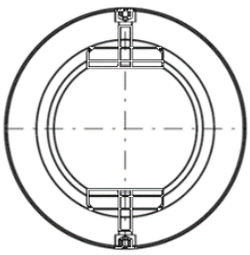
INTEGRAL BORE

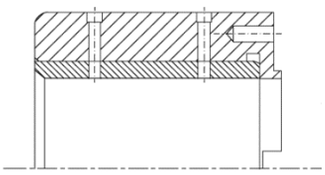


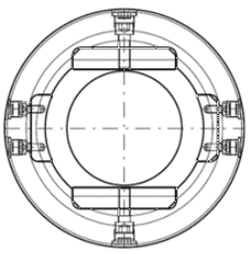


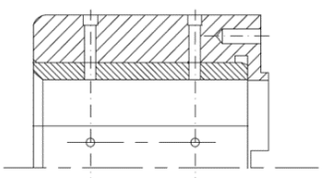


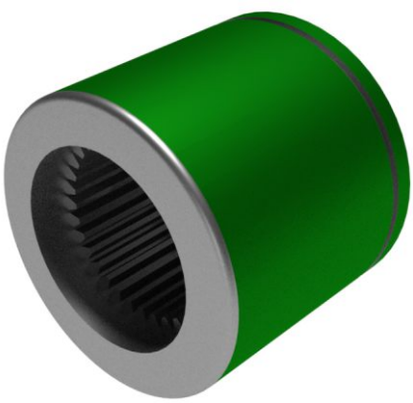
TWO FLAT WEAT KEYS / TWO ROUND WEAR KEYS



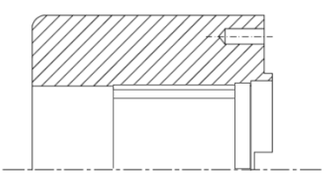








SPLINED ACCORDING TO DIN5480



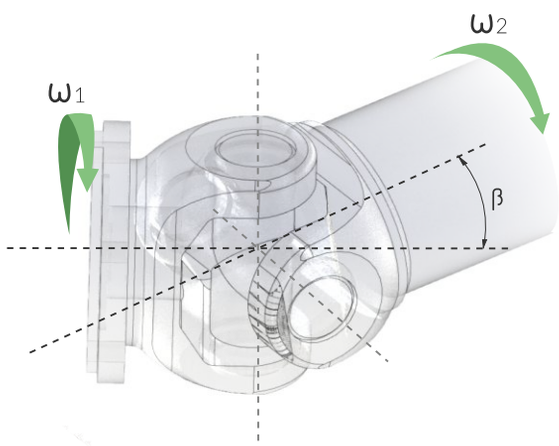
KINEMATICS

The universal joint, also called cardan joint or Hooke´s joint, is defined as a spatial or spherical drive unit with a non-uniform gear ratio or transmission. When a universal joint is set as an angle(β), non-uniform motion is developed. With the driving yoke of the joint operating at a uniform rotational velocity(ω1), the driven yoke rotates non-uniformly with respect to angular displacement, velocity(ω2) and acceleration.

The transmission behaviour of this joint is described by the following equations:

$$\alpha_2 = tan^{-1}(\frac{1}{cos\beta} \cdot tan\alpha_1)$$

$$\omega_2 = (\frac{cos\beta \cdot \omega_1}{1 - sin^2\alpha_1 \cdot sin^2\beta})$$



Where,
β = Deflection angle
ω1 = Rotational velocity drive side
ω2 = Rotational velocity driven side
α1 = Angle of rotation drive side
α2 = Angle of rotation driven side

The average angular displacement and velocity is uniform, which means that if the driving yoke rotates one revolution, the driven also rotates one revolution. Nevertheless, the incremental angular displacement, instantaneous angular velocity and acceleration is not transmitted uniformly through the joint during this revolution.

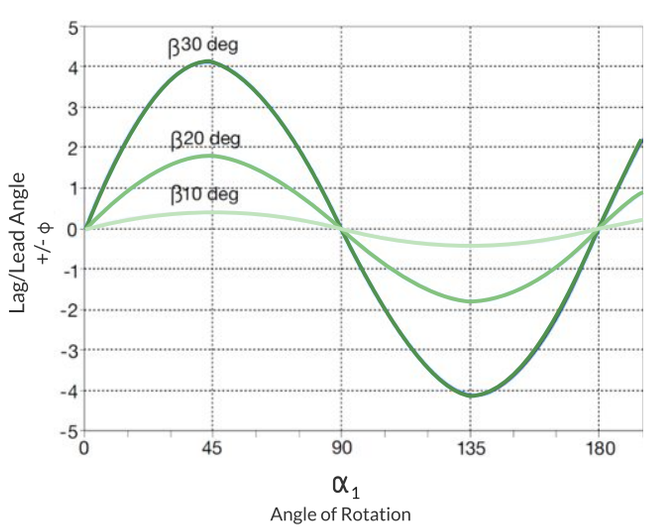
The angular displacement of the driven yoke during one revolution lags and leads the driving yoke twice. This lag and lead angle (ϕ) depends on the angular rotation (α) of the joint and on the bend angle(β),

$$\phi = tan^{-1}(\frac{tan\alpha_2 - tan\alpha_1}{1 + tan\alpha_1 \cdot tan\alpha_2}) \cdot tan\alpha_1)$$

The maximum and minimum angular velocity will be:

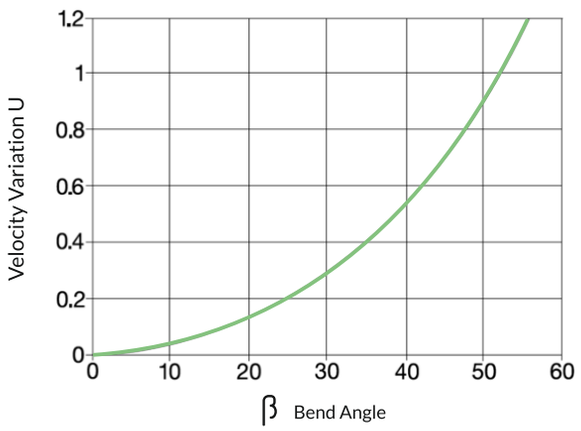
$$\omega_2 max = \frac{\omega_1}{cos\beta}$$

$$\omega_2 min = cos\beta \cdot \omega_1$$



As it is clear in the last graphic, velocity variation (U= ω1 / ω2) depends also on the bend angle (β). This can be represented using the next formula:

$$U = \left(\frac{\omega_2 max - \omega_2 min}{\omega_1}\right) = tan\beta \cdot sin\beta$$



Due to the non-constant rotational speed, few applications are suitable for a single joint. However, by placing two universal joints in tandem the irregularities of a single joint can be compensated. Usual configurations are "Z" or "W" bend.

W Bend

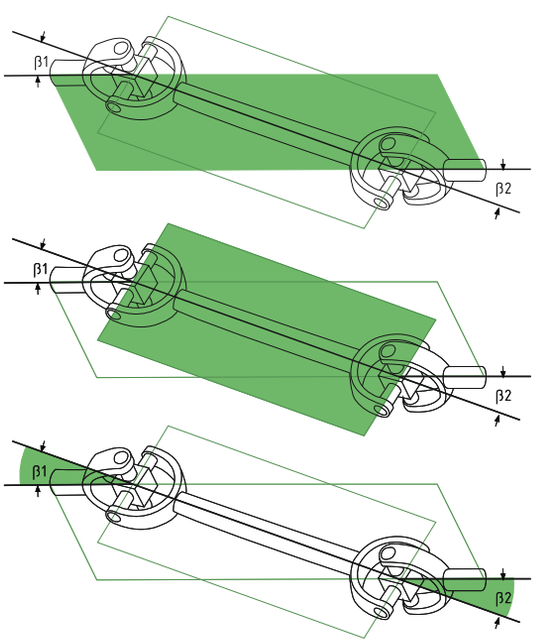
Z Bend

Using these configurations, to achieve synchronous rotation of the drive and driven shafts three conditions are necessary to be fulfilled:

1. The axes of all shaft sections lie in the same plane.

2. The bearing bores of the inboard yokes of the center section lie in the same plane.

3. The bend angles β_1 and β_2 are equal.



The third condition ($\beta_1 = \beta_2$) is an essential requirement for a uniform output speed condition, but cannot always be fulfilled. We recommend therefore not to exceed 1,5° difference between bend angles, especially for high-torque/high-speed applications.

SELECTION AND DIMENSIONING

Please use the following method to select the best solution for your application. Is important to notice that this selection method is valid only for US.A and US.B series. In case you need a product from our US.C or US.F series, we will be glad to assist you.

Normally, an universal joint shaft is selected according to two principal values: torque and required bearing life. One is the torque to transmit and the other is the required bearing life.

1. To calculate the nominal torque, please use the next formulas:

$$Tc = KT$$

$$T = 9950\frac{Pw}{n}$$

$$T = 7020\frac{Ph}{n}$$

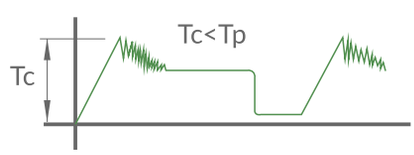
Where,
Tc =Calculated Torque (Nm)
K= Service Factor
T= Operation Torque (Nm)
Pw=Driving Power (kW)
Ph= Driving Power (HP)
n= Operating speed (rpm)

SERVICE FACTOR		
LIGHT SHOCK LOAD K=1,1 -1.5	HEAVY SHOCK LOAD K=2-3	EXTRA HEAVY SHOCK LOAD K=3-5
Generators	Paper machines	Crushers
Belt conveyers	Bar mills	Cold rolling mills
Centrifugal pumps	Calender Drives	Blooming mills
Ventilators	Compresssors(single)	Continuous tube mills
Wood handling machines	Continuous tube mills	Vibration conveyors
MEDIUM SHOCK LOAD K=1,5-2	Marine transmissions	Medium section mills
	Medium section mills	
Compressors(multi)	Mixers	EXTREME SHOCK LOAD K=5-10
Continuous wire mills	Presses	
Conveyer primary drives	Pumps(single)	
Pumps(multi)	Straightener machines	Feed roller drives
Small section mills	Transport roller tables	Plate shears

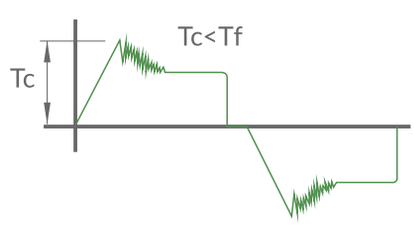
2. Now we have to seek for a shaft that fulfil next conditions, depending on the operation requirements:

One-way not pulsating loads: Tc<Tn, where Tn=Nominal Torque. This is the maximum admitted torque. After this level, plastic deformation may occur.

One-way pulsating loads: Tc<Tp where Tp=Pulsating Torque, and Tp=1,45 Tf



Reversing loads: Tc<Tf where Tf= Fatigue Torque



3. Once the torque conditions are satisfied, checking the bearing life is required:

$$Ln = \frac{K_l}{K1 \cdot n \cdot \beta \cdot T^{\frac{10}{3}}} \cdot 10^{10}$$

$$Ln \geq Lmin$$

Where,
Ln=Service life(hrs)
Kl= Bearing capacity factor
K1= Motor factor (=1 for electric motor/=1,2 for diesels motors)
n=Operating speed(rpm)
β= Working angle(°)
T= Operating torque (Nm)
Lmin= Minimum bearing life (hrs)

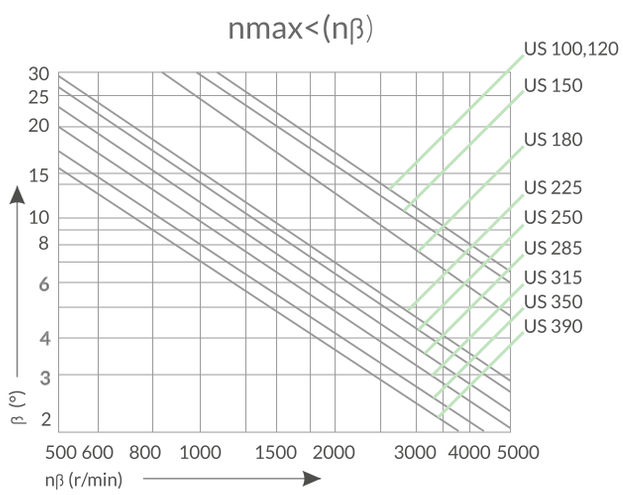
In case of simultaneous horizontal and vertical angular misalignments on the universal joint shaft, the composite deflection angle is calculated using the next formula:

$$\beta = tg^{-1}(\sqrt{tg^2\beta_1 + tg^2\beta_2})$$

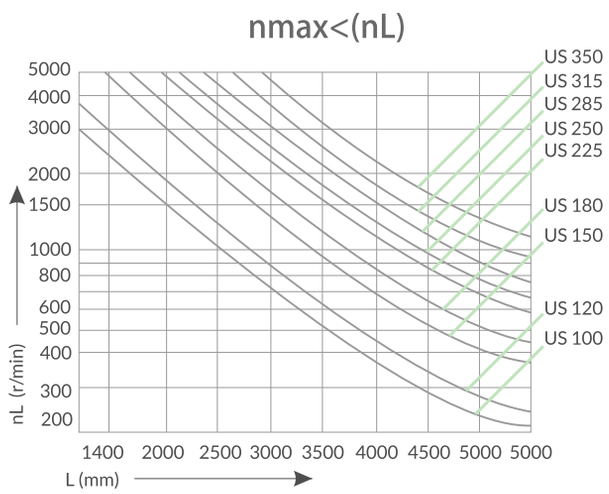
Where,
β=Composite deflection angle(°)
β1=Horizontal defelection angle(°)
β2=Vertical deflection angle(°)

BEARING CAPACITY FACTOR KL					
DESING	KL	DESING	KL	DESING	KL
US.A 58	0.022x10^-5	US.B 200	1,47	US.B 460	13.53x10^3
US.A 65	0.012x10^-4	US.B 225	7,812	US.B 490	2.145x10^4
US.A 75	0.058x10^-4	US.B 250	28,2	US.B 540	5.6367x10^4
US.A 90	0.048x10^-3	US.B 265	54,8	US.B 550	6.335x10^4
US.A 100	0.26x10^-3	US.B 285	82,8	US.B 560	7.287x10^4
US.A 120	0.26x10^-2	US.B 315	279	US.B 620	0.13x10^6
US.A 150	2.65x10^-2	US.B 350	744	US.C 700	0.32x10^6
US.A 180	0,56	US.B 370	1,02	US.C 750	0.75x10^6
US.A 200	1,03	US.B 390	1860	US.C 800	1.06x10^6
US.A 225	1,89	US.B 410	4416	US.C 900	5.62x10^6
US.B 160	0,16	US.B 425	6333	US.C 1060	303x10^6
US.B 180	0,51	US.B 440	8.25x10^3		

4. When torque and bearing requirements are accomplished, maximum operating speed should be checked considering angle β and operating length L of the shaft according the following charts:



Where,
nmax=maximun operating speed(rpm)
β=Misalignment angle
nβ=Maximun permissible speed in relation to operating deflection angle(rpm)



Where,
nmax=maximun operating speed(rpm)
nL=maximun permissible speed in relation to operating lenght(rpm)
L= Operating length

5. Finally, under some operating circustances (linear speed > 7 m/s) dynamic balancing test is required. The grade of balancing, according to DIN ISO 1940:2003, will depend on the application of the joint:

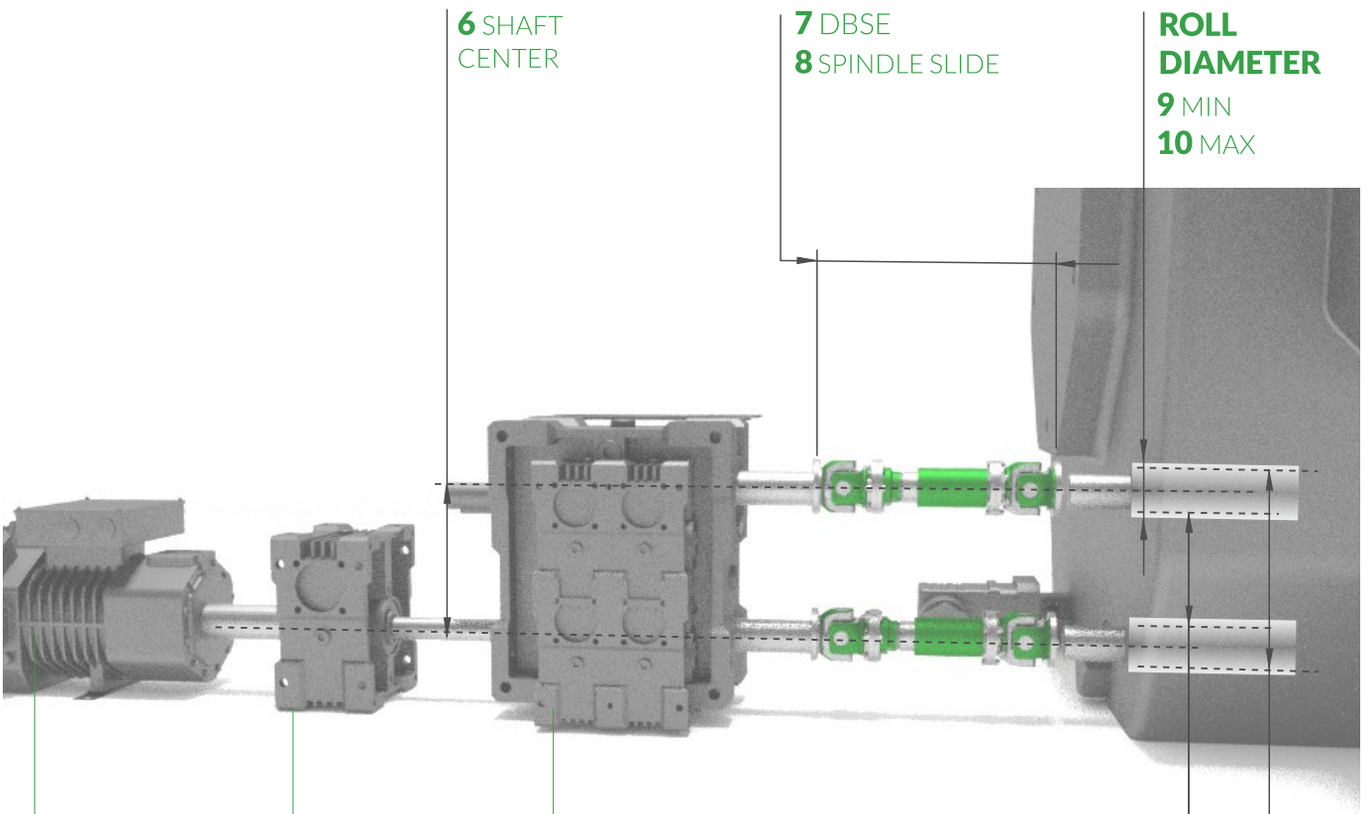
GUIDANCE FOR BALANCE QUALITY GRADES FOR ROTORS		
G40	G6.3	G 2,5
Cars: wheels, wheel rims, wheel sets, drive shafts Crankshaft drives, inherently balanced, elastically mounted	Aircraft gas turbines Centrifuges (separators, decanters) Electric motors and generators (of at least 80 mm shaft height), of maximum rated speeds up to 950 r/min Electric motors of shaft heights smaller than 80 mm Fans Gears Machinery, general Machine-tools Paper machines Process plant machines Pumps Turbo-chargers Water turbines	Compressors Computer drives Electric motors and generators (of at least 80 mm shaft height), of maximum rated speeds above 950 r/min Gas turbines and steam turbines Machine-tool drives Textile machines
G16		
Agricultural machinery Crankshaft drives, inherently balanced, rigidly mounted Crushing machines Drive shafts (cardan shafts, propeller shafts)		

APPLICATION SHEET FOR SELECTION AND DESING

Customer:	Type of mill:
Contact name:	No. of stands:
Phone:	Inquiry No:
Mail:	Date:

	DIMENSION	UNIT
1. Motor power		
2. Base motor speed		
3. Operation motor speed		
4. Maximun motor speed		
5. Reducer ratio		
6. Pinion stand shafts centers		
7. Distance between shaft ends		
8. Spindle slide(if required)		
9. Minimun roll diameter		
10. Maximum roll diameter		
11. Minimum roll center		
12. Maximum roll center		
13. Ambient temperature		
14. Pinion end shaft		
15. Roll end shaft		
16. Comments or special conditions		

KINEMATIC CHAIN



GREEN GEAR TRASMISSIONI SRL

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