

万向传动轴 施塔特伊尔姆(stadtilm)制造
Cardan shafts made in Stadtilm



2010/2011

万向传动轴 极限扭矩 350–370 000 Nm
Cardan shafts from 350 up to 370 000 Nm



Location and history

GEWES is located in Stadtilm, a town in Thuringia with excellent traffic links to all directions. The motorways from Frankfurt via Bad Hersfeld to Dresden (A 5, A 4) and the motorways A 71 / A 73 to the South are not far away. GEWES employs highly skilled specialist workers and is one of Europe's most experienced manufacturers of cardan shafts. Cardan shaft production started in Stadtilm in 1942, when Rheinmetall Borsig AG shifted its production facility here. Discounting a short interruption after the war, cardan shafts have been made in Stadtilm ever since. Over the course of several decades, a group of highly experienced specialists have developed in design, process scheduling and production of cardan shafts. GEWES is a privately owned company with a workforce of more than 300 employees.

地理位置和历史

盖威狮(GEWES)万向传动轴有限公司位于德国图林根(Thuringia)州的施塔特伊尔姆(Stadtilm)市, 地理位置优越, 交通便捷。公司所在地位于从法兰克福(Frankfurt)经由巴特赫斯菲尔德(Bad Hersfeld)至德累斯顿(Dresden)的A5/A4高速公路, 以及通往南方的A71/A73高速公路附近。盖威狮(GEWES)员工具有高超的专业技能, 这也使得公司成为欧洲最富盛名的万向传动轴生产厂家之一。1942年, 当Rheinmetall Borsig股份有限公司将它的万向轴生产厂搬迁到施塔特伊尔姆 (Stadtilm) 市后, 这里便开始了此类产品的生产历史。除了战后短暂的停产, 万向传动轴在这里的生产持续至今。在几十年的生产实践中, 一批具有丰富经验的专家型员工, 对万向传动轴的产品设计、制造工艺以及生产组织进行了持续的发展、改进。盖威狮(GEWES)是一家私营企业, 员工300余人。



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We will not be liable for any errors or omissions in this catalogue. Technical consultation with GEWES Gelenkwellenwerk Stadtilm GmbH is a necessity to ensure the proper function of the products.

This catalogue supersedes all earlier editions. subject to modifications

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此版本为最新版本。必要时会做进一步修改。

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General product description

产品概述

No machine element other than a cardan shaft allows power transmission of torque between spacially offset driving and driven shafts whose position can be changed during operation.

万向传动轴是在具有空间偏移量的主传动轴和被驱动轴间, 实现扭矩传递的最佳产品。在运转过程中, 主/被动轴相对位置可以改变。

Spatial angular motion and changes of axial length are ensured by advanced constructional elements.

通过采用优异的结构组件, 万向传动轴可以实现带有一定空间角度的运动以及传动轴长度的变化。

Thus, cardan shafts have become an indispensable transmission component in automotive engineering and industry.

因此万向轴成为机车和工业领域不可或缺的传动组件。

Cardan shafts offer

万向传动轴特点:

- » universal application
- » excellent efficiency
- » high reliability
- » low maintenance
- » easy use

- » 应用广泛
- » 效率高
- » 可靠性强
- » 维护成本低
- » 使用便捷

They are an integral part in almost all industries with mechanical drives.

万向传动轴在几乎所有需要机械驱动的工业领域都是必需的部件。

Convince yourself that our products will solve your drive problems to your complete satisfaction. This catalogue is intended as a source of ready reference.

请相信我们的产品会完美实现您的传动要求, 让您满意。本手册可作参考资料。

我们期待着与您富有成效的合作!

We are looking forward to having a fruitful cooperation with you!

Model range cardan shafts

万向传动轴型号范围

»Standard cardan shafts«

»标准万向传动轴«

Cardan shafts for lifetime- based applications in vehicles, paper machines, ships and industrial plants.

应用于车辆, 造纸机械, 船舶和工业领域, 基于使用寿命为核心的万向传动轴。

Size 型号	Limiting torque 极限扭矩	Alternating torque 交变扭矩	Swing diameter 回转直径	Flange connection DIN法兰连接	Flange connection SAE法兰连接	Flange connection KV / XS 法兰连接
	[Nm]	[Nm]	[mm]	[mm]		[mm]
15	350	100	60	58/65	-	-
30	1100	320	90	75/90/100	1120/1300	-
43	2400	1000	98	90/100/120	1120/1300/1400	100
53	4200	1300	115	100/120/150	1400/1500	120
63	6200	1700	125	120/150/165/180	1500/1600	120
58	8800	2500	155	150/165/180	1600/1700/1800	152
68	11500	4000	160	150/165/180	1600/1700/1800	152/180
70	17000	5100	174	180/225	1800	-
72	21000	5100	170	180/225	1800	180
73	25000	7300	178	180/220/225/250	1800/1880	180
77	28000	11000	204	180/225/250	1880	180
79	34000	-	204	-	-	200
80	33000	13000	215	225/250/285	1880/1900	-
83	40000	18000	250	250/285	1880	-
84	55000	23000	265	285	-	-
85	55000	23000	250	250/285/315	-	-
86	58000	24000	250	285/315	-	-
90	120000	45000	285	285/315/350	-	-
95	175000	58000	315	315/350/390	-	-
97	200000	70000	350	350/390/435	-	-
98	200000	70000	370	350/390/435	-	-

»Heavy duty cardan shafts«

»重载万向传动轴«

Cardan shafts for torque- based applications in rolling mills and industrial plants.

应用于轧钢机械和工业领域, 基于传递扭矩为核心的万向传动轴

Size 型号	Limiting torque 极限扭矩	Alternating torque 交变扭矩	Swing diameter 回转直径	Flange connection Face key 法兰连接端面键	Flange connection DIN法兰连接
	[Nm]	[Nm]	[mm]	[mm]	[mm]
86-H	75000	30000	250	250/285	285/315
90-H	150000	53000	285	285/315	315/350
95-H	180000	72000	315	315/350	350/390
97-H	260000	100000	350	350/390	390/435
S1-H	370000	140000	390	390/435	435

Our product ranges also includes

我们的产品范围还包括

» Double cardan shafts «

» 双关节万向传动轴 «

For front-wheel drives of trucks, off road vehicles, tractors, building machines etc.		应用于卡车、越野车、拖拉机和建筑机械等的前轮驱动	
Size 型号	Largest permitted short-time torque 瞬时许用最大扭矩 [Nm]	Swing diameter 回转直径 [mm]	Angle of deflection 摆角 [°]
41	4000	112	50
51	8000	138	42/50
61	3200/4000/6000	115/128/128	52/52/43
71	12000	152	42
81	15000	172	42

» Precision turned parts «

» 精密传动部件 «

Our range of production includes:
» Gear parts, such as differential pins in many variations
» Shift forks, shift fingers, guide bolts, etc. with more than 1 million components per year
» Besides control parts like king pins etc.
» Splined drive shafts
» Hydraulic components
» Water pump parts

产品包括
» 齿轮部件,例如各类差动销
» 年供货逾百万件的变速杆、滑叉、导向销
» 中枢销操控部件
» 带花键的驱动轴
» 液压零件
» 水泵零件

» Drive shafts «

» 驱动轴 «

Splined drive shafts with or without flanges for trucks, commercial vehicles etc. Available sizes:	
Shaft length	500 ... 1400 mm
Shaft diameter	30 ... 70 mm
Flange diameter	up to 250 mm
Profile diameter	up to 100 mm
Profile according to	DIN 5480 and 5482
Modulus	1 ... 3
Mass	up to 30 kg

应用于卡车和商用车,带或者不带法兰的花键驱动轴	
轴长	500 ... 1400 mm
轴径	30 ... 70 mm
法兰直径	最大250 mm
剖面直径	最大100 mm
剖面标准	DIN 5480和5482标准
模数	1 ... 3
重量	最重可达30千克

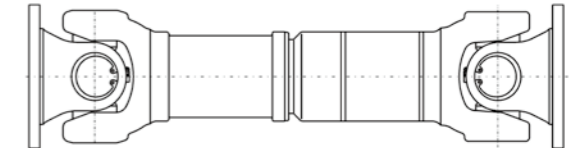
Cardan shaft-variants 万向传动轴 – 延伸产品

Cardan shafts with length displacement

Normal angle design - Code No. 41 and 45
Normal angle design - Code No. 51 and 55
Wide angle design - Code No. 46

具有长度补偿功能的万向传动轴

标准摆角设计-代码41和45
标准摆角设计-代码51和55
大摆角设计-代码46

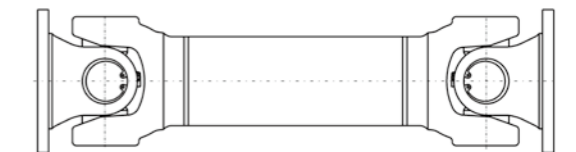


Cardan shafts without length displacement

Normal angle design - Code No. 47 and 57
Wide angle design - Code No. 48

无长度补偿功能的万向传动轴

标准摆角设计-代码47和57
大摆角设计-代码48

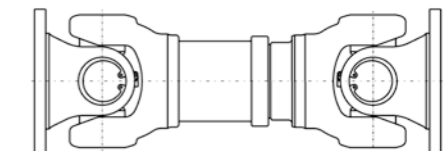


Short cardan shafts with length displacem.

Normal angle design - Code No. 43 and 53
Wide angle design - Code No. 44

短型并具有长度补偿功能的万向传动轴

标准摆角设计-代码43和53
大摆角设计-代码44

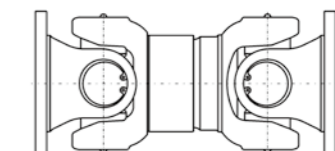


Super short cardan shafts with length displacement

Reduced deflection angle design - Code No. 4496

超短型并具有长度补偿功能的万向传动轴

小摆角设计-代码4496

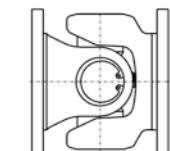


Flange joints

Normal angle design - Code No. 310
Wide angle design - Code No. 314

单关节法兰连接

标准摆角设计-代码310
大摆角设计-代码314

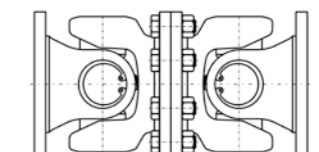


Double joints

Normal angle design - Code No. 7670
Wide angle design - Code No. 7675

双关节法兰连接

标准摆角设计-代码7670
大摆角设计-代码7675





Explanations

参数说明

M _{LG}	Limiting torque	极限扭矩
M _{dW}	Alternating torque	交变扭矩
M _A	Tightening torque of flange fastening bolts	法兰紧固螺栓的拧紧扭矩
KZ	Code number (design)	设计代码
L	Length of cardan shaft	万向传动轴长度(无长度补偿型)
L _{min}	Shortest length of cardan shaft without length displacement	无长度补偿功能的万向传动轴最小长度
L _Z	Compressed length	压缩后的长度(长度补偿型万向传动轴)
L _{Z min}	Shortest compressed length	压缩后长度的最短值
L _{Z max}	Longest compressed length	压缩后长度的最大值
L _A	Length compensation	长度补偿量
L _{A min}	Length compensation for L _{Z min}	L _{Z min} 长度补偿量
L _{A max}	Length compensation for L _{Z max}	L _{Z max} 长度补偿量
L _B	Operating length	运转时长度
z	Number of flange holes	法兰连接孔数
β _{max}	Maximum joint deflection angle	最大摆角
m	Mass of cardan shaft for L	长度为L时万向传动轴的质量
m _{min}	Mass of cardan shaft for L _{min} resp. L _{Z min}	长度为L _{min} 或L _{Z min} 时万向传动轴的质量
m _{max}	Mass of cardan shaft for L _{Z max}	长度为L _{Z max} 时万向传动轴的质量
m _R	Mass per 1 m tube length	每米管身长度的质量
J	Moment of inertia of cardan shaft for L	长度为L时万向传动轴的转动惯量
J _{min}	Moment of inertia of cardan shaft for L _{min} resp. L _{Z min}	长度为L _{min} 或L _{Z min} 时万向传动轴的转动惯量
J _{max}	Moment of inertia of cardan shaft for L _{Z max}	长度为L _{Z max} 时万向传动轴的转动惯量
J _R	Moment of inertia per 1 m tube length	每米管身长度的转动惯量
C	Torsional stiffness of the cardan shaft for L	长度为L时万向传动轴的抗扭刚度
C _{min}	Torsional stiffness of the cardan shaft for L _{min} resp. L _{Z min}	长度为L _{min} 或L _{Z min} 时万向传动轴的抗扭刚度
C _{max}	Torsional stiffness of the cardan shaft for L _{Z max}	长度为L _{Z max} 时万向传动轴的抗扭刚度
C _R	Torsional stiffness per 1 m tube length	每米管身长度的抗扭刚度

Torque definitions

扭矩定义

M _{LG}	Capable of transmitting torque at a limited frequency without damage to the function of the cardan shaft	在限定的频率范围内，在不损坏万向传动轴功能的情况下所能传递的扭矩。
M _{dW}	At this torque the cardan shaft is permanently solid at alternating loads. The permanently solid at pulsating load (M _{d Sch}) can be calculated as follows: M _{d Sch} = M _{dW} × 1,45	万向传动轴可以永久稳固使用时的交变扭矩值，该脉动交变扭矩载荷的数值M _{d Sch} 可以根据以下公式计算： M _{d Sch} = M _{dW} × 1,45

Determining the length L_Z of cardan shaft in a static application:

万向传动轴静态时的长度确定:

- Size 15: L_Z = L_B - 10
- Size 30: L_Z = L_B - 20
- Sizes 43 ... 70: L_Z = L_B - 45
- Sizes 72 ... S1: L_Z = L_B - 50

- 型号 15: L_Z = L_B - 10
- 型号 30: L_Z = L_B - 20
- 型号 43 ... 70: L_Z = L_B - 45
- 型号 72 ... S1: L_Z = L_B - 50

Calculation of m, J and C for other cardan shaft lengths than specified in the dimension charts:

在尺寸图中未列出的，其它长度的万向传动轴的质量m、转动惯量J和抗扭刚度C的计算方法:

Determine the length of the additional tube (L_R):

确定额外延长的管身长度(L_R):

resp. 或

$$L_R = L - L_{min} \quad [mm]$$

$$L_R = L_Z - L_{Z min} \quad [mm]$$

1. Mass: 质量

$$m = m_{min} + \left(m_R \cdot \frac{L_R}{1000} \right) \quad [kg]$$

2. Moment of inertia: 转动惯量

$$J = J_{min} + \left(J_R \cdot \frac{L_R}{1000} \right) \quad [kgm^2]$$

3. Torsional stiffness: 抗扭刚度

$$\frac{1}{C} = \frac{1}{C_{min}} + \left(\frac{L_R}{C_R \cdot 1000} \right) \quad \left[\frac{kNm}{rad} \right]$$

Note!

All denoted and calculable technical parameters are valid for the cardan shaft as an independent system. Influences of overall system will not be considered!
If you have questions to this please ask our design department.

注意!

以上直接列明和经计算得出的技术参数仅适用于独立系统的作用下，未考虑整个系统的影响。
如有疑问请咨询本公司设计部门。



Cardan shafts up to 6200 Nm

极限扭矩可达6200 Nm的万向传动轴

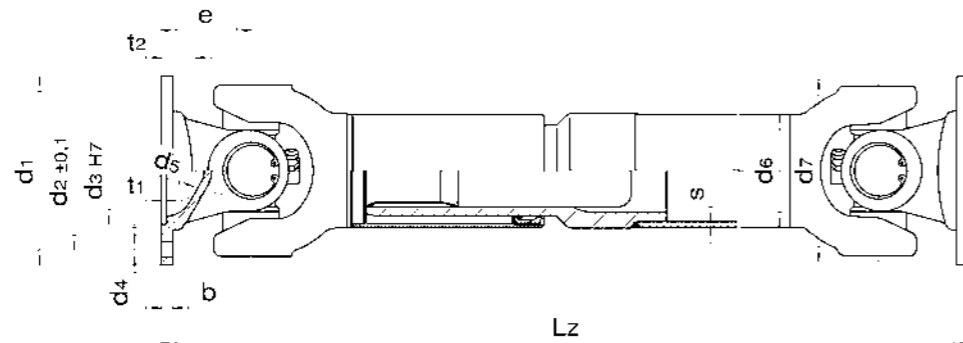
Size 型号	MdG	MdW	d1	d2	d3	z x d4	b	t1	d5	t2	d7	d6	s
	[Nm]	[Nm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]
15	350	100	65	52,0	35	4 x 6	4,5	2	42	8	60	30	2,5
30	1100	320	90	74,5	47	4 x 8	6,0	3	62	12	90	50	2,0
43	2400	1000	100	84,0	57	6 x 8	6,5	3	50	20	98	60	3,0
53	4200	1300	120	101,5	75	8 x 10	8,0	3	70	22	115	70	3,0
63	6200	1700	150	130,0	90	8 x 12	10,0	3	95	24	125	80	3,5

Explanations see page 8
Other flange connections see pages 23, 31 and 33

注释见第8页
其它形式的法兰连接见页码23, 31和33

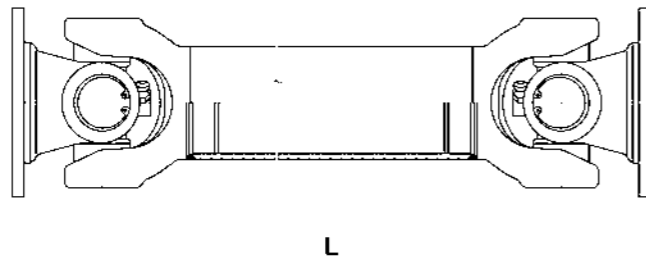
Code No./
代码

41, 45, 46



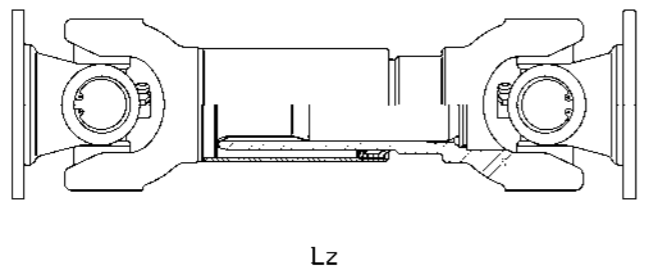
Code No./
代码

47, 48



Code No./
代码

43, 44



Cardan shafts with length displacem.

具有长度补偿功能的万向传动轴

Normal angle design - Code No. 41 and 45
Wide angle design - Code No. 46

标准摆角设计-代码41和45
大摆角设计-代码46

Size 型号	KZ	β max	e	LZ min	LA	m min	J min	C min	mR	JR	CR
		[°]	[mm]	[mm]	[mm]	[kg]	[kgm ²]	[kNm/rad]	[kg]	[kgm ²]	[kNm/rad]
15	41	25	32	275	25	1,9	0,00105	5,3	1,70	0,00032	3,38
30	45	20	40	365	50	4,6	0,0030	22,0	2,37	0,00137	14,3
30	46	30	47	380	50	4,8	0,0033	21,2	2,37	0,00137	14,3
43	45	25	48	440	110	8,4	0,0077	35,5	4,22	0,00344	35,9
43	46	35	58	460	110	8,8	0,0082	32,5	4,22	0,00344	35,9
53	45	25	56	490	110	12,7	0,0134	55,4	4,96	0,00557	58,2
53	46	35	70	520	110	13,6	0,0148	49,8	4,96	0,00557	58,2
63	45	20	62	530	110	19,5	0,0250	88,5	6,60	0,00968	101
63	46	35	80	565	110	20,6	0,0270	80,8	6,60	0,00968	101

Cardan shafts without length displ.

无长度补偿功能的万向传动轴

Normal angle design - Code No. 47
Wide angle design - Code No. 48

标准角设计-代码47
大摆角设计-代码48

Size 型号	KZ	β max	e	L min	m min	J min	C min	mR	JR	CR
		[°]	[mm]	[mm]	[kg]	[kgm ²]	[kNm/rad]	[kg]	[kgm ²]	[kNm/rad]
15	47	25	32	165	1,2	0,00036	6	1,70	0,00032	3,38
30	47	20	40	215	3,3	0,0023	28	2,37	0,00137	14,3
30	48	30	47	230	3,5	0,0025	26	2,37	0,00137	14,3
43	47	25	48	250	4,8	0,0046	55	4,22	0,00344	35,9
43	48	35	58	270	5,7	0,0050	46	4,22	0,00344	35,9
53	47	25	56	285	7,2	0,0085	92	4,96	0,00557	58,2
53	48	35	70	315	8,6	0,0101	85	4,96	0,00557	58,2
63	47	20	62	320	11,7	0,0190	133	6,60	0,00968	101
63	48	35	80	355	13,0	0,0210	121	6,60	0,00968	101

Short cardan shafts with length displ.

短型并具有长度补偿功能的万向传动轴

Normal angle design - Code No. 43
Wide angle design - Code No. 44

标准摆角设计-代码43
大摆角设计-代码44

Size 型号	KZ	β max	e	LZ min	LA min	m min	J min	C min	LZ max	LA max	m max	J max	C max
		[°]	[mm]	[mm]	[mm]	[kg]	[kgm ²]	[kNm/rad]	[mm]	[mm]	[kg]	[kgm ²]	[kNm/rad]
15	43	25	32	225	20	1,6	0,0010	5,5	250	25	1,8	0,00103	5,4
30	43	20	40	230	15	3,3	0,0022	18,2	315	60	4,1	0,0024	17,3
30	44	30	47	245	15	3,5	0,0025	17,5	330	60	4,3	0,0027	16,6
43	43	20	48	280	25	5,5	0,0050	37,2	400	60	7,4	0,0058	34,2
43	44	30	58	300	25	5,9	0,0054	34,0	420	60	7,8	0,0062	31,3
53	43	20	56	315	30	8,4	0,0106	55,4	450	80	11,3	0,0120	51,3
53	44	35	70	365	45	9,3	0,0120	50,1	500	85	12,2	0,0134	46,5
63	43	20	62	365	35	13,5	0,0230	86,0	505	110	17,5	0,0245	79,0
63	44	35	80	400	35	14,6	0,0250	78,5	540	110	18,6	0,0265	72,0

Other designs available on request

其他设计形式请咨询

Cardan shafts 8.8 ... 25 kNm

极限扭矩8 800 Nm至25 000 Nm的万向传动轴

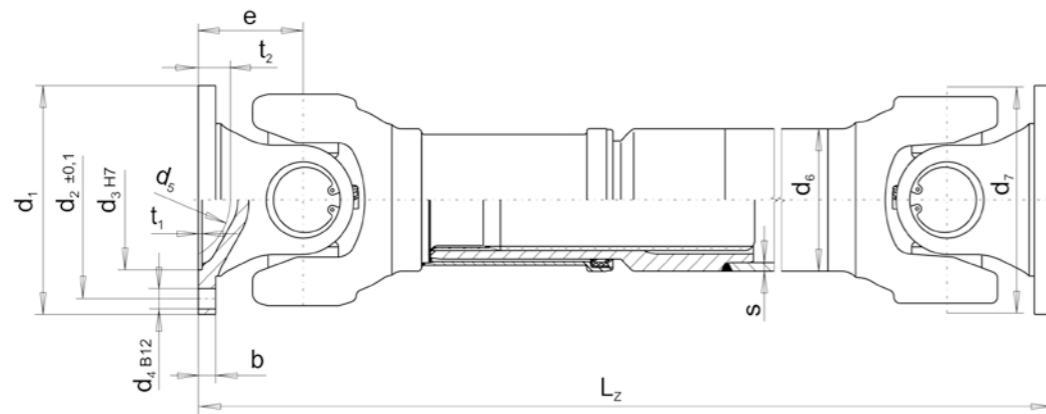
Size 型号	MdG [Nm]	MdW [Nm]	d1 [mm]	d2 [mm]	d3 [mm]	z x d4 [mm]	b [mm]	t1 [mm]	d5 [mm]	t2 [mm]	d7 [mm]	d6 [mm]	s [mm]
58	8800	2500	150	130,0	90	8 x 12	10	3	92	26	155	100	3,0
68	11500	4000	180	155,5	110	8 x 14	12	3	120	24	160	92	6,5
70	17000	5100	180	155,5	110	8 x 14	12	3	100	28	174	120	4,0
72	21000	5100	180	155,5	110	10 x 16	12	3	95	26	170	104	8,0
73	25000	7300	180	155,5	110	10 x 16	14	3	95	26	178	111,5	6,75

Explanations see page 8
Other flange connections see pages 25, 31 and 33

注释见第8页
其它形式的法兰连接见页码25, 31和33

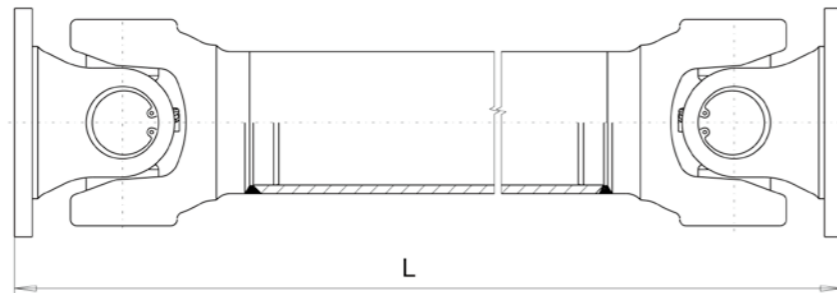
Code No.
代码

45, 46



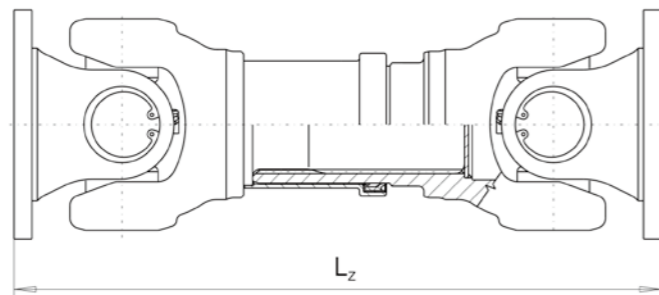
Code No.
代码

47, 48



Code No.
代码

43, 44



Cardan shafts with length displacem.

具有长度补偿功能的万向传动轴

Normal angle design - Code No. 45
Wide angle design - Code No. 46

标准摆角设计-代码45
大摆角设计-代码46

Size 型号	KZ	β max [°]	e [mm]	LZ min [mm]	LA [mm]	m min [kg]	J min [kgm ²]	C min [kNm/rad]	mR [kg]	JR [kgm ²]	CR [kNm/rad]
58	46	35	90	640	110	26,9	0,049	135	7,18	0,0169	177
68	45	24	78	640	110	34,1	0,074	210	13,7	0,0252	263
68	46	35	95	670	110	36,1	0,080	193	13,7	0,0252	263
70	45	25	95	600	110	35,6	0,096	210	11,4	0,0385	403
72	45	20	85	670	110	51,8	0,156	320	18,9	0,0439	459
72	46	33	100	700	110	53,0	0,161	300	18,9	0,0439	459
73	45	20	85	670	110	51,4	0,160	365	17,4	0,0480	502
73	46	24	100	700	110	52,6	0,165	345	17,4	0,0480	502

Cardan shafts without length displ.

无长度补偿功能的万向传动轴

Normal angle design - Code No. 47
Wide angle design - Code No. 48

标准摆角设计-代码47
大摆角设计-代码48

Size 型号	KZ	β max [°]	e [mm]	L min [mm]	m min [kg]	J min [kgm ²]	C min [kNm/rad]	mR [kg]	JR [kgm ²]	CR [kNm/rad]
58	48	35	90	420	18,7	0,042	195	7,18	0,0169	177
68	47	24	78	430	24,8	0,063	300	13,7	0,0252	263
68	48	35	95	460	27,0	0,068	275	13,7	0,0252	263
70	47	25	95	430	27,8	0,083	300	11,4	0,0385	403
72	47	20	85	430	31,1	0,096	375	18,9	0,0439	459
72	48	33	100	460	32,2	0,099	320	18,9	0,0439	459
73	47	20	85	430	32,1	0,103	450	17,4	0,0480	502
73	48	24	100	460	33,3	0,107	375	17,4	0,0480	502

Short cardan shafts with length displ.

短型并具有长度补偿功能的万向传动轴

Normal angle design - Code No. 43
Wide angle design - Code No. 44

标准摆角设计-代码43
大摆角设计-代码44

Size 型号	KZ	β max [°]	e [mm]	LZ min [mm]	LA min [mm]	m min [kg]	J min [kgm ²]	C min [kNm/rad]	LZ max [mm]	LA max [mm]	m max [kg]	J max [kgm ²]	C max [kNm/rad]
58	44	30	90	460	20	21,6	0,046	141	585	110	25,4	0,048	131
68	43	24	78	410	30	24,8	0,064	210	565	110	31,3	0,071	190
68	44	35	95	445	30	26,8	0,070	197	650	110	35,4	0,079	170
70	43	25	95	550	90	33,7	0,091	210	570	110	34,2	0,092	205
72	43	20	85	510	40	38,8	0,104	330	650	110	45,3	0,110	300
72	44	24	100	540	40	40,0	0,108	320	680	110	46,5	0,114	290
73	43	20	85	510	40	40,5	0,110	380	650	110	47,0	0,116	340
73	44	24	100	540	40	41,7	0,115	370	680	110	48,2	0,121	330

Other designs available on request

其他设计形式请咨询



Cardan shafts 28 ... 55 kNm

极限扭矩28 000 Nm至55 000 Nm的万向传动轴

Size 型号	MdG	MdW	d1	d2	d3	z x d4	b	t1	d5	t2	d7	d6	s
	[Nm]	[Nm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]
77	28000	11000	180	155,5	110	10 x 16	15	3	95	30	204	144	7,00
79*	34000	-	200	165,0	-	4 x 15	20	-	-	-	204	144	7,00
80	33000	13000	225	196,0	140	8 x 16	15	5	160	30	215	144	7,00
83	40000	18000	250	218,0	140	8 x 18	18	6	120	45	250	162	9,85
84	55000	23000	285	245,0	175	8 x 20	20	7	130	35	265	162	9,85

* Only XS flange connection

* 代表仅有XS法兰连接形式

Explanations see page 8

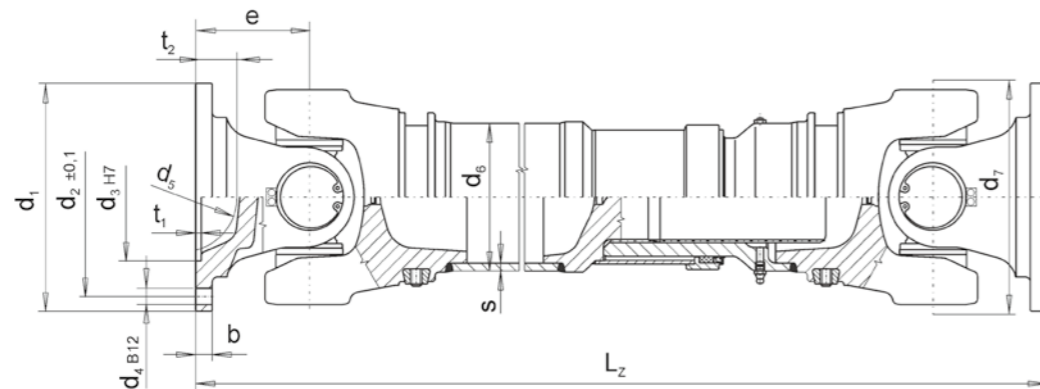
注释见第8页

Other flange connections see pages 27, 31 and 33

其它形式的法兰连接见页码27, 31和33

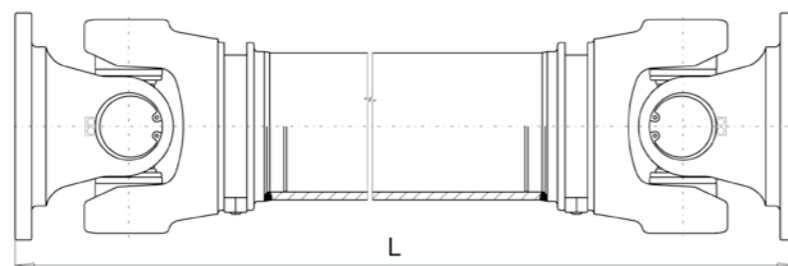
Code No.
代码

41, 45



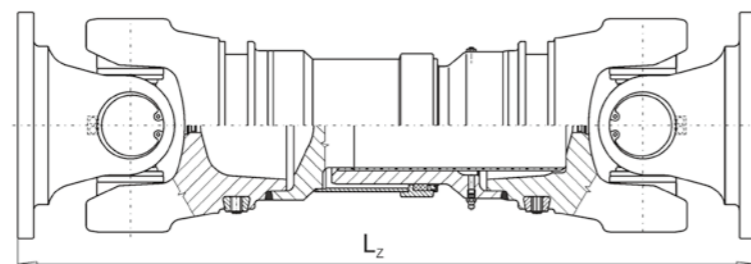
Code No.
代码

47



Code No.
代码

43



Cardan shafts with length displacem.

具有长度补偿功能的万向传动轴

Normal angle design - Code No. 41 and 45

标准摆角设计-代码41和45

Size 型号	KZ	β max	e	LZ min	LA	m min	J min	C min	mR	JR	CR
		[°]	[mm]	[mm]	[mm]	[kg]	[kgm ²]	[kNm/rad]	[kg]	[kgm ²]	[kNm/rad]
77	45	25	110	695	110	68,4	0,218	545	23,7	0,111	1162
79	45	22	113	785	110	82,0	0,319	565	23,7	0,111	1162
80	45	24	108	735	110	84,4	0,348	705	23,7	0,111	1162
83	41	20	125	860	110	121	0,620	945	37,0	0,215	2244
84	41	20	135	900	110	147	0,903	1060	37,0	0,215	2244

Cardan shafts without length displ.

无长度可补偿功能的万向传动轴

Normal angle design - Code No. 47

标准摆角设计-代码47

Size 型号	KZ	β max	e	L min	m min	J min	C min	mR	JR	CR
		[°]	[mm]	[mm]	[kg]	[kgm ²]	[kNm/rad]	[kg]	[kgm ²]	[kNm/rad]
77	47	25	110	495	47,2	0,195	680	23,7	0,111	1162
79	47	22	113	555	62,8	0,287	670	23,7	0,111	1162
80	47	24	108	560	65,1	0,320	965	23,7	0,111	1162
83	47	20	125	610	88,4	0,560	1415	37,0	0,215	2244
84	47	20	135	640	115	0,815	1525	37,0	0,215	2244

Short cardan shafts with length displ.

短型并具有长度补偿功能的万向传动轴

Normal angle design - Code No. 43

标准摆角设计-代码43

Size 型号	KZ	β max	e	LZ min	LA min	m min	J min	C min	LZ max	LA max	m max	J max	C max
		[°]	[mm]	[mm]	[mm]	[kg]	[kgm ²]	[kNm/rad]	[mm]	[mm]	[kg]	[kgm ²]	[kNm/rad]
77	43	25	110	590	60	62,5	0,211	620	690	160	69,8	0,223	570
79	43	22	113	650	95	75,2	0,302	630	810	160	86,6	0,321	560
80	43	24	108	560	30	71,2	0,320	785	730	110	82,5	0,340	720
83	43	20	125	700	60	104	0,570	1010	855	110	119	0,605	940
84	43	20	135	735	60	131	0,825	1130	895	110	146	0,860	1070

Other designs available on request

其他设计形式请咨询



Cardan shafts 55 ... 200 kNm
»Standard cardan shafts«

极限扭矩55 000 Nm至200 000 Nm的万向传动轴
»标准万向传动轴«

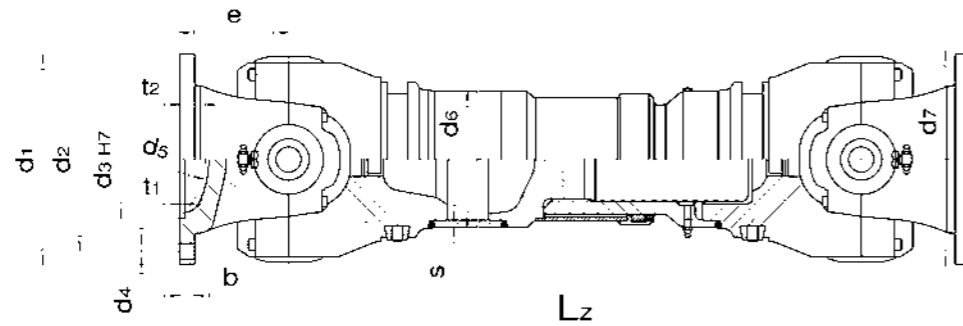
Size 型号	MdG [Nm]	MdW [Nm]	d1 [mm]	d2 [mm]	d3 [mm]	z x d4 [mm]	b [mm]	t1 [mm]	d5 [mm]	t2 [mm]	d7 [mm]	d6 [mm]	s [mm]
85	55000	23000	250	218	140	8 x 18	18	6	170	34	250	162	9,85
86	58000	24000	285	245	175	8 x 20	20	6	170	34	250	165	12,5
90	120000	45000	315	280	175	8 x 22	22	6	180	40	285	218	10,5
95	175000	58000	350	310	220	10 x 22	25	7	210	44	315	219	15,0
97	200000	70000	390	345	250	10 x 24	28	7	280	35	350	273	11,6
98	200000	70000	435	385	280	10 x 27	32	9	280	35	370	273	11,6

Explanations see page 8
Other flange connections see pages 27 and 29

注释见第8页
其它形式的法兰连接见页码27和29

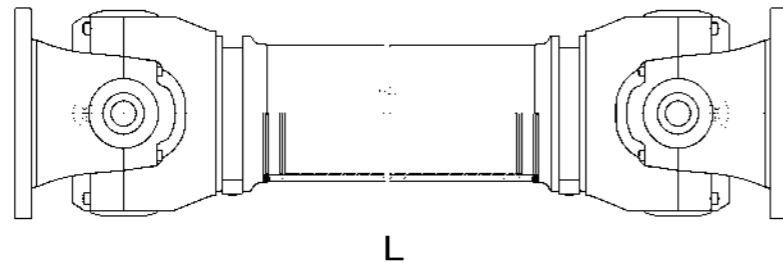
Code No.
代码

41, 45



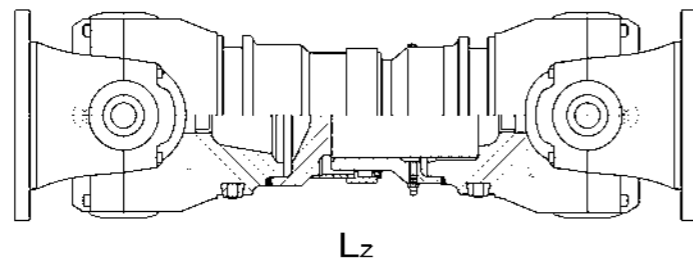
Code No.
代码

47



Code No.
代码

43



Cardan shafts with length displacem.

具有长度补偿功能的万向传动轴

Normal angle design - Code No. 41 and 45

标准摆角设计-代码41和45

Size 型号	KZ	β_{max} [°]	e [mm]	LZ min [mm]	LA [mm]	m min [kg]	J min [kgm ²]	C min [kNm/rad]	mR [kg]	JR [kgm ²]	CR [kNm/rad]
85	41	15	130	905	110	164	0,91	1200	37,0	0,215	2244
86	41	15	130	905	110	168	1,00	1220	47,0	0,275	2874
90	41	15	150	1005	135	265	2,17	2170	53,7	0,580	6057
95	41	15	170	1105	135	340	3,39	3210	75,5	0,789	8246
97	41	15	195	1285	170	518	7,14	5315	74,8	1,28	13370
98	41	15	195	1285	170	542	8,11	5325	74,8	1,28	13370

Cardan shafts without length displ.

无长度补偿功能的万向传动轴

Normal angle design - Code No. 47

标准摆角设计-代码47

Size 型号	KZ	β_{max} [°]	e [mm]	L min [mm]	m min [kg]	J min [kgm ²]	C min [kNm/rad]	mR [kg]	JR [kgm ²]	CR [kNm/rad]
85	47	15	130	650	125	0,840	1755	37,0	0,215	2244
86	47	15	130	650	130	0,935	1770	47,0	0,275	2874
90	47	15	150	720	202	1,87	2605	53,7	0,580	6057
95	47	15	170	800	263	3,03	4215	75,5	0,789	8246
97	47	15	195	925	408	6,19	5945	74,8	1,28	13370
98	47	15	195	925	440	7,16	5955	74,8	1,28	13370

Short cardan shafts with length displ.

短型并具有长度补偿功能的万向传动轴

Normal angle design - Code No. 43

标准摆角设计-代码43

Size 型号	KZ	β_{max} [°]	e [mm]	LZ min [mm]	LA min [mm]	m min [kg]	J min [kgm ²]	C min [kNm/rad]	LZ max [mm]	LA max [mm]	m max [kg]	J max [kgm ²]	C max [kNm/rad]
85	43	15	130	585*	30	123	0,75	1430	900	110	163	0,84	1220
86	43	15	130	585*	30	127	0,84	1430	900	110	167	0,93	1220
90	43	15	150	800	40	238	2,00	2410	1000	135	268	2,15	2280
95	43	15	170	900	40	306	3,18	3470	1100	135	345	3,37	3250
97	43	15	195	1090	100	482	6,97	5505	1280	170	520	7,13	5390
98	43	15	195	1090	100	514	7,95	5515	1280	170	553	8,11	5400

* When Lz less 700 mm $\beta_{max} = 5^\circ$

* 适用于无补偿时的长度Lz<700 mm, 摆角 $\beta_{max} = 5^\circ$

Other designs available on request

其他设计形式请咨询



Cardan shafts 75 ... 370 kNm 极限扭矩75 000 Nm至370 000 Nm的万向传动轴
»Heavy duty cardan shafts« »重载万向传动轴«

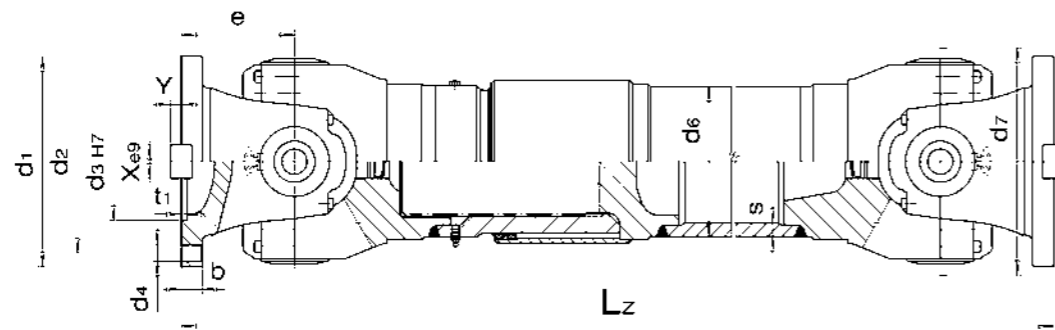
Size 型号	MdG	MdW	d1	d2	d3	z x d4	b	t1	X	Y	d7	d6	s
	[Nm]	[Nm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]
86-H	75000	30000	250	218	105	8 x 19	25	6	40	12,5	250	178	16,0
90-H	150000	53000	285	245	125	8 x 21	27	6	40	15,0	285	219	15,0
95-H	180000	72000	315	280	130	10 x 23	32	6	40	15,0	315	244	16,0
97-H	260000	100000	350	310	155	10 x 23	35	7	50	16,0	350	273	19,0
S1-H	370000	140000	390	345	170	10 x 25	40	8	70	18,0	390	273	36,0

Explanations see page 8
Other flange connections see pages 27 and 29

注释见第8页
其它形式的法兰连接见页码27和29

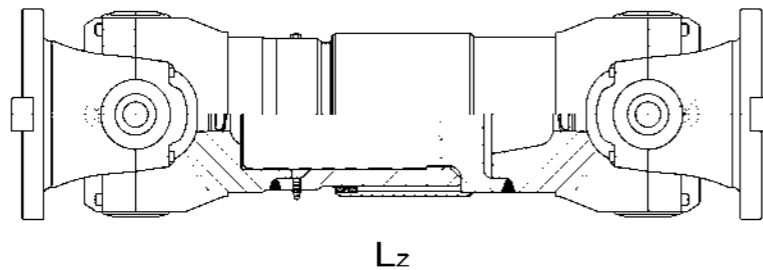
Code No.
代码

51, 55



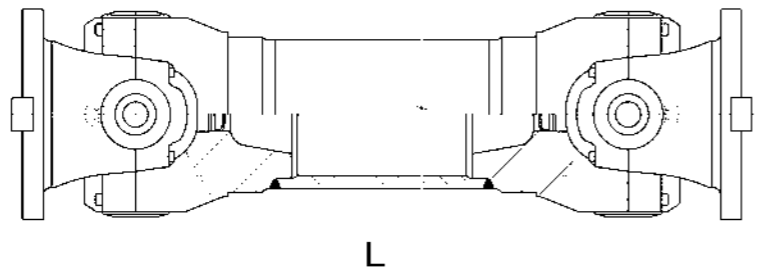
Code No.
代码

53



Code No.
代码

57



Cardan shafts with length displacem. 具有长度补偿功能的万向传动轴

Normal angle design - Code No. 51 and 55

标准摆角设计-代码51和55

Size 型号	KZ	β_{max}	e	LZ min	LA	m min	J min	C min	mR	JR	CR
		[°]	[mm]	[mm]	[mm]	[kg]	[kgm ²]	[kNm/rad]	[kg]	[kgm ²]	[kNm/rad]
86-H	51	15	135	955	135	195	1,17	1425	63,8	0,422	4407
90-H	55	15	165	1090	135	300	2,43	2225	75,5	0,789	8246
95-H	55	15	195	1240	170	395	4,20	3150	90,0	1,175	12273
97-H	51	15	225	1345	170	575	7,22	5350	119,0	1,93	20165
S1-H	55	10	205	1495	170	770	11,8	5855	210,4	3,023	31576

Cardan shafts without length displ. 无长度补偿功能的万向传动轴

Normal angle design - Code No. 57

标准摆角设计-代码57

Size 型号	KZ	β_{max}	e	L min	m min	J min	C min	mR	JR	CR
		[°]	[mm]	[mm]	[kg]	[kgm ²]	[kNm/rad]	[kg]	[kgm ²]	[kNm/rad]
86-H	57	15	135	660	138	0,93	1665	63,8	0,422	4407
90-H	57	15	165	750	213	1,93	2555	75,5	0,789	8246
95-H	57	15	195	890	300	3,35	3600	90,0	1,175	12273
97-H	57	15	225	985	453	6,22	5990	119,0	1,93	20165
S1-H	57	10	205	1050	595	10,4	7325	210,4	3,023	31576

Short cardan shafts with length displ. 短型并具有长度补偿功能的万向传动轴

Normal angle design - Code No. 53

标准摆角设计-代码53

Size 型号	KZ	β_{max}	e	LZ min	LA min	m min	J min	C min	LZ max	LA max	m max	J max	C max
		[°]	[mm]	[mm]	[mm]	[kg]	[kgm ²]	[kNm/rad]	[mm]	[mm]	[kg]	[kgm ²]	[kNm/rad]
86-H	53	15	135	900	135	189	1,14	1450	950	135	195	1,17	1430
90-H	53	15	165	1020	135	290	2,33	2260	1085	135	301	2,38	2230
95-H	53	15	195	1170	170	385	4,05	3250	1235	170	392	4,13	3210
97-H	53	15	225	1150	100	525	6,97	5505	1340	170	563	7,13	5390
S1-H	53	10	205	1420	170	740	11,35	5935	1490	170	755	11,45	5685

Other designs available on request

其他设计形式请咨询



**Super short cardan shafts
up to 160 kNm**

超短型万向传动轴,极限扭矩
可达到160 000 Nm

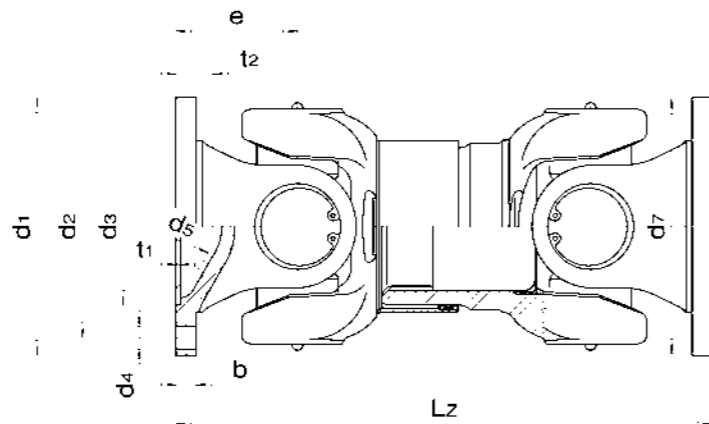
Size 型号	MdG [Nm]	MdW [Nm]	d1 [mm]	d2 [mm]	d3 [mm]	z x d4 [mm]	b [mm]	t1 [mm]	d5 [mm]	t2 [mm]	d7 [mm]
63	6200	1700	150	130	90	8 x 12	10	3	95	24	125
73	25000	6500	180	155,5	110	10 x 16	14	3	95	26	178
73*	25000	6500	180	150	-	4 x 14	18	-	-	-	178
80	33000	13000	225	196	140	8 x 16	15	5	160	30	215
85	55000	23000	348	314	175	10 x 18	18	7	-	-	285
90	80000	40000	360	328	175	10 x 18	18	7	-	-	315
97	200000	75000	390	345	250	10 x 24	28	7	280	35	350
98	200000	75000	435	385	280	10 x 27	32	9	280	35	370

Explanations see page 8

注释见第8页

Code No.
代码

4496



**Super short cardan shafts
with length displacement**

具有长度补偿功能的超短型万向传动轴

Reduced deflection angle design - Code No. 4496

小摆角设计-代码4496

Size 型号	KZ	β max	e	LZ min	LA min	m min	J min	C min	LZ max	LA max	m max	J max	C max
		[°]	[mm]	[mm]	[mm]	[kg]	[kgm ²]	[kNm/rad]	[mm]	[mm]	[kg]	[kgm ²]	[kNm/rad]
63	4496	20	62	340	30	12,8	0,0225	87,5	365	50	13,5	0,0230	86,0
73	4496	10	85	365	15	33,6	0,097	450	475	70	41,9	0,111	420
73*	4496	5	56	290	15	30,8	0,094	590	420	70	40,3	0,110	535
80	4496	5	108	450	15	61,1	0,281	778	585	85	72,2	0,298	710
85	4496	5	110	545	40	124	0,836	1470	595	80	129	0,851	1420
90	4496	5	105	600	40	190	2,150	3240	700	110	210	2,280	3100
97	4496	15	195	1025	50	437	6,42	5320	1085	100	451	6,53	5220
98	4496	15	195	1025	50	469	7,39	5330	1085	100	483	7,51	5230

* Only XS flange connection

* 仅试用于XS法兰连接形式

Explanations see page 8

注释见第8页

Flange joints / Double joints

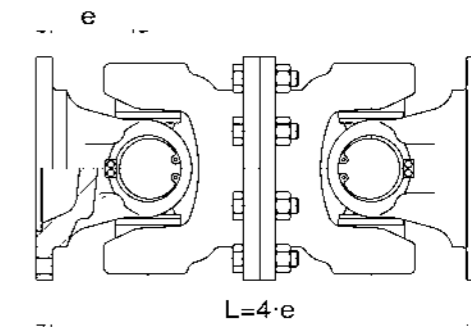
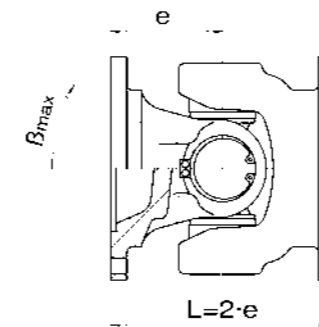
单关节 / 双关节法兰连接节

Size 15 - 84

型号 15 - 84

Code No. 代码 310, 314

Code No. 代码 7670, 7675

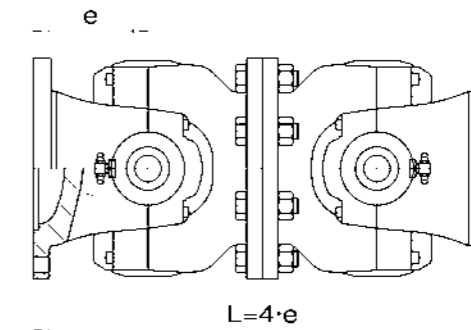
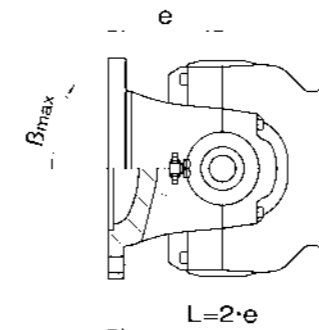


Size 85 - S1

型号 85 - S1

Code No. 代码 310

Code No. 代码 767



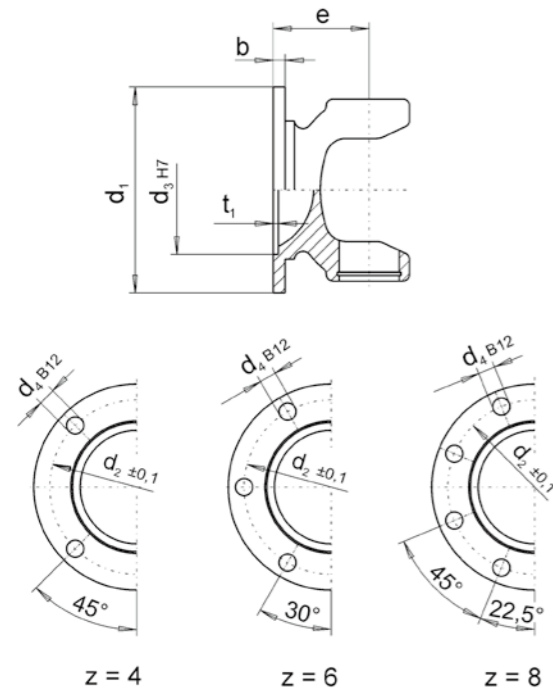
Available flange connections,
deflection angles and "e-dimensions"
see pages 22 to 33.

可采用的法兰连接形式, 摆角和e尺寸规格
见22至23页



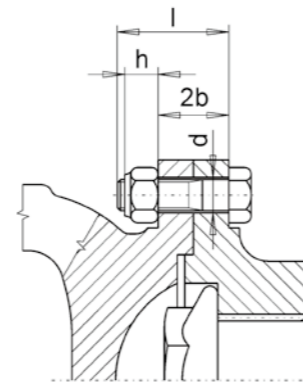
»DIN« - Flanges and boltings

See ISO 7646 resp. DIN 15451



根据DIN标准的法兰及螺栓

参见ISO 7646及DIN 15451



Flange boltings

The following connecting elements are recommended for flange bolted connections:

Hexagon head bolt ISO 4014-10.9
(reduced thread length, if available)

Hexagon nut ISO 7042-V-10
(self-locking)

All bolts must be tightened with the specified torque M_A . Permitted tolerance: $\pm 5\%$.
For reference see DIN 25202

法兰连接螺栓

推荐采用以下的法兰连接螺栓

六角头螺栓ISO 4014-10.9
(如可能,请采用短螺栓)

六角螺母ISO 7042-V-10
(自锁螺母)

所有螺栓必须按照扭矩 M_A 拧紧, 允许公差 $\pm 5\%$.
参见DIN 25202

»DIN« - Flanges and boltings

根据DIN标准的法兰及螺栓

Size 型号	d1	d2	d3	z x d4	b	t1	e	β_{max}	d	l	h	2b	MA	Schr./Bolts
	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[°]	[mm]	[mm]	[mm]	[mm]	[Nm]	1)
15	58	47	30	4 x 5	4,5	2	32	25	M5	16	5	9	9	nein/no
15	65	52	35	4 x 6	4,5	2	32	25	M6	16	6	9	15	ja/yes
30	75	62	42	6 x 6	5	2	47	30	M6	20	6	10	15	nein/no
30	90	74,5	47	4 x 8	6	3	40	20	M8	22	8	12	35	ja/yes
30	90	74,5	47	4 x 8	6	3	47	30	M8	22	8	12	35	ja/yes
30	90	74,5	47	6 x 8	6	3	47	30	M8	22	8	12	35	
30	100	84	57	6 x 8	6,5	3	40	20	M8	22	8	13	35	nein/no
43	90	74,5	47	4 x 8	6,5	3	48	25	M8	22	8	13	35	nein/no
43	100	84	57	6 x 8	6,5	3	48	25	M8	22	8	13	35	nein/no
43	100	84	57	6 x 8	6,5	3	58	35	M8	22	8	13	35	ja/yes
43	100	84	57	8 x 8	6,5	3	58	35	M8	22	8	13	35	nein/no
43	120	101,5	75	8 x 8	7	3	48	25	M8	25	8	14	35	nein/no
43	120	101,5	75	8 x 10	7	3	48	25	M10	25	10	14	70	nein/no
53	100	84	57	6 x 8	8	3	65	25	M8	25	8	16	35	nein/no
53	100	84	57	6 x 10	8	3	65	25	M10	30	10	16	70	nein/no
53	100	84	57	8 x 10	8	3	65	25	M10	30	10	16	70	nein/no
53	120	101,5	75	8 x 8	8	3	56	25	M8	25	8	16	35	nein/no
53	120	101,5	75	8 x 8	8	3	70	35	M8	25	8	16	35	
53	120	101,5	75	8 x 10	8	3	56	25	M10	30	10	16	70	nein/no
53	120	101,5	75	8 x 10	8	3	70	35	M10	30	10	16	70	ja/yes*
53	150	130	90	4 x 10	10	3	56	25	M10	35	10	20	70	nein/no
53	150	130	90	8 x 10	10	3	56	25	M10	35	10	20	70	nein/no
53	150	130	90	8 x 12	10	3	56	25	M12	35	12	20	120	nein/no
63	120	101,5	75	8 x 10	8	3	75	35	M10	30	10	16	70	ja/yes*
63	150	130	90	8 x 10	10	3	62	20	M10	35	10	20	70	nein/no
63	150	130	90	8 x 10	10	3	80	35	M10	35	10	20	70	ja/yes
63	150	130	90	8 x 12	10	3	62	20	M12	35	12	20	120	nein/no
63	150	130	90	8 x 12	10	3	80	35	M12	35	12	20	120	ja/yes
63	165	140	95	8 x 14	12	3	80	30	M14	40	14	24	200	
63	180	155,5	110	8 x 14	12	3	80	30	M14	40	14	24	200	ja/yes

1) Bolts inserted from joint side
* Only spanner size 16

1) 螺栓从法兰连接侧插入
* 仅可采用16号扳手

It is not possible to insert bolts from the yoke side for all designs!

所有的型号, 螺栓都不能从连接侧插入

Explanations see page 8

注释见第8页

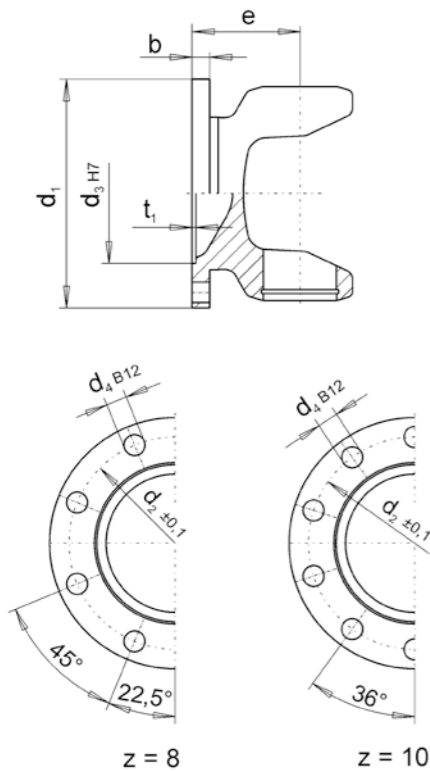
Other flange connections on request

其他法兰连接形式请咨询



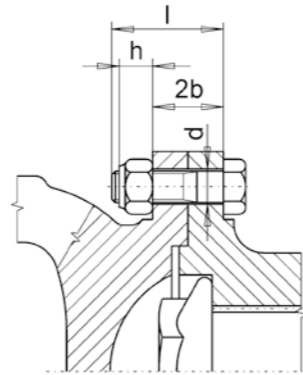
»DIN« - Flanges and boltings

See ISO 7646 resp. DIN 15451



根据DIN标准的法兰及螺栓

参见ISO 7646及DIN 15451



Flange boltings

The following connecting elements are recommended for flange bolted connections:

Hexagon head bolt ISO 4014-10.9
(reduced thread length, if available)

Hexagon nut ISO 7042-V-10
(self-locking)

All bolts must be tightened with the specified torque M_A . Permitted tolerance: $\pm 5\%$.
For reference see DIN 25202

法兰连接螺栓

推荐采用以下的法兰连接螺栓

六角头螺栓ISO 4014-10.9
(如可能,请采用短螺栓)

六角螺母ISO 7042-V-10
(自锁螺母)

所有螺栓必须按照扭矩 M_A 拧紧,允许公差 $\pm 5\%$.
参见DIN 25202

»DIN« - Flanges and boltings

根据DIN标准的法兰及螺栓

Size 型号	d1 [mm]	d2 [mm]	d3 [mm]	z x d4 [mm]	b [mm]	t1 [mm]	e [mm]	β_{max} [°]	d [mm]	l [mm]	h [mm]	2b [mm]	MA [Nm]	Schr./Bolts 1)
58	150	130	90	8 x 10	10	3	90	35	M10	35	10	20	70	ja/yes
58	150	130	90	8 x 12	10	3	90	35	M12	35	12	20	120	ja/yes
58	150	130	90	8 x 14	10	3	90	35	M14	35	14	20	200	
58	165	140	95	8 x 14	12	3	90	35	M14	40	14	24	200	
58	165	140	95	8 x 16	12	3	90	35	M16	42	16	24	300	
58	180	155,5	110	8 x 12	10	3	90	35	M12	35	12	20	120	ja/yes
58	180	155,5	110	8 x 14	10	3	90	35	M14	40	14	20	200	ja/yes
68	150	130	90	8 x 12	12	3	95	35	M12	40	12	24	120	nein/no
68	165	140	95	8 x 14	12	3	95	35	M14	40	14	24	200	
68	165	140	95	8 x 16	12	3	95	35	M16	42	16	24	300	
68	180	155,5	110	8 x 12	12	3	78	24	M12	40	12	24	120	nein/no
68	180	155,5	110	8 x 12	12	3	95	35	M12	40	12	24	120	ja/yes
68	180	155,5	110	8 x 14	12	3	78	24	M14	40	14	24	200	nein/no
68	180	155,5	110	8 x 14	12	3	95	35	M14	40	14	24	200	ja/yes
68	180	155,5	110	8 x 16	12	3	78	24	M16	42	16	24	300	nein/no
68	180	155,5	110	8 x 16	12	3	95	35	M16	42	16	24	300	ja/yes
68	180	155,5	110	10 x 16	12	3	78	24	M16	42	16	24	300	nein/no
68	180	155,5	110	10 x 16	12	3	95	35	M16	42	16	24	300	
70	180	155,5	110	8 x 14	12	3	95	25	M14	40	14	24	200	ja/yes
70	225	196	140	8 x 16	15	5	95	25	M16	50	16	30	300	ja/yes
72	180	155,5	110	8 x 14	12	3	85	20	M14	40	14	24	200	nein/no
72	180	155,5	110	8 x 14	12	3	100	33	M14	40	14	24	200	
72	180	155,5	110	8 x 16	12	3	85	20	M16	42	16	24	300	nein/no
72	180	155,5	110	8 x 16	12	3	100	33	M16	42	16	24	300	
72	180	155,5	110	10 x 16	12	3	85	20	M16	42	16	24	300	nein/no
72	180	155,5	110	10 x 16	12	3	100	33	M16	42	16	24	300	ja/yes
72	225	196	140	8 x 16	15	5	100	33	M16	50	16	30	300	ja/yes
72	225	196	140	10 x 16	15	5	100	33	M16	50	16	30	300	
73	180	155,5	110	8 x 16	14	3	85	20	M16	50	16	28	300	nein/no
73	180	155,5	110	8 x 16	14	3	100	33	M16	50	16	28	300	nein/no
73	180	155,5	110	10 x 16	14	3	85	20	M16	50	16	28	300	nein/no
73	180	155,5	110	10 x 16	14	3	100	33	M16	50	16	28	300	ja/yes
73	220	196	150	8 x 14	15	5	100	33	M14	50	14	30	200	ja/yes
73	225	196	140	8 x 16	15	5	85	20	M16	50	16	30	300	ja/yes
73	225	196	140	8 x 16	15	5	100	33	M16	50	16	30	300	ja/yes
73	225	196	140	10 x 16	15	5	100	33	M16	50	16	30	300	ja/yes
73	225	196	140	10 x 16	15	5	100	33	M16	50	16	30	300	ja/yes
73	250	218	140	8 x 18	15	6	100	33	M18	50	18	30	410	ja/yes

1) Bolts inserted from joint side

1) 螺栓从法兰连接侧插入

It is not possible to insert bolts from the yoke side for all designs!

所有的型号, 螺栓都不能从连接侧插入

Explanations see page 8

注释见第8页

Other flange connections on request

其他法兰连接形式请咨询

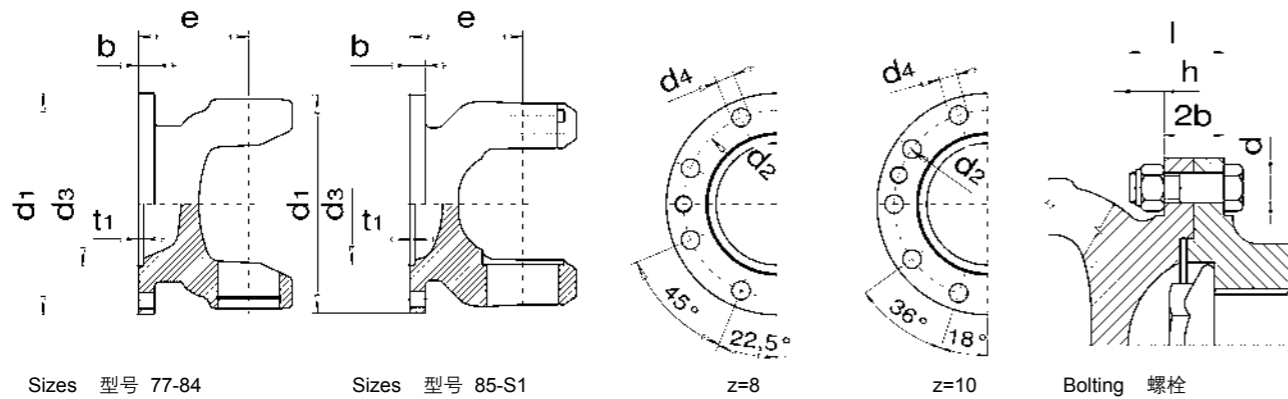


»DIN« - Flanges and boltings

See ISO 7646 resp. DIN 15451

根据DIN标准的法兰及螺栓

参见ISO 7646及DIN 15451



Sizes 型号 77-84

Sizes 型号 85-S1

z=8

z=10

Bolting 螺栓

Flange boltings

The following connecting elements are recommended for flange bolted connections:

Hexagon head bolt ISO 4014-10.9
(reduced thread length, if available)

Hexagon nut ISO 7042-V-10
(self-locking)

All bolts must be tightened with the specified torque M_A . Permitted tolerance: $\pm 5\%$.
For reference see DIN 25202

法兰连接螺栓

推荐采用以下的法兰连接螺栓

六角头螺栓ISO 4014-10.9
(如可能,请采用短螺栓)

六角螺母ISO 7042-V-10
(自锁螺母)

所有螺栓必须按照扭矩 M_A 拧紧, 允许公差 $\pm 5\%$.
参见DIN 25202

»DIN« - Flanges and boltings

根据DIN标准的法兰及螺栓

Size 型号	d1	d2	d3	z x d4	b	t1	e	β_{max}	d	l	h	2b	MA	Schr./Bolts
	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[°]	[mm]	[mm]	[mm]	[mm]	[Nm]	1)
77	180	155,5	110	8 x 16	15	3	110	25	M16	50	16	30	300	ja/yes
77	180	155,5	110	10 x 16	15	3	110	25	M16	50	16	30	300	nein/no
77	225	196	140	8 x 16	15	5	110	25	M16	50	16	30	300	ja/yes
77	250	218	140	8 x 18	18	6	110	25	M18	56	18	36	410	ja/yes
80	225	196	140	8 x 16	15	5	108	24	M16	50	16	30	300	ja/yes
80	250	218	140	8 x 18	18	6	108	24	M18	56	18	36	410	ja/yes
80	285	245	175	8 x 20	18	6	108	24	M20	60	20	38	600	ja/yes
83	250	218	140	8 x 18	18	6	125	20	M18	56	18	36	410	ja/yes
83	285	245	175	8 x 20	20	6	125	20	M20	65	20	40	600	ja/yes
84	285	245	175	8 x 20	20	6	135	20	M20	65	20	40	600	ja/yes
84	315	280	175	8 x 22	22	6	135	20	M22	70	22	44	800	ja/yes

1) Bolts inserted from joint side
It is not possible to insert bolts from the yoke side for all designs!

1) 螺栓从法兰连接侧插入
所有的型号, 螺栓都不能从连接侧插入

Size 型号	d1	d2	d3	z x d4	b	t1	e	β_{max}	d	l	h	2b	MA	Schr./Bolts
	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[°]	[mm]	[mm]	[mm]	[mm]	[Nm]	1)
85	250	218	140	8 x 18	18	6	130	15	M18	56	18	36	410	ja/yes
85	285	245	175	8 x 20	20	6	130	15	M20	65	20	40	600	ja/yes
85	315	280	175	8 x 22	22	6	130	15	M22	70	22	44	800	ja/yes
86	285	245	175	8 x 20	20	6	130	15	M20	65	20	40	600	ja/yes
86	315	280	175	8 x 22	22	6	130	15	M22	70	22	44	800	ja/yes
90	285	245	175	8 x 20	20	6	150	15	M20	65	20	40	600	nein/no
90	315	280	175	8 x 22	22	6	150	15	M22	70	22	44	800	ja/yes
90	350	310	220	10 x 22	25	7	150	15	M22	75	22	50	800	ja/yes
95	315	280	175	8 x 22	22	6	170	15	M22	70	22	44	800	nein/no
95	350	310	220	10 x 22	25	7	170	15	M22	75	22	50	800	ja/yes
95	390	345	250	10 x 24	28	7	170	15	M24	85	24	56	1000	ja/yes
97/98	350	310	220	10 x 22	25	7	225	15	M22	75	22	50	800	nein/no
97/98	390	345	250	10 x 24	28	7	195	15	M24	85	24	56	1000	ja/yes
97/98	435	385	280	10 x 27	32	9	195	15	M27	95	27	64	1500	ja/yes
S1	435	385	280	10 x 27	32	9	195	15	M27	95	27	64	1500	ja/yes

1) Bolts inserted from joint side
It is not possible to insert bolts from the yoke side for all designs!

1) 螺栓从法兰连接侧插入
所有的型号, 螺栓都不能从连接侧插入

Explanations see page 8
Other flange connections on request

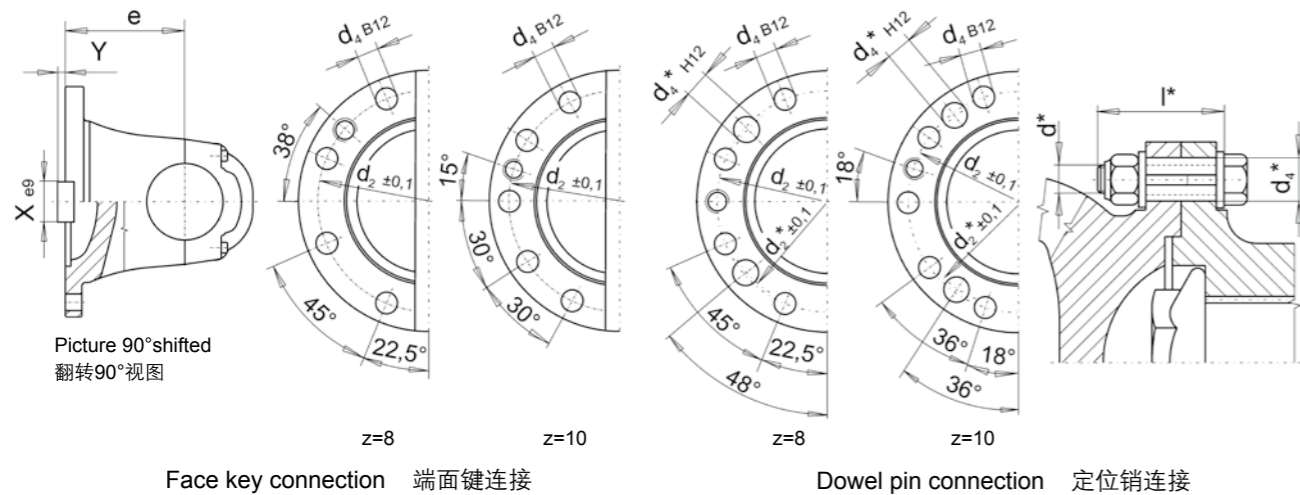
注释见第8页
其他法兰连接形式请咨询

»DIN« - Flanges and boltings

See ISO 7646 resp. DIN 15451

根据DIN标准的法兰及螺栓

参见ISO 7646及DIN 15451



Flange boltings

The following connecting elements are recommended for flange bolted connections:

Hexagon head bolt ISO 4014-10.9
(reduced thread length, if available)

Hexagon nut ISO 7042-V-10
(self-locking)

All bolts must be tightened with the specified torque M_A . Permitted tolerance: $\pm 5\%$.
For reference see DIN 25202

法兰连接螺栓

推荐采用以下的法兰连接螺栓

六角头螺栓ISO 4014-10.9
(如可能,请采用短螺栓)

六角螺母ISO 7042-V-10
(自锁螺母)

所有螺栓必须按照扭矩 M_A 拧紧, 允许公差 $\pm 5\%$.
参见DIN 25202

»DIN« - Flanges and boltings

根据DIN标准的法兰及螺栓

»DIN« - Flanges with »Face Key«

根据DIN标准的端面键法兰连接

Size 型号	d1	d2	d3	z x d4	b	t1	e	d	l	MA	X	Y	Schr./ Bolts 1)
	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[Nm]	[mm]	[mm]	
86	250	218	105	8 x 19	25	6	135	M18	70	410	40	12,5	nein/no
90	285	245	125	8 x 21	27	6	165	M20	80	600	40	15,0	nein/no
95	315	280	130	10 x 23	32	6	195	M22	90	800	40	15,0	nein/no
97/98	350	310	155	10 x 23	35	7	225	M22	95	800	50	16,0	nein/no
S1	390	345	170	10 x 25	40	8	205	M24	110	1000	70	18,0	nein/no

»DIN« - Flanges with »Dowel Pin«

根据DIN标准的定位销法兰连接

Size 型号	d1	d2	d2*	d3	z x d4	b	t1	e	d	l	z x d4*	d*	l*	MA	MA*	Schr./ Bolts 1)
	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[Nm]	[Nm]	
86	285	245	240	175	8 x 20	20	6	130	M20	65	4 x 28	M16	75	600	200	ja/yes
90	315	280	270	175	8 x 22	22	6	150	M22	70	4 x 30	M16	75	800	200	ja/yes
95	350	310	300	220	10 x 22	25	7	170	M22	75	4 x 32	M18	90	800	300	ja/yes
97/98	390	345	340	250	10 x 24	28	7	195	M24	85	4 x 32	M18	95	1000	300	ja/yes
S1	435	385	378	280	10 x 27	32	9	205	M27	95	4 x 35	M20	110	1500	400	ja/yes

1) Bolts inserted from joint side
It is not possible to insert bolts from the yoke side for all designs!

Explanations see page 8
Other flange connections on request

1) 螺栓从法兰连接侧插入
所有的型号, 螺栓都不能从连接侧插入

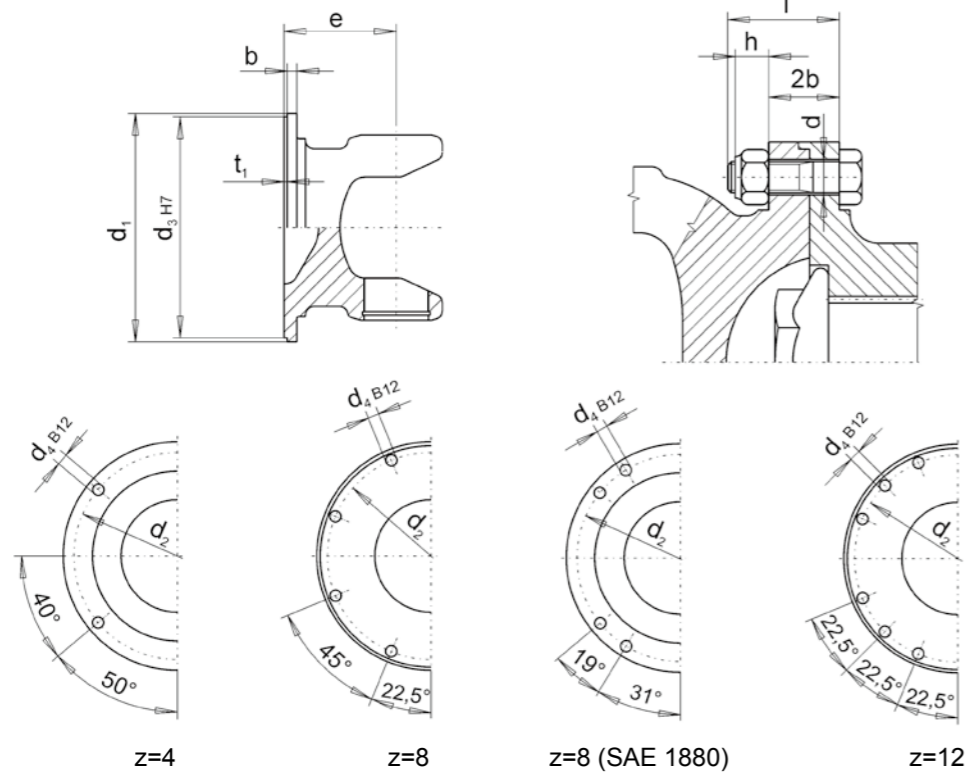
注释见第8页
其他法兰连接形式请咨询

»SAE« - Flanges and boltings

See ISO 7647

根据SAE标准的法兰及螺栓

参见ISO 7647



Flange boltings

The following connecting elements are recommended for flange bolted connections:

Hexagon head bolt ISO 4014-10.9
(reduced thread length, if available)

Hexagon nut ISO 7042-V-10
(self-locking)

All bolts must be tightened with the specified torque M_A . Permitted tolerance: $\pm 5\%$.
For reference see DIN 25202

法兰连接螺栓

推荐采用以下的法兰连接螺栓

六角头螺栓ISO 4014-10.9
(如可能,请采用短螺栓)

六角螺母ISO 7042-V-10
(自锁螺母)

所有螺栓必须按照扭矩 M_A 拧紧, 允许公差 $\pm 5\%$.
参见DIN 25202

»SAE« - Flanges and boltings

根据SAE标准的法兰及螺栓

Size 型号	d1	d2	d3	z x d4	b	t1	e	β_{max}	d	l	h	2b	MA	SAE
	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[°]	[mm]	[mm]	[mm]	[mm]	[Nm]	
30	90	69,9	57,15	4 x 8	6	2	40	20	M8	22	8	12	35	1120
30	90	69,9	57,15	4 x 8	6	2	47	30	M8	22	8	12	35	1120
30	97	79,4	60,32	4 x 10	6	2	40	20	M10	25	10	12	70	1300
30	97	79,4	60,32	4 x 10	6	2	47	30	M10	25	10	12	70	1300
43	90	69,9	57,15	4 x 8	6	2	48	20	M8	22	8	12	35	1120
43	97	79,4	60,32	4 x 10	6,5	2	58	35	M10	25	10	13	70	1300
43	116	95,25	69,85	4 x 11	7	2	48	20	M10	25	10	14	70	1400
53	116	95,25	69,85	4 x 12	8	2	56	20	M12	30	12	16	120	1400
53	116	95,25	69,85	4 x 12	8	2	70	35	M12	30	12	16	120	1400
53	150	120,65	95,25	4 x 14	10	2	56	20	M14	35	14	20	200	1500
58	174,6	155,52	168,23	8 x 10	12	3	90	35	M10	35	10	24	70	1600
58	203,2	184,15	196,82	8 x 10	11	3	95	35	M10	35	10	22	70	1700
58	203,2	184,15	196,82	12 x 10	11	3	95	35	M10	35	10	22	70	1800
63	150	120,65	95,25	4 x 14	10	2	62	20	M14	35	14	20	200	1500
63	150	120,65	95,25	4 x 14	10	2	80	35	M14	35	14	20	200	1500
63	174,6	155,52	168,23	8 x 10	10	3	80	30	M10	35	10	20	70	1600
68	174,6	155,52	168,23	8 x 10	10	3	95	35	M10	35	10	20	70	1600
68	203,2	184,15	196,82	8 x 10	11	3	95	35	M10	35	10	22	70	1700
68	203,2	184,15	196,82	12 x 11	11	3	95	35	M10	35	10	22	70	1800
70	203,2	184,15	196,82	12 x 11	11,5	3	95	25	M10	35	10	23	70	1800
72	203,2	184,15	196,82	12 x 11	11,5	3	100	33	M10	35	10	23	70	1800
73	203,2	184,15	196,82	12 x 10	11,5	3	100	33	M10	35	10	23	70	1800
73	203,2	184,15	196,82	12 x 11	11,5	3	100	33	M10	35	10	23	70	1800
73	244,5	209,55	177,8	8 x 16	15	3,4	100	33	M16	50	16	30	300	1880
77	244,5	209,55	177,8	8 x 16	15	3,4	110	25	M16	50	16	30	300	1880
80	244,5	209,55	177,8	8 x 16	15	3,4	108	24	M16	55	16	36	300	1880
80	250,0	228,57	196,8	12 x 12	18	1,5	108	24	M12	50	12	36	120	1900GS
80	276,0	247,64	222,22	8 x 16	18	2,4	108	24	M16	55	16	36	300	1900
80	276,0	251,70	222,22	8 x 16	18	2,4	108	24	M16	55	16	36	300	1900HS
83	244,5	209,55	177,8	8 x 16	18	3,4	125	20	M16	55	16	36	300	1880

Explanations see page 8

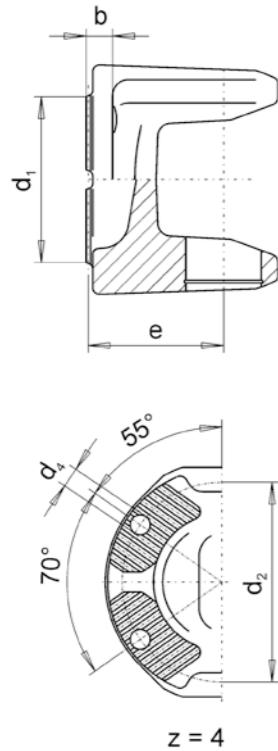
注释见第8页

Other flange connections on request

其他法兰连接形式请咨询

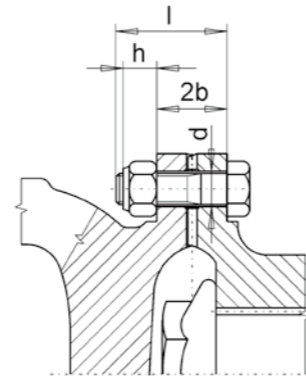
»KV/XS« - Flanges and boltings

70° X-serrated according to ISO 12667 resp. ISO 8667



根据KV/XS标准的法兰及螺栓

70° X型锯齿式 参见ISO 12667及ISO 8667



Flange boltings

The following connecting elements are recommended for flange bolted connections:

Hexagon head bolt ISO 4014-10.9
(reduced thread length, if available)

Hexagon nut ISO 7042-V-10
(self-locking)

All bolts must be tightened with the specified torque M_A . Permitted tolerance: $\pm 5\%$. For reference see DIN 25202

法兰连接螺栓

推荐采用以下的法兰连接螺栓

六角头螺栓ISO 4014-10.9
(如可能,请采用短螺栓)

六角螺母ISO 7042-V-10
(自锁螺母)

所有螺栓必须按照扭矩 M_A 拧紧,允许公差 $\pm 5\%$. 参见DIN 25202

»KV/XS« - Flanges and boltings

根据KV/XS标准的法兰及螺栓

Size 型号	d1 [mm]	d2 [mm]	z x d4 [mm]	b [mm]	e [mm]	β_{max} [°]	d [mm]	l [mm]	h [mm]	2b [mm]	MA [Nm]
43	100	84	4 x 8	10	58	35	M8	30	8	20	35
53	120	100	4 x 11	14	68	35	M10	40	10	28	70
63	120	100	4 x 11	14	75	35	M10	40	10	28	70
58	152	130	4 x 13	16	95	35	M12	45	12	32	120
68	152	130	4 x 13	16	75	20	M12	45	12	32	120
68	152	130	4 x 13	16	95	35	M12	45	12	32	120
68	180	150	4 x 15	18	95	35	M14	55	14	36	200
72	180	150	4 x 15	18	100	35	M14	55	14	36	200
73	180	150	4 x 15	18	95	30	M14	55	14	36	200
77	180	150	4 x 15	18	100	22	M14	55	14	36	200
79	200	165	4 x 15	20	113	22	M14	55	14	40	200

Explanations see page 8

注释见第8页

Other flange connections on request

其他法兰连接形式请咨询

Journal cross assemblies

Code No. 21

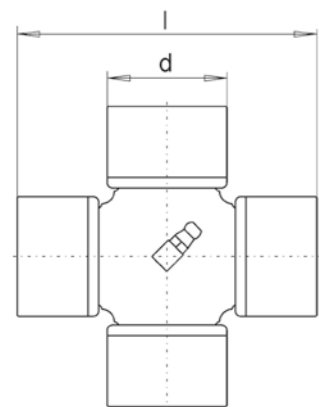
十字万向轴组件

代码 21

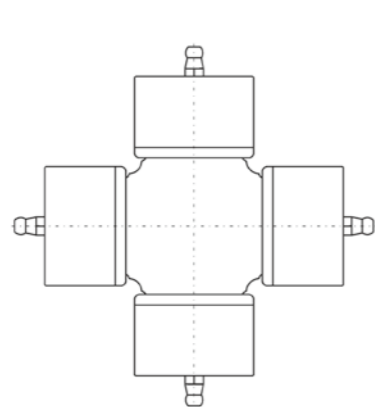
Size 型号	d [mm]	l [mm]	m [kg]
15	20	44,6	0,14
30	26	72,10	0,39
43	30	82,40	0,64
53	35	96,85	0,98
63	42	104,5	1,45
63*	42	106,0	1,48
55*	38	105,8	1,28
57*	47	132,2	2,32
58	48	132,2	2,38
65*	48	116,5	2,16
68	52	133,1	2,93
69*	53	135,05	3,11
70	52	147,2	3,35
72	57	144,0	3,94
73	57	152,0	4,17
77	65	172,0	6,27
79**	68	117,0	7,75
80	72	185,0	8,30
83	74	217,0	10,3
84	83	231,4	15,0

* Spare equipment
** With inside snap ring
Other designs available on request

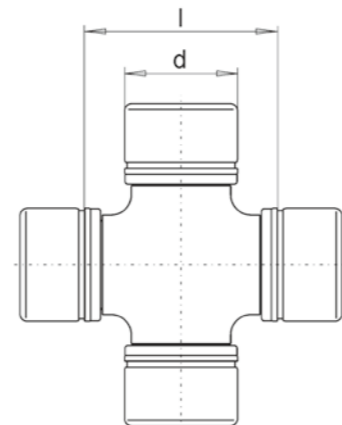
* 备用部件
** 有内卡环
其他设计形式请咨询



Central lubrication
中央润滑
Code No. 代码 2110



Bush lubrication
套筒润滑
Code No. 代码 2111



Size 型号 79
Code No. 代码 2110

Designation sample

Journal cross assembly, size 63
with length 106 mm:
Journal cross assembly 2110-63/106

选型举例

十字万向轴, 型号是63
长度是106mm:
十字万向轴组件 2110-63/106

Journal cross assemblies

Code No. 21

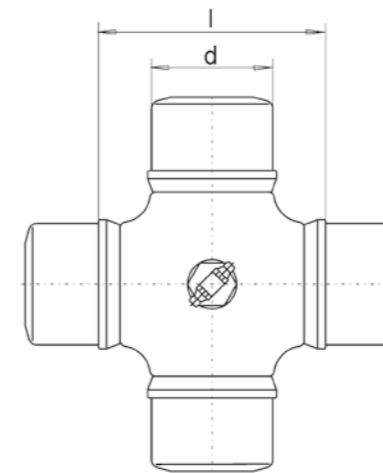
十字万向轴组件

代码 21

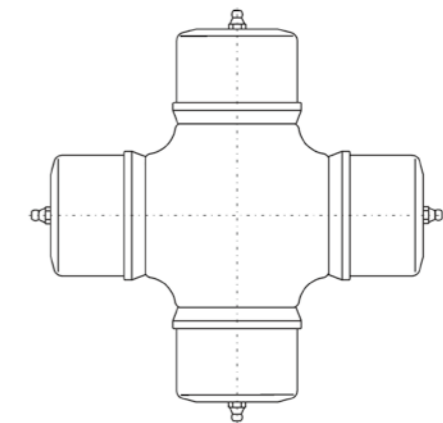
Size 型号	d [mm]	l [mm]	m [kg]
82*	74	154	12,9
85	83	139	15,0
85*	83	129	14,7
85*	83	175	19,4
86	83	139	15,0
90	95	160	23,3
90*	95	139	22,3
90**	95	190	26,8
95	110	176	33,8
95*	110	160	32,8
95*	110	210	39,1
97	120	196	46,6
97*	120	176	43,7
98	130	196	55,3
S1	130	216	58

* Spare equipment
** For cardan shaft Code No. 4496
Other designs available on request

* 备用部件
** 适用于代码4496的万向传动轴
其他设计形式请咨询



Central lubrication 中央润滑
Code No. 代码 2112



Bush lubrication 套筒润滑
Code No. 代码 2111

Designation samples

Journal cross assembly, size 68,
with bush lubrication:
Journal cross assembly 2111-68

Journal cross assembly, size 85
with length 139 mm:
Journal cross assembly 2112-85/139

选型举例

十字万向轴, 型号68
采用套筒润滑:
十字万向轴组件2111-68

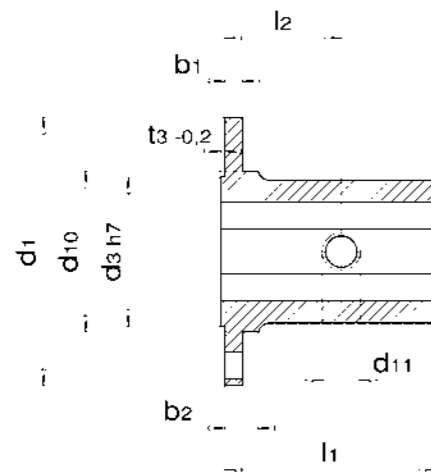
十字万向轴, 型号85
长度为139mm
十字万向轴组件2112-85/139

»DIN« - Companion flanges

Code No. 141

Following table lists different designs of available companion flanges. In your request, please inform us about the required design as shown in the list and the technical data.

See ISO 7646 (DIN), ISO 7647 (SAE) and ISO 12667 resp. ISO 8667 (XS).

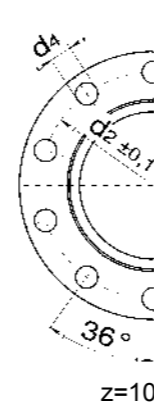
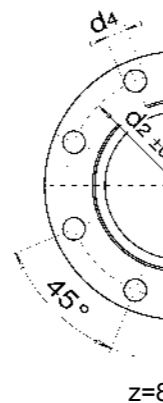
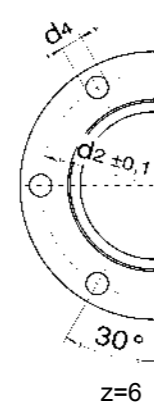
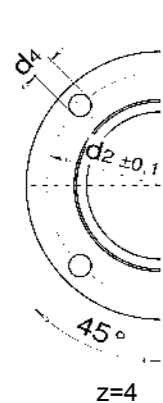
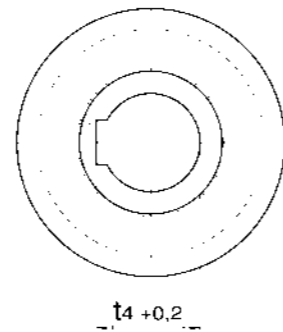


根据DIN标准的成对法兰

代码 141

以下列出我们所能提供的不同设计形式的成对法兰。请根据下表所列技术参数向我们咨询所需要的设计形式。

参见ISO 7646 (DIN) , ISO 7647 (SAE) ISO12667及ISO 8667 (XS)



»DIN« - Companion flanges

Code No. 141

Size 型号	d1	d2	d3	z x d4	d8	d9	d10	d11	b1	b2	b3	t3	t4	l1	l2	m
	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[kg]
15	65	52,0	35	4 x 6	28	41	41	M6	5	-	8	1,6	31,3	40	20	0,3
30	90	74,5	47	4 x 8	35	52	57	M6	8	11	10	2,3	38,3	55	27	0,8
43	100	84,0	57	6 x 8	38	60	70	M6	8	11	10	2,3	41,3	62	31	1,2
53	120	101,5	75	8 x 10	45	80	84	M8	8	11	14	2,3	48,8	70	35	2,3
63	150	130	90	8 x 12	55	95	111	M12	10	14	16	2,3	59,3	85	42	4,1
58	150	130	90	8 x 12	60	100	111	M12	12	15	18	2,3	64,4	100	50	5,0
68	180	155,5	110	8 x 14	75	120	133	M16	12	16	20	2,3	79,9	120	60	7,9
80	225	196	140	8 x 16	90	155	171	M18	15	20	25	4,5	95,4	150	75	18,4
83	250	218	140	8 x 18	100	170	190	M18	18	22	28	5,0	106,4	160	80	25,4
86	285	245	175	8 x 20	110	190	214	M20	20	25	28	6,0	116,4	180	90	32,1
90	315	280	175	8 x 22	120	210	247	M20	22	28	32	6,0	127,4	180	90	40,4
95	350	310	220	10 x 22	130	220	277	M22	25	30	32	7,0	137,4	200	100	52,1
97	390	345	250	10 x 24	150	250	308	M24	28	32	36	7,0	158,4	220	110	71,5
98	435	385	280	10 x 27	180	300	342	M24	32	38	45	9,0	190,4	260	130	114,0
S1	435	385	280	10 x 27	180	300	342	M24	32	38	45	9,0	190,4	260	130	114,0

For feather key according to DIN 6885 and DIN flange connections.

滑键按照DIN6885标准和DIN法兰连接标准

Other designs, matching with

- Face key (see page 29)
- Dowel pin (see page 29)
- SAE (see page 31)
- XS (see page 33)

其他如以下连接方式，可以根据要求提供

- 端面键 (见第29页)
- 定位销 (见第29页)
- SAE (见第31页)
- XS (见第33页)

available on request.

Designation sample

Companion flange, size 63
Companion flange 141-63

命名示例

成对法兰、型号63
成对法兰141-63



**Designation samples
for cardan shafts**

1. Cardan shaft with length displacement,
standard angle, size 68, $L_z = 980$ mm,
 $n = 3500$ rpm, with XS connection $\varnothing 180$ mm:

Cardan shaft 45-68 · 980-3,5 XS180

2. Cardan shaft with length displacement,
wide angle, size 53
 $L_z = 1250$ mm, $n = 2000$ rpm,
DIN flange $\varnothing 120$ mm, 8 holes $\varnothing 10$ mm:

**Cardan shaft 46-53 · 1250-2,0
DIN $\varnothing 120 \cdot 8 \cdot \varnothing 10$**

3. Cardan shaft without length displacement,
wide angle, size 53,
 $L_z = 1250$ mm, $n = 2000$ rpm,
DIN flange $\varnothing 120$ mm, 8 holes $\varnothing 10$ mm:

**Cardan shaft 48-53 · 1250-2,0
DIN $\varnothing 120 \cdot 8 \cdot \varnothing 10$**

4. Short cardan shaft with length displacement,
standard angle, size 43,
 $L_z = 400$ mm, $n = 1500$ rpm,
DIN flange $\varnothing 100$ mm, 6 holes $\varnothing 8$ mm:

**Short cardan shaft 43-43 · 400-1,5
DIN $\varnothing 100 \cdot 6 \cdot \varnothing 8$**

5. Cardan shaft with length displacement, size 85,
 $L_z = 1400$ mm, $n = 2500$ rpm,
DIN flange $\varnothing 285$ mm, 12 holes $\varnothing 20$ mm:

**Cardan shaft 41-85 · 1400-2,5
DIN $\varnothing 285 \cdot 12 \cdot \varnothing 20$**

6. Short cardan shaft with length displacement,
size 85, $L_z = 710$ mm, $n = 3000$ rpm,
DIN flange $\varnothing 250$ mm, 8 holes $\varnothing 18$ mm:

**Short cardan shaft 43-85 · 710-3,0
DIN $\varnothing 250 \cdot 8 \cdot \varnothing 18$**

7. Super short cardan shaft with length displacement,
size 73, $L_z = 365$ mm, $n = 3500$ rpm,
SAE flange $\varnothing 203,2$ mm, 12 holes $\varnothing 11$ mm:

**Super short cardan shaft 4496-73 · 365-3,5
SAE $\varnothing 203,2 \cdot 12 \cdot \varnothing 11$**

万向传动轴的选型举例

1. 具有长度补偿功能的万向传动轴
标准摆角, 型号68, $L_z=980$ mm,
 $n=3500$ rpm, 采用XS连接 $\varnothing 180$ mm:

万向传动轴45-68 · 980-3,5 XS180

2. 具有长度补偿功能的万向传动轴
大摆角, 型号53
 $L_z=1250$ mm, $n=2000$ rpm,
采用DIN法兰连接 $\varnothing 120$ mm, 8孔 $\varnothing 10$ mm:

**万向传动轴46-53 · 1250-2,0
DIN $\varnothing 120 \cdot 8 \cdot \varnothing 10$**

3. 无长度无补偿功能的万向传动轴
大摆角, 型号53
 $L_z=1250$ mm, $n=2000$ rpm,
采用DIN法兰连接 $\varnothing 120$ mm, 8孔 $\varnothing 10$ mm:

**万向传动轴48-53 · 1250-2,0
DIN $\varnothing 120 \cdot 8 \cdot \varnothing 10$**

4. 短型且具有长度补偿功能的万向传动轴
标准摆角, 型号43
 $L_z=400$ mm, $n=1500$ rpm,
采用DIN法兰连接 $\varnothing 100$ mm, 6 孔 $\varnothing 8$ mm:

**短型万向传动轴43-43 · 400-1,5
DIN $\varnothing 100 \cdot 6 \cdot \varnothing 8$**

5. 具有长度补偿功能的万向传动轴, 型号85
 $L_z=1400$ mm, $n=2500$ rpm,
DIN法兰连接 $\varnothing 285$ mm, 12孔 $\varnothing 20$ mm:

**万向传动轴 41-85 · 1400-2,5
DIN $\varnothing 285 \cdot 12 \cdot \varnothing 20$**

6. 短型且具有长度补偿功能的万向传动轴
型号85, $L_z=710$ mm, $n=3000$ rpm,
DIN法兰连接 $\varnothing 250$ mm, 8 孔 $\varnothing 18$ mm:

**短型万向传动轴 43-85 · 710-3,0
DIN $\varnothing 250 \cdot 8 \cdot \varnothing 18$**

7. 超短型且具有长度补偿功能的万向传动轴
型号73 $L_z=365$ mm, $n=3500$ rpm,
SAE法兰连接 $\varnothing 203.2$ mm, 12 孔 $\varnothing 11$ mm:

**超短型万向传动轴 4496-73 · 365-3,5
SAE $\varnothing 203,2 \cdot 12 \cdot \varnothing 11$**

**Application engineering
advice on the use
of cardan shafts**

The following instructions are intended, in particular, to help the design and project engineer develop optimum operating conditions for any intended use of cardan shafts and thereby obtain perfect functional reliability and a prolonged lifetime of the driveline. It is often possible at the design stage to facilitate the incorporation of a universal drive, most desirably for efficiency reasons, as a standard type. We would be very pleased to help you with any drive problems.

Deflection angle and service life

The pertinent feature of a universal joint is its ability to transmit rotary motion at a constant or varying deflection angle of $\pm\beta$. The deflection angles shown on the data sheets can be used where special circumstances necessitate it. Generally reduces an increase of β the lifetime of the joint bearing. The operating deflection angle should be as small as possible, however not below 1° for maintaining a sufficient lubrication film of the bearings.

Where a universal joint has angles in the horizontal and vertical planes at the same time, the resulting angle can be calculated from the components β_H and β_V , or it can be obtained from the diagram, which gives sufficient accuracy in most cases (Fig. 1).

$$\tan\beta = \sqrt{\tan^2\beta_H + \tan^2\beta_V}$$

Example: $\beta_V = 25^\circ; \beta_H = 15^\circ \rightarrow \beta = 28,3^\circ$

**万向传动轴
在工程应用上的建议**

下面的说明有助于设计和项目工程师优化万向传动轴的运行条件, 从而实现其最佳的使用可靠性, 并延长传动系统的使用寿命。通常在设计阶段为了获取最佳的传递效率, 采用万向传动轴被公认为标准设计方案。我们非常高兴与您共同解决任何驱动方面的难题。

摆角和使用寿命

万向传动轴最大特点就是, 能以恒定的或者在摆角 $\pm\beta$ 范围内变化的角度传递旋转运动。数据表中摆角参数是在一定使用条件下所需的。一般情况下, 减小摆角 β 值可以延长万向传动轴轴承的使用寿命。因此使用时应该尽量减小摆角, 但是摆角最好不小于 1° , 以保证轴承有充足的润滑膜。

当万向传动轴在水平和垂直方向同时都有角度偏移时, 实际的摆角可通过 β_H 值和 β_V 值计算得出, 或者直接从摆角图表 (见 Fig. 1) 中查出, 大多数情况下从该图表中得出的数据是比较准确的。

范例: $\beta_V = 25^\circ; \beta_H = 15^\circ \rightarrow \beta = 28,3^\circ$

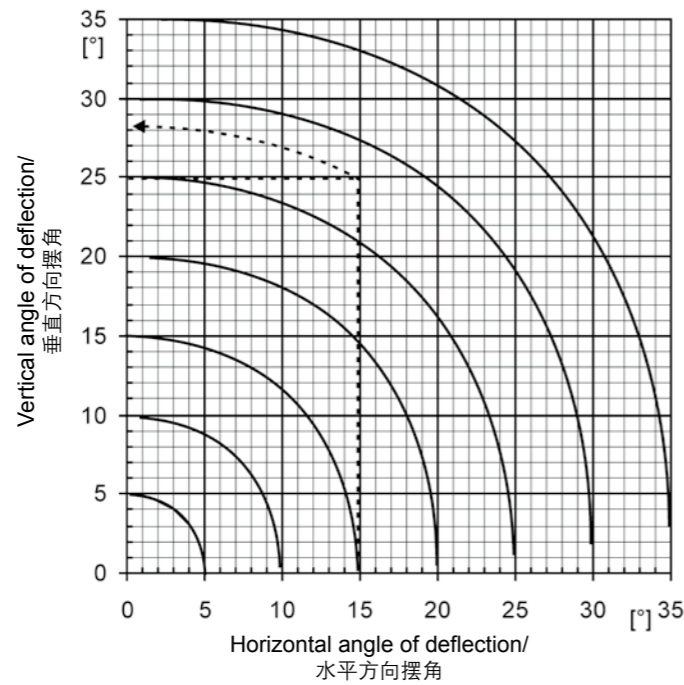


Figure 1 / 图1

Kinematics

The universal joint is working on a specific kinematic law:

A constant angular velocity ω_1 at drive shaft of a cardan joint results periodic variations in angular velocity ω_2 at driven shaft. This angular velocity on the driven side passes through peaks and valleys twice per revolution. Their absolute amounts increase progressively with the deflection angle. With constant power, the torque is inversely proportional to the angular velocities, so that the resulting extremal values for the driven shaft are as follows:

运动学特性

万向传动轴具有以下特定的运动特性:

当万向传动轴的驱动轴以恒定的角速度 ω_1 运动时, 从动轴的角速度 ω_2 会周期性变化。从动轴的角速度在一个周期内会经历2次波峰和波谷。角速度的绝对值随着摆角逐步变大。在恒定功率下, 所传递的扭矩与角速度成反比, 因此从动轴的极限值如下表所列:

Turning angle / 转角 φ	
0° and 和 180°	90° and 和 270°
$\omega_2 = \omega_1 \cdot \cos\beta$	$\omega_2 = \frac{\omega_1}{\cos\beta}$
$M_{t2} = \frac{M_{t1}}{\cos\beta}$	$M_{t2} = M_{t1} \cdot \cos\beta$

This kinematical non-uniformity is critical, if two shafts positioned at an angle of deflection, are linked by a single joint. Cardan shafts can also induce vibration in the power train. This is caused by acceleration and deceleration of the mid-section of a cardan shaft (located between two joints).

To minimize this effect small angles of deflection should be realised. In addition to this the shaft configuration, especially in the high-speed range, is important.

To ensure that cardan shafts run smoothly and with little vibration, the product of $n \cdot \beta$ (speed · angle of deflection) should remain within empirical limits.

如果两轴之间存在一定偏移角, 但却通过一个万向传动轴连接, 那么其运动特性的非均一性是很明显的。万向传动轴会对传动链产生振动。这是由于万向传动轴中间段的加速和减速造成的。为了降低这种振动影响, 应该尽量采用小摆角。特别是在传递高速旋转时, 小摆角是很重要的。为了保证万向传动轴运行平稳、振动小, 参数 $n \cdot \beta$ (速度x摆角) 的值应该限定在经验值内。

For orientation:

取值范围:

$$n \cdot \beta \leq \frac{36000}{\sqrt[6]{m}} \quad \text{or / 或:} \quad n \cdot \beta \cdot \sqrt[6]{m} \leq 36000$$

n = Speed [rpm]
 β = Deflection angle [°]
 m = Mass of cardan shaft [kg]

n = 速度 [rpm]
 β = 摆角 [°]
 m = 万向传动轴质量 [kg]

Where a single joint is used, it is necessary to check that the differential angle of the non-uniform rotation and the resulting mass forces are within permissible limits for the given application.

当单独使用一个万向传动轴时, 需要校核非匀速运动的角度差和由此产生的惯量在允许的应用范围内。

The maximum differential angle of a single joint can be calculated by the following formula:

使用单一万向传动轴所产生的最大角度差可以由以下公式得出:

$$\Delta\varphi_{\max} = \pm \arctan \frac{1 - \cos\beta}{2 \cdot \sqrt{\cos\beta}}$$

Another term to express non-uniform rotation is the degree of non-uniformity U. It is defined by:

另外一个用来描述非匀速状态运动的量是非匀速度 U, 它被定义为:

$$U = \frac{\omega_{2\max} - \omega_{2\min}}{\omega_1} \quad \text{or / 或:} \quad U = \sin\beta \cdot \tan\beta$$

Arrangement of cardan shafts

Two joints allow compensating the periodic fluctuations of the angular velocity of a single joint. With reference to the following figure, this is achieved by locating the inner pin axes and the shafts 1, 2 and 3 in the same plane which makes identical deflection angles of both joints. There is no kinematical difference between M- and Z-Form. (Fig. 2)

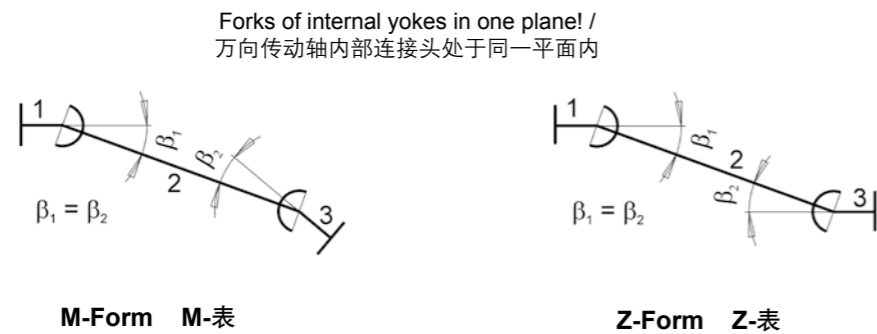


Figure 2 图2

Homokinetic transmission of the rotary motion is also possible when shafts 1, 2 or 3 are not in one plane. However, identical spatial deflection angles necessary in this situation.

This is the case, if one view shows the M-Form whereas the other is of Z-Form. In this situation, the joints must be rotated relative to each other until the inner joint axes are located in their respective deflection planes.

Cardan shafts for this application have to be designed specially.

Basically, all deflection angles in a cardan shaft should be the same. This may not be possible in some cases. Then it should be decided if the remaining degree of non-uniformity can be tolerated.

Exact figures for the permitted difference between the deflection angles on the input (driving) side and the output (driven) side cannot be specified because the degree of non-uniformity U depends on the absolute magnitude of the angle.

Other factors that need to be considered are speed and stiffness, i. e., the drive system's torsional spring coefficient.

万向传动轴的布置

使用两个万向传动轴可补偿使用一个万向传动轴所造成的周期性的角速度波动。

参照下表, 通过调整内部的定位销, 可以实现轴1、轴2、轴3在同一个平面内, 使得两个万向传动轴的摆角相同。表M和表Z的运动特性是相同的(图2)。

当轴1、轴2、轴3不在同一个平面内时, 也可实现动力传动, 但是在这种情况下, 万向传动轴的空间摆角仍需相同。

两个万向传动轴连接时, 如果一个视图位置显示为图M的形式, 而另一个视图位置显示的是图Z的形式, 在这种情况下, 两个万向传动轴必须彼此相对旋转, 直到它们内部的连接件处于相应的偏转平面上。

此种情况下使用的万向传动轴需要专门设计。

原则上同一个万向传动轴上的所有摆角都应是相同的。但在有些情况下, 不可能完全实现。这时需要确定此偏差角度是否在允许的范围内。

驱动轴摆角和从动轴摆角之间允许的具体角度差值无法确定, 这是因为体现偏差程度的U值取决于角度的绝对值。

其它需要被考虑的因素是速度和刚度, 即驱动系统的抗扭弹性系数。

Where the cardan shafts are arranged one after the other in a power train, the following combinations are recommended:

当在传动系统中采用串联形式布置万向传动轴时, 建议采用以下方式:

Cardan shaft and intermediate shaft with elastic bearing



万向传动轴和中间轴之间采用弹性支撑座

Cardan shaft with double support bearing



万向传动轴采用双支撑座

Figure 3 图3

To minimize non-uniformities and driveline vibrations, it is recommended that the Cardan shafts are installed with yokes ears phased 90° to one another.

为了尽量减少非均匀性和传动系统的振动, 建议两个万向传动轴之间, 在连接轭耳部处采用90°布置安装。

Transverse critical speed

Each cardan shaft has a transverse critical speed which must not be reached during operation. This depends basically on the distance between the two joints and the flexural rigidity of the used tube. Also, it is influenced by the wear and tear of the shaft, especially of the splined parts of the slip assembly.

横向临界速度

每个万向传动轴都有一个横向临界速度, 在运行时应该保证不超过该值。

该速度值主要由两个十字轴之间的长度以及所采用的套筒抗挠刚度决定的。

此外, 它也受万向传动轴的磨损程度, 特别是滑动部的花键连接处磨损情况的影响。

Excessive speed causes vibration and premature failure of the cardan shaft and the connected parts of equipment.

超速会造成传动系统的振动, 并导致万向传动轴及设备连接处的过早损坏。

The transverse critical speed for cardan shafts can be calculated by:

万向传动轴的横向临界速度可由以下公式得出:

$$n_k = 0,9 \cdot 10^7 \cdot \frac{\sqrt{D^2 + d^2}}{l^2}$$

D = Tube outer diameter [cm]

D = 套筒外径 [cm]

d = Tube inner diameter [cm]

d = 套筒内径 [cm]

l = Distance between joints or distance between joint and intermediate bearing [cm]

l = 两个十字轴之间的距离或者是十字轴与中间支撑座之间的距离 [cm]

$$n_{max} = 0,8 \cdot n_k$$



The operating speed should not exceed 80 % of the critical speed calculated. Critical speed can be increased by using tubes with bigger outside diameters. Otherwise the application would require using an arrangement of two cardan shafts with an intermediate bearing instead of one cardan shaft. This involves certain requirements with respect to the deflection angle. For advice contact our design engineers.

正常工作速度不能超过计算得出的临界速度的80%。可以通过增加套筒外径的方式来提高临界速度。否则就需要采用两个万向传动轴，并且在中间采用支撑座的传动方案。这种情况对摆角有一些特殊的要求。可以咨询我们的设计工程师。

Limitations of length and speed

The length of tubular cardan shafts is limited by the critical speed of the shaft and by the limits of production facilities. The largest length, which can be balanced is L = 6000 mm. Larger length options on request.

长度和速度的限制

万向传动轴套筒的长度取决于临界转速和生产设备的能力。可以实现动平衡的万向传动轴的最大长度 L=6000 mm 如需更长的万向传动轴，请咨询。

Balancing of cardan shafts

Unless some low speed applications cardan shafts are balanced dynamically. Dynamic balancing guarantees smooth running of the cardan shaft and minimizes loads on the bearings caused by centrifugal forces. Depending on the specific requirements, balancing is done in various quality categories according to DIN ISO 1940. (Fig. 4)

万向传动轴的动平衡

除了低速条件下的应用外，万向传动轴都需要进行动平衡测试。动平衡能保证万向传动轴的平稳运行，并降低由于离心力而对轴承的损坏。根据实际需求，可以按照DIN ISO 1940标准（图4）采用不同的动平衡等级。

Balancing quality 动平衡等级	Service conditions	应用条件
G 16	Cardan shafts with special requirements	特殊条件下使用
G 40	Cardan shafts for general use	通常条件下使用

Unbalance at gmm per kg mass of cardan shaft: 每千克的不平衡量（重径积），单位gmm

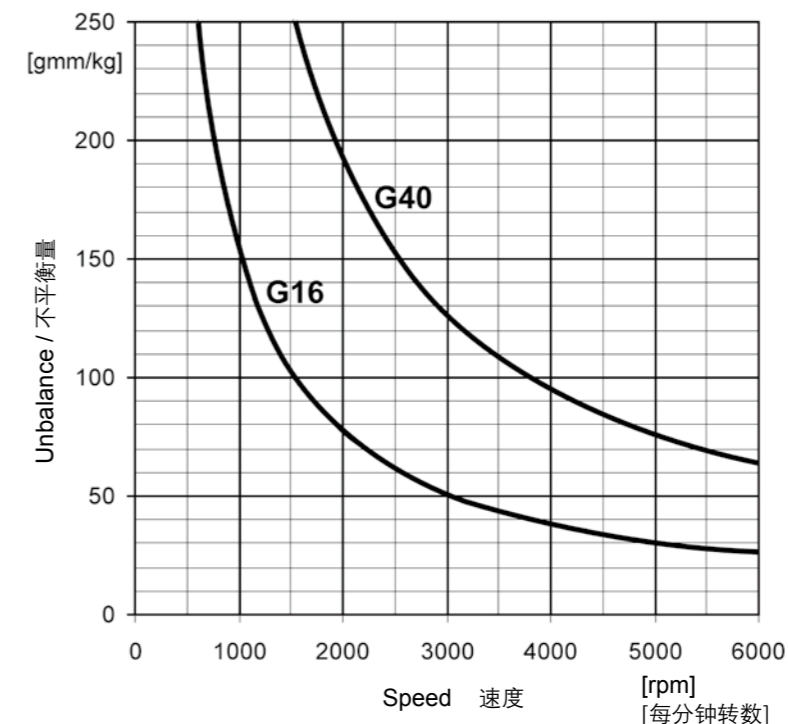


Figure 4 图4

Or calculate by the following formula:

或者通过以下公式计算：

$$U_{R\ zul} = \frac{G \cdot 30000}{\pi \cdot n}$$

U_{R zul} = Permitted unbalance [gmm/kg]
G = Balancing quality (16 or 40)
n = Speed [rpm]

U_{R zul} = 允许的不平衡量 [gmm/kg]
G = 动平衡等级 (16 or 40)
n = 速度 [rpm]



Non-operating bending moment

The deflection of the power flow through deflection angle of the joint causes transverse forces and bending moments on the shaft ends which support the joint or cardan shaft.

This phenomenon becomes particularly clear if one imagines the practically useless deflection angle of 90°, in which the entire torque of one drive fork acts as bending moment in the other. For the shaft ends connected to the cardan shaft this creates a superposition of lateral thrust and bending which is free of transverse forces. So this means additional load on the bearings of these connected shafts, especially at high angles and torques, a consideration which must be taken into account in the design of the drive.

Selection and use of cardan shafts

Cardan shafts being used for various applications. So it is impossible to select their size and predict their lifetime with reliable accuracy with just one general rule.

The familiar failure probabilities for roller bearings apply to cardan shafts as well.

The size of the cardan shaft should be chosen so that its maximum momentary torque rating, is not smaller than the maximum torque to be transmitted in your application. Additionally parameters like deflection angle, speed, length, operating conditions (kind of drive, temperature, dust etc.) should be considered. Therefore please refer to our technical questionnaire. This is available for download on www.gewes.de. Our experts will evaluate your information given in this questionnaire, to find the best choice for your application. If you need more detailed calculations like determining lifetime, stability etc. please contact us.

非工作状态下的弯矩

由于万向传动轴摆角的存在而产生的偏移动能，会在万向传动轴的连接末端产生剪切力和弯矩。

如果假设摆角为90°时，就可以很清楚地了解到这样的现象对于实际的扭矩传递是毫无用处的，因为此时驱动轴所有的扭矩全部转化为从动轴的弯矩。对于连接着万向传动轴的轴末端，这产生了侧推力和弯矩的重合，而不会产生横向力。这意味着对连接轴的轴承产生了额外力。特别是在大摆角和大扭矩的情况下，此情况必须在轴的设计时予以考虑。

万向传动轴的选型和使用

万向传动轴应用广泛。所以无法根据单一的规则，对万向传动轴进行精确的选型，并预测其使用寿命。

我们所熟悉的滚子轴承的失效概论同样适用于万向传动轴。

万向传动轴的选型原则是，它的最大瞬时扭矩值，不小于该工况下需要传递的最大扭矩。其他参数如摆角、速度、长度、工况（驱动类型、环境温度、灰尘等）也应予以考虑。

因此，请参考我们的技术参数调查问卷，可以到网址www.gewes.de上下载。我们的技术人员会根据调查问卷中的信息进行评估，为您的应用选择最适合的产品。如果您需要使用寿命的决定因素、稳定性等具体计算，请联系我们。

Installation instructions

To make sure the running quality and precise balancing of the cardan shaft are warranted, for connecting flanges running free from play we recommend the centring tolerances and maximum values for radial and axial deviation listed in the table below. (see Fig. 5 too)

安装说明

为了确保万向传动轴平稳运行和应达到的精确动平衡状态，并且保证连接法兰运行良好，我们建议采用下表所列出的对中公差，以及径向和轴向的最大偏差值。（见图5）

Cardan shaft speed [rpm]	Fit for d ₃	Radial runout	Axial runout
		径向偏移量	轴向偏移量
万向传动轴的速度 (转/分钟)	d ₃ 公差等级	K _R [mm]	K _S [mm]
up to 500 ≤500	h8	0,15	0,18
500 up to 3000 500~3000	h7	0,08	0,10
over 3000 ≥3000	h6	0,05	0,07

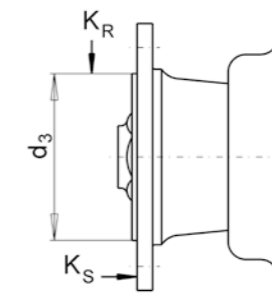


Figure 5 / 图5

All anti-corrosion paint should be removed carefully from the cardan shaft flanges before the shaft is installed. Anti-corrosion agent on the cardan mounting flanges reduces frictional adhesion (not with flange yokes with staggered tooth arrangement).

Caused by kinematical requirements, make sure that the markings on the length displacement are matching exactly. Otherwise the inner yokes will not be located in one plane and rotation causes vibration and early failure of the drive system components.

All cardan shafts have an alkyd-base priming coat; the finish coat or paint can be customized.

在安装前，万向传动轴法兰上的防腐漆应仔细清理干净。残留的防腐漆会减小摩擦附着力（安装交错齿的法兰连接轭除外）。

考虑到运动性能因素，请确保长度补偿处的标记要对齐。否则内部的连接轭就不在同一个平面上并产生转动，这会引起传动系统组件的振动并导致过早损坏。

所有的万向传动轴都会喷上一层醇酸树脂的底漆，最终的外漆和表面喷涂可根据客户需要定制。



Cardan shaft maintenance

It is necessary to grease the moving parts of a cardan shaft at certain intervals to remove used lubricant and foreign matter, if any, and replenishing the lubricant. Lubrication is required after cleaning with high pressure or a steam jet.

Maintenance procedure

Lubricant is supplied to the joints and the slip assembly by taper lubricator nipples acc. to DIN 71412 or flat lubricator nipples acc. to DIN 3404. Where two lubricating points placed on one joint opposite to each other, lubricant need only be supplied at one nipple. Make absolutely sure to clean the lubricator nipples before lubrication. The grease reaches four joint bearings through the ducts in the spider. Supply lubricant until lubricant emerges from the seals. When supplying lubricant avoid harsh strokes or forceful impact that can damage the seals. The splined shaft connection of the length displacement of cardan shaft requires a controlled supply of lubricant in order to avoid high hydraulic forces that impair the axial movement. Rilsan-coated spline shaft connections are lifetime lubricated.

Lubricant

We recommend the use of lithium complex greases of specification KP 1-2 N-30 or KP 2 N-20 DIN 51502 with EP additives for European climates or of non-freezing grease of the same base of specification KP 2 N-40 or KP 3 N-40 for use in temperatures of down to -40 °C. Lubricant should never be replenished with a grease of a different soap base. Do not grease cardan shaft bearings with MoS₂ or other solid lubricant additives.

万向传动轴的维护

需要定期对万向传动轴的运动部件加润滑脂，以去除失效的润滑脂和异物，并补充所需润滑脂。在对万向传动轴进行高压或蒸汽喷射清洗后，必须重新加润滑脂。

保养程序

对十字轴和滑动组件加润滑脂时，采用符合DIN71412标准的锥形油嘴，或符合DIN3404标准的平头油嘴。如果一个十字轴上有两个相对的润滑点，仅需对一个润滑点加润滑脂。在加润滑脂前必须要确保油嘴已经清理干净。润滑脂通过管路润滑到十字轴的四个轴承。当油脂从密封处渗漏出来时，停止加注。在加润滑脂时应避免用力拍打或者撞击，这样会损坏油封。在对采用花键连接的长度补偿型万向传动轴加润滑脂时，要控制润滑脂的加注量，以避免过大液压力损害轴向上的运动。表面覆有丽绚涂层的花键连接是终身免润滑的。

润滑剂

我们建议使用符合DIN 51502标准，含EP添加剂的锂基润滑脂，牌号为KP 1-2 N-30或KP 2 N-20。该润滑脂适用于欧洲气候条件。也可以使用牌号为KP 2 N-40或KP 3 N-40的同类润滑脂，在温度低于-40°C时仍可以正常使用。不同基质的润滑脂不可混用。万向传动轴的轴承不可采用含二硫化钼或固态添加剂的润滑脂。

Maintenance cycle

Maintenance intervals for cardan shafts depend mainly on the conditions of the given application; heavy duty or superior ambient temperatures, for instance, lead to faster lubricant consumption. Hostile environments, heavy soiling or exposure to water, necessitate shorter maintenance intervals. The following are recommended lubrication intervals in the interest of a prolonged service life (The values below are valid only for use at normal conditions):

Cardan shafts	Maintenance cycle
In motor vehicles: - Road application - Road and off-road applications - Construction site and off-road applications	50,000 km or 1 year 30,000 km or 1 year 10,000 km or 250 hours of operation
In rail vehicles:	3,000 hours of operat. or 6 months
In stationary installations and travelling cranes:	500 hours of operation
In marine drive lines:	1500 hours of operat. or 6 months

see DIN 15453 too

Storage

Store cardan shafts on suitable shelves in dry, closed rooms. Do not stack cardan shafts, place one beside the other, lying or standing upright. Cardan shafts standing upright must be backed to prevent them from falling, lying shaft must be secured against rolling way.

保养周期

万向传动轴的保养周期主要取决于其应用工况，例如重载或者极端环境温度，会导致更快的润滑脂损耗。恶劣环境、重污染或暴露于水，都需要更短的保养周期。建议采用以下保养周期，以延长产品使用寿命（以下值仅适用于一般工况）

万向传动轴	维护周期
机车领域 - 道路车辆 - 道路车辆和越野车 - 现场施工车辆和越野车	50,000公里或1年 30,000公里或1年 10,000公里或每累计行驶250小时
轨道交通:	每累计行驶3000小时或6个月
固定的设备和移动式起重机:	每累计运行500小时
船舶驱动:	每累计运行1500小时或6个月

参照DIN5453

存储

万向传动轴必须存储在合适的货架上，并保证室内干燥，密闭。不要堆叠万向轴，请并排平放或直立摆放。直立摆放的万向传动轴必须保证后有支撑，以防止落倒。平放的万向传动轴应确保安全，防止滚动。



Safety considerations

Rotating shafts create a hazard!
The user must therefore strictly adhere to the safety-standards and take suitable precautions, providing e. g. safeguards or covers.
Observe the EC-Regulations for machinery!
When working at the cardan shaft the drive motor must be shut off. Disassembling, assembling, repair and maintenance should only be performed by qualified staff. At such work and at the transportation the cardan shafts have to be secured in such a way, that they cannot slip apart and the flanges are fixed preventing damages to the cardan shaft and avoiding the risk of getting hurt.

Please attention to our relevant instructions for selection, installation and safety.

Because the customer has the knowledge of the various demands on our product for your application, it is his responsibility to verify the drawings and documents that we prepared on the basis of the data made available by the customer and to examine the suitability of the product for the proposed use.
Our offer shall in this case be considered as a recommendation only.

General notes

- » The installation of cardan shafts requires expertise and careful workmanship!
- » Be sure to follow manufacturer's instructions for installation and repair.
- » Parts to be installed in universal drives must be in perfect working order and approved for the specific application in hand.
- » Make sure that cardan shaft locating centres are properly seated and that the flange surfaces are in perfect contact!
- » The operation ratings must never be exceeded (M_d , β , n).
- » Do not use high pressure (water, steam, air) for cleaning to prevent damage of the bearings and sealings!

安全注意事项

旋转的万向传动轴具有危险性!
用户必须严格遵守安全标准, 并采取适当的防护措施, 如安装防护隔断或防护盖。
请遵守有关机械产品的EC规则
当调试万向传动轴时必须先关闭驱动电机。只有具备专业技能的人员才可进行拆卸、安装、维修和保养工作。在从事上述作业以及搬运万向传动轴时, 应保证其不会滑动, 法兰需要加以固定, 以确保设备和人身安全。

请关注有关选型、安装和安全的有关指导。

由于客户更了解万向传动轴的使用工况以及对我们产品的要求, 因此客户有责任审核相关图纸和文件, 审核产品是否能够达到使用要求。以上产品资料是根据客户所提供的信息而做出的。
在这种情况下, 我们的建议仅供参考。

一般注意事项

- » 万向传动轴的安装需要专业和细心的技术人员来完成!
- » 一定要按照制造商的说明来安装和维修。
- » 需要安装的万向传动轴配件应处于最佳状态, 并事先确认符合该工况。
- » 确保万向传动轴定位中心在正确的位置, 法兰面连接充分!
- » 使用万向传动轴时切勿超过额定值(M_d , β , n)。
- » 切勿使用高压(水, 蒸汽, 空气)清洗万向传动轴, 以免损坏轴承和密封件!

Certifications

GEWES holds the certificate of "DQS Deutsche Gesellschaft zur Zertifizierung von Qualitäts-managementsystemen mbH" according to:

- ISO/TS 16949:2002
- DIN EN ISO 9001:2008
- DIN EN ISO 14001:2005

认证

盖威狮 (GEWES) 拥有 "DQS Deutsche Gesellschaft zur Zertifizierung von Qualitäts-managementsystemen mbH" 授予的以下认证证书



Declaration of Conformity

Our products correspond to following guidelines:

- CE Conformity according to machine directive 98/37/EG II
- EU Conformity according to directive 94/9 EG II 2G/2D (ATEX)

符合标准声明

盖威狮产品符合以下规范:

- CE认证: 符合机械产品98/37/EG II 的要求
- 欧盟认证: 符合规章94/9 EG II 2G/2D (防爆)



Special acceptance tests

On customer request, we will arrange acceptance of project-related cardan shaft products by a classification society.

特殊的验收测试

根据客户的要求, 我们可以向有关船级社申请对相关项目的万向传动轴产品进行认证。

