chiavette unificate S.p.A.

Catalogue

CHIAVETTE UNIFICA

chiavette unificate S.p.A.

Ed. 2004

CERTIFICATE

TÜV MANAGEMENT SERVICE

Certificato Nr 50 100 3886

Si attesta che / *This is to certify that*

IL SISTEMA QUALITÀ DI
THE QUALITY SYSTEM OF

CHIAVETTE UNIFICATE SPA

SEDE LEGALE E OPERATIVA:
VIA G BRODOLINI 6/8/10
I-40069 ZOLA PREDOSA (BO)

SEDE OPERATIVA:
VIA VIALBA 52/B
I-20026 NOVATE MILANESE (MI)

chiavette unificate S.p.A.

È CONFORME AI REQUISITI DELLA NORMA
HAS BEEN FOUND TO CONFORM TO THE REQUIREMENTS OF

UNI EN ISO 9001:2000

Questo certificato è valido per il seguente campo di applicazione
This certificate is valid for the following product or service range

Progettazione e fabbricazione di terminali a snodo a marchio Tescubal componenti meccanici per la trasmissione di potenza (EA 17)

Design and manufacture trade mark Tescubal of rod ends and power transmission components (EA 17)

Data di scadenza/*Expiry date*
2006-11-28

Data/date
2004-01-27

Lead Auditor: Maurizio Turtura

Per l'Organismo di Certificazione
For the Certification Body
TÜV Italia S.r.l.
Cinisello Balsamo (MI)

Nico Mastrorillo
Management Representative

SINCERT

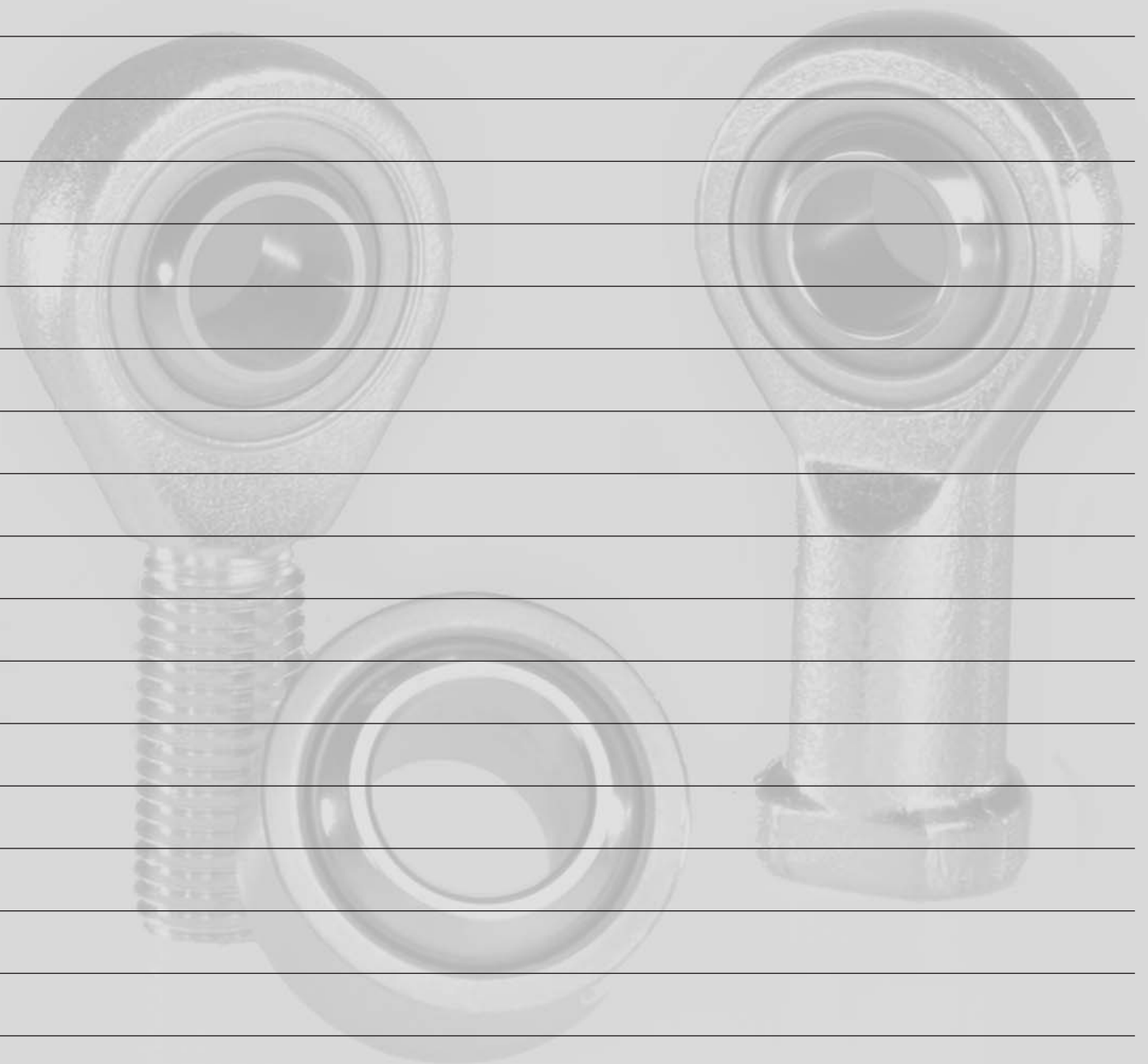
TÜV MANAGEMENT SERVICE ISO 9001

ZERTIFIKAT ◆ CERTIFICATE ◆ СВИДЕТЕЛЬСТВО ◆ CERTIFICADO ◆ CERTIFICAT ◆ CERTIFICATO

INDEX

INDEX

NOTE



1. INTRODUCTION

TESCUBAL® articulated heads and ball joints are mechanical junctions which, because of their internal geometry, are particularly suited to the transmission of static and dynamic forces together with rotary, oscillatory and tipping movements.

They are standardised products which are produced in accordance with ISO 12240-4 series K and ISO 12240-1 series K standards respectively.

The project takes into account the ever more stringent requirements of the market which calls for a reduced play, remaining constant with time, and completely maintenance-free operation.

Advantages

- Maintenance-free operation, high load-bearing capacity and reduced wear during operation thanks to the metal/metal coupling and suitable, constant lubrication (our products do not require any maintenance, even at the start).
- Limited values of resistant couple which remain constant with time and an absence of stick-slip guaranteed by the lubricating fluid between the bush and the ball which ensures a low coefficient of friction.
- Products are capable of functioning in the presence of or when immersed in oil.

2. DESCRIPTION OF THE PRODUCT

The TESCUBAL® maintenance-free articulated heads and ball joints employ a coupling of metal (spherical ring) on sintered metal (bush) impregnated with a high-potency lubricating fluid.
The bush has the dual function of withstanding the loads applied and guaranteeing the necessary lubrication during operation.

Articulated Head series CF and CM

Coupling: steel on bronze, maintenance free
Support: from size 5 to size 12 are produced in automatic steel, successive sizes in forged, tempered steel
Bush: sintered bronze impregnated with high-potency lubricating fluid, formed cold on the ball
Ball: tempered, ground and polished steel for bearings

Articulated Head series CF OK and CM OK

Coupling: steel on steel, maintenance free
Support: from size 5 to size 12 are produced in automatic steel, successive sizes in forged, tempered steel
Bush: sintered steel impregnated with high-potency lubricating fluid, formed cold on the ball
Ball: tempered, ground and polished steel for bearings

Articulated Head series CFX e CMX

Coupling: stainless steel AISI 420 on bronze free from maintenance
Support: produced in stainless steel AISI 304
Bush: sintered bronze impregnated with high-potency lubricating fluid, formed cold on the ball
Ball: tempered, ground and polished stainless steel AISI 420

Ball joint

Coupling: steel on steel, maintenance free
Bush: sintered steel impregnated with high-potency lubricating fluid, formed cold on the ball and ground
Ball: tempered, ground and polished steel for bearings

3. CHOICE OF ARTICULATED HEAD OR BALL JOINT

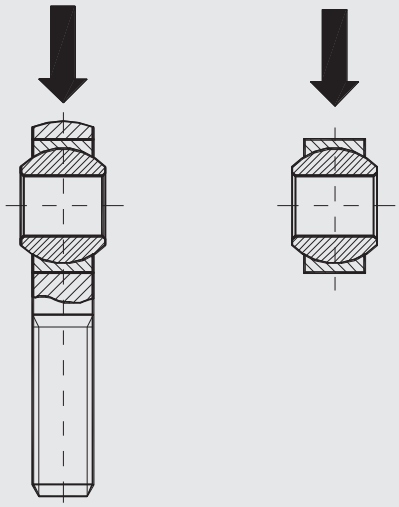
To make the appropriate choice of articulated head or ball joint it is important to know what its actual application will be. The type of load applied, whether static or dynamic, will determine the correct dimensions of the articulated head or ball joint.

Static Load

By static load we mean the maximum radial or axial load which, when applied to the articulated heads or ball joints at room temperature without oscillation or rotation, will not create permanent deformations or prejudice the functioning of the unit.
The values of the maximum permissible load were obtained by calculation and then verified on significant samples extracted from our production run.

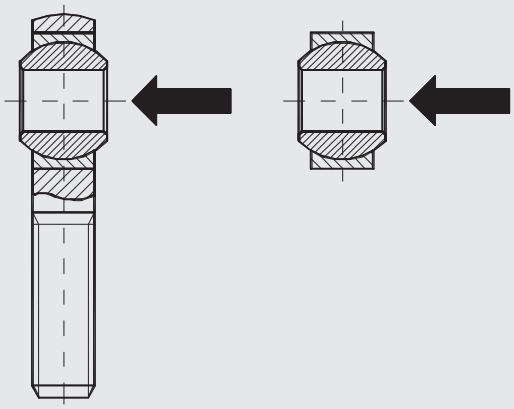
Radial static load

The maximum permissible radial static load is given in the dimensional tables for articulated heads and ball joints.

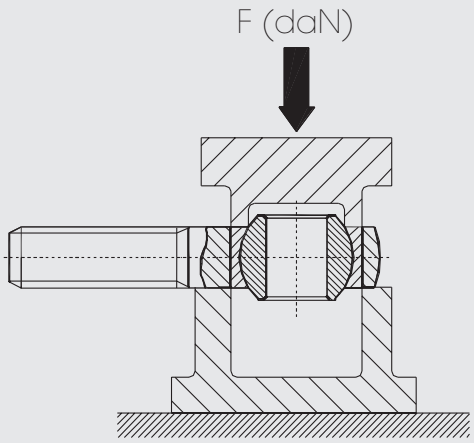


Axial static load

For articulated heads the maximum axial static load should not exceed the axial holding load of the articulation in the head (table 1), and furthermore it should be calculated as a function of the length of the screw thread for the male type and of the resistance of the male connected to the female type.
For ball joints the maximum permissible axial static load is given in the dimensional tables on page 17.



Axial holding load of the joint on the head



SIZE OF HOLE IN BALL	LOAD (daN)
5	100
6	120
8	170
10	200
12	270
14	400
16	550
18	580
20	600
22	700
25	800
30	1200
35	1400

Table 1

Dynamic Load

In case of dynamic load (load with relative movement between the ball and the bush) it is necessary to carry out the following tests:

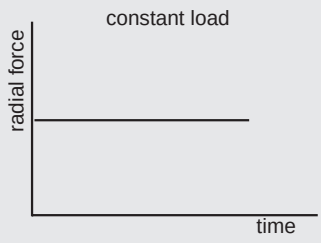
a) Permissible radial load on the articulated head according to the type of load

It is indispensable to check the permissible stress.
In case of loads which are nominally equal, dynamic loads produce greater stress on the articulated head than constant loads; it is therefore necessary to introduce the coefficient Kf in the calculation of the permissible radial stress:

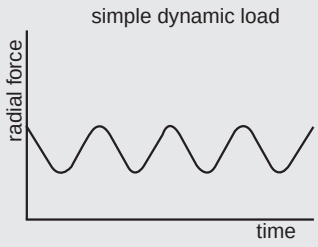
$$Fr\ amm. = Co \times Kf$$

Fr amm. = maximum permissible load on the articulated head (daN)
Co = permissible radial static load on the articulated head (daN)
Kf = load coefficient
Fr = radial force applied (daN)

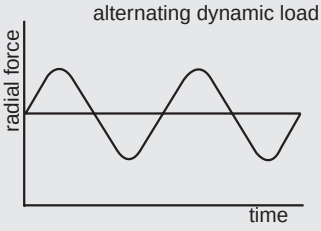
It is always important to verify the following condition: $Fr \leq Fr\ amm.$



Kf 1



Kf 0,5



Kf 0,25

b) Permissible axial load on the articulated head

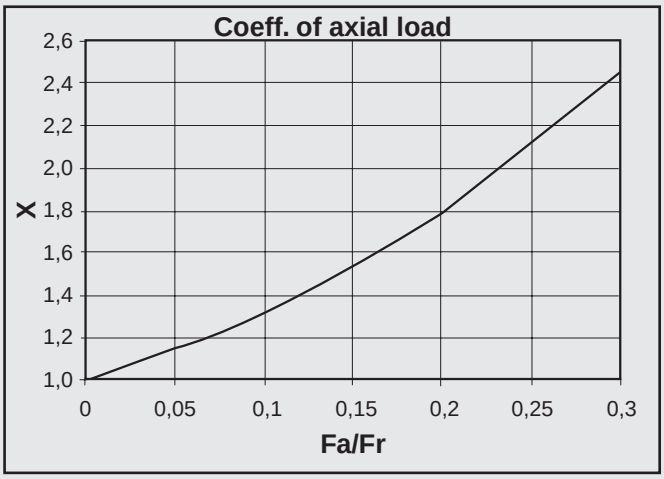
Normally there are no dynamic axial loads, so the conditions to be observed are those given in the paragraph on static axial loads on page 2.

c) Permissible equivalent load

If both types of load, axial and radial, are applied to articulated heads or ball joints, the equivalent load P will be given by the formula

$$P = Fr \bullet X$$

P = equivalent load (daN)
Fr = radial load (daN)
Fa = axial load (daN)
X = axial load factor determinable from the graph



d) Permissible specific pressure p:

The specific pressure is the pressure between the ball and the surface on which it slides

$$p = \frac{P}{dk \bullet C1}$$

p = specific pressure (daN/mm^2)
P = equivalent load applied (daN)
dk = external diameter of the ball (mm)
C1 = thickness of the bush (mm)

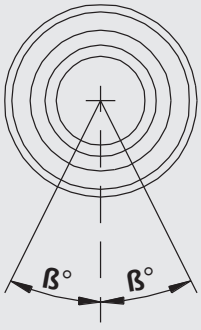
Check that the permissible specific pressure falls within the limits indicated in table 2.

e) Permissible sliding speed v:

The average sliding speed is the speed between the ball and the surface on which it slides

$$v = \frac{2 \bullet \pi \bullet ß \bullet f \bullet dk}{180.000}$$

v = average sliding speed (m/min)
ß = semi-angle of oscillation (°) for complete rotations we consider that ß = 90°
f = frequency of the oscillations or number of revolutions (min -1)



Check that the permissible sliding speed falls within the limits indicated in table 2.

f) Permissible pv factor:

$$pv = p \cdot v$$

p = specific pressure (daN/mm²)
v = average sliding speed (m/min)

Check that the permissible pv factor falls within the limits indicated in table 2.

Coupling	P max (daN/mm²)	v max (m/min)	p.v max. (daN/mm² ·m/min)
Steel on sintered bronze	5	30	4
Steel on sintered steel	7	20	3

Table 2

It is important to point out that the above safety coefficients have been calculated on the basis of the standard use of the units. Where heavier use is made (with strong pulsating loads or compound stresses) or where the personal safety is at risk, it is essential to employ greater safety factors to reduce stress and where necessary practical tests corresponding to the real use should be carried out in order to analyse the actual durability. In the case of these special applications we can take no responsibility for the product since we are unable to foresee the actual use to which it will be put.

g) Operating Temperature:

All articulated heads and ball joints are capable of functioning in temperatures ranging from -30 and +120°C; it is possible to work at even higher temperatures (up to 150°C) but the durability of the joint will be reduced.

4. CRITERIA OF USE

TESCUBAL® articulated heads and ball joints are products requiring no maintenance either before or during use. As precision items, they will maintain their normal functioning only if the following criteria are observed:

- they should be stored in an appropriate place in their original packaging
- during assembly the area between the ball and the bush should be kept free of foreign bodies
- the bush should not be subjected to any stress during assembly or disassembly and during operation it should not come into contact with any part outside the joint itself
- avoid shocks or damage during assembly

USE OF BALL JOINTS

During assembly careful attention to the following instructions is essential:

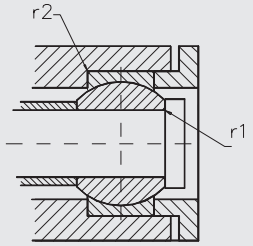
- For ease of assembly the end of the shaft and that of the housing should form a chamfer with an angle between 10° and 20°
- It is advisable to assemble the joint using a suitable bush (or tube) which adheres to the entire surface of the external ring (fig 1); however, direct blows to the ball joint should be avoided
- In assembling the housing and the shaft, it is of primary importance to pay careful attention to the precision of the tolerances and to errors of form.

Incorrect assembly of the ball joint can damage it, thus reducing its durability.
The chamfers r1 of the shaft and r2 of the housing should be inferior to those of the joint given in the table (respectively r1s and r2s((fig.2).
The choice of coupling should not be a question of chance, since a too high level of interference would cancel out the radial play between the external and internal rings, considerably increasing the wear and thus compromising the durability of the ball joint; on the other hand, a loose coupling would produce a deformation of the external ring, reducing its durability.

Tolerances should be as follows:

type of load	housing	shaft
normal	M7	m6
strong	N7	m6

(fig. 1)



5. TOLERANCES

External Support

h, h1 height from the flat side of the shank to the centre of the hole in the ball
d3 screw thread in the shank

Bush of the ball joint

D nominal external diameter
ΔDmp movement of the medium external diameter from the normal value
C nominal width
ΔC_s variation in the nominal width C

Ball

d nominal diameter of the hole
Δdmp movement of the medium external diameter from the normal value
B nominal width
ΔB_s variation in the nominal width B

Articulated heads DIN ISO 12240-4 series k - type CF, CFX, CM and CMX

d (mm)		Δdmp H7 (µm)		ΔB_s (µm)		h, h_1 (µm)	d_3	
over	up to	max	min	max	min		CF	CM
3	6	+12	0	0	-120	±1200	6H	6g
6	10	+15	0	0	-120	±1200	6H	6g
10	18	+18	0	0	-120	±1200	6H	6g
18	30	+21	0	0	-120	±1700	6H	6g
30	50	+25	0	0	-120	±2100	6H	6g

Similar articulated heads DIN ISO 12240-4 series k - type CF OK and CM OK

d (mm)		Δdmp H9 (µm)		ΔB_s (µm)		h, h_1 (µm)	d_3	
over	up to	max	min	max	min		CF	CM
3	6	+30	0	0	-120	±1200	6H	6g
6	10	+36	0	0	-120	±1200	6H	6g
10	18	+43	0	0	-120	±1200	6H	6g

- The remaining constructive tolerances respect the ISO 12240 - 4 - series K

Ball joints DIN ISO 12240-1 series K - type SB

		Sfera			
d (mm)		Δdmp H7 (µm)		ΔB_s (µm)	
over	up to	max	min	max	min
3	6	+12	0	0	-120
6	10	+15	0	0	-120
10	18	+18	0	0	-120
18	30	+21	0	0	-120
30	50	+25	0	0	-120

		Boccola			
D (mm)		ΔDmp (µm)		ΔC_s (µm)	
over	up to	max	min	max	min
5	18	0	-11	0	-240
18	30	0	-13	0	-240
30	50	0	-16	0	-240

Similar ball joints DIN ISO 12240-1 series K - type SB OK

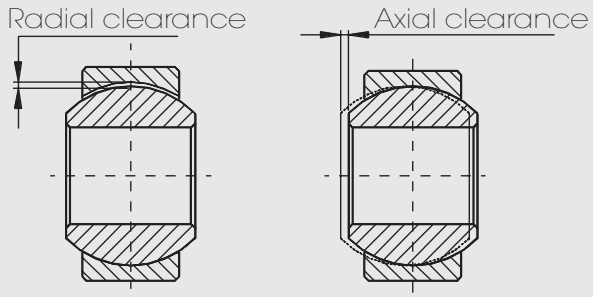
		Sfera			
d (mm)		Δdmp H9 (µm)		ΔB_s (µm)	
over	up to	max	min	max	min
3	6	+30	0	0	-120
6	10	+36	0	0	-120
10	18	+43	0	0	-120

		Boccola			
D (mm)		ΔDmp (µm)		ΔC_s (µm)	
over	up to	max	min	max	min
5	18	0	-11	0	-240
18	30	0	-13	0	-240
30	50	0	-16	0	-240

- The remaining constructive tolerances respect the ISO 12240 - 1 - series K

6. CLEARANCE OF THE JOINT

By play we mean the radial or axial displacement of the ball with respect to the bush; this is measured by applying a load of ± 10 daN (see figure).



Articulated heads

RADIAL PLAY (µm):

Hole in the ball d		Radial clearance (µm)	
over (mm)	up to (mm)	min	max
3	6	5	50
6	10	7	61
10	18	8	75
18	30	10	92
30	35	13	112

AXIAL PLAY: this is about 3-5 times radial play

Ball joint

RADIAL PLAY (µm):

Hole in the ball d		Radial clearance (µm)	
over (mm)	up to (mm)	min	max
3	6	30	70
6	10	40	80
10	18	45	90
18	30	50	100

AXIAL PLAY: this is about 3-5 times radial play

The radial play in the ball joint may vary according to the location of the ball joint in its housing; it should thus be assembled with a greater play so that the correct play can then be obtained.

7. PROTECTION OF THE ARTICULATED HEAD

The protection allows the articulated head to be guarded against external agents such as dust, chemical and atmospheric agents, etc.

Material: Black Neoprene, resistant at temperatures from -30°C to + 120°C

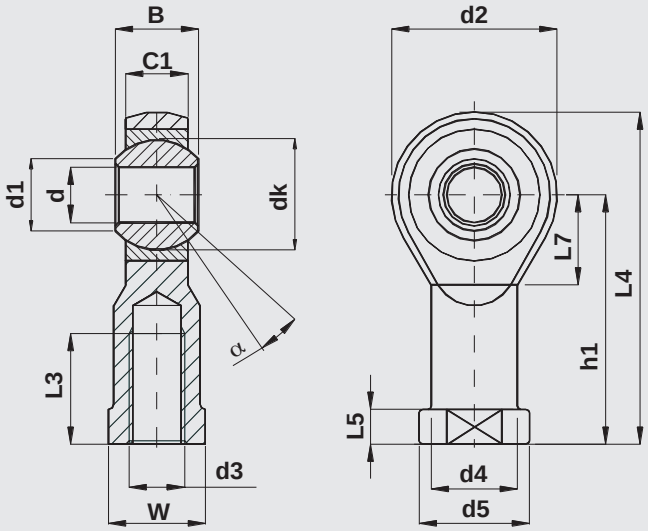
Advisable for protection from:	oil, grease, chemical agents, saline mist
Inadvisable for:	long-term contact with oxidising agents and where the ball is subject to complete rotations or a high angle of rotation, and in the case of high speed.

Dimension and assembly application are indicated on page 18

CF

DIN ISO 12240 - 4 Serie K female thread

Coupling: steel on bronze self-lubricating



Body:
Up to dimension 12 automatic steel
From dimension 14 forged hardening steel
surface finish zinc plated and passivated
Outer race:
sintered bronze, self-lubrificating impregnated with oil
Ball:
bearing steel, hardened, grinded and polished

Designation	d H7	d3 6H	B	C1	d1	d2	d4	d5	dk	h1	L3	L4	L5	L7	W	max radial load Co.(daN)	α° angle ≈	weight ≈ (kg)
CF5 M5	5	M5	8	6	7,7	18	9	11	11,11	27	10	36	4	10	9	600	13	0,019
CF6 M6	6	M6	9	6,75	8,9	20	10	13	12,7	30	12	40	5	11	11	700	13	0,026
CF8 M8	8	M8	12	9	10,4	24	12,5	16	15,87	36	16	48	5	13	14	1200	14	0,046
CF10 M10	10	M10	14	10,5	12,9	28	15	19	19,05	43	20	57	6,5	15	17	1400	13	0,074
CF12 M12	12	M12	16	12	15,4	32	17,5	22	22,22	50	22	66	6,5	17	19	1900	13	0,111
CF14 M14	14	M14	19	13,5	16,8	36	20	25	25,4	57	25	75	8	19	22	3600	15	0,156
CF16 M16	16	M16	21	15	19,3	42	22	27	28,57	64	28	85	8	23	22	4800	15	0,231
CF18 M18	18	M18x1,5	23	16,5	21,8	46	25	31	31,75	71	32	94	10	25	27	5100	15	0,295
CF20 M20	20	M20	25	18	24,3	50	27,5	34	34,92	77	33	102	10	27	30	5200	14	0,402
CF22 M22	22	M22x1,5	28	20	25,8	54	30	37	38,10	84	37	111	12	29	32	7500	15	0,490
CF25 M25	25	M24x2	31	22	29,5	60	33,5	42	42,85	94	42	124	12	32	36	8500	15	0,650
CF30 M30x2	30	M30x2	37	25	34,8	70	40	50	50,8	110	51	145	15	36	41	10800	17	1,126
CF35 M36x2	35	M36x2	43*	28	37,7*	80	46	58*	57,15	125	56	165	17,0*	41	50	12400	19*	1,635

* not included in DIN ISO 12240-4
For left-hand thread add L (example CFL8 M8) - Technical reading from page 1 to page 7

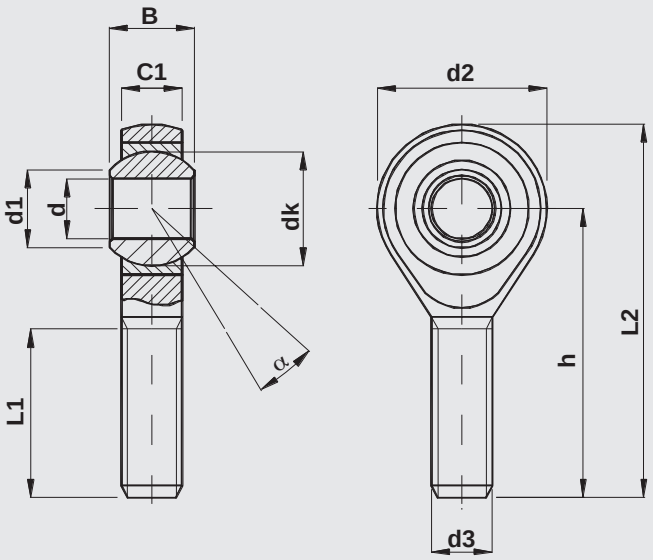
Application: precision engineering

UP TO DATE SERIES

DIN ISO 12240 - 4 Serie K female thread

CM

Coupling: steel on bronze self lubrificating



Body:
Up to dimension 12 automatic steel
From dimension 14 forged hardening steel
surface finish zinc plated and passivated
Outer race:
sintered bronze, self-lubrificating impregnated with oil
Ball:
bearing steel, hardened, grinded and polished

Designation	d H7	d3 6g	B	C1	d1	d2	dk	h	L1	L2	max radial load Co.(daN)	α° amgle ≈	weight ≈ (kg)
CM5 M5	5	M5	8	6	7,7	18	11,11	33	19	42	300	13	0,015
CM6 M6	6	M6	9	6,75	8,9	20	12,7	36	21	46	400	13	0,021
CM8 M8	8	M8	12	9	10,4	24	15,87	42	25	54	800	14	0,04
CM10 M10	10	M10	14	10,5	12,9	28	19,05	48	28	62	1300	13	0,064
CM12 M12	12	M12	16	12	15,4	32	22,22	54	32	70	1700	13	0,097
CM14 M14	14	M14	19	13,5	16,8	36	25,4	60	36	78	3600	15	0,13
CM16 M16	16	M16	21	15	19,3	42	28,57	66	37	87	4800	15	0,208
CM18 M18	18	M18x1,5	23	16,5	21,8	46	31,75	72	41	95	5100	15	0,260
CM20 M20	20	M20	25	19	24,3	50	34,52	78	45	103	5200	14	0,367
CM20 M20x1,5	20	M20x1,5	25	18	24,3	50	34,92	78	45	103	5200	14	0,367
CM22 M22	22	M22x1,5	28	20	25,8	54	38,10	84	48	112	7500	15	0,435
CM25 M25	25	M24x2	31	22	29,5	60	42,85	94	55	124	8500	15	0,590
CM30 M30	30	M30x2	37	25	34,8	70	50,80	110	66	145	10800	15	1,060

For left-hand thread add L (example CML8 M8)
Technical reading from page 1 to page 7

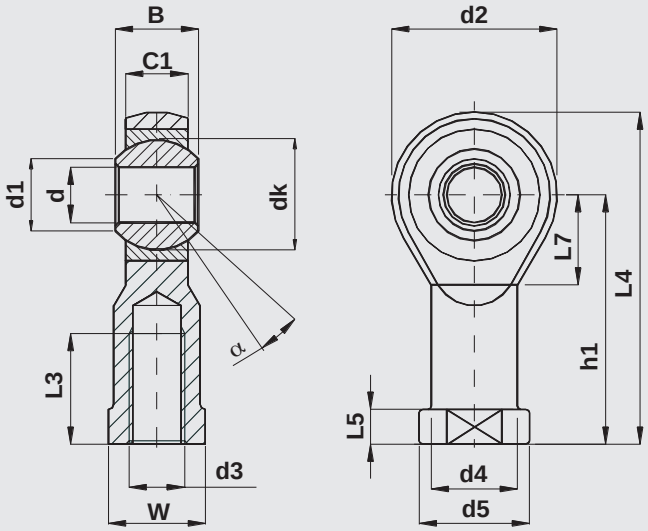
Application: precision engineering

UP TO DATE SERIES

CF

DIN ISO 12240 - 4 Serie K thread ISO 8139 (Cetop) female thread

Coupling: steel on bronze self-lubricating



Body:
Up to dimension 12 automatic steel
From dimension 14 forged hardening steel
surface finish zinc plated and passivated
Outer race:
sintered bronze, self-lubrificating impregnated with oil
Ball:
bearing steel, hardened, grinded and polished

Designation	Cylinder	d H7	d3 6H	B	C1	d1	d2	d4	d5	dk	h1	L3	L4	L5	L7	W	max radial load Co.(daN)	α° angle ≈	weight ≈ (kg)
CF5 M4	8-10	5	M4	8	6	7,7	18	9	11	11,11	27	10	36	4	10	9	600	13	0,02
CF6 M6	12-16	6	M6	9	6,75	8,9	20	10	13	12,7	30	12	40	5	11	11	700	13	0,025
CF8 M8	20	8	M8	12	9	10,4	24	12,5	16	15,87	36	16	48	5	13	14	1200	14	0,046
CF10 M10x1,25	25-32	10	M10x1,25	14	10,5	12,9	28	15	19	19,05	43	20	57	6,5	15	17	1400	13	0,075
CF12 M12x1,25	40-50	12	M12x1,25	16	12	15,4	32	17,5	22	22,22	50	22	66	6,5	17	19	1900	13	0,112
CF16 M16x1,5	50-63	16	M16x1,5	21	15	19,3	42	22	27	28,57	64	28	85	8	23	22	4800	15	0,222
CF20 M20x1,5	80-100	20	M20x1,5	25	18	24,3	50	27,5	34	34,92	77	33	102	10	27	30	5200	14	0,406
CF25 M24x2	125	25	M24x2	31	22	29,5	60	33,5	42	42,85	94	42	124	12	32	36	8500	15	0,650
CF30 M27x2	125	30	M27x2	37	25	34,8	70	40	50	50,8	110	51	145	15	36	41	10800	17	1,119
CF35 M36x2	160-200	35	M36x2	43*	28	37,7*	80	46,0*	58*	57,15	125	56	165	17,0*	41	50	12400	16	1,595

* not included in DIN ISO 12240-4
Technical reading from page 1 to page 7

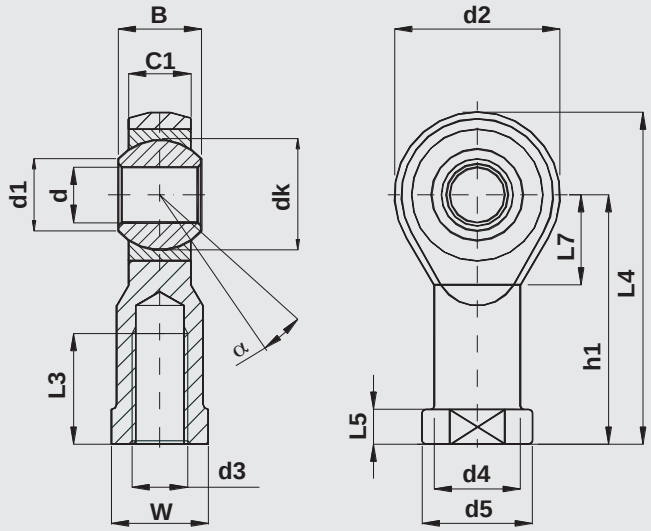
Application: precision engineering

UP TO DATE SERIES

DIN ISO 12240 - 4 Serie K female thread

Coupling: steel on stell self-lubricating

CF ok



Body:
Up to dimension 12 automatic steel
From dimension 14 forged hardening steel
surface finish zinc plated and passivated
Outer race:
sintered steel, self-lubrificating impregnated with oil
Ball:
bearing steel, hardened, grinded and polished

Designation	d H9*	d3 6H	B	C1	d1	d2	d4	d5	dk	h1	L3	L4	L5	L7	W	max radial load Co.(daN)	α° angle ≈	weight ≈ (kg)
CF6 OK M6	6	M6	9	6,75	8,9	20	10	13	12,7	30	12	40	5	11	11	700	13	0,025
CF8 OK M8	8	M8	12	9	10,4	24	12,5	16	15,87	36	16	48	5	13	14	1200	14	0,046
CF10 OK M10	10	M10	14	10,5	12,9	28	15	19	19,05	43	20	57	6,5	15	17	1400	13	0,075
CF12 OK M12	12	M12	16	12	15,4	32	17,5	22	22,22	50	22	66	6,5	17	19	1900	13	0,112
CF16 OK M16	16	M16	21	15	19,3	42	22	27	28,57	64	28	85	8	23	22	4800	15	0,222

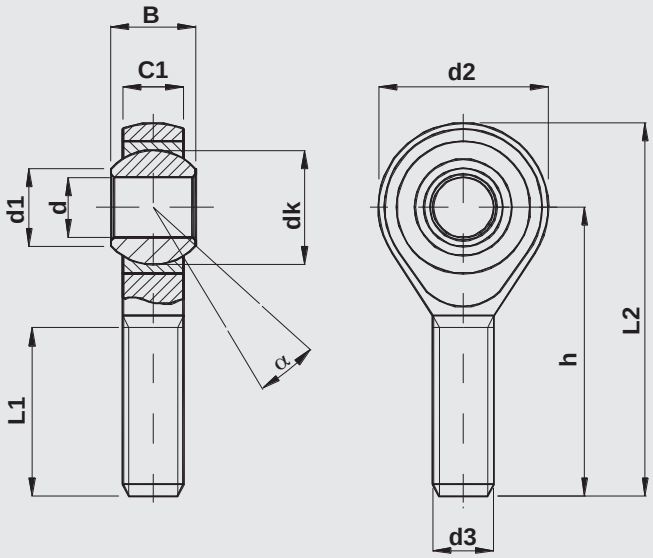
* tolerance not included in DIN ISO 12240-4
For left-hand thread add L (example CFL16 OK M16)
Technical reading from page 1 to page 7

Application: mechanical engineering

CM ok

DIN ISO 12240 - 4 Serie K male thread

Coupling: steel on steel self-lubricating



Body:
Up to dimension 12 automatic steel
From dimension 14 forged hardening steel
surface finish zinc plated and passivated
Outer race:
sintered steel, self-lubrificating impregnated with oil
Ball:
bearing steel, hardened, grinded and polished

Designation	d H9*	d3 6g	B	C1	d1	d2	dk	h	L1	L2	max radial load Co.(daN)	α° angle ≈	weight ≈ (kg)
CM6 OK M6	6	M6	9	6,75	8,9	20	12,7	36	21	46	400	13	0,021
CM8 OK M8	8	M8	12	9	10,4	24	15,88	42	25	54	800	14	0,04
CM10 OK M10	10	M10	14	10,5	12,9	28	19,05	48	28	62	1300	13	0,064
CM12 OK M12	12	M12	16	12	15,4	32	22,23	54	32	70	1700	13	0,097
CM16 OK M16	16	M16	21	15	19,3	42	28,58	66	37	87	4800	15	0,195

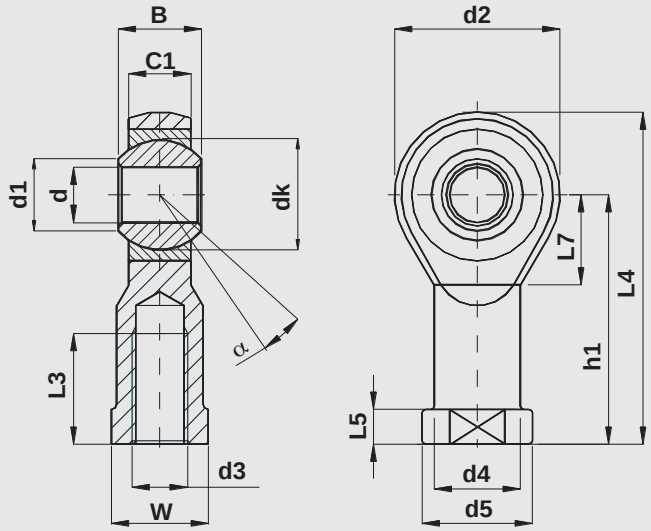
* tolerance not included in DIN ISO 12240-4
For left-hand thread add L (example CML16 OK M16)
Technical reading from page 1 to page 7

Application: mechanical engineering

DIN ISO 12240 - 4 Serie K thread ISO 8139 (CETOP) female thread

CF ok

Coupling: steel on steel self-lubricating



Body:
Up to dimension 12 automatic steel
From dimension 14 forged hardening steel
surface finish zinc plated and passivated
Outer race:
sintered steel, self-lubrificating impregnated with oil
Ball:
bearing steel, hardened, grinded and polished

Designation	Cylinder	d	d3	B	C1	d1	d2	d4	d5	dk	h1	L3	L4	L5	L7	W	max radial load Co.(daN)	α° angle ≈	weight ≈ (kg)
		H9*	6H																
CF6 OK M6	12-16	6	M6	9	6,75	8,9	20	10	13	12,7	30	12	40	5	11	11	700	13	0,025
CF8 OK M8	20	8	M8	12	9	10,4	24	12,5	16	15,9	36	16	48	5	13	14	1200	14	0,046
CF10 OK M10x1,25	25-32	10	M10x1,25	14	10,5	12,9	28	15	19	19,1	43	20	57	6,5	15	17	1400	13	0,075
CF12 OK M12x1,25	40-50	12	M12x1,25	16	12	15,4	32	17,5	22	22,2	50	22	66	6,5	17	19	1900	13	0,112
CF16 OK M16x1,5	50-63	16	M16x1,5	21	15	19,3	42	22	27	28,6	64	28	85	8	23	22	4800	15	0,222

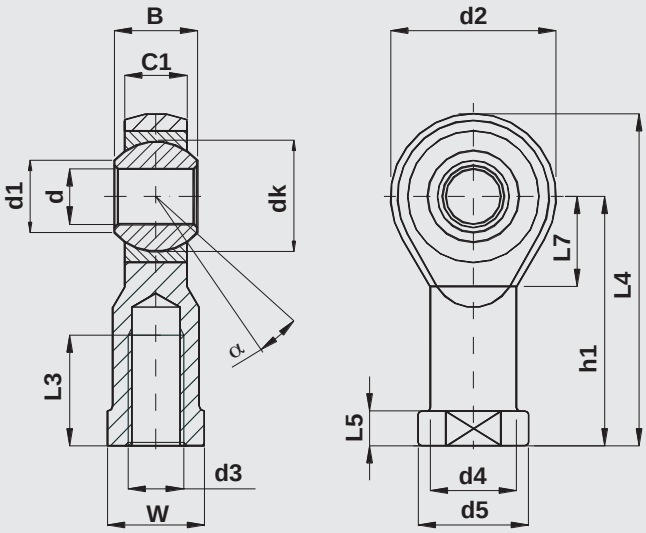
* tolerance not included in DIN ISO 12240-4
For left-hand thread add L (example CFL16 OK M16x1,5)
Technical reading from page 1 to page 7

Application: mechanical engineering

CFX

DIN ISO 12240 - 4 Serie K female thread

Coupling: AISI 420 / bronze self-lubricating



Body:
stainless steel AISI 304
Outer race:
sintered bronze, self-lubrificating impregnated with oil
Ball:
stainless steel AISI 420

STAINLESS STEEL

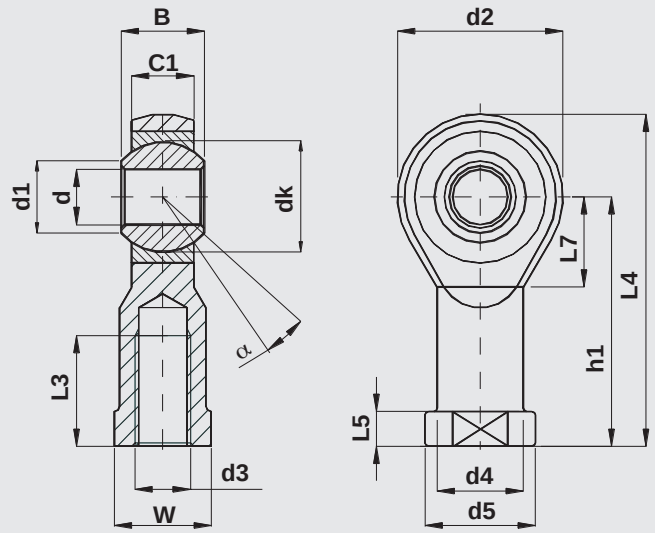
Designation	d H7	d3 6H	B	C1	d1	d2	d4	d5	dk	h1	L3	L4	L5	L7	W	max radial load Co.(daN)	α° angle ≈	weight ≈ (kg)
CFX6 M 6	6	M6	9	6,75	8,9	20	10,00	13	12,70	30	12	40	5,0	11	11	700	13	0,025
CFX8 M 8	8	M8	12	9,00	10,4	24	12,50	16	15,87	36	16	48	5,0	13	14	1200	14	0,025
CFX10 M 10	10	M10	14	10,50	12,9	28	15,00	19	19,05	43	20	57	6,5	15	17	1400	13	0,075
CFX12 M 12	12	M12	16	12,00	15,4	32	17,5	22	22,22	50	22	66	6,5	17	19	1900	13	0,112
CFX14 M 14	14	M14	19	13,50	16,8	36	20,00	25	25,40	57	25	75	8,0	19	22	3600	15	0,156
CFX16 M 16	16	M16	21	15,00	19,3	42	22,00	27	28,57	64	28	85	8,0	23	22	4800	15	0,222
CFX20 M 20	20	M20	25	18,00	24,3	50	27,50	34	34,92	77	33	102	10,0	27	30	5200	14	0,406

For left-hand thread add L (example CFXL16 M16)
Technical reading from page 1 to page 7

DIN ISO 12240 - 4 Serie K Filetto ISO 8139 (CETOP) female thread

CFX

Coupling: AISI 420 / bronze self-lubricating



Body:
stainless steel AISI 304
Outer race:
sintered bronze, self-lubrificating impregnated with oil
Ball:
stainless steel AISI 420

STAINLESS STEEL

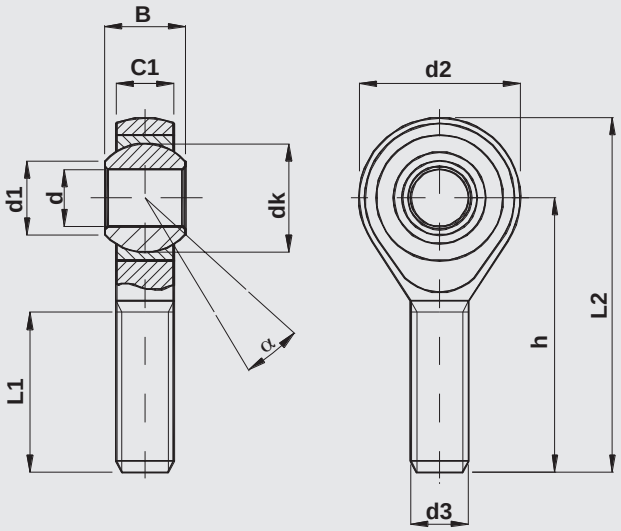
Designation	Cylinder	d H7	d3 6H	B	C1	d1	d2	d4	d5	dk	h1	L3	L4	L5	L7	W	max radial load Co.(daN)	α° angle ≈	weight ≈ (kg)
CFX6 M 6	12-16	6	M6	9	6,75	8,9	20	10,00	13	12,70	30	12	40	5,0	11	11	700	13	0,025
CFX8 M 8	20	8	M8	12	9,00	10,4	24	12,50	16	15,87	36	16	48	5,0	13	14	1200	14	0,025
CFX10 M 10x1,25	25-32	10	M10x1,25	14	10,50	12,9	28	15,00	19	19,05	43	20	57	6,5	15	17	1400	13	0,075
CFX12 M 12x1,25	40-50	12	M12x1,25	16	12,00	15,4	32	17,5	22	22,22	50	22	66	6,5	17	19	1900	13	0,112
CFX16 M 16x1,5	50-63	16	M16x1,5	21	15,00	19,3	42	22,00	27	28,57	64	28	85	8,0	23	22	4800	15	0,222
CFX20 M 20x1,5	80-100	20	M20x1,5	25	18,00	24,3	50	27,50	34	34,92	77	33	102	10,0	27	30	5200	14	0,406

For left-hand thread add L (example CFXL16 M16X1,5)
Technical reading from page 1 to page 7

CMX

DIN ISO 12240 - 4 Serie K male thread

Coupling: AISI 420 / bronze self-lubricating



Body:
stainless steel AISI 304
Outer race:
sintered bronze, self-lubrificating impregnated with oil
Ball:
stainless steel AISI 420

STAINLESS STEEL

Designation	d H7	d3 6g	B	C1	d1	d2	dk	h	L1	L2	max radial load Co.(daN)	α° angle ≈	weight ≈ (kg)
CMX6 M6	6	M6	9	6,75	8,9	20	12,7	36	21	46	400	13	0,021
CMX8 M8	8	M8	12	9	10,4	24	15,87	42	25	54	800	14	0,04
CMX10 M10	10	M10	14	10,5	12,9	28	19,05	48	28	62	1300	13	0,064
CMX12 M12	12	M12	16	12	15,4	32	22,22	54	32	70	1700	13	0,097
CMX14 M14	14	M14	19	13,5	16,8	36	25,4	60	36	78	3600	15	0,13
CMX16 M16	16	M16	21	15	19,3	42	28,57	66	37	87	4800	15	0,208
CMX20 M20	20	M20	25	18	24,3	50	34,92	78	45	103	5200	14	0,367
CMX20 M20x1,5	20	M20x1,5	25	18	24,3	50	34,92	78	45	103	5200	14	0,367

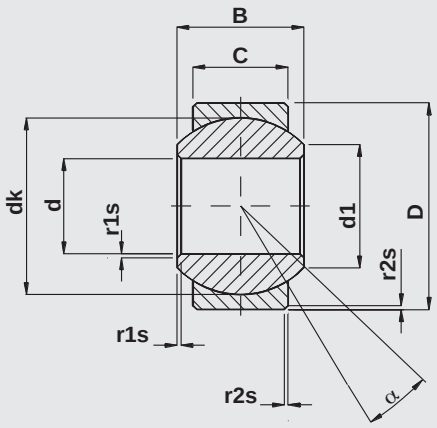
For left-hand thread add L (example CMXL20 M20x1,5)
Technical reading from page 1 to page 7

NEW

DIN ISO 12240 - 1 Serie K

SB

Coupling: steel on steel self-lubricating



Outer race:
sintered steel, self-lubrificating impregnated with oil
Ball:
bearing steel, hardened, grinded and polished

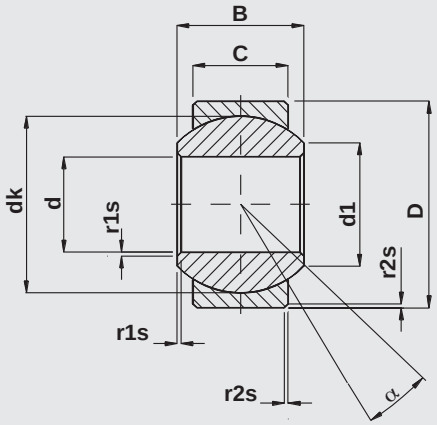
Designation	d H7	B	C	D h6	d1	dk	r1s	r2s	max radial load Co.(daN)	max axial load Co.(daN)	α° angle ≈	weight ≈ (kg)
SB5	5	8	6	13	7,7	11,1	0,3	0,3	1300	170	13	0,006
SB6	6	9	6,75	16	8,9	12,7	0,3	0,3	1700	220	13	0,009
SB8	8	12	9	19	10,4	15,9	0,3	0,3	2800	370	14	0,016
SB10	10	14	10,5	22	12,9	19,1	0,3	0,3	4000	520	13	0,025
SB12	12	16	12	26	15,4	22,2	0,3	0,3	5300	700	13	0,04
SB16	16	21	15	32	19,3	28,6	0,3	0,3	8500	1100	15	0,08
SB20	20	25	18	40	24,3	34,9	0,3	0,6	12500	1600	14	0,15
SB30	30	37	25	55	34,8	50,8	0,3	0,6	25400	3300	17	0,38
SB35	35	43	28,00*	62*	37,7*	57,2*	0,6	1	32000	4150	19	0,49

* not included in DIN ISO 12240 - 4
Technical reading from page 1 to page 7
Application: precision engineering

DIN ISO 12240 - 1 Serie K

SB ok

Coupling: steel on steel self-lubricating



Outer race:
Sintered steel, self-lubrificating impregnated with oil
Ball:
bearing steel, hardened, grinded and polished

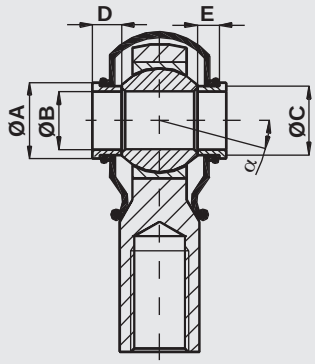
Designation	d H9*	B	C	D h6	d1	dk	r1s	r2s	carico radial load Co.(daN)	max axial load Co.(daN)	α° angle ≈	weight ≈ (kg)
SB6-OK	6	9	6,75	16	8,9	12,7	0,3	0,3	1700	220	13	0,009
SB8-OK	8	12	9	19	10,4	15,9	0,3	0,3	2800	370	14	0,016
SB10-OK	10	14	10,5	22	12,9	19,1	0,3	0,3	4000	520	13	0,025
SB12-OK	12	16	12	26	15,4	22,2	0,3	0,3	5300	700	13	0,04
SB16-OK	16	21	15	32	19,3	28,6	0,3	0,3	8500	1100	15	0,08

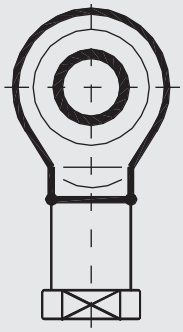
* tolerance not included in DIN ISO 12240 - 4
Technical reading from page 1 to page 7
Application: mechanical engineering

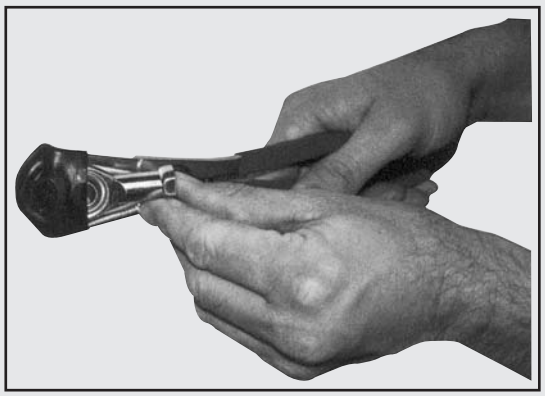
PTS

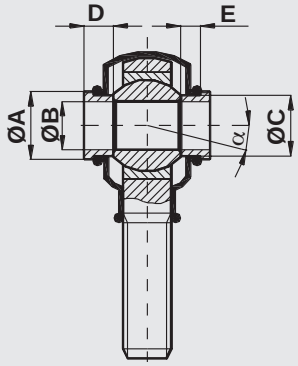
RUBBER COVERS AND RINGS

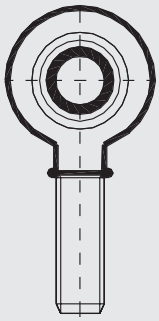
For rod ends DIN ISO 12240 - 4 Serie K











Rubber cover	Compatible rod ends
PTS 1	6-8
PTS 2	10-12
PTS 3	14-16
PTS 4	20

DTS

Ring	ø A	ø B	ø C	D	E	α°
DTS 6	11	6	8,7	6	4	13
DTS 8	12	8	10,3	6	4	14
DTS 10	14	10	12,5	6	4	14
DTS 12	17	12	15	8	6	13
DTS 14	19	14	16,8	8	6	16
DTS 16	21	16	19	8	6	15
DTS 20	28	20	24	10	8	15

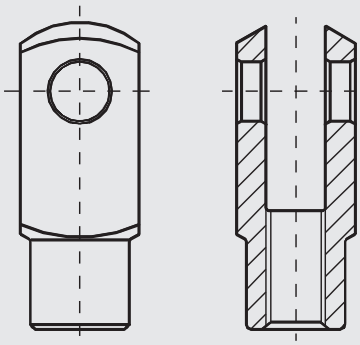
For the mounting it can be used a pair of pincers suitable to the fixing of seegers (see picture)

1. DESCRIPTION OF THE PRODUCT

The yokes are mechanical linking units suitable for the transmission of static forces.
The pins or lockable pins, used in conjunction with the yokes, have the function of connecting the yoke with the mechanical part for the transmission of the force.

They are standardised products which are produced according to the specifications and dimensional tables from page 21 to page 37.

All of our products can be supplied in either a galvanised or unfinished.



2. TECHNICAL DATA

- Yoke type G — specification DIN 71752
- Yoke type G FG — specification DIN 71752 with thread ISO 8140
- Yoke type G CN — specification ex. CNOMO 06 07 14
- Pin type PDIN — specification DIN 1434
- Pin type PKS — according to dimensional tables
- Pin type PI — according to dimensional tables
- Pin type PC — according to dimensional tables

Material: Automatic steel 9SMnPb28 resistance R ≥ 50 daN/mm^2

- Yoke type G STAINLESS STEEL — specification DIN 71752
- Yoke type G FG STAINLESS STEEL — specification DIN 71752 with thread ISO 8140
- Yoke type PI STAINLESS STEEL — according to dimensional tables

Material: Stainless steel AISI 303 resistance R ≥ 50 daN/mm^2

- Yoke type GA — specification DIN 71752
- Yoke type GA FG — specification DIN 71752 with thread ISO 8140
- Pin type PKSAL — according to dimensional tables

Material: Aluminium 2011 (11S) resistance R ≥ 30 daN/mm^2

- Lockable pins type PM — according to dimensional tables
- Lockable pins type PMC — according to dimensional tables

Material:
Pin - Automatic steel 9SMnPb28 resistance R ≥ 50 daN/mm^2
Spring - Carbon steel C70 resistance R ≥ 100 daN/mm^2

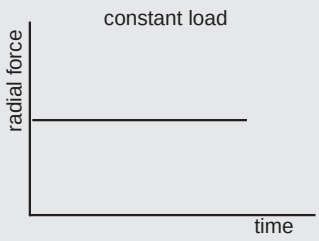
Static load

By static load we mean the maximum radial load which, when applied to the yoke in a static way, does not create permanent deformations or prejudice its functioning.
The values of the maximum permissible load were obtained by calculation and then verified on significant samples taken from our production series.
In the dimensional tables the permissible static loads (Co) which are indicated have been calculated on the basis of a minimum safety factor of 2.5 times with respect to the breaking static load.
Where pulsating or alternating loads are used, it is necessary to reduce the permissible static load introducing the safety coefficient Kf:

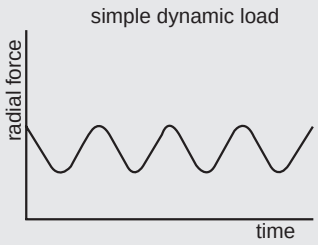
$$Fr\ amm. = Co \times Kf$$

Fr amm. = maximum permissible load on the yoke (daN)
Co = permissible radial static load on the yoke (daN)
Kf = load coefficient
Fr = radial force applied (daN)

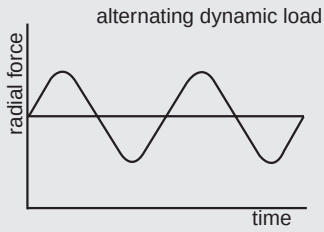
It is always important to verify the following condition: **Fr Fr amm.**



Kf 1



Kf 0,5

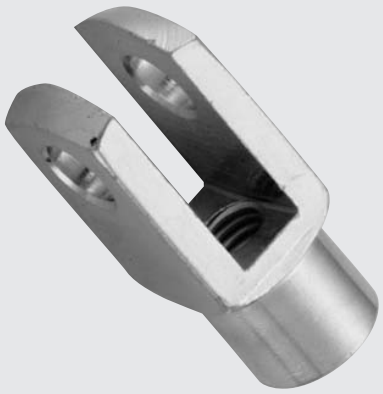


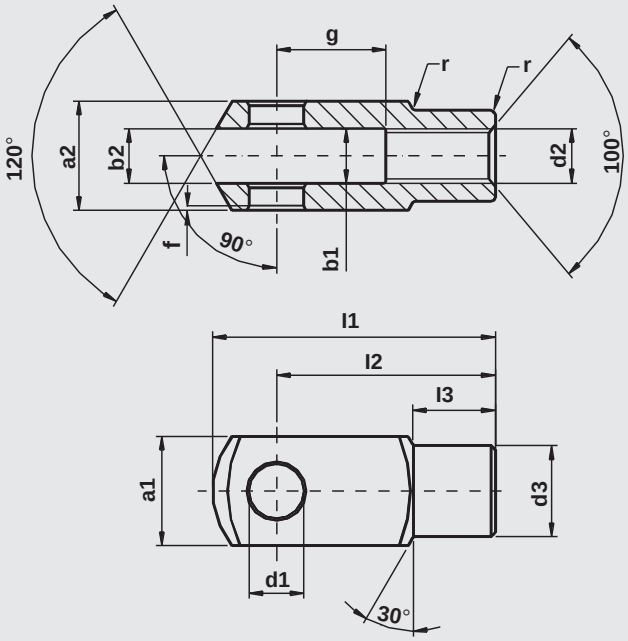
Kf 0,25

3. TOLERANCES:

The constructional tolerances refer to current regulations or to those specified in the dimensional tables.

YOKES DIN 71752





Designation	d1	g	a1	a2	b1	b2	d2	d3	f	l1	l2	l3	r	max load Co.(daN)	weight ≈ (kg)
	H9	±0,5	h11	+0,3 -0,16	B13		6H	±0,3	±0,2	±0,5		±0,2			
G4X8	4	8	8	8	4	4	M4x0,70	8	0,5	21	16	6	0,5	320	0,005
G5X10	5	10	10	10	5	5	M5x0,80	9	0,5	26	20	7,5	0,5	500	0,009
G5X20	5	20	10	10	5	5	M5x0,80	9	0,5	36	30	7,5	0,5	500	0,013
G6X12	6	12	12	12	6	6	M6x1,00	10	0,5	31	24	9	0,5	720	0,015
G6X24	6	24	12	12	6	6	M6x1,00	10	0,5	43	36	9	0,5	720	0,021
G8X16	8	16	16	16	8	8	M8x1,25	14	0,5	42	32	12	0,5	1280	0,036
G8X32	8	32	16	16	8	8	M8x1,25	14	0,5	58	48	12	0,5	1280	0,050
G10X20	10	20	20	20	10	10	M10x1,50	18	0,5	52	40	15	0,5	2000	0,070
G10X40	10	40	20	20	10	10	M10x1,50	18	0,5	72	60	15	0,5	2000	0,120
G12X24	12	24	24	24	12	12	M12x1,75	20	0,5	62	48	18	0,5	2880	0,121
G12X48	12	48	24	24	12	12	M12x1,75	20	0,5	86	72	18	0,5	2880	0,175
G14X28	14	28	27	27	14	14	M14x2,00	24	1	72	56	22,5	1	3380	0,176
G14X56	14	56	27	27	14	14	M14x2,00	24	1	101	85	22,5	1	3380	0,258
G16X32	16	32	32	32	16	16	M16x2,00	26	1	83	64	24	1	5120	0,250
G16X64	16	64	32	32	16	16	M16x2,00	26	1	115	96	24	1	5120	0,411

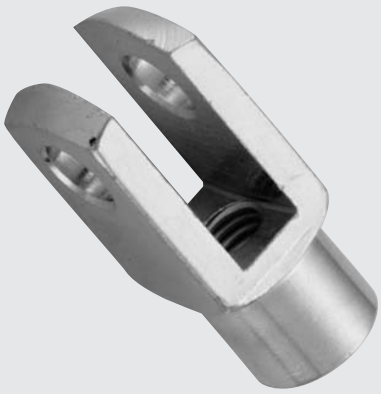
Yokes similar to DIN 71752 (measures not included in the norm)

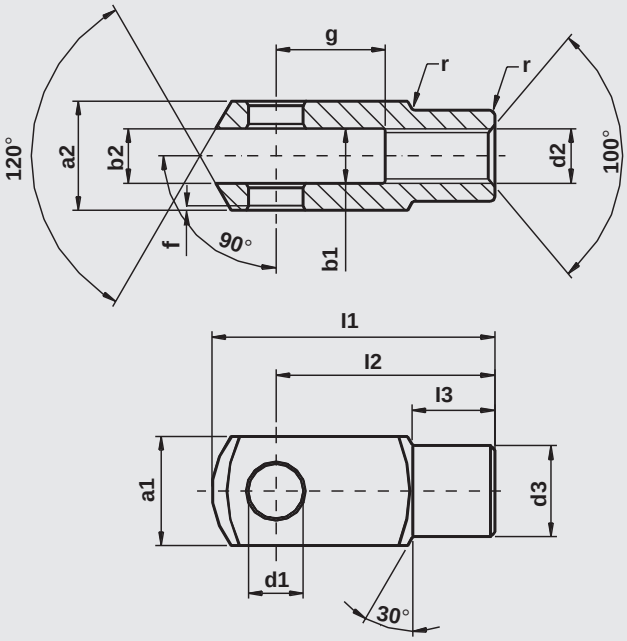
Designation	d1	g	a1	a2	b1	b2	d2	d3	f	l1	l2	l3	r	max load Co.(daN)	weight ≈ (kg)
	H9	±0,5	h11	+0,6 –0,20	B13		6H	±0,3	±0,2	±0,5		±0,3			
G18X36	18	36	36	36	18	18	M18x2,50	30	1	94	72	27	1,5	6480	0,390
G20X40	20	40	40	40	20	20	M20x2,50	34	1	105	80	30	1	8000	0,550
G25X50	25	50	50	50	25	25	M24x3,00	42	1	132	100	36	1	12500	1,100

For left-hand thread add LH (example G 16x32 LH)
For zinc plated add 1A, yellow passivated 2C (example G 16x32 1A) - Zinc - plating: norm ISO 2081, standard Fe Zn 8
Without any indications, the yoke will be provided unplated oiled
Tolerance: b2 up G 10x20 B13, from the 10x40 +0,7+0,15
l2 up G 6x12 ±0,30, from the G 6x24 ±0,40
Tolerance refer to zinc plated yokes/pins
Technical reading from page 19 to page 20

G/FG

YOKES DIN 71752 thread ISO 8140 (CETOP)





Designation	Cylinder	d1 H9	g ±0,5	a1 h11	a2 +0,3 -0,16	b1 B13	b2	d2 6H	d3 ±0,3	f ±0,2	l1 ±0,5	l2	l3 ±0,2	r	max load Co.(daN)	weight ≈ (kg)
G4X8	8-10	4	8	8	8	4	4	M4x0,70	8	0,5	21	16	6	0,5	320	0,005
G6X12	10-12	6	12	12	12	6	6	M6x1,00	10	0,5	31	24	9	0,5	720	0,015
G8X16	20	8	16	16	16	8	8	M8x1,25	14	0,5	42	32	12	0,5	1280	0,036
G10X20 FG	25-32	10	20	20	20	10	10	M10x1,25	18	0,5	52	40	15	0,5	2000	0,070
G12X24 FG	40	12	24	24	24	12	12	M12x1,25	20	0,5	62	48	18	0,5	2880	0,121
G16X32 FG	50-63	16	32	32	32	16	16	M16x1,50	26	1	83	64	24	1	5120	0,250

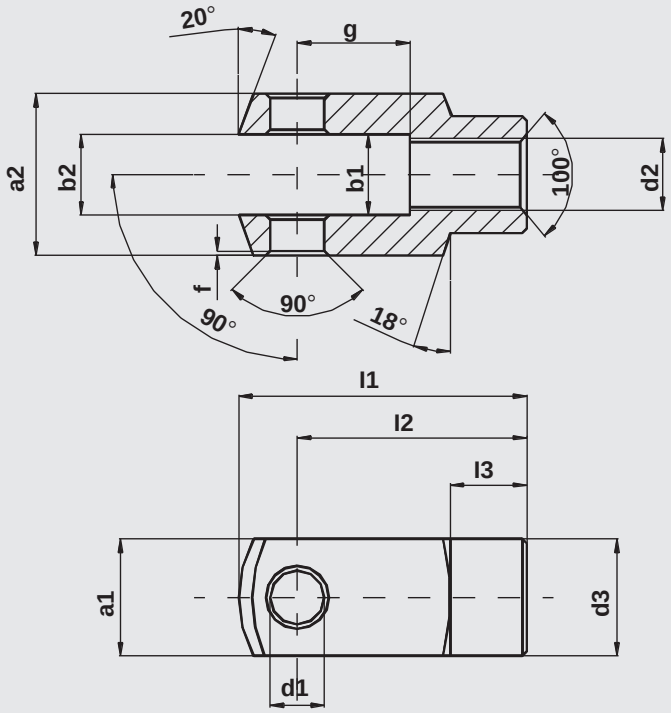
Yokes similar to DIN 71752 (measures not included in the norm)

Designation	Cylinder	d1 H9	g ±0,5	a1 h11	a2 +0,6 –0,20	b1 B13	b2	d2 6H	d3 ±0,3	f ±0,2	l1 ±0,5	l2	l3 ±0,3	r	max load Co.(daN)	weight ≈ (kg)
G20X40 FG	80-100	20	40	40	40	20	20	M20x1,50	34	1	105	80	30	1	8000	0,550
G25X50 FG	125	25	50	50	50	25	25	M24x2,00	42	1	132	100	36	1	12500	1,100
G30X54 FG	125	30	54	55	55	30	30	M27x2,00	48	1	148	110	38	1	12500	1,460
G35X72 FG	160-200	35	72	70	70	35	35	M36x2,00	60	1	188	144	40	1	24500	3,270

For left-hand thread add LH (example G16x32 FG LH)
For zinc plated add 1A, yellow passivated 2C (example G16x32 FG 1A)
Zinc-plating: norm ISO 2081, standard FeZn8
Without any indications, the yoke will be provided unplated oiled
Tolerance: b2 up to G10x20 B13, from the G10x40 +0,7+0,15
l2 up to G6x12 ±0,30, from the G6x24 ±0,40
Tolerances refer to zinc plated yokes/pins
Technical reading from page 19 to page 20

YOKES EX CNOMO 06-07-14

G/CN

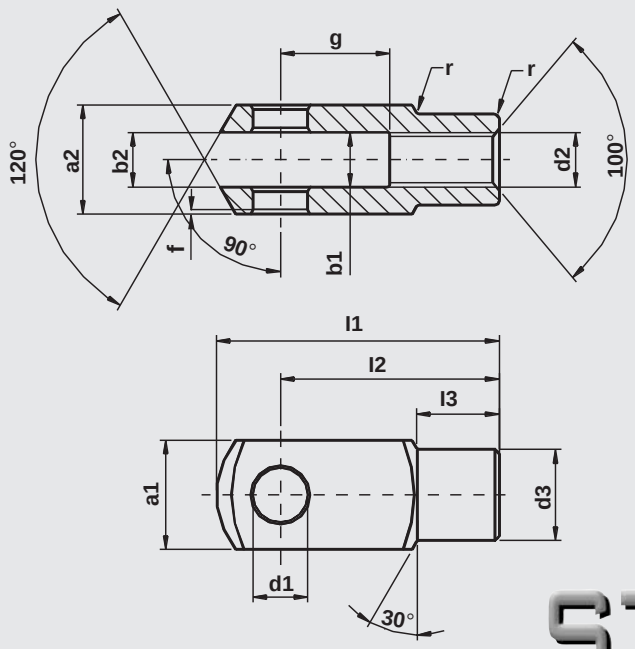


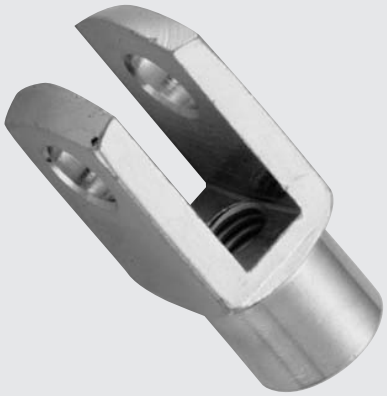
Designation	Cylinder	a1	a2	d1	g	b1	b2	d2	d3	l1	l2	l3	max load Co.(daN)	weight ≈ (kg)
		h11	h11	H8	±0,5	H11	H11	6H	±0,3	±0,5	±0,3	±0,2		
G8x16 CN	32	22	22	8	16	11	11	M10x1,5	18	45	36	14	3080	0,080
G12x25 CN	40-50	26	36	12	25	18	18	M16x1,5	26	64	51	17	5040	0,210
G16x33 CN	63-80	34	45	16	33	22	22	M20x1,5	34	80	63	18,5	8280	0,440
G20x40 CN	100-125	42	63	20	40	30	30	M27x2,0	42	105	85	30	14520	0,910
G25x40 CN	160-200	50	80	25	40	40	40	M36x2,0	50	140	115	45	20000	1,800

For left-hand thread add LH (example G25x50 CN LH)
For zinc plated add 1A, yellow passivated 2C (example G25x50 CN 1A)
Zinc-plating: norm ISO 2081, standard FeZn8
Without any indications, the yoke will be provided unplated oiled
Tolerances refer to zinc plated yokes/pins
Technical reading from page 19 to page 20

G inox

YOKES STAINLESS STEEL DIN 71752





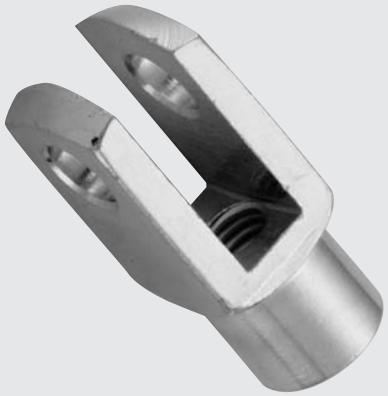
STAINLESS STEEL

Designation	d1	g	a1	a2	b1	b2	d2	d3	f	l1	l2	l3	r	max load Co.(daN)	weight ≈ (kg)
	H9	±0,5	h11	+0,3 -0,16	B13		6H	±0,3	±0,2	±0,5		±0,2			
G5x10 INOX	5	10	10	10	5	5	M5x0,80	9	0,5	26	20	7,5	0,5	500	0,009
G6x12 INOX	6	12	12	12	6	6	M6x1,00	10	0,5	31	24	9	0,5	720	0,015
G8x16 INOX	8	16	16	16	8	8	M8x1,25	14	0,5	42	32	12	0,5	1280	0,036
G10x20 INOX	10	20	20	20	10	10	M10x1,50	18	0,5	52	40	15	0,5	2000	0,070
G12x24 INOX	12	24	24	24	12	12	M12x1,75	20	0,5	62	48	18	0,5	2880	0,121
G16x32 INOX	16	32	32	32	16	16	M16x2,00	26	1	83	64	24	1	5120	0,250

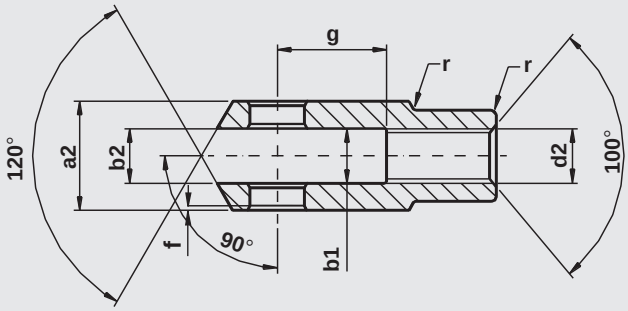
For left-hand thread add LH (ex. G16x32 LH INOX)
Tolerance: b2 up to G10x20 B 13, from the G12x24 +0,7 +0,15
l2 up to G6x12 ±0,30, from the G8x16 ±0,40
Technical reading from page 19 to page 20

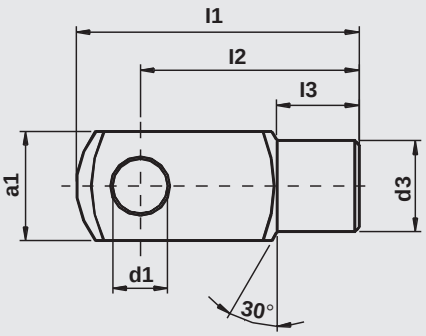
YOKES STAINLESS STEEL DIN 71752 thread ISO 8140 (CETOP)

G/FG inox



STAINLESS STEEL





Designation	Cylinder	d1	g	a1	a2	b1	b2	d2	d3	f	l1	l2	l3	r	max load Co.(daN)	weight ≈ (kg)
		H9	±0,5	+0,3 h11	-0,16	B13		6H	±0,3	±0,2	±0,5		±0,2			
G6x12 INOX	10-12	6	12	12	12	6	6	M6x1,00	10	0,5	31	24	9	0,5	720	0,015
G8x16 INOX	20	8	16	16	16	8	8	M8x1,25	14	0,5	42	32	12	0,5	1280	0,036
G10x20 FG INOX	25-32	10	20	20	20	10	10	M10x1,25	18	0,5	52	40	15	0,5	2000	0,070
G12x24 FG INOX	40	12	24	24	24	12	12	M12x1,25	20	0,5	62	48	18	0,5	2880	0,121
G16x32 FG INOX	50-63	16	32	32	32	16	16	M16x1,50	26	1	83	64	24	1	5120	0,250

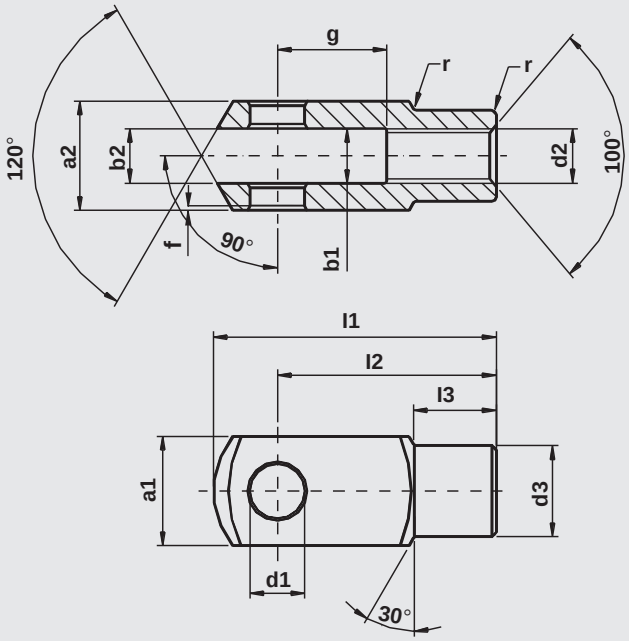
Yokes similar to DIN 71752 (measures not included in the norm)

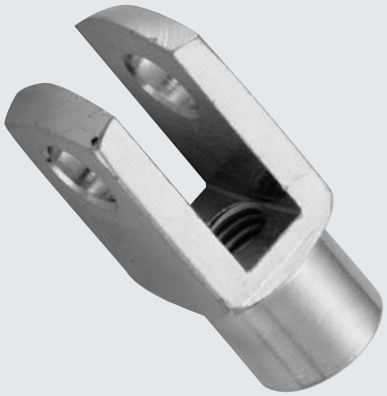
Designation	Cylinder	d1	g	a1	a2	b1	b2	d2	d3	f	l1	l2	l3	r	max load Co.(daN)	weight ≈ (kg)
		H9	±0,5	h11	+0,6 -0,2	B13		6H	±0,3	±0,2	±0,5		±0,3			
G20x40 FG INOX	80-100	20	40	40	40	20	20	M20x1,50	34	1	105	80	30	1	8000	0,550

For left-hand thread add LH (example G16x32 FGLH INOX)
Tolerance: b2 up to G10x20 B 13, from the G12x24 +0,7 +0,15
l2 up to G6x12 ±0,30, from the G6x24 ±0,40
Technical reading from page 19 to page 20

GA

YOKES ALUMINIUM DIN 71752





ALUMINIUM

Denomination	d1	g	a1	a2	b1	b2	d2	d3	f	l1	l2	l3	r	max load Co.(daN)	weight ≈ (kg)
	H9	±0,5	h11	+0,3 -0,16	B13		6H	±0,3	±0,2	±0,5		±0,2			
GA4x8	4	8	8	8	4	4	M4x0,70	8	0,5	21	16	6	0,5	190	0,001
GA5x10	5	10	10	10	5	5	M5x0,80	9	0,5	26	20	7,5	0,5	300	0,003
GA6x12	6	12	12	12	6	6	M6x1,00	10	0,5	31	24	9	0,5	430	0,005
GA8x16	8	16	16	16	8	8	M8x1,25	14	0,5	42	32	12	0,5	760	0,012
GA10x20	10	20	20	20	10	10	M10x1,50	18	0,5	52	40	15	0,5	1200	0,023
GA12x24	12	24	24	24	12	12	M12x1,75	20	0,5	62	48	18	0,5	1720	0,040
GA16x32	16	32	32	32	16	16	M16x2,00	26	1	83	64	24	1	3070	0,085

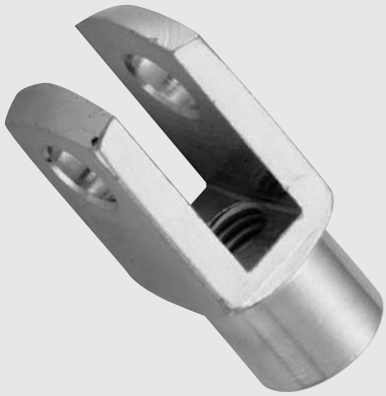
Yokes similar to DIN 71752 (measures not included in the norm)

Denomination	d1	g	a1	a2	b1	b2	d2	d3	f	l1	l2	l3	r	max load Co.(daN)	weight ≈ (kg)
	H9	±0,5	h11	+0,6 -0,2	B13		6H	±0,3	±0,2	±0,5		±0,3			
GA20x40	20	40	40	40	20	20	M20x2,50	34	1	105	80	30	1	4800	0,185

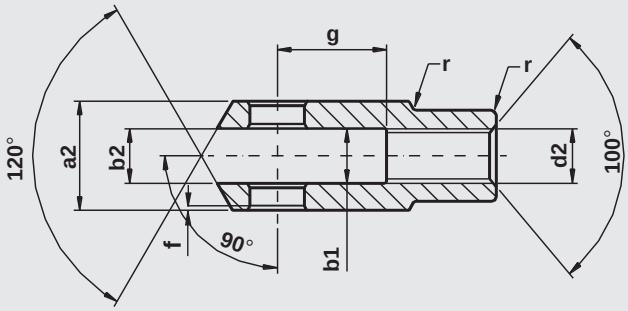
For left-hand thread add LH (example GA 16x32 LH)
Tolerance: b2 up to GA 10x20 B13, from 12x24 +0,7+0,15
l2 up to GA 6x12 ±0,30, from GA 8x16 ±0,40
Finishing: anodic oxidation. silver colour
Upon request: gold colour
black colour
Technical reading from page 19 to page 20

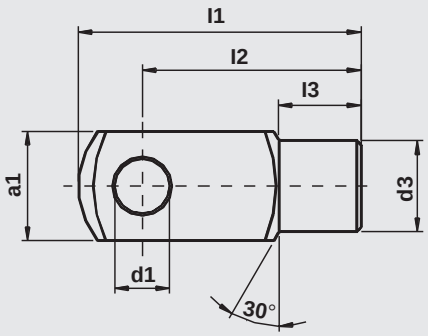
YOKES ALUMINIUM DIN 71752 thread ISO 8140 (CETOP)

GA/FG



ALUMINIUM





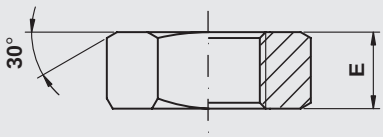
Denomination	Cylinder	d1	g	a1	a2	b1	b2	d2	d3	f	l1	l2	l3	r	max load Co.(daN)	weight ≈ (kg)
		H9	±0,5	h11	+0,3 -0,16	B13		6H	±0,3	±0,2	±0,5		±0,2			
GA4x8	8-10	4	8	8	8	4	4	M4x0,70	8	0,5	21	16	6	0,5	190	0,001
GA6x12	10-12	6	12	12	12	6	6	M6x1,00	10	0,5	31	24	9	0,5	430	0,005
GA8x16	20	8	16	16	16	8	8	M8x1,25	14	0,5	42	32	12	0,5	760	0,012
GA10x20 FG	25-32	10	20	20	20	10	10	M10x1,25	18	0,5	52	40	15	0,5	1200	0,023
GA12x24 FG	40	12	24	24	24	12	12	M12x1,25	20	0,5	62	48	18	0,5	1720	0,040
GA16x32 FG	50-63	16	32	32	32	16	16	M16x1,50	26	1	83	64	24	1	3070	0,085

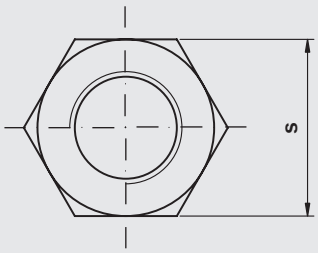
Yokes similar to DIN 71752 (measures not included in the norm)

Denomination	Cylinder	d1	g	a1	a2	b1	b2	d2	d3	f	l1	l2	l3	r	max load Co.(daN)	weight ≈ (kg)
		H9	±0,5	h11	+0,6 -0,2	B13		6H	±0,3	±0,2	±0,5		±0,3			
GA20x40 FG	80-100	20	40	40	40	20	20	M20x1,50	34	1	105	80	30	1	4800	0,185

For left-hand thread add LH (example GA 16x32 FG LH)
Tolerance: b2 up to GA 10x20 B13, from 12x24 +0,7+0,15
l2 up to GA 6x12 ±0,30, from GA 8x16 ±0,40
Finishing: anodic oxidation. silver colour
Upon request: gold colour
black colour
Technical reading from page 19 to page 20

REDUCED DICE UNI 5589

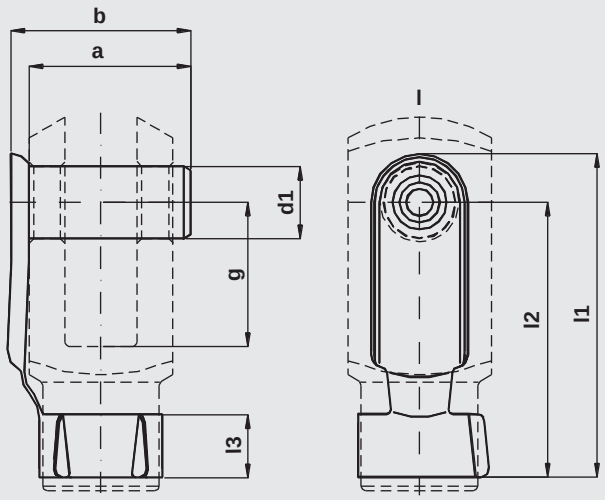




Diameter thread UNI 5589	s	E
8	13	5
10	17	6
12	19	7
14	22	8
16	24	8
18	27	9
20	30	9
22	32	10
24	36	10
27	41	12
30	46	12
33	50	14
36	55	14
39	60	16
42	65	16
45	70	18
48	75	18
52	80	20
56	85	22

LOCKABLE PINS for yokes series G, GFG and GA

PM

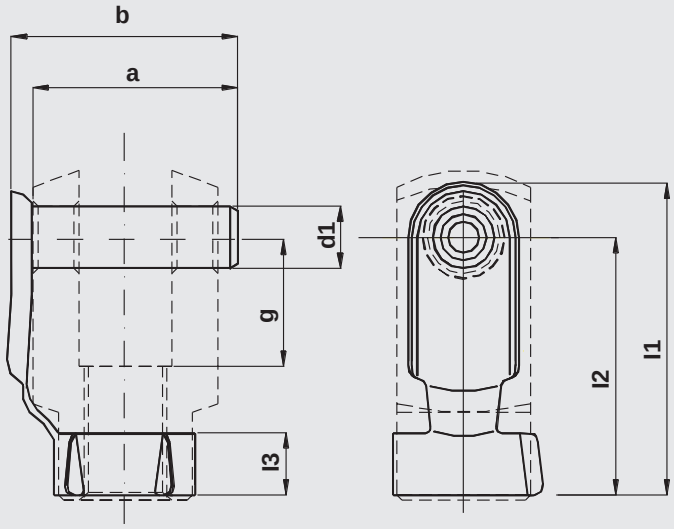


Designation	d1 h11	g	b	a	l1	l2	l3	weight ≈ (kg)
PM4x8	4	8	11	9	19	15	4	0,002
PM5x10	5	10	14	12	23	19	4,5	0,003
PM5x20	5	20	14	12	33	29	4,5	0,003
PM6x12	6	12	16	14	28	23	6	0,005
PM6x24	6	24	16	14	40	35	6	0,005
PM8x16	8	16	23	19	37	31	8	0,011
PM8x32	8	32	23	19	53	47	8	0,012
PM10x20	10	20	27	23	46	39	10	0,019
PM10x40	10	40	27	23	66	59	10	0,020
PM12x24	12	24	32	28	55	46	12	0,032
PM12x48	12	48	32	28	79	71	12	0,034
PM14x28	14	28	34	31	62	52	14	0,047
PM16x32	16	32	41	36	72	62	13	0,067
PM20x40	20	40	49	44	88	72	16	0,130

For zinc plated add 1A, yellow passivated 2C (ex. PM20x40 1A)
Zinc-plating: norm ISO 2081, standard FeZn8
Tolerance: b, a, l1, l2, l3 up to PM 5x20 ±0,1; from the PM 6x12 ±0,2
Tolerances refer to Zinc-plated lockable pins
Without any indications, the lockable pin will be provided unplated oiled
Technical reading from page 19 to page 20

PMC

LOCKABLE PINS for yokes ex CNOMO 06-07-14 serie GCN

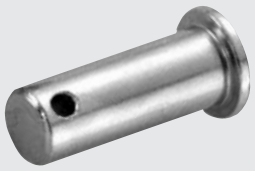


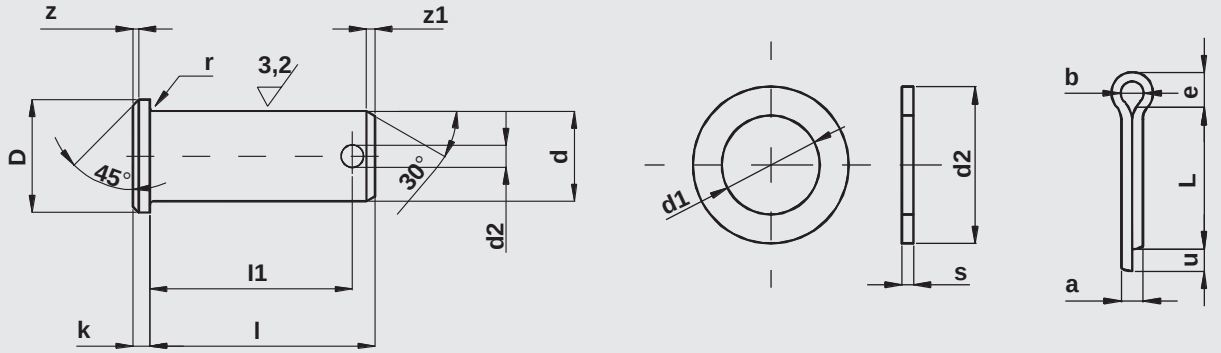
Designation	d1 h11	g	b	a	l1	l2	l3	weight ≈ (kg)
PMC 8x16	8	16	28	25	41	36	10	0,014
PMC 12x25	12	25	44	40	60	50	12	0,043
PMC 16x33	16	33	53	49	74	63	15	0,09
PMC 20x40	20	40	73	69	98	81	19	0,193

For zinc plated add 1A, yellow passivated 2C (ex. PMC 20x40 1A)
Zinc-plating: norm ISO 2081, standard FeZn8
Without any indications, the lockable pin will be provided unplated oiled
Tolerances refer to zinc plated lockable pins.
Technical reading from page 19 to page 20

PINS DIN 1434

PD





Designation	d	D*	k	z	z1	r	d2	l1	l	weight ≈ (kg)
	h11	h12	js14	≈	≈		H14	+0,5 0	+0,3 0	
PD 4	4	6	1	0,5	0,8	0,3	1	8	10	0,001
PD 5	5	7	1	0,5	0,8	0,3	1	10	12	0,001
PD 6	6	9	1,5	0,5	1	0,5	1,6	15	18	0,004
PD 8	8	12	2	1	1	0,5	2	19,5	23	0,009
PD 10	10	14	2	1	1,5	0,5	3,2	24,5	29	0,017
PD 12	12	17	3	1,5	2	0,5	4	29,5	35	0,030
PD 14	14	19	3	1,5	2,5	1	4	32,5	40	0,048
PD 16	16	21	3	1,5	2,5	1	4	37,5	45	0,067
PD 20	20	26	4	2	3	1	5	47	54	0,125
PD 25	25	32	5	2	3	1	6	59	67	0,260

* = not included in DIN 1434

WASHERS DIN 433

PDR

Designation	d1	d2	s	weight ≈ (kg x 1000 pz.)
	≈	≈	≈	
PDR 4	4,3	7,5	0,8	0,150
PDR 5	5,3	9,5	1	0,385
PDR 6	6,4	11	1,6	0,700
PDR 8	8,4	15	1,6	1,520
PDR 10	10,5	18	1,6	2,110
PDR 12	13	20	2	2,850
PDR 14	15	24	2	4,300
PDR 16	17	27	2	5,420
PDR 20	21	33	2,5	9,980
PDR 25	25	39	4	14,500

SPLIT PINS DIN 94

PDC

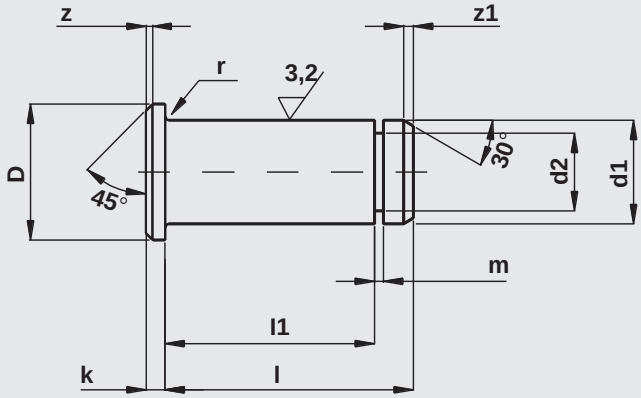
Designation	L	u	e	b	a
	≈	max	≈	max	max
PDC 4	10	1,5	2,5	1,5	1
PDC 5/6	10	2,5	4	3,6	1,6
PDC 8	16	3,2	6,4	5,8	2
PDC 10	20	4	8	7,4	3,2
PDC 12/16	32	4	8	7,4	4
PDC 20/25	32	4	10	9,2	4

For zinc plated add 1A, yellow passivated 2C (ex. PD 25 1A)
Zinc-plating: norm ISO 2081, standard FeZn8
Without any indications, the pin will be provided unplated oiled
Tolerances refer to zinc plated pins
Technical reading from page 19 to page 20

PKS

PINS PKS

for yokes Series G and GFG



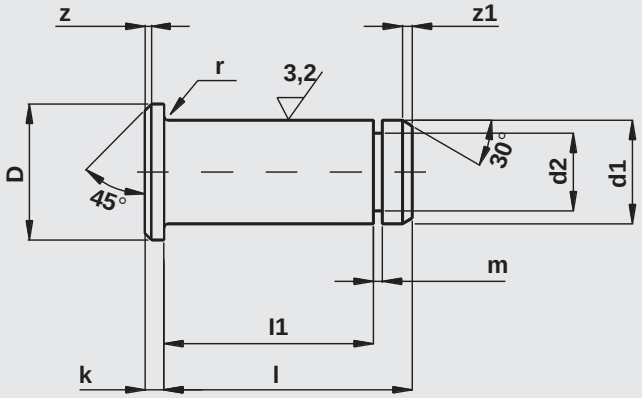
Designation	d1	D	k	z	z1	r	d2	m	l1	l	weight ≈ (kg)
	h11	h12	js14	≈	≈		h11	+0,1 0	+0,3 0	+0,3 0	
PKS 4	4	6	1	0,5	0,5	0,3	3,2	0,64	8,5	10,5	0,002
PKS 5	5	8	1,5	0,5	0,5	0,5	4	0,74	10,5	13	0,003
PKS 6	6	9	1,5	0,5	0,75	0,5	5	0,74	12,5	15,5	0,004
PKS 8	8	12	2	1	1	0,5	6	0,94	16,5	20	0,009
PKS10	10	14	2	1	1	0,5	8	1,05	20,5	25	0,017
PKS12	12	17	3	1,5	1,25	0,5	9	1,15	24,5	30	0,030
PKS14	14	19	3	1,5	1,5	1	10	1,25	27,5	33	0,048
PKS16	16	20	3	1,5	1,5	1	12	1,35	32,5	38,5	0,067
PKS20	20	26	4	2	1,5	1	17,5	1,8	40,5	46	0,125
PKS25	25	32	5	2	1,5	1	18	1,8	50,5	57	0,260

For zinc plated add 1A, yellow passivated 2C (ex. PKS 25 1A)
Zinc-plating: norm ISO 2081, standard FeZn8
Without any indications, the lockable pin will be provided unplated oiled
Tolerances refer to zinc plated pins.
Technical reading from page 19 to page 20

PINS ALUMINIUM

for yokes Series GA and GAFG

PKSAL



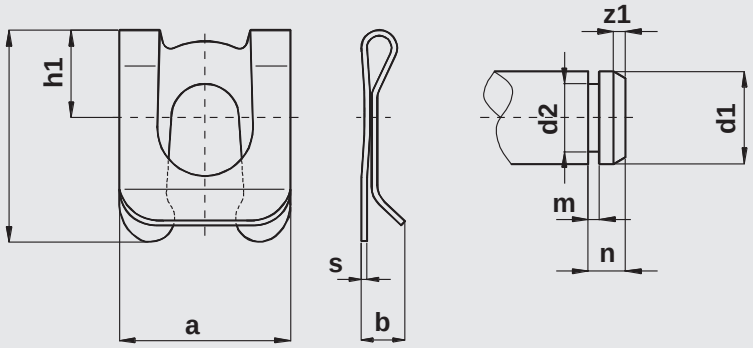
ALUMINIUM

Designation	d1	D	k	z	z1	r	d2	m	l1	l	weight ≈ (kg)
	h11	h12	js14	≈	≈		h11	+0,1 0	+0,3 0	+0,3 0	
PKSAL 4	4	6	1	0,5	0,5	0,3	3,2	0,64	8,5	10,5	0,001
PKSAL 5	5	8	1,5	0,5	0,50	0,5	4,0	0,74	10,5	13,0	0,001
PKSAL 6	6	9	1,5	0,5	0,75	0,5	5,0	0,74	12,5	15,5	0,002
PKSAL 8	8	12	2,0	1,0	1,00	0,5	6,0	0,94	16,5	20,0	0,003
PKSAL 10	10	14	2,0	1,0	1,00	0,5	8,0	1,05	20,5	25,0	0,006
PKSAL 12	12	17	3,0	1,5	1,25	0,5	9,0	1,15	24,5	30,0	0,010
PKSAL 16	16	20	3,0	1,5	1,50	1,0	12,0	1,35	32,5	38,5	0,023
PKSAL 20	20	26	4,0	2,0	1,50	1,0	17,5	1,8,	40,5	46,0	0,042

Finishing: anodic oxidation, silver colour
Upon request: gold colour - black colour
Technical reading from page 19 to page 20

SL

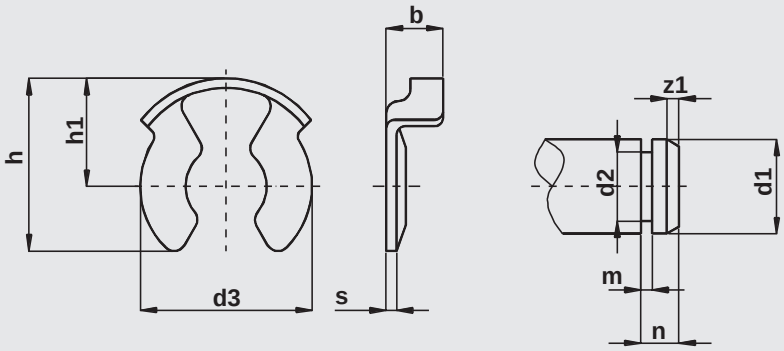
RETAINERS SL FOR PINS PKS



Designation	d1	a	h	h1	b	s	d2	m	n	z1	Max axial force daN x PKS	Max axial force daN x PKSAL
	h11	≈	≈	≈	≈		h11	+0,1 0	+0,3 0	≈		
SL 4	4	7	8,5	4	2,3	0,3	3,2	0,64	2	0,5	100	50
SL 5	5	9	10,7	5	3,3	0,4	4	0,74	2,5	0,5	130	65
SL 6	6	11	14,1	6	3,8	0,4	5	0,74	3	0,75	150	75
SL 8	8	14	17,5	8	4	0,5	6	0,94	3,5	1	360	180
SL10	10	18	22,1	10	5	0,5	8	1,05	4,5	1	640	320
SL12	12	22	26	12	5	0,5	9	1,15	5	1,25	960	480
SL14	14	25	30	13,5	6	0,6	10	1,25	5,5	1,5	1130	560
SL16	16	28	34	16	6	0,6	12	1,35	6	1,5	1350	670

KL

RETAINERS KL FOR PINS PKS

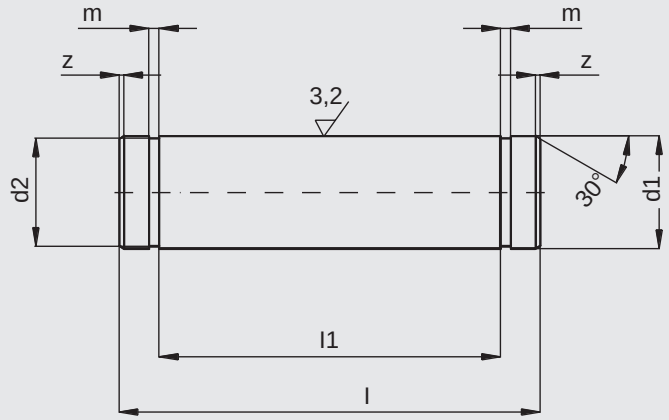


Designation	d1	d3	h	h1	b	s	d2	m	n	z1	Max axial force daN x PKS	Max axial force daN x PKSAL
	h11	≈	≈	≈			h11	+0,1 0	+0,3 0	≈		
KL 4	4	6,5	7	4,3	2,7	0,4	3,2	0,64	2	0,5	150	50
KL 5	5	7,5	8,7	5,2	2,8	0,5	4	0,74	2,5	0,5	300	65
KL 6	6	10,4	11,5	6,8	3,5	0,5	5	0,74	3	0,75	485	75
KL 8	8	11,5	12,1	7,2	4,1	0,5	6	0,94	3,5	1	550	180
KL10	10	15,6	16,3	9,5	5,9	0,6	8	1,05	4,5	1	950	320
KL12	12	16,7	18	10,5	6,1	0,6	9	1,15	5	1,25	1070	480
KL14	14	19	20	11,5	6,5	0,7	10	1,25	5,5	1,5	1270	560
KL16	16	22,7	23,5	13,8	7,8	0,8	12	1,35	6	1,5	1400	670
KL20-25	20-25	34,5	34	20	9	1	16-18	1,8	8	1,5	1600	720

For zinc plated add 1A, yellow passivated 2C (ex. SL 16 1A)
Zinc-plating: norm ISO 2081, standard FeZn8

PINS EX CNOMO

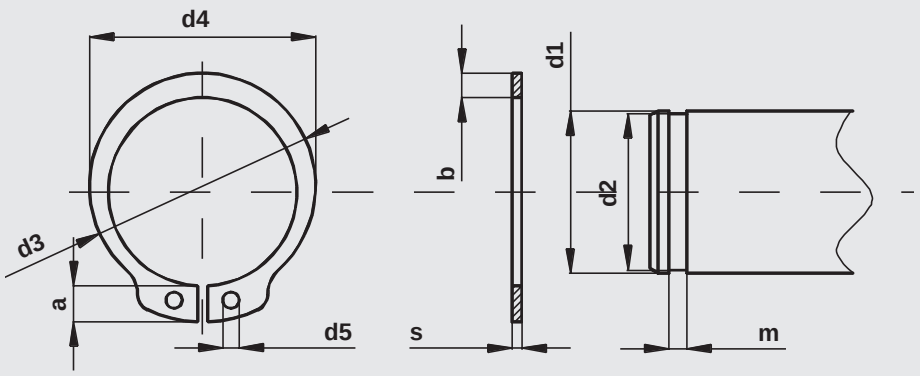
PC



Designation	d1	l	d2	l1	z	m	weight ≈ (kg)
	h11	+0,4 0	h11	+0,2 0	≈	H13	
PC 8	8	30	7,6	22	1	0,9	0,012
PC12	12	45	11,5	36	1	1,1	0,039
PC16	16	55	15,2	45	1	1,1	0,085
PC20	20	75	19	63	1	1,3	0,185
PC25	25	95	23,9	80	1	1,3	0,360

SEEGER DIN 471

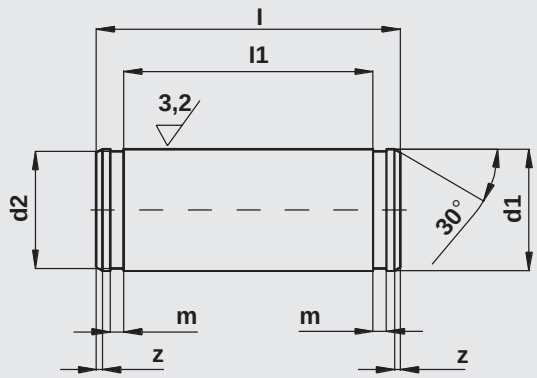
SE



Designation	s	d3	d4	d5 min.	a max	b ≈
SE 8	0,8	7,4	14,7	1,2	3,2	1,5
SE12	1	11	19	1,7	3,3	1,8
SE16	1	14,7	23,8	1,7	3,7	2,2
SE20	1,2	18,5	28,4	2	4	2,6
SE25	1,2	23,2	34,2	2	4,4	3,0

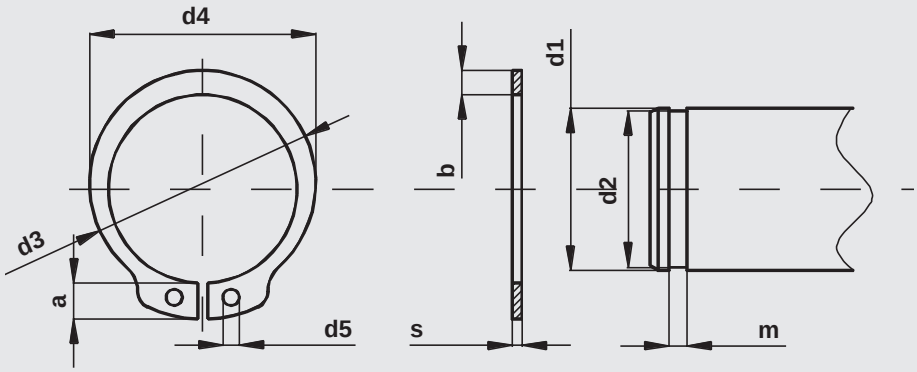
For zinc plated add 1A, yellow passivated 2C (ex. PC 25 1A)
Zinc-plating: norm ISO 2081, standard FeZn8
Without any indications, the pin will be provided unplated oiled

PI PINS ISO



Designation	d1 h11	l +0,4 0	d2 h11	l1 +0,2 0	z ≈	m H13	weight ≈ (kg)
PI 8	8	20	7,6	16,5	1	0,9	0,008
PI10	10	25	9,6	20,5	1	1,1	0,015
PI12	12	30	12	24,5	1	1,1	0,026
PI14	14	35	13	27,5	1	1,1	0,042
PI16	16	39	15	32,5	1	1,1	0,061
PI20	20	48	19	40,5	1	1,3	0,118
PI25	25	60	24	50,5	1	1,3	0,230
PI30	30	65	29	55,5	1	1,6	0,350
PI35	35	84	33	70,5	1	1,6	0,620

SE SEEGER DIN 471

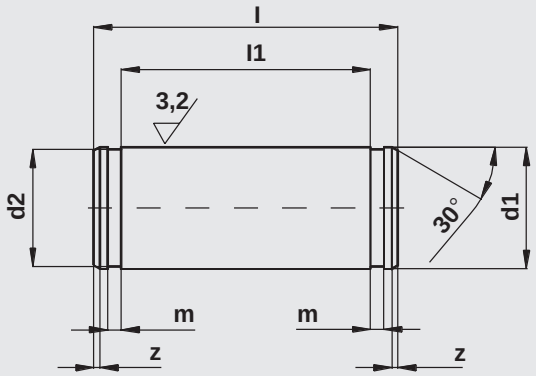


Designation	s	d3	d4	d5 min.	a max	b ≈
SE 8	0,8	7,4	14,7	1,2	3,2	1,5
SE10	1	9,3	17	1,5	3,3	1,8
SE12	1	11	19	1,7	3,3	1,8
SE14	1	12,9	21,4	1,7	3,5	2,1
SE16	1	14,7	23,8	1,7	3,7	2,2
SE20	1,2	18,5	28,4	2	4	2,6
SE25	1,2	23,2	34,2	2	4,4	3,0
SE30	1,5	27,9	40,5	2	5	3,5
SE35	1,5	32,2	46,8	2,5	5,6	3,9

For zinc plated add 1A, yellow passivated 2C (ex. PI 25 1A)
Zinc-plating: norm ISO 2081, standard FeZn8
Without any indications, the pin will be provided unplated oiled
Tolerances refer to zinc plated pins

PINS STAINLESS STEEL

PI inox

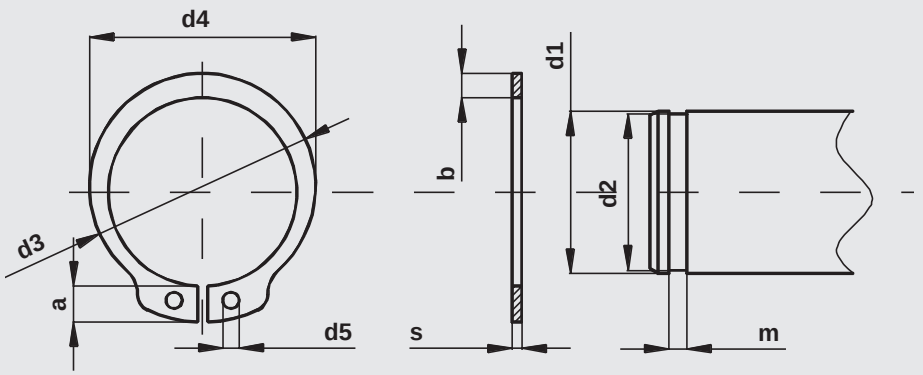


STAINLESS STEEL

Designation	d1 h11	l +0,4 0	d2 h11	l1 +0,3 0	z ≈	m H13	weight ≈ (kg)
PI 5 INOX	5	15	4,8	10,5	1	0,7	0,003
PI 6 INOX	6	17	5,7	12,2	1	0,8	0,005
PI 8 INOX	8	20	7,6	16,5	1	0,9	0,008
PI 10 INOX	10	25	9,6	20,5	1	1,1	0,015
PI 12 INOX	12	30	11,5	24,5	1	1,1	0,026
PI 16 INOX	16	39	15,2	32,5	1	1,1	0,061
PI 20 INOX	20	48	19	40,5	1	1,3	0,118

SEEGER STAINLESS STEEL DIN 471

SE inox

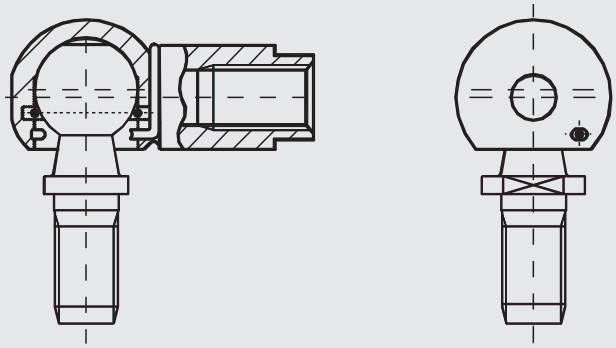


Designation	s	d3	d4	d5 min.	a max	b ≈
SE 5 INOX	0,6	4,7	10,3	1	2,5	1,1
SE 6 INOX	0,7	5,6	11,7	1,15	2,7	1,3
SE 8 INOX	0,8	7,4	14,7	1,2	3,2	1,5
SE 10 INOX	1	11	19	1,7	3,3	1,8
SE 12 INOX	1	11	19	1,7	3,3	1,8
SE 16 INOX	1	14,7	23,8	1,7	3,7	2,2
SE 20 INOX	1,2	18,5	28,4	2	4	2,6

STAINLESS STEEL

1. DESCRIPTION OF THE PRODUCT

Ball joints are mechanical units for the connection of two parts which are perpendicular with respect to each other; they allow the transmission of alternating forces with angular and oscillatory movements at a moderate speed.
They are standardised products which are produced according to the specifications and dimensional tables given on pages 40 to 41.
All our products can be supplied in a galvanised or unfinished.



2. TECHNICAL DATA

The ball joints are supplied in two types:
a) Type C, without the external safety spring S and therefore without the related external opening to receive the spring and without the two slots for the spring itself.
b) Type CS, with the safety spring mounted on the opening which blocks it and the two slots to house the spring itself.

- **Materials**

Ball stud:	carbon steel with resistance to traction of 60 daN/mm^2 and a ball tempered on the surface with hardness ≥ 52 HRc
Ball socket:	9SMnPb28 steel with resistance to traction of 50 daN/mm^2
Spring:	steel for springs
Lubrication:	ball coupling lubricated on assembly with LITHIUM grease, NLGI 1 grade

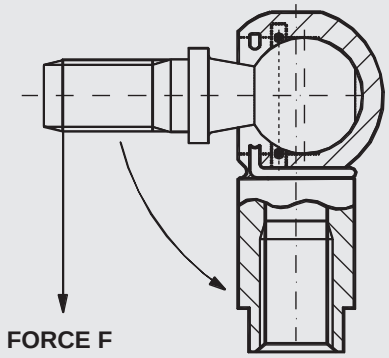
- **Force of extraction BALL STUD - BALL SOCKET**

The values of the force necessary to extract the ball stud from the ball socket seating with the spring "R" mounted, with the joint free of grease, are given in the following table:

Denomination	Minimum force (daN)
C 8 M5	3
CS 8 M5	3
C 10 M6	4
CS 10 M6	4
C 13 M8	6
CS 13 M8	6
C 16 M10	8
CS 16 M10	8
C 19 M14	10
CS 19 M14	10

• Sliding moment

In the stud-socket coupling (with grease), the stud in a horizontal position falls with a force F applied to the extremity of the stud thread (see drawing), according to the table below:



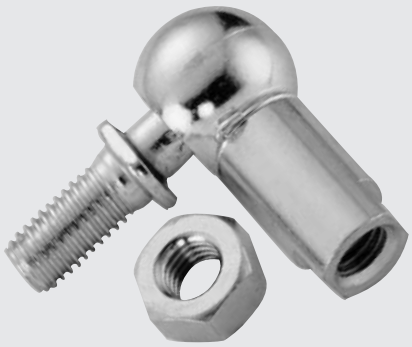
Denomination	Maximum force (daN)
C 8 M6	0,400
CS 8 M6	0,400
C 10 M6	0,500
CS 10 M6	0,500
C 13 M8	0,600
CS 13 M8	0,600
C 16 M10	0,700
CS 16 M10	0,700
C 19 M14	0,800
CS 19 M14	0,800

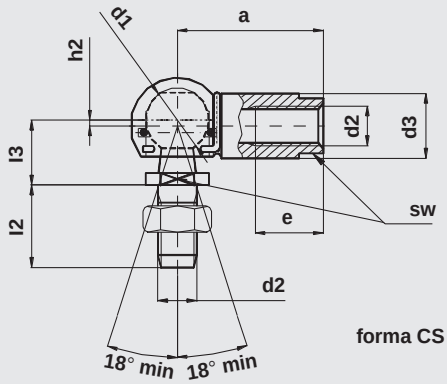
• Permissible load and tightening couple

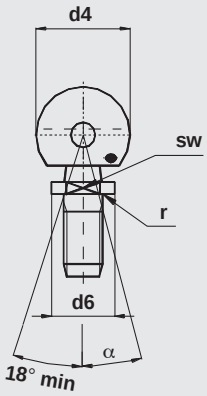
The maximum permissible load for the ball joint is given in the following table; it is also important to tighten the nut as indicated:

Denomination	Permissible load (daN)		Nut tightening torque dado (daN•m)
	static	dynamic	
C 8 M6	50	20	0,35
CS 8 M6	50	20	0,35
C 10 M6	100	40	0,74
CS 10 M6	100	40	0,74
C 13 M8	200	80	1,80
CS 13 M8	200	80	1,80
C 16 M10	400	160	3,50
CS 16 M10	400	160	3,50
C 19 M14	800	320	7,00
CS 19 M14	800	320	7,00

CS DIN 71802 Form CS



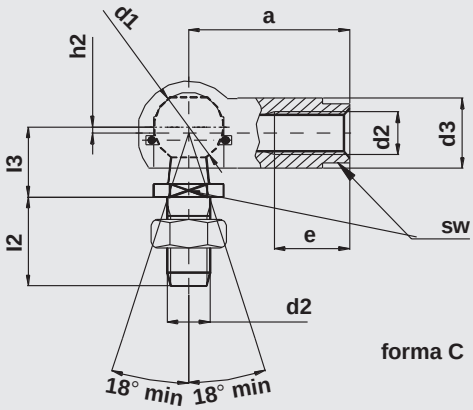


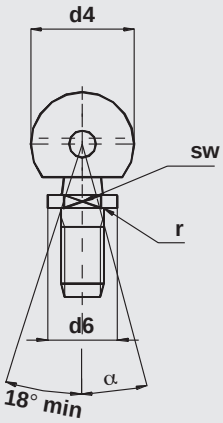


Designation	d1	d2	a	d3	d4	d6	e	h2	l2	l3	r	*sw	α°	weight (gr) form CS
			±0,3	±0,5	±0,5	h 14	min.	±0,5	±0,3	±0,3	max.	h14	≈	
CS8 M5	8	M5	22	8	12,8	8	10,2	0,65	10,0	9	0,3	7	10	15,2
CS10 M6	10	M6	25	10	14,8	10	11,5	0,70	12,5	11	0,3	8	12	25,2
CS13 M8	13	M8	30	13	19,3	13	14,0	1,15	16,5	13	0,5	11	12	53,1
CS16 M10	16	M10	35	16	24,0	16	15,5	1,15	20,0	16	0,5	13	12	103,8
CS19 M14X1,5	19	M14X1,5	45	19	30,0	19	21,5	0,50	28,0	20	0,8	/	15	220,9
CS19 M14X2	19	M14X2	45	19	30,0	19	21,5	0,50	28,0	20	0,8	/	15	220,9

* across flat
For left - hand thread add LH (ex. CS 16 LH)
For Zinc plated add 1A, yellow passivated 2C (ex. CS 16 1A)
Zinc-plating: norm ISO 2081, standard FeZn8
Ball stud according to tolerances Chiavette Unificate

C DIN 71802 Form C



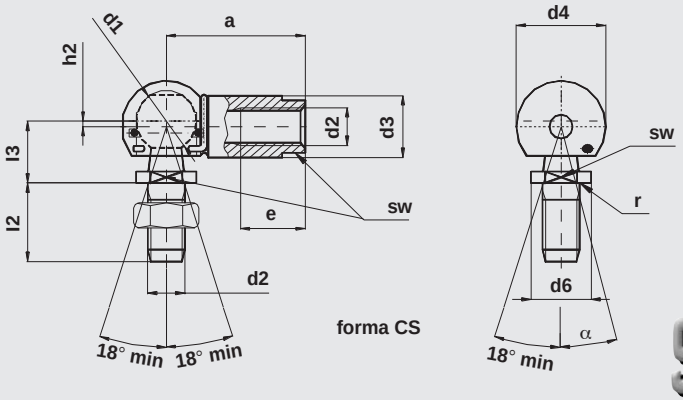


Designation	d1	d2	a	d3	d4	d6	e	h2	l2	l3	r	*sw	α°	weight (gr) form CS
			±0,3	±0,5	±0,5	h 14	min.	±0,5	±0,3	±0,3	max.	h14	≈	
C8 M5	8	M5	22	8	12,8	8	10,2	0,65	10,0	9	0,3	7	10	15,2
C10 M6	10	M6	25	10	14,8	10	11,5	0,70	12,5	11	0,3	8	12	25,0
C13 M8	13	M8	30	13	19,3	13	14,0	1,15	16,5	13	0,5	11	12	52,9
C16 M10	16	M10	35	16	24,0	16	15,5	1,15	20,0	16	0,5	13	12	103,5
C19 M14X1,5	19	M14X1,5	45	19	30,0	19	21,5	0,50	28,0	20	0,8	/	15	220,9
C19 M14X2	19	M14X2	45	19	30,0	19	21,5	0,50	28,0	20	0,8	/	15	220,9

* across flat
For left - hand thread add LH (ex. C 16 LH) - For Zinc plated add 1A, yellow passivated 2C (ex. C 16 1A)
Zinc-plating: norm ISO 2081, standard FeZn8.
Ball stud according to tolerances Chiavette Unificate

DIN 71802 Form CS STAINLESS STEEL

CSinox

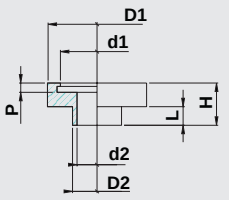


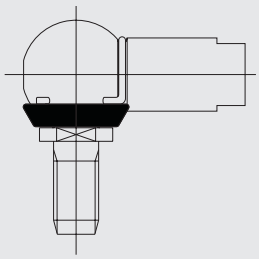
STAINLESS STEEL

Designation	d1	d2	a	d3	d4	d6	e	h2	l2	l3	r	*sw	α°	weight (gr) forma CS
			±0,3	±0,5	±0,5	h 14	min.	±0,5	±0,3	±0,3	max.	h14	≈	
CS8 M5 INOX	8	M5	22	8	12,8	8	10,2	0,65	10,0	9	0,2	/	10	15,2
CS10 M6 INOX	10	M6	25	10	14,8	10	11,5	0,70	12,5	11	0,3	/	12	25,2
CS13 M8 INOX	13	M8	30	13	19,3	13	14,0	1,15	16,5	13	0,5	/	12	53,1
CS16 M10 INOX	16	M10	35	16	24,0	16	15,5	1,15	20,0	16	0,5	/	12	103,8
CS19 M14X1,5 INOX	19	M14X1,5	45	19	30,0	19	21,5	0,50	28,0	20	0,8	/	15	220,9
CS19 M14X2 INOX	19	M14X2	45	19	30,0	19	21,5	0,50	28,0	20	0,8	/	15	220,9

* across flat
For left - hand thread add LH (ex. CS 16 M10 LH INOX)

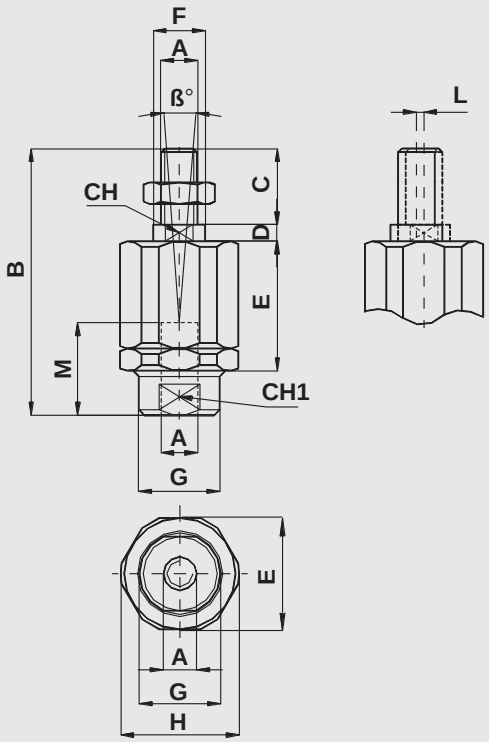
SEALING CUP (NEOPRENE)





Designation	Ø	D1	d1	D2	d2	H	L	P
SEALING CUP NEOPRENE	8	11,5	9	5,4	4	4,5	1,5	1,5
SEALING CUP NEOPRENE	10	13	10,5	6,9	5,5	6,5	3,5	1,5
SEALING CUP NEOPRENE	13	17	14	8,6	7	7,5	3,5	2
SEALING CUP NEOPRENE	16	21	17,5	10,5	9	8,5	4,5	2
SEALING CUP NEOPRENE	19	25	20	14,5	13	10	6	2

GB



Characteristics:
The self-aligning joint allows the compensation of angle bending and radial moves.

Designation	Cyl	A	B	C	D	E	F	G	H	L	M	CH*	ß°	CH1*	max load	weight (kg) Co (daN)
GB 6	12/16	M6x1	35	10	3,5	17,5	6	8,5	15	1	10	5	10	7	120	0,03
GB 8	25/30	M8x1,25	57	20	4	28,5	8	12,5	19	2	20	7	10	11	250	0,06
GB10x1,25	32	M10x1,25	71	20	5	35	14	22	32	2	20	12	10	19	500	0,22
GB10	32	M10x1,5	71	20	5	35	14	22	32	2	20	12	10	19	500	0,22
GB12x1,25	40	M12x1,25	75	24	5	35	14	22	32	2	20	12	10	19	500	0,23
GB12	40	M12x1,75	75	24	5	35	14	22	32	2	20	12	10	19	500	0,23
GB16x1,5	50/63	M16x1,5	103	32	8	54	22	32	45	2	32	20	10	30	1000	0,66
GB20x1,5	80/100	M20x1,5	119	40	8	54	22	32	45	2	40	20	10	30	1000	0,7

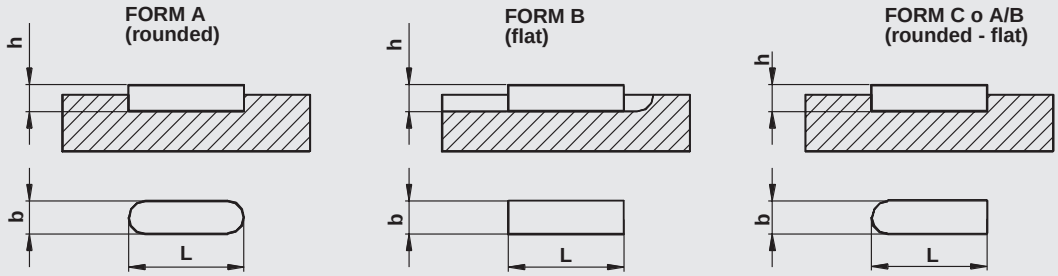
* across flat
Materiale: acciaio zincato bianco (ISO 2081, standard Fe Zn 8)
Zinc-plated steel 1A (ISO 2081, standard Fe Zn 8)

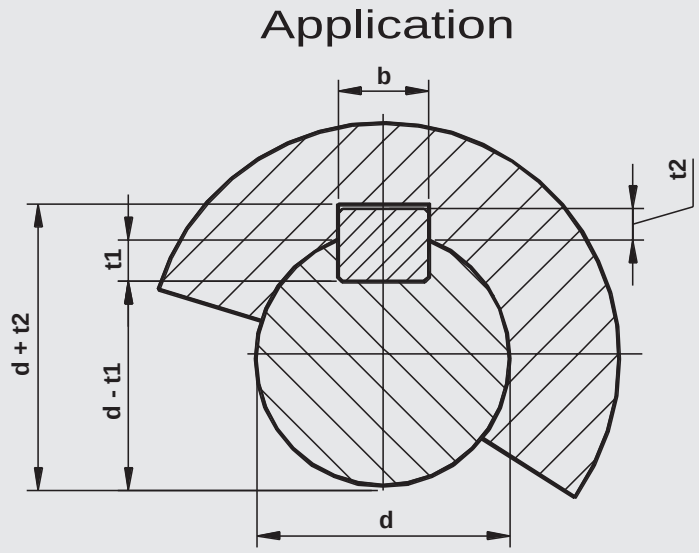
FEATHER KEYS

Feather keys are normally used for the transmission of a twisting moment from the shaft to the hub.

• Feather keys according to specification ISO 773 - UNI 6604-69 - DIN 6885

form A: has rounded ends, with radius equal to half the base
form B: has flat ends
form C or A/B: has rounded ends, with a flat ends





Material:
- C45 steel with R ≥ 59 daN/mm^2
- AISI 316 stainless steel with R ≥ 59 daN/mm^2

The relationship between the diameter of the shaft and the section of the key, indicated in the dimensional tables on page 44, refers to normal uses.
The use of keys with smaller sections is possible if their resistance is sufficient for the force to be transmitted.
The use of keys with larger sections is not recommended.
In case of particular need forms A and B can be combined: that is, with one end rounded and the other flat.
In that case the symbol for the form is C or AB.

Table of tolerances for keys and housing slots (mm)

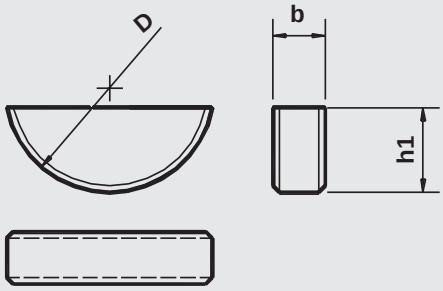
Field of application		key			Slot										
		Section			Width							Depth			
Diameter of shaft		Nominal Diment	Tolerances on		Nominal Diment	Tolerances on **b**						shaft		hub	
						for shaft			for hub			t1		t2	
d		**b x h**	**b^{h9}**	**h***	**b**	H9	N9	P9	D10	Js9	P9	Nom	Tol.	Nom	Tol.
from	6	2 x 2	0 -0,025	0 -0,025	2	+0,025 0	-0,004 0	-0,006 -0,031	+0,060 +0,020	±0,012	-0,006 -0,031	1,2		1	
over up to	8 10	3 x 3			3							1,8		1,4	
over up to	10 12	4 x 4	0 -0,030	0 -0,030	4	+0,030 0	0 -0,030	-0,012 -0,042	+0,078 +0,030	±0,015	-0,012 -0,042	2,5	+0,1 0	1,8	+0,1 0
over up to	12 17	5 x 5			5							3		2,3	
over up to	17 22	6 x 4			6							2,5		1,8	
over up to	17 22	6 x 5			6							3		2,3	
over up to	17 22	6 x 6			6							3,5		3,5	
over up to	22 30	8 x 5	0 -0,036		8	+0,036 0	0 -0,036	-0,015 -0,051	+0,098 +0,040	±0,018	-0,015 -0,051	3		2,3	
over up to	22 30	8 x 6			8							3,5		2,8	
over up to	22 30	8 x 7		0 -0,090	8							4	+0,2 0	3,3	+0,2 0
over up to	22 30	8 x 8			8							5		3,3	
over up to	30 38	10 x 8			10							5		3,3	
over up to	30 38	10 x 10			10							6		4,3	
over up to	38 44	12 x 8	0 -0,043		12	+0,043 0	0 -0,043	-0,018 -0,061	+0,120 +0,050	±0,021	-0,018 -0,061	5		3,3	
over up to	38 44	12 x 12		0 -0,110	12							7,5		4,9	
over up to	44 50	14 x 9		0 -0,090	14							5,5		3,8	
over up to	44 50	14 x 14		0 -0,110	14							9		5,4	
over up to	50 58	16 x 10		0 -0,090	16							6		4,3	
over up to	58 60	18 x 11		0 -0,110	18							7		4,4	
over up to	65 75	20 x 12	0 -0,052		20	+0,052 0	0 -0,052	-0,022 -0,074	+0,149 +0,065	±0,026	-0,022 -0,074	7,5		4,9	
over up to	75 85	22 x 14			22							9		5,4	
over up to	85 95	25 x 14			25							9		5,4	
over up to	95 110	28 x 16			28							10		6,4	
over up to	110 130	32 x 18	0 -0,062	0 -0,130	32	+0,062 0	0 -0,062	-0,026 -0,088	+0,180 +0,080	±0,031	-0,026 -0,088	11		7,4	
over up to	130 150	36 x 20			36							12	+0,3 0	8,4	+0,3 0
over up to	150 170	40 x 22			40							13		9,4	
over up to	170 200	45 x 25			45							15		10,4	
over up to	200 230	50 x 28			50							17		11,4	
over up to	230 260	56 x 32	0 -0,074	0 -0,160	56	+0,074 0	0 -0,074	-0,032 -0,106	+0,220 +0,100	±0,037	-0,032 -0,106	20		12,4	
over up to	260 290	63 x 32			63							20		12,4	
over up to	290 330	70 x 36			70							22		14,4	
over up to	330 380	80 x 40			80							25		15,4	
over up to	380 440	90 x 45	0 -0,087		90	+0,087 0	0 -0,080	-0,037 -0,124	+0,260 +0,120	±0,043	-0,037 -0,124	28		17,4	
over up to	440 500	100 x 50			100							31		19,5	

* Tolerance: **h9** for the square section and **h11** for the rectangular section.

Table of tolerances on length l (mm):

Lengths		Tolerance of the key	Tolerance of slot
up to	28	0 -0,20	+0,20 0
over up to	28 80	0 -0,30	+0,30 0
over	80	0 -0,50	+0,50 0

• Woodruff keys according to specification ISO 3912 - DIN 6888 - UNI 6606



Material:
- C45 steel with R ≥ 59 daN/mm²

The relationship between the diameter of the shaft and the section of the keys, indicated in the dimensional tables, refers to normal uses.
The use of keys with smaller sections is possible if their resistance is sufficient for the force to be transmitted.
The use of keys with larger sections is not recommended.

Table of tolerances for the woodruff keys (mm):

diameter shaft d				Standard keys bxh1xD or equival. form	KEYS							
Transmiss. couple		For positioning			Base **b**		Height **h1**		Diameter **D**		Chamfer/radius	
>	<	>	<		nom.	tol. h9	nom.	tol.h11	nom.	tol.h12	Min.	Max.
3	4	3	4	1,0x1,4x 4	1,0	0 -0,025	1,4	0 -0,060	4	0 -0,120	0,16	0,25
4	5	4	6	1,5x2,6x7	1,5		2,6		7	0 -0,150		
5	6	6	8	2,0x2,6x7	2,0		2,6		7			
6	7	8	10	2,0x3,7x10	2,0		3,7	0 -0,075	10			
7	8	10	12	2,5x3,7x10	2,5		3,7		10			
8	10	12	15	3,0x5,0x13	3,0		5,0		13	0 -0,180		
10	12	15	18	3,0x6,5x16	3,0		6,5	0 -0,090	13			
12	14	18	20	4,0x6,5x16	4,0	0 -0,030	6,5		16		0,25	0,40
14	16	20	22	4,0x7,5x19	4,0		7,5		19	0 -0,210		
16	18	22	25	5,0x6,5x16	5,0		6,5		16	0 -0,210		
18	20	25	28	5,0x7,5x19	5,0		7,5		19	0 -0,210		
20	22	28	32	5,0x9,0x22	5,0		9,0		22			
22	25	32	36	6,0x9,0x22	6,0		9,0		22			
25	28	36	40	6,0x10,0x25	6,0		10,0		25			
28	32	40	-	8,0x11,0x28	8,0	0 -0,036	11,0	0 -0,110	28			
32	38	-	-	10,0x13,0x32	10,0		13,0		32	0 -0,210	0,40	0,60
For keys of no-standard dimensions, the tolerances remain the same.												

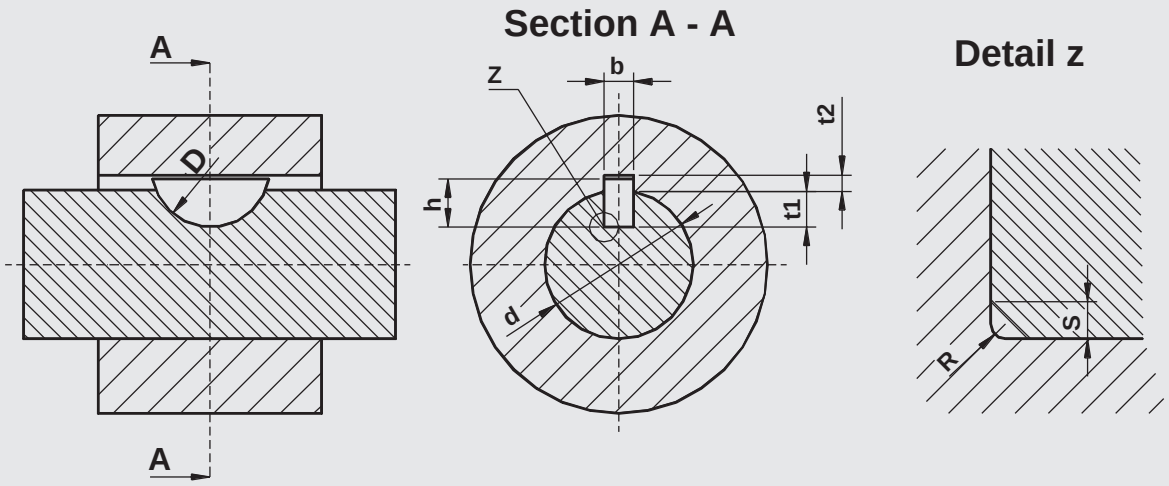
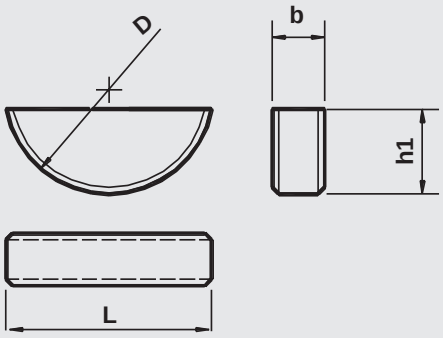
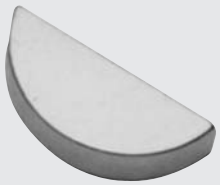


Table of tolerances slot for the woodruff keys(mm):

diameter shaft d				Standard keys bxh1xD or equival. form	Slot									
transmiss. couple		for positioning.			Base **b**				depth				radius **R**	
					nom.	Type of coupling			shaft		hub			
						uncertain		blocked						
≥	≤	≥	≤			shaft	hub	shaft/hub	**t1**		**t2**		max	min
						tol. N9	tol. Js9	tol. P9	nom.	tol.	nom.	tol.		
3	4	3	4	1,0x1,4x4	1,0				1,0		0,6			
4	5	4	6	1,5x,6x7	1,5				2,0	+0,1	0,8			
5	6	6	8	2,0x2,6x7	2,0	-0,004	+0,012	-0,006	1,8	0	1,0		0,16	0,08
6	7	8	10	2,0x3,7x10	2,0	-0,029	-0,012	-0,031	2,9		1,0			
7	8	10	12	2,5x3,7x10	2,5				2,7		1,2			
8	10	12	15	3,0x5,0x13	3,0				3,8		1,4	+0,1		
10	12	15	18	3,0x6,5x16	3,0				5,3		1,4	0		
12	14	18	20	4,0x6,5x16	4,0				5,0	+0,2	1,8			
14	16	20	22	4,0x7,5x19	4,0				6,0	0	1,8			
16	18	22	25	5,0x6,5x16	5,0				4,5		2,3		0,25	0,16
18	20	25	28	5,0x7,5x19	5,0	0	+0,015	-0,012	5,5		2,3			
20	22	28	32	5,0x9,0x22	5,0	-0,030	-0,015	-0,042	7,0		2,3			
22	25	32	36	6,0x9,0x22	6,0				6,5		2,8			
25	28	36	40	6,0x10,0x25	6,0				7,5	+0,3	2,8			
28	32	40	-	8,0x11,0x28	8,0	0	+0,018	-0,015	8,0	0	3,3	+0,2		
32	38	-	-	10,0x13,0x32	10,0	-0,036	-0,018	-0,051	10,0		3,3	0	0,40	0,25
For keys of no-standard dimensions, the tolerances remain the same														

WOODRUFF KEYS ISO 3912 - UNI 6606 - DIN 6888

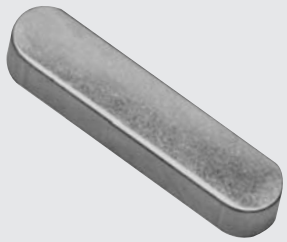




Designation	b^{h9}	h_1^{h11}	L mm	D^{h12} mm	Weight 100 pz. (kg)
KEY 2X3,7	2	3,7	9,66	10	0,034
KEY 2,5X3,7	2,5	3,7	9,66	10	0,047
KEY 3X3,7	3	3,7	9,66	10	0,060
KEY 2X5	2	5	12,65	13	0,070
KEY 3X5	3	5	12,65	13	0,108
KEY 4X5	4	5	12,65	13	0,141
KEY 3X6,5	3	6,5	15,72	16	0,171
KEY 4X6,5	4	6,5	15,72	16	0,231
KEY 5X6,5	5	6,5	15,72	16	0,290
KEY 3X7,5	3	7,5	18,57	19	0,234
KEY 4X7,5	4	7,5	18,57	19	0,308
KEY 5X7,5	5	7,5	18,57	19	0,397
KEY 4X9	4	9	21,63	22	0,442
KEY 5X9	5	9	21,63	22	0,556
KEY 6X9	6	9	21,63	22	0,556
KEY 5X10	5	10	24,49	25	0,704
KEY 6X10	6	10	24,49	25	0,837
KEY 6X11	6	11	27,35	28	1,390
KEY 8X11	8	11	27,35	28	1,850
KEY 6X13	6	13	31,42	32	1,400
KEY 8X13	8	13	31,42	32	1,420
KEY 8X15	8	15	37,15	38	2,500
KEY 8X16	8	16	43,8	45	3,100
KEY 10X16	10	16	43,08	45	4,120

Technical reading from page 43 to page 46

FEATHER KEYS ISO 773 - UNI 6604 - DIN 6885

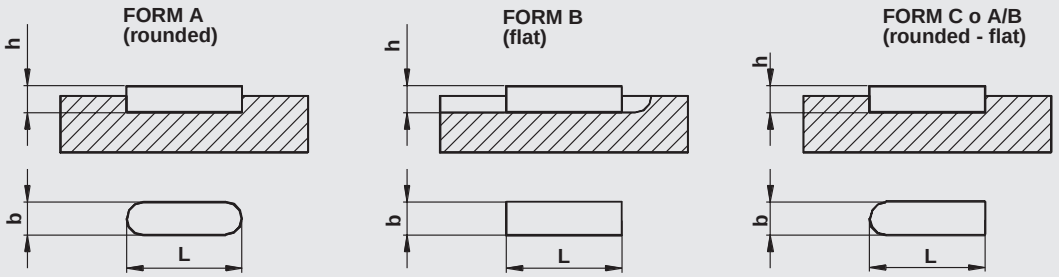


Note: the weight refers to the type A
Technical reading from page 43 to page 46

b x h																
3 x 3	8	10	12	14	15	16	18	20	22	25	28	30	32	35	36	40
Kg/100 pz.	0,0520	0,0662	0,0804	0,0944	0,1070	0,1085	0,1225	0,1365	0,1505	0,1725	0,1935	0,2140	0,2215	0,2425	0,2495	0,2772
4 x 4	8	10	12	14	15	16	18	20	22	25	28	30	32	35	36	40
Kg/100 pz.	0,0902	0,1152	0,1402	0,1652	0,1825	0,1902	0,2152	0,2402	0,2652	0,3032	0,3412	0,3650	0,3912	0,4278	0,4412	0,4912
5 x 5	8	10	12	14	15	16	18	20	22	25	28	30	32	35	36	40
Kg/100 pz.	0,1391	0,1739	0,2139	0,2539	0,2720	0,2929	0,3319	0,3709	0,4109	0,4699	0,5289	0,5666	0,6069	0,6558	0,6849	0,7639
6 x 4	10	12	14	15	16	18	20	22	25	28	30	32	35	36	40	45
Kg/100 pz.	0,1703	0,2043	0,2384	0,2601	0,2774	0,3121	0,3468	0,3815	0,4335	0,4855	0,5202	0,5549	0,6069	0,6242	0,6936	0,7803
6 x 5	10	12	14	15	16	18	20	22	25	28	30	32	35	36	40	45
Kg/100 pz.	0,2128	0,2554	0,2980	0,3251	0,3468	0,3902	0,4335	0,4769	0,5419	0,6069	0,6503	0,6936	0,7586	0,7803	0,8670	0,9754
6 x 6	10	12	14	15	16	18	20	22	25	28	30	32	35	36	40	45
Kg/100 pz.	0,2554	0,3065	0,3576	0,3901	0,4156	0,4726	0,5196	0,5856	0,6706	0,7546	0,8009	0,8676	0,9590	0,9836	1,0936	1,2336
8 x 5	12	14	15	16	18	20	22	25	28	30	32	35	36	40	45	50
Kg/100 pz.	0,3416	0,3985	0,4270	0,4555	0,5124	0,5693	0,6263	0,7117	0,7971	0,8540	0,9109	0,9963	1,0248	1,1386	1,2810	1,4233
8 x 6	12	14	15	16	18	20	22	25	28	30	32	35	36	40	45	50
Kg/100 pz.	0,4100	0,4783	0,5125	0,5467	0,6150	0,6833	0,7517	0,8542	0,9567	1,0250	1,0933	1,1958	1,2300	1,3667	1,5375	1,7083
8 x 7	12	14	15	16	18	20	22	25	28	30	32	35	36	40	45	50
Kg/100 pz.	0,4783	0,5581	0,5979	0,6378	0,7175	0,8045	0,8915	1,0245	1,1545	1,2439	1,3345	1,4527	1,5045	1,6845	1,9045	2,1245
8 x 8	15	16	18	20	22	25	28	30	32	35	36	40	45	50	55	56
Kg/100 pz.	0,6786	0,7238	0,8143	0,9048	0,9953	1,1310	1,2667	1,3572	1,4477	1,5834	1,6286	1,8096	2,0358	2,2620	2,4882	2,5334
10 x 8	15	16	18	20	22	25	28	30	32	35	36	40	45	50	55	56
Kg/100 pz.	0,848	0,905	1,018	1,131	1,245	1,435	1,625	1,757	1,875	2,065	2,125	2,375	2,695	3,005	3,324	3,385
10 x 10	15	20	22	25	28	30	32	35	36	40	45	50	55	56	60	63
Kg/100 pz.	1,060	1,414	1,555	1,767	1,979	2,121	2,262	2,474	2,545	2,828	3,181	3,534	3,888	3,959	4,241	4,453
12 x 8	15	20	22	25	28	30	32	35	36	40	45	50	55	56	60	63
Kg/100 pz.	1,026	1,368	1,505	1,710	1,916	2,077	2,216	2,446	2,516	2,816	3,196	3,576	3,954	4,026	4,339	4,556
12 x 12	20	22	25	28	30	32	35	36	40	45	50	55	56	60	63	65
Kg/100 pz.	2,052	2,257	2,565	2,873	3,078	3,283	3,591	3,694	4,104	4,617	5,130	5,643	5,746	6,156	6,464	6,669
14 x 9	20	22	25	28	30	32	35	36	40	45	50	55	56	60	63	65
Kg/100 pz.	1,813	1,994	2,266	2,538	2,719	2,900	3,172	3,263	3,663	4,153	4,653	5,057	5,243	5,615	5,933	6,150
14 x 14	30	35	40	45	50	55	56	60	63	65	70	80	85	90	100	110
Kg/100 pz.	4,23	4,93	5,64	6,34	7,05	7,75	7,90	8,46	8,88	9,16	9,87	11,28	11,98	12,69	14,10	15,51
16 x 10	30	35	40	45	50	55	56	60	63	65	70	80	85	90	100	110
Kg/100 pz.	3,43	4,00	4,57	5,22	5,85	6,43	6,60	7,07	7,48	7,77	8,37	9,57	10,27	10,87	12,17	13,37
18 x 11	30	40	45	50	55	56	60	63	65	70	75	80	90	100	110	120
Kg/100 pz.	4,30	5,74	6,45	7,17	7,88	8,10	8,65	9,19	9,56	10,30	11,06	11,80	13,40	14,90	16,50	17,80
20 x 12	40	45	50	55	56	60	63	70	80	90	100	110	120	125	130	140
Kg/100 pz.	6,80	7,65	8,50	9,62	9,79	10,30	11,09	12,39	14,29	16,19	17,99	19,89	21,50	22,69	23,20	25,59
22 x 14	50	55	60	63	70	80	90	100	110	120	125	130	140	150	160	180
Kg/100 pz.	10,83	11,92	13,00	14,06	15,76	18,16	20,66	23,06	25,46	27,60	29,06	30,00	32,66	34,50	37,56	42,36
24 x 14	60	63	70	80	90	100	110	120	125	130	140	150	160	180	200	220
Kg/100 pz.	14,40	15,10	17,00	19,50	22,50	24,80	27,40	30,00	31,50	32,80	35,20	38,00	40,50	48,00	51,00	55,00
25 x 14	60	63	70	80	90	100	110	120	125	130	140	150	160	180	200	220
Kg/100 pz.	13,90	15,60	17,73	20,53	23,23	26,03	28,73	31,00	32,83	34,00	37,03	39,30	42,53	48,03	53,53	58,93
28 x 16	55	60	70	80	90	100	110	120	125	130	140	145	150	160	180	200
Kg/100 pz.	17,44	19,03	22,20	25,99	29,59	33,09	36,59	39,50	41,89	43,50	47,09	48,77	50,30	54,19	61,19	68,19
32 x 18	65	70	80	90	100	110	120	125	130	140	150	160	170	180	200	220
Kg/100 pz.	27,15	29,24	33,41	37,59	42,09	47,59	49,50	53,39	55,50	60,19	64,00	69,19	73,94	78,29	87,29	96,39
36 x 20	80	90	100	110	120	125	130	140	150	160	170	180	200	220	250	280
Kg/100 pz.	41,33	46,50	52,13	57,83	63,00	66,23	68,50	74,73	79,80	86,03	92,21	97,63	108,63	119,63	136,63	153,63
40 x 22	70	90	100	110	120	125	130	140	150	160	180	200	220	240	250	280
Kg/100 pz.	43,79	56,30	62,80	70,07	76,30	80,37	83,00	90,77	96,60	105,07	118,07	132,07	146,07	160,39	167,07	187,07
45 x 25	100	110	120	125	130	140	150	160	180	200	220	240	245	250	260	280
Kg/100 pz.	80,00	88,00	96,50	101,47	105,00	115,47	122,00	132,47	150,47	168,47	185,47	202,33	206,55	212,47	219,19	238,47
50 x 28 Kg/100 pz.	**available upon request**															

Inches measures upon request

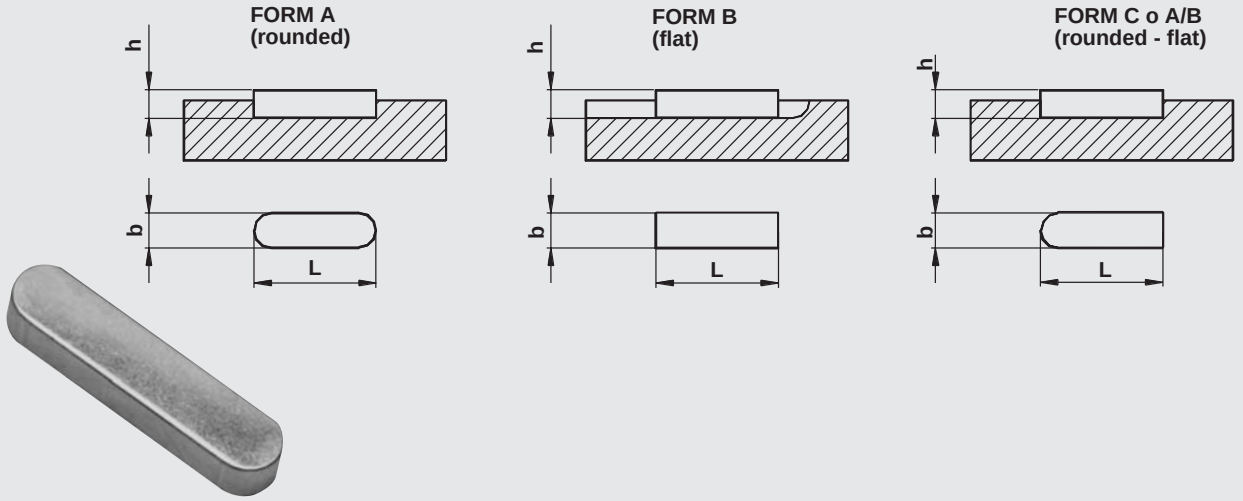
FEATHER KEYS



L mm																	slots	
45 0,3118	50 0,3444																1,8	d+1,4
45 0,5542	50 0,6157	60 0,7388	70 0,8620	80 0,9851													2,5	d+1,8
45 0,8619	50 0,9599	55 1,0572	56 1,0789	60 1,1559	65 1,2522	70 1,3521	80 1,5453	100 1,9316	140 2,7042								3	d+2,3
50 0,8670	55 0,9537	56 0,9710	60 1,0404	65 1,1271	70 1,2138	75 1,3005	80 1,3872	90 1,5606	100 1,7340	110 1,9074	120 2,0808						2,5	d+1,8
50 1,0838	55 1,1921	56 1,2138	60 1,3005	65 1,4089	70 1,5173	75 1,6256	80 1,7340	90 1,9508	100 2,1675	110 2,3843	120 2,6010						3	d+2,3
50 1,3736	55 1,5160	56 1,5436	60 1,6538	65 1,8048	70 1,9436	75 2,0824	80 2,2212	90 2,4989	100 2,7765	110 3,0542	120 3,3318						3,5	d+2,8
55 1,5656	56 1,5941	60 1,7079	63 1,7933	65 1,8503	70 1,9926	75 2,1349	80 2,2773	85 2,4196	90 2,5619	100 2,8466	110 3,1312	120 3,4159	130 3,7005	140 3,9852	150 4,2699		3	d+2,3
55 1,8792	56 1,9133	60 2,0500	63 2,1525	65 2,2208	70 2,3917	75 2,5625	80 2,7333	85 2,9042	90 3,0750	100 3,4167	110 3,7583	120 4,1000	130 4,4417	140 4,7833	150 5,1250		3,5	d+2,8
55 2,3419	56 2,3845	60 2,5661	63 2,6945	65 2,7800	70 3,0045	75 3,2191	80 3,4445	85 3,8845	90 3,8845	100 4,3161	110 5,1793	120 5,6502	130 6,1210	140 6,5918	150 7,0627		4	d+3,3
60 2,7144	63 2,8501	65 2,9406	70 3,1668	75 3,3930	80 3,6192	90 4,0716	100 4,5240	110 4,9764	120 5,4288	130 5,8812	135 6,1074	140 6,3336	145 6,5598	150 6,7860	160 7,2384	180 8,1432	5	d+3,3
60 3,642	63 3,825	65 3,960	70 4,265	75 4,570	80 4,885	90 5,515	100 6,145	110 6,775	120 7,390	130 8,006	135 8,314	140 8,622	145 8,930	150 9,237	160 9,853	180 11,085	5	d+3,3
65 4,595	70 4,948	75 5,302	80 5,655	85 6,008	90 6,362	95 6,715	100 7,069	110 7,776	120 8,483	130 9,189	140 9,896	150 10,603	200 14,138				6	d+4,3
65 4,723	70 5,086	75 5,471	80 5,836	85 6,220	90 6,586	95 6,979	100 7,346	110 8,096	120 8,830	130 9,565	140 10,406	150 11,149	200 14,866				5	d+3,3
70 7,182	75 7,695	80 8,208	90 9,234	100 10,260	110 11,286	115 11,799	120 12,312	125 12,825	130 13,338	140 14,364	150 15,390	160 16,416	180 18,468	200 20,520			7,5	d+4,9
70 6,623	75 7,137	80 7,613	90 8,603	100 9,593	110 10,600	115 11,084	120 11,566	125 12,103	130 12,496	140 13,503	150 14,384	160 15,343	180 17,261	200 19,179			5,5	d+3,8
115 16,21	120 16,92	125 17,62	130 18,32	140 19,73	150 21,14	160 22,55	200 28,19	210 29,60									9	d+5,4
115 13,80	120 14,40	125 15,27	130 15,70	140 17,17	150 18,20	160 19,41	200 24,26	210 25,48									6	d+4,3
125 18,80	130 19,50	140 21,20	150 22,40	160 24,3	180 27,338	200 30,375											7	d+4,4
150 26,90	160 29,29	180 33,09	200 36,89	220 40,58	250 46,11												7,5	d+4,9
200 47,26	220 52,06	250 59,26															9	d+5,4
250 64,00																	9	d+5,4
250 67,23	280 75,30																9	d+5,4
220 75,29	250 85,89	280 96,39	300 101,00														10	d+6,4
230 101,10	250 109,89	280 123,89	300 132,00	310 137,692	360 159,9												11	d+7,4
300 164,50																	12	d+8,4
300 200,00	320 213,33	400 266,67															13	d+9,4
300 245,00																	15	d+10,4

available upon request

FEATHER KEYS ISO 773 - UNI 6604 - DIN 6885 STAINLESS STEEL

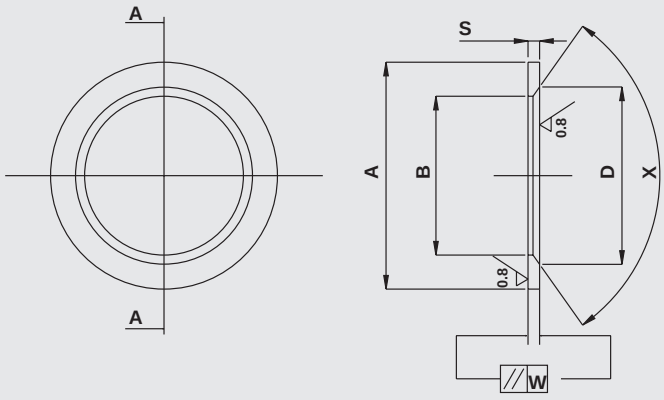


b x h	L mm																						slots t_1	slots d_1+t_2
3 x 3	8	10	12	14	15	16	18	20	22	25	28	30	32	35	36	40	45	50					1,8	d1+1,4
Kg/100 pz.	0,0530	0,0662	0,0804	0,0944	0,1070	0,1085	0,1225	0,1365	0,1505	0,1725	0,1935	0,2140	0,2215	0,2425	0,2495	0,2772	0,3118	0,3444						
4 x 4	10	12	14	15	16	18	20	22	25	28	30	32	35	36	40	45	50						2,5	d1+1,8
Kg/100 pz.	0,1152	0,1402	0,1652	0,1825	0,1902	0,2152	0,2402	0,2652	0,3032	0,3412	0,3650	0,3912	0,4278	0,4412	0,4912	0,5542	0,6157							
5 x 5	10	12	14	15	16	18	20	22	25	28	30	32	35	36	40	45	50	55	60				3	d1+2,3
Kg/100 pz.	0,1739	0,2139	0,2539	0,2720	0,2929	0,3319	0,3709	0,4109	0,4699	0,5289	0,5666	0,6069	0,6558	0,6849	0,7639	0,8619	0,9599	1,0572	1,1559					
6 x 6	10	12	14	15	16	18	20	22	25	28	30	32	35	36	40	45	50	55	60	70	80	85	3,5	d1+2,8
Kg/100 pz.	0,2554	0,3065	0,3576	0,3901	0,4156	0,4726	0,5196	0,5856	0,6706	0,7546	0,8009	0,8676	0,9590	0,9836	1,0936	1,2336	1,3736	1,5160	1,6538	1,9436	2,2212	2,3598		
8 x 7	15	20	22	25	28	30	32	35	36	40	45	50	55	60	70	80	90	100	110	140	160		4	d1+3,3
Kg/100 pz.	0,5588	0,8045	0,8915	1,0245	1,1545	1,2439	1,3345	1,4527	1,5045	1,6845	1,9045	2,1245	2,3419	2,5661	3,0045	3,4445	3,8845	4,3161	4,7477	6,0425	6,9058			
10 x 8	20	22	25	28	30	32	35	36	40	45	50	55	56	60	65	70	80	90	100	110	120		5	d1+3,3
Kg/100 pz.	1,131	1,245	1,435	1,625	1,757	1,875	2,065	2,125	2,375	2,695	3,005	3,324	3,399	3,642	3,960	4,265	4,885	5,515	6,145	6,775	7,390			
12 x 8	25	28	30	32	35	36	40	45	50	55	60	65	70	80	90	100	110	120	130	140	150		5	d1+3,3
Kg/100 pz.	1,710	1,916	2,077	2,216	2,446	2,516	2,816	3,196	3,576	3,954	4,339	4,723	5,086	5,836	6,586	7,346	8,096	8,830	9,565	10,406	11,149			
14 x 9	35	36	40	45	50	55	60	70	80	90	100	110	120	130	140	150							5,5	d1+3,8
Kg/100 pz.	3,172	3,263	3,663	4,153	4,653	5,057	5,615	6,623	7,613	8,603	9,593	10,603	11,566	12,496	13,503	14,384								
16 x 10	40	45	50	55	60	70	80	90	100	110	120	130	140	150									6	d1+4,3
Kg/100 pz.	4,573	5,219	5,849	6,433	7,070	8,369	9,569	10,869	12,169	13,369	14,400	15,700	17,169	18,197										
18 x 11	50	55	60	70	80	90	100	110	120	130	140	150											7	d1+4,4
Kg/100 pz.	7,17	7,88	8,65	10,30	11,80	13,40	14,90	16,50	17,80	19,50	21,20	22,40												
20 x 12	50	60	70	80	90	100	110	120	130	140	150												7,5	d1+4,9
Kg/100 pz.	8,500	10,300	12,391	14,291	16,191	17,991	19,891	21,500	23,200	25,591	26,900													

Note: the weight refers to the type A

Technical reading from page 43 to page 46

RINGS, FOOTSTEP, THICNESS



Material
Steel from hardness or cementation

Depth
from 0,8 mm to 5,00 mm

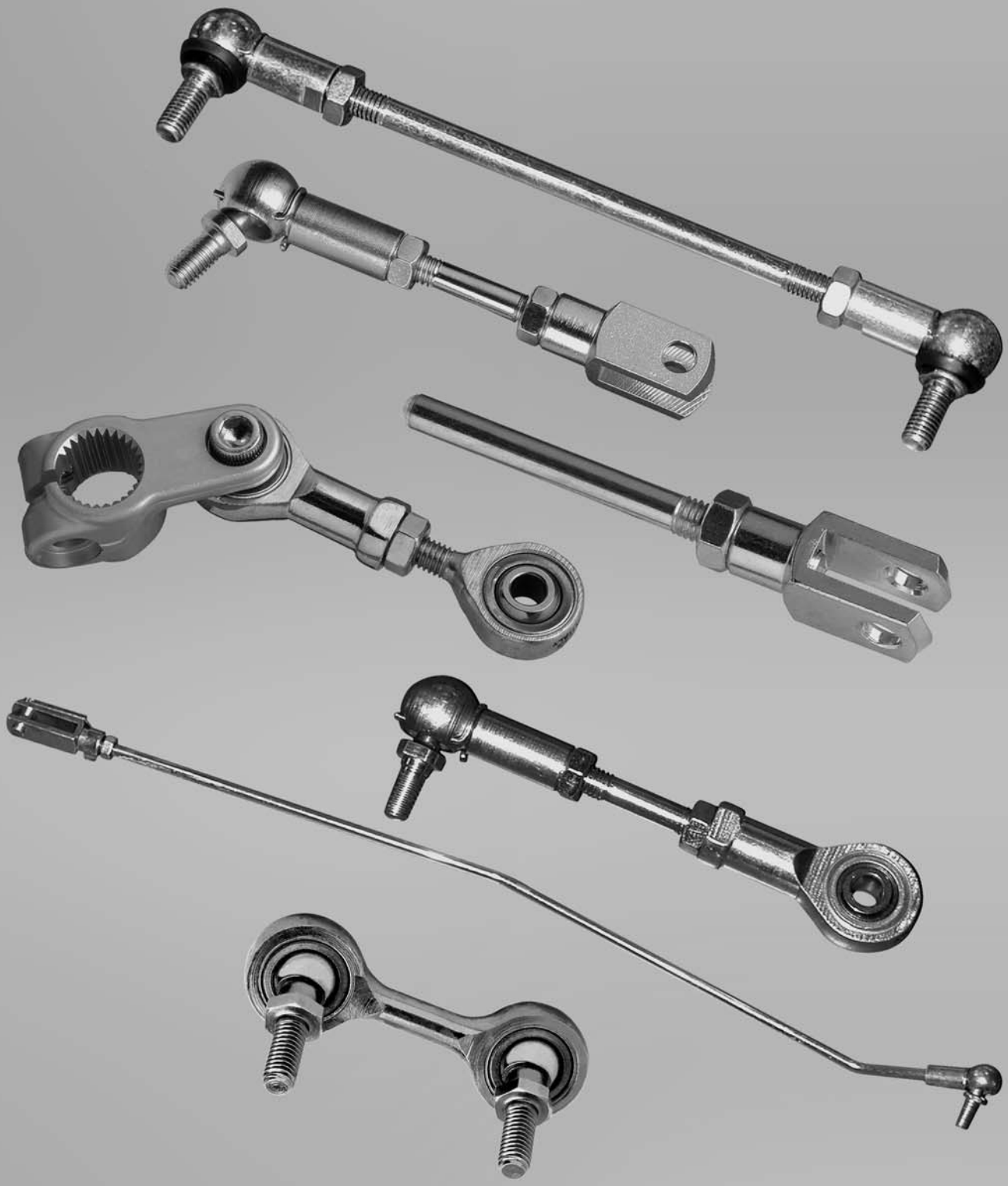
Workings
Shearing, turning, heat treatments,rectify plans, polishing

Tolerances on depth up to ±0,01 mm.

Possibility of identification of the details by paint job and laser mark

Our specialization consists in realizing products taken from clients drawings that need shearing, turning, heat treatments,rectify plans, polishing, eventual laser mark and/or paint job for the recognition of the thickness.

PRESSEMBLED TIE-RODS BASED FROM PROVIDED DRAWINGS OR PLANNED ON THE BASES OF YOUR TECHNICAL INFORMATION



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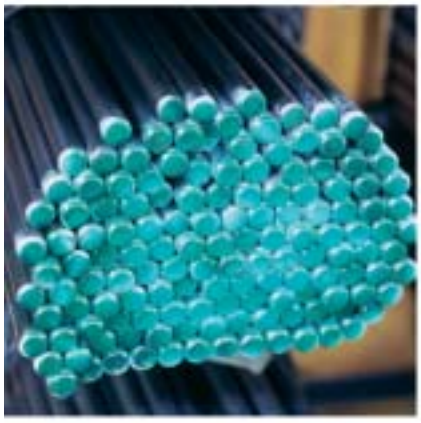

chiavette unificate S.p.A.

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Uscita Zona Industriale