DISTRIBUIDOR EN EXCLUSIVA
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Extemely demanding application cases must be faced when building racecars and very often suitable mechanical components or tools are easily available from generic industrial suppliers.
*In order to use **AURORA** spherical bearings for motorsports applications, bearings swaging tools are now available.*

SPECIFIC NEEDS

Users of spherical plain bearings probably is aware of how to mount them in housing bores with a press fit, without further specific problems in the case of industrial applications.

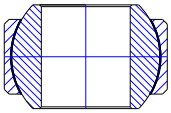
In motorsports applications, correct spherical bearing installation and securing is a very important task, due to higher, combined radial / axial loads and the security factor that needs to be considered.

Only manufacturers of high quality spherical bearings for motorsports or aerospace applications, besides normal unitys with chamfered race rim, make also units wit same overal dimensions, but with circular grooves on race rims that make a correct swaging possible.

AURORA motorsports bearings with groove have a letter "G" added to the part number: e.g.. PWB-12TG.

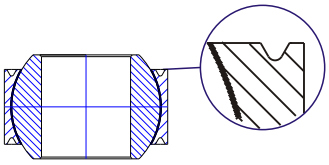
***AURORA* SNODO SPHERICAL BEARING** standard form, can be mounted with press fit; futher axial securing possible by using elastic rings and providing rlevant grooves in housing's bore

part number example:
PWB-12T



***AURORA* SNODO SPHERICAL BEARING** form with groove for swaging, can be mounted with press fit; further axial securing by staking with relevant tool on bearing's groove, swaging bearing's rim on chamfer of housing's bore

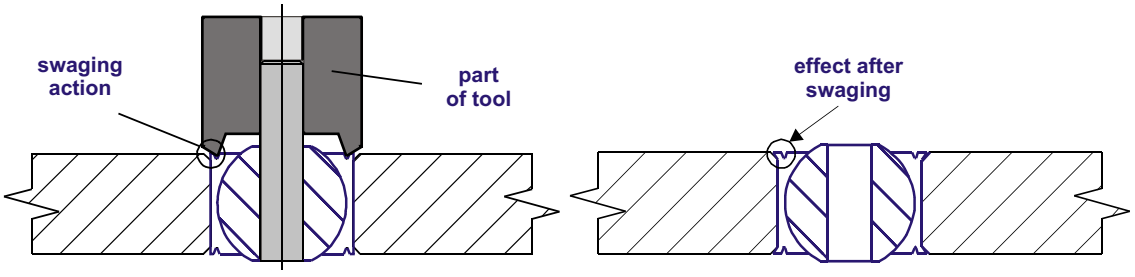
part number example:
PWB-12TG



SWAGING TOOLS SET

For correct swaging of groved bearings **swaging tool sets are available**; for each size of bearing each set is including **tool no.1 for swaging** and **tool no. 2 for closing and finishing**, both provided with center guide pin.

Use of tool set is quite evident and best results are possible after some practising; instructions on following pages give a description of all **operations steps** and **staking load parameters**



Tab. 1 - Table 1

Forma della gola dello snodo — **Groove type**

A usata in snodi.. as used in bearings..	B usata in snodi.. as used in bearings..	C usata in snodi.. as used in bearings..
PNB-4TG - PWB-4TG	PNB-6TG - PWB-6TG	PNB-12TG - PWB-12TG
PNB-5TG- PWB-5TG	PNB-6TG - PWB-6TG	
	PNB-6TG - PWB-6TG	
	PNB-6TG - PWB-6TG	
	PNB-6TG - PWB-6TG	

Tab. 2 - Table 2

Smussatura bordo foro di alloggiamento — **Housing chamfer**

A	B	C
0,5 mm (± 0,1) x 45°	0,8 mm (± 0,1) x 45°	1,3 mm (± 0,1) x 45°

Tab. 3 - Table 3

Pressione cianfrinatura e verifica — **Staking pression and proof load**

utensile - tool	swaging force (kg) pression	swaging force (kg) tolerance	proof load kg
ST-PNB-4TG narrow	5.358	+/- 1.361	298
ST-PWB-4TG wide	4.252	+/- 1.361	256
ST-PNB-5TG narrow	6.124	+/- 1.361	341
ST-PWB-5TG wide	4.678	+/- 1.361	281
ST-PNB-6TG narrow	6.634	+/- 1.361	369
ST-PWB-6TG wide	6.634	+/- 1.361	369
ST-PNB-7TG narrow	7.399	+/- 1.361	412
ST-PWB-7TG wide	7.654	+/- 1.361	426
ST-PNB-8TG narrow	11.340	+/- 2.268	727
ST-PWB-8TG wide	8.165	+/- 1.361	455
ST-PNB-9TG narrow	12.402	+/- 2.268	795
ST-PWB-9TG wide	9.185	+/- 2.268	511
ST-PNB-10TG narrow	13.466	+/- 2.268	864
ST-PWB-10TG wide	9.696	+/- 1.361	540
ST-PNB-12TG narrow	16.301	+/- 2.268	1.045
ST-PWB-12TG wide	15.592	+/- 2.268	1.000

Instructions for installion of *AURORA* grooved type spherical bearing

1. Find in Table 1 which **groove form** (A, B, C) is used on the spherical bearing you will install.
2. **Bore** housing. Width of housing should not excedd ± 0,1 mm bearing width. See figure 1
3. **Chamfer** each side of bore, see chart 2 for chamfer details **Table 2**. Be sure not to deburr the internal angle to bore intersection (see figure) 2.
4. **Clean well** bearing and housing bore.
5. **Press in bearing in housing** using suitable tools, straiut, slowly and carefully. See figure 3. Use adhesive Loctite 648 (bearing and sleeve retainer) between bearing and housing. Use small hand press for easier press-in operation.
6. Be sure that **bearing position is within 0,2 mm** one of the two surfaces of housing support, see figure 4
7. Be sure that swaging tools have **clean and undamaged swagin edge**.
8. **Lubricate slightly** with generic grease **swaging edges of both tools** to prevent cracks or separations of swaged bearings' lips.
9. **Mount tool no. 1**, that one with 60° edge, use the center pin, see figure 5.
10. Use a press with pression gauge, **apply pression on tool gradually** until staking pression as shown in Table 3 is reached.
11. Release press, **rotate tool 120°**, repeat pression action two times to provide uniformity of swaged lips. Fig. 6
12. **Repeat** points 7 through 11 using **tool no. 2**, that one with 80° edge.
13. When swaging operation are completed, **clean assembly** from grease or adhesive traces, so that accurate inspoection of result is possible.

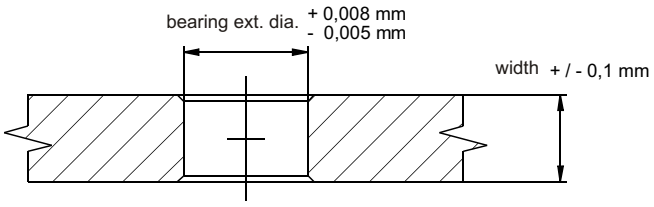


fig. 1 - housing bore

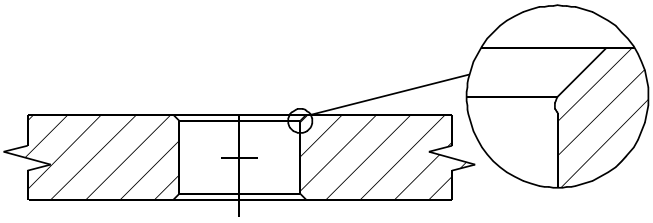


fig. 2 - chamfer

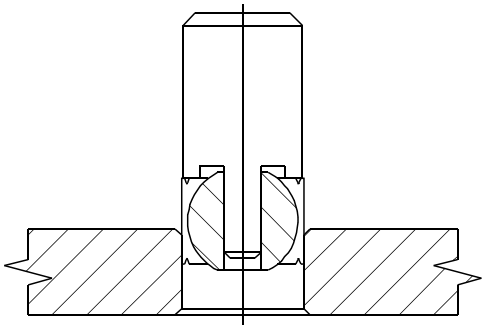


fig. 3 - press in bearing

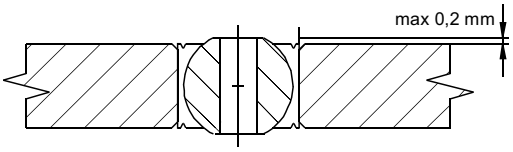


fig. 4 - position check

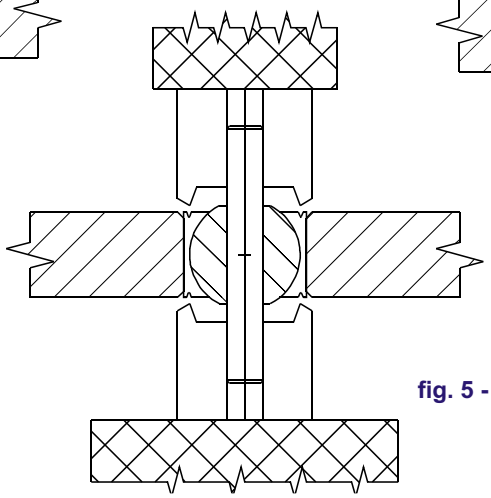


fig. 5 - use of tool

Swaging inspection

1. Verify that there are **no cracks or separations in housing** support after installation and swaging of spherical bearing.
2. Verify that there are **no cracks or separations** in swaged lips.
3. Use **0,1 mm wire gauge to inspect quality of swaging**. A properly staked bearing in optimally prepared housing will not accept the feeler gauge, however, no more tham 40% of the circumference may accept the gauge. See figure 6
4. Verify that bearing has kept its **central position within the support width**, max. Acceptable offset 0,2 mm. See figure 4
5. Verify that spherical inner ring can be **moved smoothly and completely**. It's hoever possible that new bearings require some bedding.

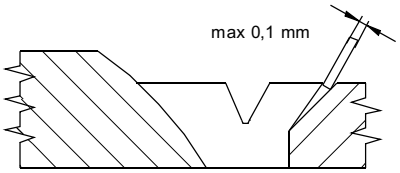


fig. 6 - swaging inspection

It's possible to perform inspection of assembly quality applying a prrof load on bearings' race to test swaging for axial strength. This operation is highly recommended especially for beginners in swaging bearings.

Changing details of support material or housing machining will affect assembly quality.

After getting some experience in swaging, it's advisable to make load tests from time to time, to keep control on serial production.

1. Place assembly under press with load gauge, using proof tool made as shown in figure 7 / 7-1.
2. Progressively apply proof load as shown in Table 3.
3. Verify that bearings has not been moved from its position and that swaged area is unchanged.

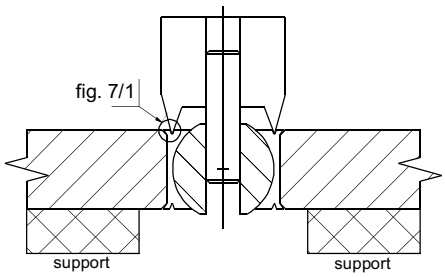


fig. 7 - load proof

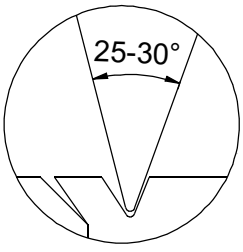


fig. 7-1 - load proof tool

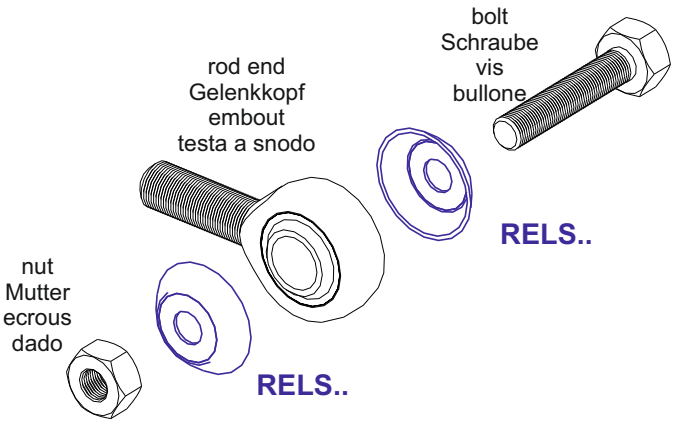
Removing the bearing for replacement:

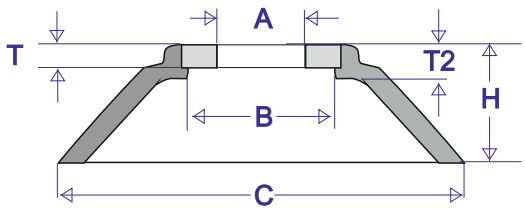
1. Use a boring head with a 80° carbide cutting tool to cut 80% through the groove in the outer race of the bearing.
2. Press out the bearing, the outer race will separate and no housing damage will occur.

Seals-it

ROD ENDS ACCESSORIES

LATERAL SEALS for ROD ENDS | **SEITLICHEN ABDICHTUNGEN für GELENKKÖPFE** | **JOINTS LATERAUX pour EMBOUTS** | **TENUTE LATERALI per TESTE A SNODO**





per teste a snodo metriche - for metric rod ends - pour embouts métriques - für metrische Gelenkköpfe

PART#	COD. PROD.	mis.		A	B	C	H	T	T2
				mm	*mm*	*mm*	*mm*	*mm*	*mm*
RELS 5	WS 5MM	5 mm		5,25	8,28	11,22	2,41	0,50	0,76
RELS 6	WS 6MM	6 mm		6,25	9,53	12,70	3,05	0,69	0,94
RELS 8	WS 8MM	8 mm		8,25	12,37	17,78	5,08	1,20	1,44
RELS 10	WS 10MM	10 mm		10,25	13,46	20,32	5,59	1,20	1,44
RELS 12	WS 12MM	12 mm		12,25	18,54	28,58	6,35	1,20	1,70
RELS 14	WS 14MM	14 mm		14,25	18,54	28,57	6,35	1,20	1,70
RELS 16	WS 16MM	16 mm		16,25	22,40	31,70	6,80	1,20	1,70
RELS 18	WS 18MM	18 mm		18,25	22,60	32,69	8,25	1,20	1,70
RELS 20	WS 20MM	20 mm		20,25	25,15	38,10	10,16	1,20	1,70
RELS 22	WS 22MM*	22 mm		su richiesta - auf Anfrage - sur demande					
RELS 25	WS 25MM	25 mm		25,25	33,80	53,30	12,70	1,50	1,50
RELS 30	WS 30MM	30 mm		30,25	55,88	56,70	13,70	2,03	2,03

METRIC *mm*

per teste a snodo in pollici - for rod ends inch - pour embouts en pouces - für zöllige Gelenkköpfe

PART#	COD. PROD.	mis./size/taille/Gr.		A	B	C	H	T	T2
		nominal (fract. of 1")	Ø mm	*mm*	*mm*	*mm*	*mm*	*mm*	*mm*
RELSI 3	WS 1870	3/16"	4,763	5,08	8,28	11,23	2,41	0,51	0,76
RELSI 4	WS 2500	1/4"	6,350	6,60	9,53	12,70	3,05	0,69	1,02
RELSI 5	WS 3120	5/16"	7,9375	8,18	12,37	17,78	5,08	1,19	1,45
RELSI 6	WS 3750	3/8"	9,525	9,78	13,46	20,32	5,59	1,19	1,45
RELSI 7	WS 4370	7/16"	11,1125	11,38	15,90	22,23	6,35	1,19	1,45
RELSI 8	WS 5000	1/2"	12,700	12,95	18,54	28,58	6,35	1,19	1,70
RELSI 10	WS 6250	5/8"	15,875	16,13	22,40	31,37	6,78	1,19	1,70
RELSI 12	WS 7500	3/4"	19,050	19,30	25,55	35,08	9,32	1,19	1,57
RELSI 14	WS 8750	7/8"	22,225	22,48	28,58	48,01	8,00	1,07	1,85
RELSI 16	WS 1000	1"	25,400	25,65	31,24	53,34	12,70	1,27	1,27

" INCH

RUBBER PROTECTIONS
RERS..

GUMMI-SCHUTZKAPPEN
RERS..

PROTECTIONS
RERS..

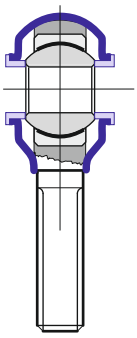
PROTEZIONI IN GOMMA
RERS..

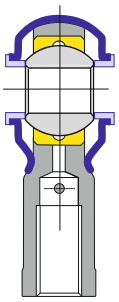
DISTANCE RINGS
DR..

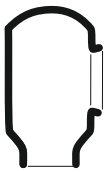
DISTANZRINGE
DR..

BAGUES DE DISTANCE
DR..

DISTANZIALI
DR..



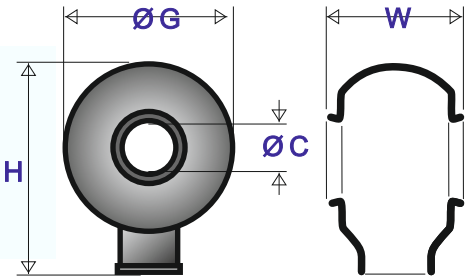


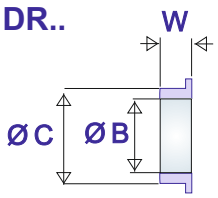


new!

RERS..B
for rod ends withs stud
fur Gelenkkopfe mit Bolzen
pour embouts averc perno
per teste a snodo con perno

RERS..





PART#	for rod ends.. fuer Gelenkköpfe... pour embouts... per teste a snodo...	Ø C mm	Ø G mm	H mm	W mm
RERS 1	RF 6.. - RM 6.. RF 8.. - RM 8..	8	27	32,5	26,5
RERS 2	RF 10.. - RM 10.. RF 12.. - RM 12..	10	33,5	39	325
RERS 3	RF 14.. - RM 14.. RF 16.. - RM 16.. RF 18.. - RM 18..	14	43,5	51	39
RERS 4	RF 20.. - RM 20.. RF 22.. - RM 22.. RF 25.. - RM 25..	19	56	63	46
RERS 5	RF 30.. - RM 30.. RF 35.. - RM 35..	29	78	85	60

PART#	Ø B mm	Ø C mm	Ø A mm	W mm	
DR 8	8	10,3	12	6	*on demand only*
DR 8.B7	8	10,3	12	7	stainless steel
DR 10	10	12,5	14	6	stainless steel
DR 10.B7	10	15	22	7	stainless steel
DR 10.B7.CR	10	15	22	7	carbon steel, phosphated
DR 12	12	15	17	8	stainless steel
DR 14	14	16,8	19	8	stainless steel
DR 16	16	19	21	8	stainless steel

Task: protection of rod ends against corrosive influences by the environment or dust contamination of the sliding coupling

Material: CR neoprene

Mounting: rod ends can be easily introduced in the rubber sealings using seeger ring pliers to widen the bottom sleeve

Lubrication: for the permanent lubrication fill the whole space between rod end and rubber booth with grease

Order: specify distance ring type, eg, 5 pcs. RERS 2 + 10 pcs. DR 12

Zweck: Schutz der Gelenkköpfen vor schädlichen Umweltfaktoren, verhindern Eindringen von Schmutz und Staub in den Gleitpaarungen.

Werkstoff: Neopren CR

Montage: untere Öffnung der Schutzkappe kann mit einer Spannringzange weit gespreizt werden, um den Gelenkkopf einzuführen

Schmierung: zur Dauerschmierung von nachschmierbaren Gelenkköp-fen, mit Schmierfett füllen

Bestellung: wenn auch Distanzringe gebraucht werden, bitte achten, 1 Schutzkappe braucht 2 Distanzringe

Emploi: protègent les embouts à rotule de la corrosion et l'accouplement sphérique des poussières et autres influences extérieures.

Matériel: protection en néoprène CR

Montage: utiliser une pince à arrêtage seeger pour introduire l'embout par le fond de la protection

Graissage: pour la lubrification permanente remplir de graisse la protection

Commander: indiquer type bague de distance, ex. 5 RERS 2 + 10 pcs. DR 12

Funzione: proteggono le teste a snodo da agenti ambientali aggressivi e da contaminazione da polvere dell'accoppiamento sferico

Materiale: neoprene CR

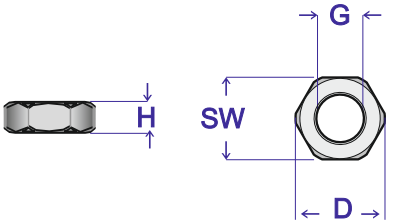
Montaggio: per agevolare l'introduzione della testa a snodo, allargare il foro della protezione con una pinza per seeger

Lubrificazione: per la lubrificazione permanente, riempire l'interno della protezione con lubrificante

Ordinare: specificare tipo distanziale, es. 5 pz. RERS 2 + 10 pz. DR 12

PINZAS PARA RERS

JAM NUTS — KONTERMUTTER — CONTRE-ECROUS — CONTRODADI



r-h — right-hand thread, Rechtsgewinde, filetage à droite, filettatura destra

l-h — left-hand thread, Linksgewinde, filetage à gauche, filettatura sinistra

Metric threads, bright nickel plated steel or stainless steel Aisi 304

Metrisches Gewindes, Automatenstahl vernickelt oder Edelstahl Ais 304

Filetage metriques, acier nickelé poli ou acier inoxydable Aisi 304

Filettature metriche, in acciaio nickelato lucido o in acciaio inox Aisi 304

UNF threads zinc plated steel

Zoll-Gewinde UNF Stahl, verzinkt

Filetages UNF en pouces, acier zingué

Filettature UNF in pollici, in acciaio zincato

PART #	G	r-h	l-h	r-h	l-h	H	SW	D
M 6	M6x1	✓	✓			3	10	11
M 8	M8x1,25	✓	✓	✓		4	13	14,5
M 10 fine	M10x1			✓		4,9	17	19,5
M 10 fine	M10x1,25	✓	✓	✓		5,8	17	19,5
M 10 normal	M10x1,5	✓	✓		✓	5,8	17	19,2
M 12 fine	M12x1,25	✓	✓	✓		7	19	21,5
M 12 normal	M12x1,75	✓	✓	✓		7	19	21,5
M 12 special	M12X1,5	✓	✓			7	19	21,5
M 14 fine	M14x1,5	✓	✓			7,2	22	25
M 16 fine	M16x1,5	✓	✓	✓		8	24	27,1
M 16 normal	M16x2		✓	✓	✓	8	24	27,1
M 18 fine	M18x1,5	✓	✓	✓		8,5	27	31
M 20 fine	M20x1,5	✓	✓	✓	✓	9	30	33,8
M 24 fine	M24x2			✓		11,8	36	41,5
M 27 fine	M27x2	✓				12	41	47
M 30 fine	M30x2			✓		14	45	51
M 36 normal	M36x3	✓				14	55	63

PART#	G	r-h	l-h	H	SW	D
10-32 = 3/16"		✓		3,1	93	10,6
UNF 1/4"	1/4" - 28 TPI	✓	✓	4	11	12,5
UNF 5/16"	5/16" - 24 TPI	✓	✓	4,8	12,5	14,3
UNF 3/8"	3/8" - 24 TPI	✓	✓	5,6	14,1	16,1
UNF 7/16"	7/16" - 20 TPI	✓	✓	6,4	17,3	19,7
UNF 1/2"	1/2" - 20 TPI	✓	✓	7,9	18,8	21,5
UNF 5/8"	5/8" - 18 TPI	✓	✓	9,5	23,5	27
UNF 3/4"	3/4" - 16 TPI	✓	✓	10,7	27,8	31,9
1" 1/4	1 1/4" - 12 TPI	✓		18,3	46,5	53,2

sizes H, SW and D may be slightly different — *Abmessungen H, SW und D unverbindlich* — *cotes H, SW et D peuvent changer* — *le quote H, SW e D possono subire leggere variazioni*

UNF THREAD TAPPING TOOL SET

set 2 tools - HSS - ISO 529

imperial fine threads - UNF - tol. 2B

hand tapping, blind holes

UNF-GEWINDEBOHRER

Satz 2 Werkzeuge - HSS - ISO 529

Zoll-Feingewinde - UNF - tol. 2B

Manueller Einsatz - blinde Bohrung

SET OUTILS A FILETER UNF

set 2 outils - HSS - ISO 529

filetages pouces, fin - UNF - tol. 2B

usage à la main

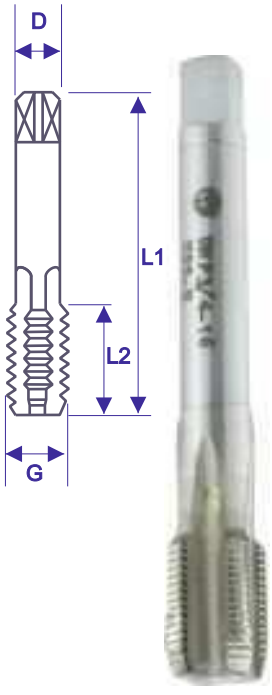
SET MASCHI A FILETTARE UNF

serie 2 pezzi - HSS - ISO 529

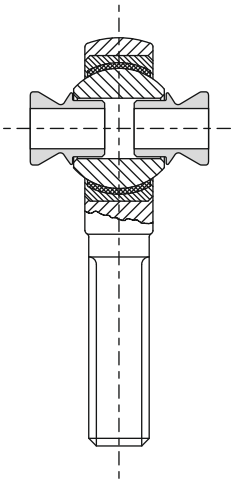
filettature fini in pollici - UNF tol. 2B

a mano, per fori ciechi

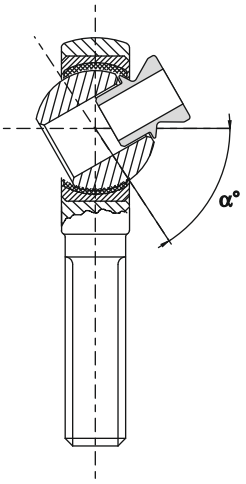
denominazione part number denomination	filettatura thread filetage	destro righ-hand à droite	sinistro left-hand à gauche	G	L1	L2	D	forare.. drill.. perçer..	disp. stock dispo
THREAD TAP 5/16" UNF RH	5/16" - 24 TPI	→		Ø 7,94	69	19	8	Ø 6,9	
THREAD TAP 5/16" UNF LH	5/16" - 24 TPI		←	Ø 7,94	69	19	8	Ø 6,9	
THREAD TAP 3/8" UNF RH	3/8" - 24 TPI	→		Ø 9,52	76	20	10	Ø 8,4	✓
THREAD TAP 3/8" UNF LH	3/8" - 24 TPI		←	Ø 9,52	76	20	10	Ø 8,4	✓
THREAD TAP 7/16" UNF RH	7/16 - 20 TPI	→		Ø 11,11	82	22	11,11	Ø 9,9	
THREAD TAP 7/16" UNF LH	7/16 - 20 TPI		←	Ø 11,11	82	22	11,11	Ø 9,9	✓
THREAD TAP 1/2" UNF RH	1/2" - 20 TPI	→		Ø 12,70	84	24	9	Ø 11,5	✓
THREAD TAP 1/2" UNF LH	1/2" - 20 TPI		←	Ø 12,70	84	24	9	Ø 11,5	✓
THREAD TAP 5/8" UNF RH	5/8" - 18 TPI	→		Ø 15,88	95	25	12,5	Ø 14,5	✓
THREAD TAP 5/8" UNF LH	5/8" - 18 TPI		←	Ø 15,88	95	25	12,5	Ø 14,5	✓
THREAD TAP 3/4" UNF RH	3/4" - 16 TPI	→		Ø 19,05	104	29	14	Ø 17,4	✓
THREAD TAP 3/4" UNF LH	3/4" - 16 TPI		←	Ø 19,05	104	29	14	Ø 17,4	✓
THREAD TAP 7/8" UNF RH	7/8" - 14 TPI	→		Ø 22,23	113	33	12,5	Ø 20,4	
THREAD TAP 7/8" UNF LH	7/8" - 14 TPI		←	Ø 22,23	113	33	12,5	Ø 20,4	



ROD ENDS BUSHINGS
BORE REDUCTION
HIGHER TILT ANGLE



GELENKKOPFBUECHSEN
BOHRUNGSREDUZIERUNG
HOEHERER KIPPWINKEL

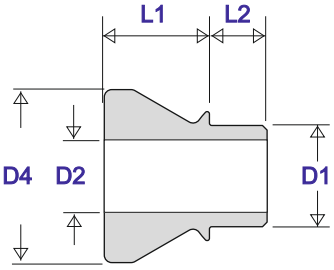


ENTRETOISES
REDUCTION ALESAGE
GRAND DEBATTEMENT

BOCCOLE DISTANZIALI
RIDUZIONE FORO
AUMENTO ANGOLO

for metric parts - fuer metrische Teile - pour embouts métriques - per teste a snodo metriche

PART#	D1 mm	D2 H7 mm		D4 mm	L1 mm	L2 mm		α
DRH 10.8	10	8		13,5	5,0	6,5		23°
DRH 12.10	12	10		16,0	7,0	7,5		23°
DRH 14.10	14	10		17,5	5,0	9,0		22°
DRH 16.12	16	12		20,0	5,0	10,0		21°
DRH 18.14	18	14		22,5	8,0	11,0		22°
DRH 20.16	20	16		25,0	8,0	12,0		21°



for inch sizes - fuer zöllige Teile - pour embouts en pouces - per teste a snodo in pollici

PART#		D1 inch	D1 mm	D2 inch	D2 mm		D4 mm	L1 mm	L2 inch	L2 mm	α
DRIH 10.08	C78-010	5/8"	15,875	1/2"	12,70		20,64	15,87	1/4"	6,35	25°
DRIH 12.08	C78-011	3/4"	19,050	1/2"	12,70		22,23	17,46	1/4"	6,35	25°
DRIH 12.08W	C78-012	3/4"	19,050	1/2"	12,70		25,40	23,81	1/2"	12,70	25°
DRIH 12.10	C78-016	3/4"	19,050	5/8"	15,88		25,40	23,81	1/2"	12,70	22°
DRIH 14.10	C78-013	7/8"	22,225	5/8"	15,88		25,40	26,99	5/8"	15,88	21°
DRIH 16.10	C78-014	1"	25,400	5/8"	15,88		31,75	36,51	3/4"	19,05	33°
DRIH 16.12	C78-015	1"	25,400	3/4"	19,05		31,75	36,51	3/4"	19,05	28°

PRO-WERKS

These stainless steel bushing have a double function: they work as spacers and increase the misalignment range of rod ends.

Using bushing reduces size of ball hole.

Not suitable for narrow spherical bearings **GE../COM-../PNB-..T**

Edelstahl-Büchsen dienen gleichzeitig als Distanzbüchsen und zur Erweiterung des Kippwinkels des Gelenkkopfes.

Einsatz von Büchsen reduziert Bohrungsdurchmesser des Innenringes (siehe Mass D2).

Nicht geeignet für schmale Gelenklager **GE../COM../PNB..T**

Les entretoises en acier inoxydable élèvent l'angle de débattement des embouts.

L'emploi des entretoises réduit l'alesage de la bille (voir dimension D2).

Pas compatible avec les rotules étroites **GE../COM../PNB..T**

Le boccole distanziali in acciaio inossidabile aumentano l'angolo di disallineamento delle teste a snodo.

Il diametro del foro dell'anello interno risulta ridotto (cfr. quota D2).

Non compatibili su snodi sferici serie stretta **GE../COM../PNB..T**

PRO-WERKS

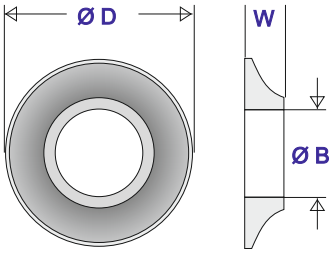
ROD ENDS ACCESSORIES

SAFETY WASHERS FOR ROD ENDS

DISTANZSCHEIBEN FUER GELENKKOEPFE

RONDELLES POUR EMBOUTS

RONDELLE DISTANZIALI PER TESTE A SNODO



PART#	Ø B		Ø D		W	
	in	*mm*	*in*	*mm*	*in*	*mm*
73-463	5/16"	7,938	7/8"	22,23	0,170"	4,32
73-464	3/8"	9,525	1"	25,40	0,200"	5,08
73-465	7/16"	11,113	1" 1/8"	28,58	0,220"	5,59
73-466	1/2"	12,700	1"/ 1/4"	31,75	0,220"	5,59
73-467	5/8"	15,875	1" 3/8"	34,93	0,250"	6,35
73-468	3/4"	19,050	1"/ 5/8"	41,28	0,350"	8,89

COLLVILARÓ S.A.

DISTRIBUIDOR EN EXCLUSIVA

RODAMIENTOS, TRANSMISIÓN Y SISTEMAS DE ENGRASE
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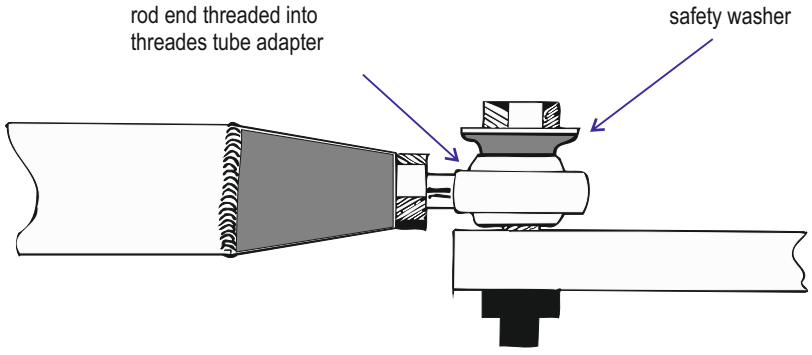

Precision machined mild steel safety washers, to be used in connection with rod ends, gold zinc plated for long lasting corrosion resistance.

Radius under cut design allows increased misalignement angle.

Sicherheitdistanzscheiben aus Automatenstahl, koennen in Verbindung mit Gelenkkoepfen angewendet werden, goldfarbig verzink fuer bessete Korrosionsbestaendigkeit.

Form mit Radius and der Innenseite ermoeglicht die maximale Ausnutzung des Kippwinkels des Gelenkkopfes

Les rondelles, réalisées en acier pour machines automatiques, sont utilisées avec embouts, sont zinguées couleur or pour meilleure résistance à la corrosion.

Rayon sous le dessin de coupe permet d'exploiter au mieux l'angle de maximum débattement de l'embout

Rondelle distanziali, da utilizzare con teste a snodo, realizzate in acciaio, zincate color oro per una migliore resistenza alla corrosione.

La forma raggiata permette di sfruttare al meglio l'angolo di massimo ribaltamento della teste a snodo