



Installation and Maintenance (summary)

Below is a summary of the most important procedures and considerations suggested to maximize coupling life. Because of the widespread use of gear couplings, most of these recommendations are well known to gear coupling users. Further details are available upon request.

Proper alignment is the key to long life.

Standard gear couplings accommodate angular and axial offsets, but the lower the operating angle, the longer the life. The couplings should be installed with as small an angle as can be reasonably achieved. Laser alignment or other alignment tools should be used to facilitate meeting this objective.

Proper lubrication is essential to long life.

1. Couplings should be lubricated with a lithium soap based grease with EP additive. Examples include, but are not limited to, Esso Beacon EP and Mobil Temp 78. There are many alternatives from which to choose, since almost every grease manufacturer makes a grease for this and similar applications. It is very important that different kinds of greases not be mixed and even different brands of the same kind of grease should be checked for compatibility before use. Please consult us for special applications such as high speed, extreme temperatures, extreme humidity or water, etc. for special recommendations.

2. After shrink mounting the hubs on the shaft and positioning gear sleeves the cavity between the hub and sleeve should be filled with grease using a spatula. A thin mastic film should be applied to the mating flange faces and the coupling bolts should be tightened to the proper torque (refer to adjacent table).

GO-A SIZE	BOLT	TIGHTENING TORQUE (Nm)	NUMBER OF BOLTS
0	M8	18	6
1	M10	36	8
2	M10	36	10
3	M12	65	10
4	M12	65	12
5	M16	150	12
6	M16	150	14
7	M16	150	14
8	M18	220	14
9	M22	400	14
10	M22	400	14
11	M24	520	16

3. After connecting the flange halves fill the couplings through the grease nipples. When filling through the grease fittings make sure that the coupling is being filled. If there is difficulty in filling, remove a grease fitting or plug. Once you are sure that the coupling is filled, replace any of the grease fittings or plugs you have removed and properly tighten them.

4. After the first 3 months of operation the coupling should be relubricated. From then on the lubrication interval can be extended to 6 months but not exceed a maximum of 1 year. The lubrication interval should take into account the severity of operation.

5. When lubricating, totally replace the grease in the coupling. This is best done by removing the grease fitting 180° from the fitting that is being used to fill the coupling. Pump in fresh grease until it begins to purge from the opening. Once you are sure that the coupling is filled, replace any of the grease fittings or plugs you have removed and properly tighten them.

6. Every 8,000 working hours or 2 years, the coupling should be opened and the grease should be completely removed and replaced with fresh grease. The flange faces should be cleaned and reconnected following the instructions above in point 2.

INSTALLATION, USE & MAINTENANCE

A CORRECT ALIGNMENT IS ESSENTIAL FOR A LONG LIFETIME.

The initial static no-load alignment condition (machines off) must consider what will happen under load (dynamic condition). This means that it shall be also able to compensate the misalignments generated by load and temperatures (see pt. 16 of INSTALLATION INSTRUCTIONS).

Check the alignment condition of the half couplings, using for this purpose a modern laser equipment. In this case, to perform the alignment operations, the instructions for use of the equipment have to be followed. Should you not have this equipment, use a thickness gauge or an inside micrometer with extension and a centesimal test indicator (with proper support elements). In this case, depending on the gear coupling type, proceed as indicated below.

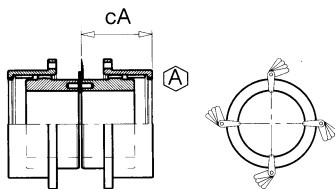


Fig. 01

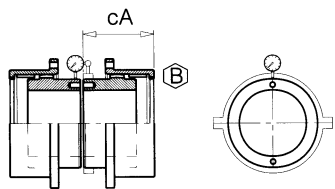


Fig. 02

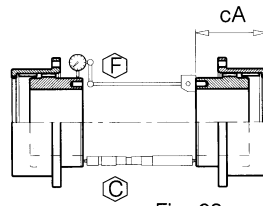


Fig. 03

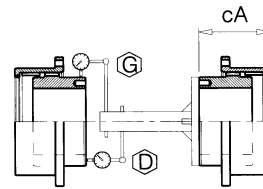


Fig. 04

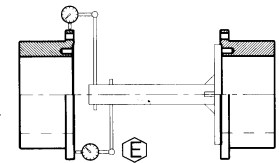
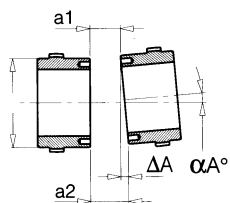
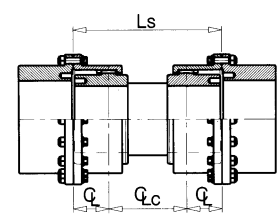
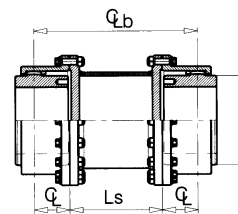
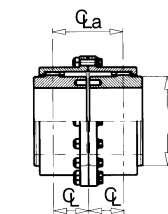
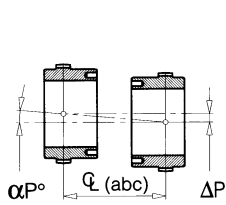


Fig. 05

According to the parallelism and coaxiality values, ΔA and ΔP verify the alignment as follows.

See TAB. I for the values of: distance between the gear mesh \mathbb{C} , hub diameter \mathbb{F} , alignment length \mathbb{cA} and hub axial slide \mathbb{H} .



$$\Delta A = a2 - a1$$

$$Q_a = 2 Q$$

$$\alpha P^\circ = \arctan \left(\frac{\Delta P}{Q_a} \right)$$

$$\alpha A^\circ = \arctan \left(\frac{\Delta A}{F} \right)$$

$$\alpha T^\circ = \arctan \sqrt{(\operatorname{tg} \alpha A)^\circ + (\operatorname{tg} \alpha P)^\circ}$$

$$\alpha T^\circ \leq \alpha D^\circ \text{ (Max Dynamic Angle)}$$

$$Q_b = L_s + 2 Q$$

$$\alpha P^\circ = \arctan \left(\frac{\Delta P}{Q_b} \right)$$

$$\alpha A^\circ = \arctan \left(\frac{\Delta A}{F} \right)$$

$$Q_c = L_s - 2 Q$$

$$\alpha P^\circ = \arctan \left(\frac{\Delta P}{Q_c} \right)$$

$$\alpha A^\circ = \arctan \left(\frac{\Delta A}{F} \right)$$

$$\alpha D^\circ = 0^\circ 10' - \text{Standard GO-A Couplings}$$

$$\alpha D^\circ = 0^\circ 15' - \text{GO-A Coupling with N.O.}$$

$$\alpha D^\circ = 0^\circ 15' - \text{GO-B \& GO-B.HT Coupling}$$

$$\alpha D^\circ = 0^\circ 30' - \text{G20 Coupling}$$

- Determine the angular misalignment value processing, in accordance with the tables, the measurements of the head parallelism between the reference frontal surfaces of the two hubs. For this purpose, by inserting the thickness gauge between the heads of the two hubs, perform a first 360° test to identify the position and the min and max entity of the distance between the hubs. After defining the extreme positions, perform a precise measurement of 4 points at 90°, like \mathbb{A} in FIG 01. The max difference between two values at 180° is ΔA . Determine the parallel misalignment value processing, according to the tables, the mutual eccentricity between the reference diameter of the two hubs. For this purpose, rigidly fasten the test indicator on a band in two halves to the reference diameter of a hub, like \mathbb{B} in FIG 02. Verify that the whole unit, during a 360° rotation, does not have any clearance, afterwards measure the min and max eccentricity. The max difference is ΔP .
- For gear couplings with tubular spacer or with floating shaft, check the head parallelism between the hubs reference surfaces, using an inside micrometer positioned like \mathbb{C} in FIG 03 or a comparator positioned like \mathbb{D} in FIG 04 or \mathbb{E} in FIG 05. The max difference between two values at 180° is ΔA . The hub eccentricity is measured by a comparator, positioned like \mathbb{F} in FIG 03, \mathbb{G} in FIG 04 or \mathbb{H} in FIG 05. The max difference is ΔP . Gear couplings with spacer, having a long distance between the gear teeth, require an alignment accuracy lower than the normal gear couplings do.

INSTALLATION, USE & MAINTENANCE

TAB. I

ALIGNMENT DIMENSIONS

GO-A SIZE	ϕ	F	cA	H	GO-B SIZE	GO-B ϕ	F	cA	H	AO-B ϕ	G20 SIZE	ϕ	F	cA	H
0	24	69	55	1.5 ± 0.5	4	155	400	251	9 ± 1	63	12	54	105	108	6 ± 1
1	29	85	62	1.5 ± 0.5	5	175	450	275	9 ± 1	67	14	65	128	121	6 ± 1
2	30	107	74	1.5 ± 0.5	6	190	490	292	9 ± 1	69	17	75	152	133	6 ± 1
3	44	133	86	2.5 ± 0.5	7	205	550	310	9 ± 1	72	19	83	170	146	9 ± 1
4	57	152	100	2.5 ± 0.5	8	215	610	322	9 ± 1	74	23	96	206	162	9 ± 1
5	66	178	115	3 ± 0.5	9	230	650	345	15 ± 1.5	80	26	108	242	177	9 ± 1
6	76	209	130	3 ± 0.5	10	240	680	357	15 ± 1.5	82	30	122	274	207	12 ± 1
7	86	234	145	4 ± 0.5	11	255	750	376	15 ± 1.5	86	35	137	322	226	12 ± 1
8	100	254	160	4 ± 0.5	12	270	790	415	22 ± 2	93	40	152	370	255	12 ± 1
9	114	279	175	4 ± 0.5	13	295	870	444	22 ± 2	97	46	170	420	280	15 ± 1.5
10	124	305	190	4 ± 0.5	14	335	1000	490	22 ± 2	103	52	187	480	301	15 ± 1.5
11	146	355	220	5 ± 0.5	15	370	1100	537	30 ± 3	112	58	203	540	321	15 ± 1.5
					16	410	1220	598	30 ± 3	118					
					17	440	1310	632	30 ± 3	122					
					18	470	1400	665	30 ± 3	125					
					19	510	1520	710	30 ± 3	130					

A CORRECT LUBRICATION IS ESSENTIAL FOR A LONG GEAR COUPLING LIFETIME

- 1 - After the hub shrinkfitting and the positioning of the gear sleeves and side flanges, fill with grease all the spaces between hubs and sleeves using a spatula. After closing the gear coupling, spread a slight mastic film on the flange connection surfaces.
- 2 - Tighten all the screws at the required torques (see TAB IV) then complete lubrication using all the grease nipples and/or plugs (2 for each half coupling).
- 3 - When lubricating through the grease nipples, verify that the grease is really filling the gear coupling; should the grease enter the coupling with difficulty, open a breather by removing a plug or a grease nipple.
- 4 - At the end of the lubrication, check that the gear coupling is completely filled with grease, then insert the plugs and/or the grease nipples checking their tightening.
- 5 - Regularly, every 3-4 months, relubricate the gear couplings. We suggest this initial time interval in case of integral seals, industrial applications, non corrosive environment, medium and heavy duty, room temperatures from 0 to 70°C. After the first working and observation year and after checking the results, time intervals can be extended up to 6 months. For different conditions, the time intervals between lubrications can still be extended, but they must never be longer than 12 months.
When lubricating, totally replace grease. To let all the old grease out, remove a plug or a grease nipple at 180° from the new grease filling point and pump the new grease until this comes out from the breather. At the end of this operation, insert the plugs and/or grease nipples, checking that they are properly tightened.
- 6 - Always check that the floating part is axially free. If no movement is possible, open the gear coupling and check the gear teeth.
- 7 - Every 8000 working hours or at max every two years, completely replace the grease. When doing this operation, you must open the gear coupling, clean the flange surfaces, remove the old grease, clean the interstices, check the gear teeth condition and then perform the operations shown in steps 1 to 4. Never use contaminated grease, or grease which is not suitable to the working conditions.

To separate the two flanges of the gear hubs never use tools which may damage the integrity of the seal surfaces.

To lubricate the gear couplings and their gear teeth, you must employ lithium soap greases, with EP additives, centrifugation resistant, non hygroscopic and antioxidant, with minimum features comparable to what shown in TAB II. Further details are contained in AGMA 9001-A86 instructions.

For all the conditions below, select the proper grease directly contacting the lubricant producer and submit the chosen grease features to MAINA Technical Department for acceptance.

- Extreme duty condition
- Very heavy and/or reversible duty
- Extreme rotation speed
- Extreme working temperature
- High humidity environment
- "LONG-LIFE" lubrication

For information only, TAB III shows some brands and names of grease suitable to lubricate gear couplings operating in condition of medium speeds, loads and duties, and temperatures from -20 to +70°C.

TAB. II

LUBRICANT FEATURES

Working Temperature	ASTM Penetration Index	NLGI Grade
≥ -20°C ≤ 30°C	350 +380	0
≥ 30°C ≤ 70°C	300 +350	1
≤ -20°C	Please contact	
≥ 70°C	our technical department	

TAB. III

RECOMMENDED LUBRICANTS

AGIP	GR-MU EP	IP	ATHESIA EP
CHEVRON	DURA-LIGHT EP	MOBIL	MOBILTEMP 78
MONTESHELL	ALVANIA EP	ESSO	BEACON EP

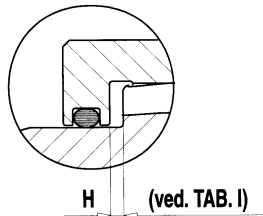
NEVER MIX DIFFERENT KINDS AND/OR DIFFERENT BRANDS OF GREASE. THEY MAY BE INCOMPATIBLE AND MAY LOSE THE LUBRICATION FEATURES. UNLESS OTHERWISE INSTRUCTED, NEVER USE OIL TO LUBRICATE GEAR COUPLINGS.

INSTALLATION, USE & MAINTENANCE

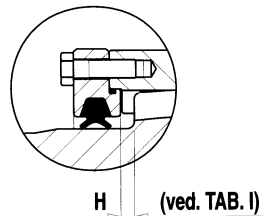
TAB. IV

SEAL GASKETS & TIGHTENING TORQUES

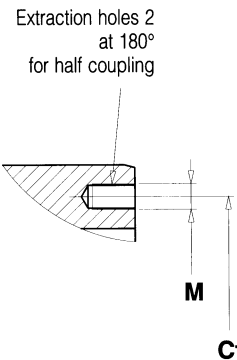
GO-A SIZE	Seals OR. TN414	Tightening Torque (Nm)	GO-A.HT SIZE	Seals GDL. TN559	Tightening Torque (Nm)	GO-B SIZE	Seals GDL. TN559	Tightening Torque (Nm)	G20 SIZE	Seals GDL. TN559	Tightening Torque (Nm)
0	OR 68	18	3	12.136	38	4	20.440	670	12	12.129	38
1	OR 85	36	4	12.160	38	5	20.490	670	14	12.152	38
2	OR 107	36	5	12.200	38	6	20.530	1250	17	12.176	38
3	OR 133	65	6	12.220	65	7	20.590	1250	19	12.194	65
4	OR 152	65	7	12.254	65	8	20.650	1250	23	12.230	65
5	OR 177	150	8	12.278	155	9	20.690	2170	26	12.266	155
6	OR 209	150	9	20.314	155	10	20.720	2170	30	20.314	155
7	OR 234	150	10	20.346	155	11	20.790	2170	35	20.362	155
8	OR 253	220	11	20.378	520	12	30.850	3480	40	20.410	520
9	OR 279	400				13	30.930	3480	46	20.460	520
10	OR 304	400				14	30.1060	5230	52	20.520	520
11	OR 355	520				15	30.1160	5230	58	20.580	520
						16	40.1300	5230			
						17	40.1390	8300			
						18	40.1480	8300			
						19	40.1600	8300			



OR seal type TN414



GDL seal type TN559



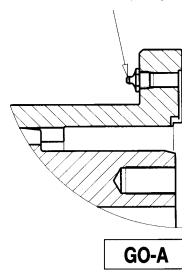
Grease nipples
2 at 180°
for half coupling

Conical plugs
2 at 180°
for half coupling

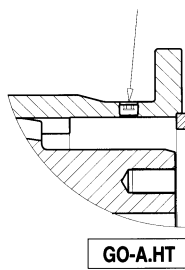
Conical plugs
2 at 180°
for half coupling

Conical plugs
2 at 180°
for half coupling

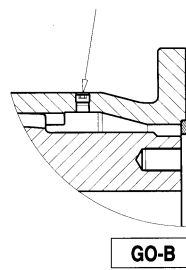
Conical plugs
2 at 180°
for half coupling



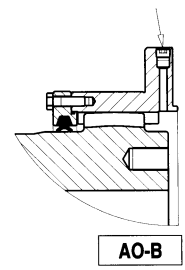
GO-A



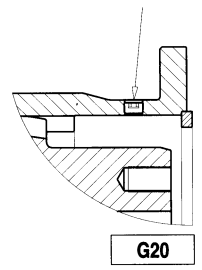
GO-A.HT



GO-B



AO-B



G20

TAB. V

EXTRACTION HOLES, 2 AT 180° FOR HALF COUPLING

GO-A SIZE	Holes M	Dia. Cf	GO-A.HT SIZE	Holes M	Dia. Cf	GO-B SIZE	Holes M	Dia. Cf	G20 SIZE	Holes M	Dia. Cf
* 0	M5	61	3	M10	98	4	M24	350	12	M10	90
* 1	M6	73	4	M10	118	5	M24	400	14	M10	110
* 2	M8	91	5	M10	154	6	M30	430	17	M10	130
* 3	M10	115	6	M12	170	7	M30	490	19	M12	145
* 4	M12	132	7	M12	200	8	M30	550	23	M12	175
* 5	M12	154	8	M16	220	9	M36	580	26	M16	205
6	M16	180	9	M16	237	10	M36	600	30	M16	235
7	M16	204	10	M16	266	11	M36	670	35	M16	280
8	M20	220	11	M24	294	12	M42	710	40	M24	320
9	M20	240				13	M42	790	46	M24	360
10	M24	268				14	M48	900	52	M24	410
11	M24	316				15	M48	1000	58	M24	460
						16	M48	1120			
						17	M56	1190			
						18	M56	1280			
						19	M56	1400			

* Only on demand