RATHI

INSTALLATION & OPERATION MANUAL FOR

Gear-Flex Couplings

TYPE - RGD / RGS

RATHI TRANSPOWER PVT. LTD.,
Gaia Apex, S.No.33/2D, Viman Nagar,
PUNE – 411 014 (INDIA)

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1. NOTES

1.1 GENERAL INSTRUCTIONS

Please read the assembly instructions carefully before starting to operate the coupling. Pay particular attention to the safety instructions.

The **GEAR-FLEX** coupling is approved for use in hazardous areas, if marked with CE mark.

When using the coupling in potentially hazardous areas, pay special attention to the safety instructions.

The assembly instructions are part of your product, and should be available with maintenance personnel at all times until it is assembled.

Keep these instructions in a safe place, so they can be referred to by maintenance personnel.

1.2 SAFETY AND ADVICE INSTRUCTIONS

STOP	**Danger!**	Danger of injury to persons.
!	**Caution!**	Damages on the machine possible.
	Attention!	Pointing to important items.
Ex	**Caution!**	Hints concerning explosion protection.

1.3 GENERAL INSTRUCTIONS OF DANGER

STOP

Danger!

With assembly, operation and maintenance of the coupling make sure that the entire drive train is protected against unintentional engagement. Serious injuries can occur from rotating parts. Likewise, make sure to read through and observe the following safety instructions:

- All operations on and with the coupling must be performed with “safety first” being the primary consideration.
- Make sure to disengage the power supply before you perform your work.
- Protect the power supply against unintentional engagement, for example, by providing hints at the place of engagement, or removing the power supply fuse.

- Do not touch the coupling's working area while it is operating.
- Protect the coupling against unintentional touch. Provide the necessary protective covers and devices.

1.4 PROPER USE

Assembly, operation and maintenance work may be performed on the coupling only if:

- The assembly instructions are read carefully and understood.
- The personnel are technically qualified, & are authorized to do so by the company.

The coupling shall only be used in accordance with the technical data.

Unauthorized modifications to the coupling are not admissible. We decline any warranty due to consequent damage. For future development of the product, we reserve the right to make technical modifications.

The GEAR-FLEX coupling described here corresponds to the technical status at the time of printing these assembly instructions.

1.5 INTENDED USE OF THE COUPLING

The intended use of the coupling is to connect input and output of a power transmission drive with each other, in most cases these are two shafts. For Stationary Application Additional equipment like brake drums, torque limiter, etc. can be added to the couplings and will not change the intended use.
The coupling compensates within the technical limits misalignment and dampens shock loads or vibrations.

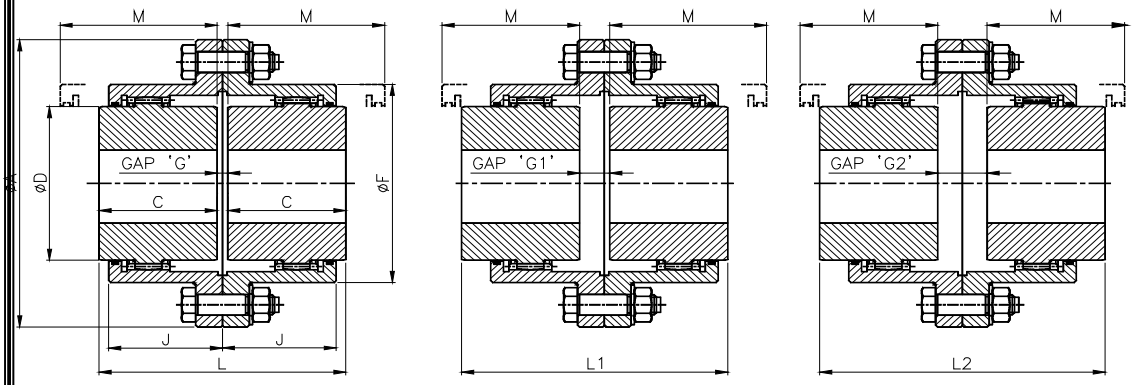
MANUFACTURER'S DECLARATION IN CONFORMANCE TO EC MACHINE DIRECTIVE 2006/42/EC

Rathi Gear-Flex Couplings must be treated as components in the sense of the EC machine directive 2006/42/EC.
Therefore M/s Rathi need not issue a separate declaration of conformity.
Information for safe use, installation, start up and operation can be found in this manual.

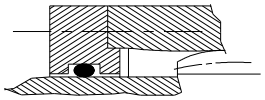
2. TECHNICAL DATA

2.1 DIMENSIONS, SPEED & WEIGHTS

Double Engagement Couplings: TYPE-RGD



STANDARD 1 HUB REVERSE BOTH HUB REVERSE



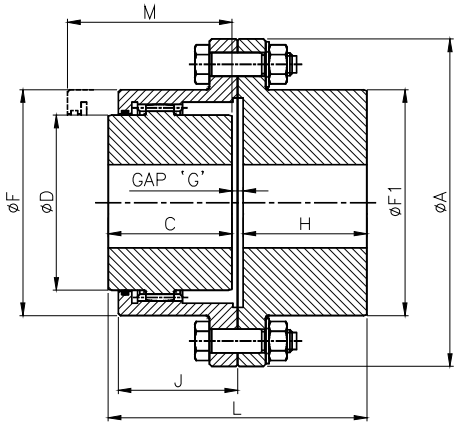
THIS END COVER PLATE CONSTRUCTION FOR SIZE RGD-80 ONWARDS.

Size	Coupling Rating		Max. Speed RPM	Bore Dia mm		Dimensions in mm								Solid Hub	
	kW at 100 RPM	Rated Torque Nm		Min. Bore	Max. Bore	ØA	L	C	ØD	ØF	J	M	GAP	Mass Kg	WR² Inertia Kg m²
10	14	1337	8000	14	52	116	89	43	69	84	39	51	3	4.4	0.0052
15	30	2865	6500	22	65	152	103	50	86	105	48	61	3	9	0.0192
20	53	5061	5600	27	80	178	127	62	105	127	60	76	3	15	0.041
25	105	10027	5000	32	98	213	159	77	131	155	72	92	5	27	0.105
30	168	16043	4400	42	115	240	187	91	152	181	84	106	5	40	0.195
35	231	22059	3900	47	135	279	220	107	178	211	98	130	6	65	0.454
40	336	32086	3600	47	160	318	248	121	210	250	111	145	6	96	0.86
45	472	45073	3200	52	180	346	278	135	235	274	123	165	8	131	1.39
50	650	62070	2900	72	195	389	314	153	254	306	141	183	8	186	2.53
55	880	84034	2650	72	215	425	344	168	279	334	158	203	8	247	3.83
60	1205	115069	2450	77	235	457	384	188	305	366	169	228	8	299	5.21
70	1823	174084	2150	92	280	527	451	221	356	425	196	266	9	473	11
80	2639	252006	1750	95	285	590	508	249	385	485	243	300	10	682	20.72
90	3037	290012	1550	100	300	660	565	276	420	535	265	325	13	898	34.95
100	4100	391521	1450	120	330	711	623	305	470	595	294	355	13	1242	55.95
110	5300	506.1	1330	130	370	775	683	335	521	653	322	386	13	1608	86.14

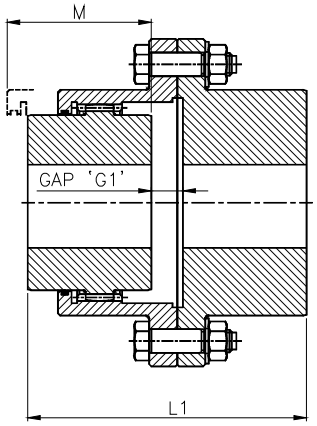
NOTES:-

1. All dimensions in mm.
2. The outer dimensions of flanges are rounded up to nearest figure in above table.
3. For special versions contact M/s RATHI.
4. Couplings generally used up to 120℃. Can be used for higher temperatures by using proper grade of grease.
5. Weight & M.I. specified are with solid hubs.
6. Max. bore with key way as per DIN 6885/1.
7. 'M' minimum clearance required for aligning.

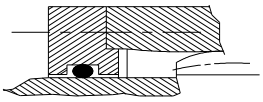
Single Engagement Couplings: TYPE-RGS



STANDARD



FLEXIBLE HUB REVERSE



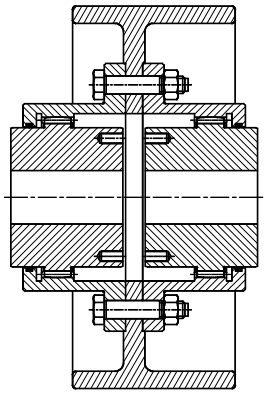
THIS END COVER PLATE CONSTRUCTION FOR SIZE RGS-80 ONWARDS.

Size	Coupling Rating		Max. Speed RPM	Min. Bore Dia mm		Max. Bore Dia mm								DIMENSIONS In mm	
	kW at 100 RPM	Rated Torque kNm		Flex Hub	Rigid Hub	Flex Hub	Rigid Hub	ØA	L	C	ØD	ØF	ØF1	J	H
10	14	1337	8000	14	18	52	60	116	83	43	69	84	84	39	40
15	30	2865	6500	22	26	65	80	152	97	50	86	105	107	48	47.0000
20	53	5061	5600	27	30	80	90	178	121	62	105	127	130	60	59.000
25	105	10027	5000	32	37	98	110	213	151	77	131	155	157	72	74.000
30	168	16043	4400	42	44	115	130	240	179	91	152	181	182	84	88.000
35	231	22059	3900	47	52	135	150	279	209	107	178	211	212	98	102.000
40	336	32086	3600	47	52	160	180	318	237	121	210	246	250	111	116.00
45	472	45073	3200	52	57	180	200	346	266	135	235	274	276	123	131.00
50	650	62070	2900	72	77	195	220	389	301	153	254	306	309	141	148.00
55	880	84034	2650	72	77	215	240	425	341	168	279	334	334	158	173.00
60	1205	115069	2450	77	82	235	260	457	374	188	305	366	366	169	186.00
70	1823	174084	2150	92	102	280	300	527	439	221	356	425	425	196	218
80	2639	252006	1750	95	105	285	335	590	498	249	385	485	470	243	249.00
90	3037	290012	1550	100	-	300	370	660	552	276	420	535	518	265	276.00
100	4100	391521	1450	120	-	330	405	711	610	305	470	595	572	294	305.00
110	5300	506	1330	130	-	370	440	775	686	335	521	653	620	322	335.00

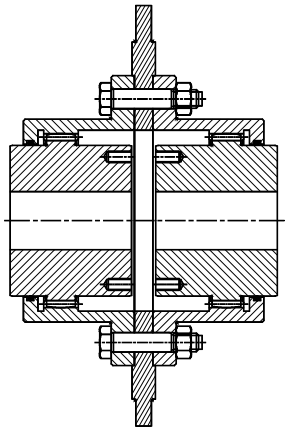
NOTES:-

1. All dimensions in mm.
2. The outer dimensions of flanges are rounded up to nearest figure in above table.
3. For special versions contact M/s RATHI.
4. Couplings generally used up to 120℃. Can be used for higher temperatures by using proper grade of grease.
5. Weight & M.I. specified are with solid hubs.
6. Max. bore with key way as per DIN 6885/1.
7. 'M' minimum clearance required for aligning.

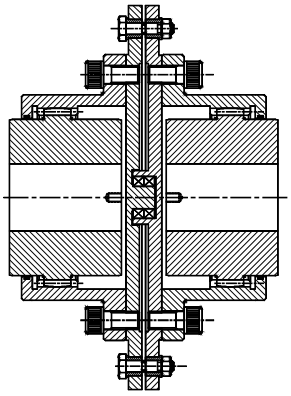
2.2 PRODUCT VARIANTS



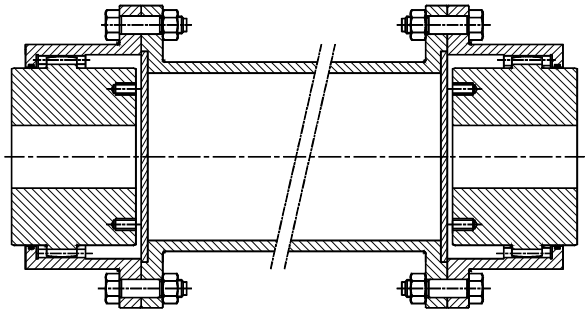
Coupling with Brake Drum



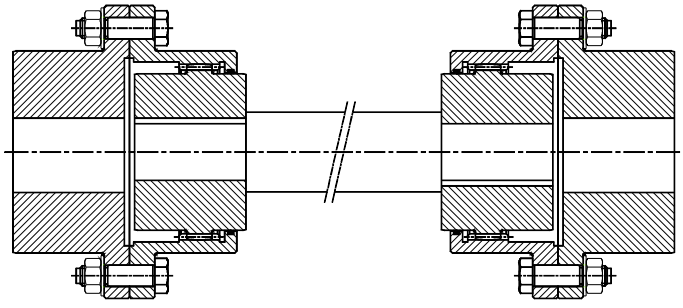
Coupling with Brake Disc



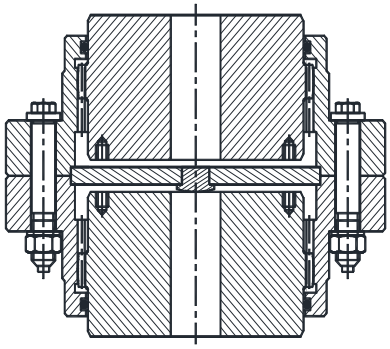
Coupling with Shear Pin



Coupling with Spacer

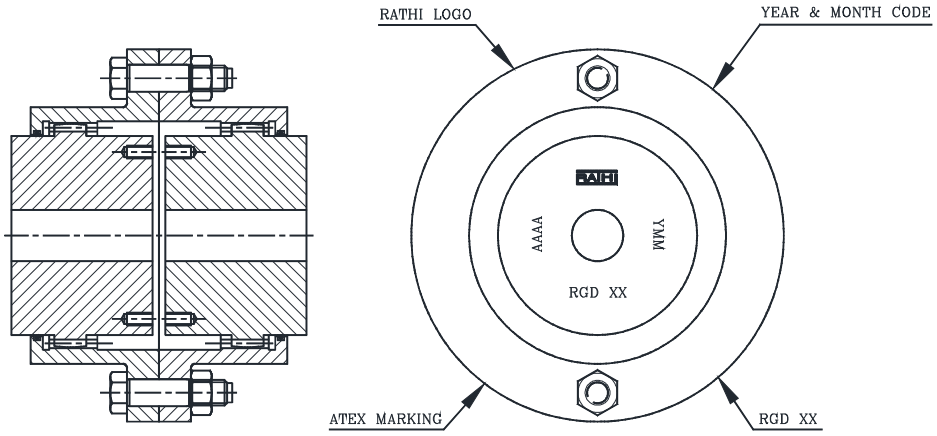


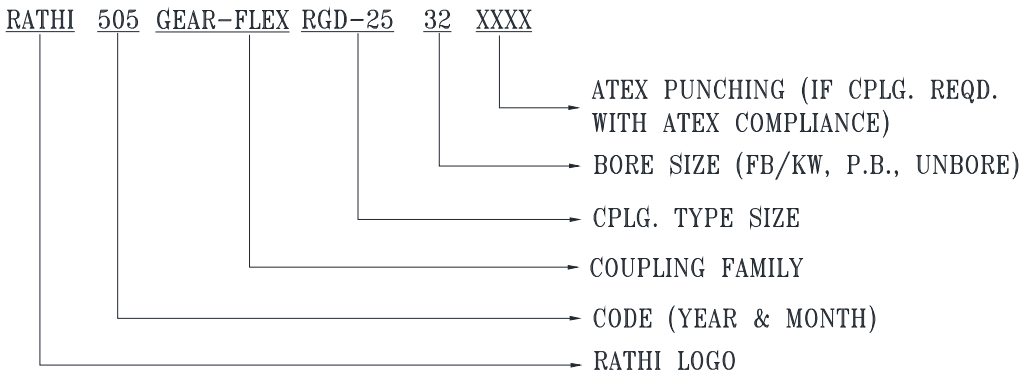
Coupling with Floating Shaft



Coupling with Vertical Mounting

3. MARKING DETAILS





Bolts	Marking of Grade 8.8 on bolt head, 8.8

e.g. (ATEX Punching)

RATHI GEAR-FLEX 505 RGD-25 32 CE Ex II 2GD -30℃+120ºC

e.g. (Standard Punching)

RATHI RGD-25 32 505

4. INSTALLATION INSTRUCTIONS

4.1 BEFORE INSTALLATION

- Remove the coupling from packing & thoroughly inspect for signs of damage.
- Disassemble the coupling by removing nuts & bolts. Clean all the parts carefully.
- Remove protective coatings / lubricants from bores & keyways.
- If received in damaged condition, coupling should not be installed.

4.2 FINISH BORE & KEYWAY PROCEDURE

Danger!
Coupling supplied with CE mark- it is responsibility and liability of the customer for marking correct F/B, K/W as specified by!

The maximum finish bore value (See Page No.-5 & 6 technical data) must not be exceeded. In the event of failure to keep to these values, the hub may break and the particles dispersed by the rotation may cause serious danger.

1. Rathi couplings are supplied with pilot bore unless ordered for finish bore. They should be bored to required finish bore sizes with reference of the outside diameter (OD) of hub (Refer fig. A)

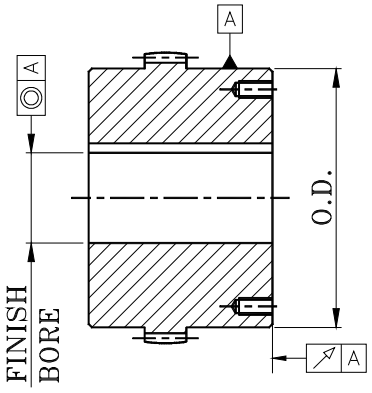


FIG. A

2. Clamp the hub puller hole side dia. on lathe and true the hub O.D. Maintain concentricity of finish bore w.r.t. coupling OD and face run-out within 0.04 mm for dia. 10-180, 0.06 mm for dia. 180-400 & 0.08 mm for dia. 400-630.

3. Unless otherwise specified, std. tolerance of H7 for Finish bore and for keyway width will be supplied as per DIN 6885/1.

4. Use dial bore gauge or plug gauge for respective bore size. (If plug gauge is used then ensure that Go end of gauge will pass straight way through out bore length.)

5. Make chamfer of required size on both the sides of bore.

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4.3 MOUNTING PROCEDURE

1. Slide the sleeves with internal teeth with rubber O ring on shafts before mounting the hubs.

2. Mount the hubs with external teeth on their respective shafts flush with the faces of hubs as shown in Fig. 1

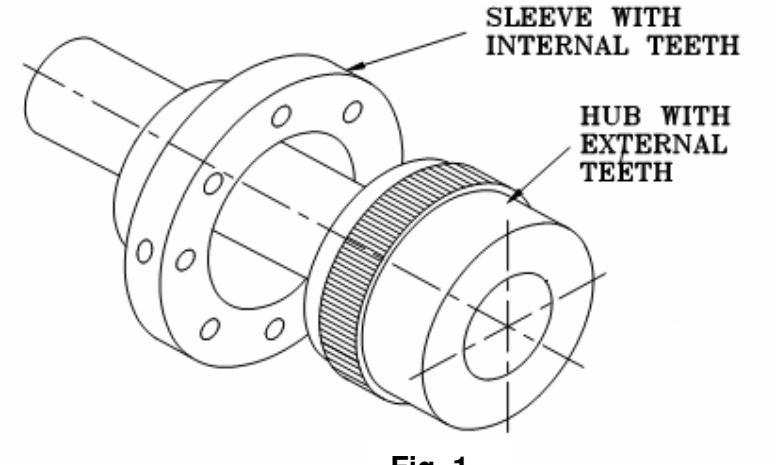


Fig. 1

3. With one machine firmly bolted down, set the equipments at a distance 'G' (refer table A & B on page 12 & 13 resp.) between shaft ends by using a spacer bar equal in thickness to the required gap 'G' as shown in Fig. 2.

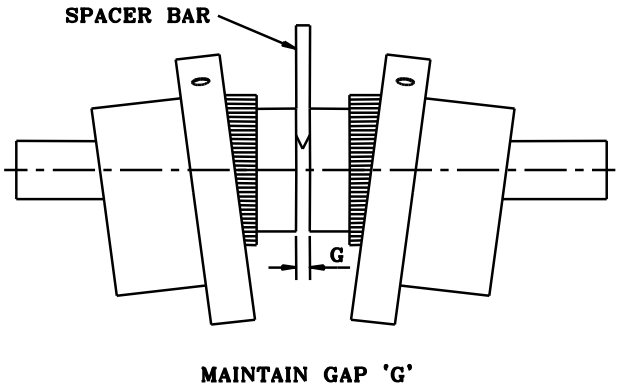


Fig. 2

Deviation in standard DBSE is defined as axial misalignment (end float). For normal applications the shaft end should be flush with inner face of the hub. In some special cases the shaft ends may protrude beyond the inner face of the hub or may remain inside, if required. The distance between two faces of hubs is to be maintained as specified. The variation in this distance should not exceed the permissible initial axial misalignment given in table A on page 12.

4.4 ALIGNMENT PROCEDURE

Alignment procedure is given separately for each type of alignment, for simplicity. However all 3 types of misalignments may be present at the same time.

For Permissible *INITIAL (INSTALLATION)* misalignments refer table A on page 12

For Permissible *MAXIMUM (OPERATIONAL)* misalignments refer table B on page 13

4.4.1 CHECKING PARALLEL / RADIAL ALIGNMENT

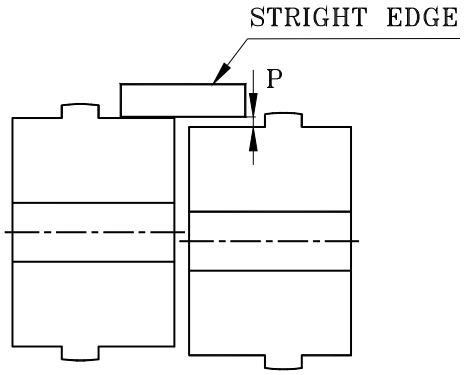


Fig. 3

Check the parallel/Radial alignment with the help of straight edge resting squarely on both the hubs at 4 places 90° apart. The deviation in the readings should not exceed the permissible initial parallel misalignment mentioned in table A. (Refer Fig. 3)

4.4.2 CHECKING ANGULAR ALIGNMENT

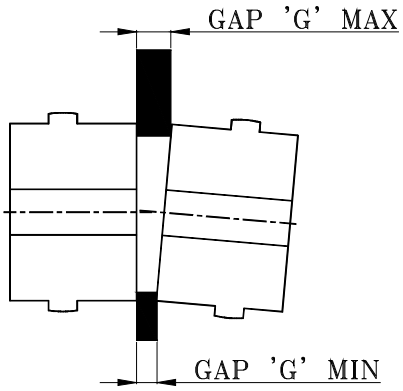


Fig. 4

Check the angular misalignment with the help of slip gauges by inserting in the gap at 4 places 90° apart.The difference in max. & min. gap will be the Total Indicated Reading (TIR). The angular misalignment 'X' in mm is half the Total Indicated Reading. The values of angular misalignment should not exceed permissible initial misalignments mentioned in table A. (Refer Fig. 4).

4.5 ASSEMBLY PROCEDURE

1. Insert the gasket between the sleeve flanges. Position the flanged sleeves with lubrication plugs.

2. Insert the bolts thru flange holes. Also place the washer & nuts on bolts and tightening the bolts.

Remember: Assemble only with the help of the fasteners supplied with the coupling.

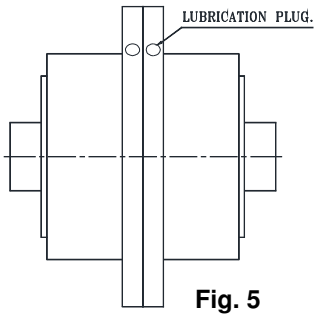


Fig. 5

3. Fill with recommended grease (**RSG** with reqd. qty.) for lubrication.
For grease quantity for respective coupling size, refer table No. C on page 14.

Use Loctite to prevent the loosening of threads, if required.

IMPORTANT:- The necessity for shields & guards varies with individual installations. The owner or user must provide the required safety guards. Safety guards or shields are not furnished by us with the couplings.

4.6 PERMISSIBLE INITIAL (INSTALLATION) MISALIGNMENTS

TABLE 'A'

COUPLING SIZE	TYPE RGD					TYPE RGS			
	ANGULAR		PARALLEL /RADIAL 'P' (mm)	AXAIL (mm)	GAP 'G' STD. (mm)	ANGULAR		AXIAL (mm)	GAP 'G' STD. (mm)
	DEG./GEAR MESH	'X' (mm)				DEG./GEAR MESH	'X' (mm)		
10	± 0.19º	0.3	0.15	± 0.125	3	± 0.19º	0.3	± 0.062	4
15		0.4	0.20		3		0.4		4
20		0.5	0.25		3		0.5		4
25		0.6	0.30		5		0.6		5
30		0.7	0.35		5		0.7		5
35		0.8	0.42	± 0.25	6		0.8	± 0.125	6
40		0.9	0.50		6		0.9		8
45		1	0.52		8		1.0		8
50		1.1	0.65		8		1.1		9
55		1.2	0.72		8		1.2		9
60		1.3	0.80	± 0.5	8		1.3	± 0.25	9.5
70		1.5	0.92		9		1.5		11
80		1.7	1.05		10		1.7		13
90		1.9	1.20		13		1.9		15
100		2.1	1.38	± 0.75	13		2.1	± 0.37	16

4.7 PERMISSIBLE MAXIMUM (OPERATIONAL) MISALIGNMENTS

TABLE 'B'

COUPLING SIZE	TYPE RGD					TYPE RGS			
	ANGULAR		PARALLEL /RADIAL 'P' (mm)	AXIAL (mm)	GAP 'G' STD. (mm)	ANGULAR		AXIAL (mm)	GAP 'G' STD. (mm)
	DEG./GEAR MESH	'X' (mm)				DEG./GEAR MESH	'X' (mm)		
10	± 0.75º	1.2	0.6	± 0.5	3	± 0.75º	1.2	± 0.25	4
15		1.6	0.8		3		1.6		4
20		2	1		3		2		4
25		2.4	1.2		5		2.4		5
30		2.8	1.4		5		2.8		5
35		3.2	1.7	± 1	6		3.2	± 0.5	6
40		3.6	2		6		3.6		8
45		4	2.1		8		4		8
50		4.4	2.6		8		4.4		9
55		4.8	2.9		8		4.8		9
60		5.2	3.2	± 2	8		5.2	± 1	9.5
70		6	3.7		9		6		11
80		6.8	4.2		10		6.8		13
90		7.6	4.8		13		7.6		15
100		8.4	5.5	± 3	13		8.4	± 1.5	16

Half Flexible Gear Couplings Type RGS cannot accommodate parallel misalignment.
Gap 'G' in the above table is given when angular & axial misalignments are zero.

5. START-UP AND OPERATIONS

Lubricants must never be mixed with other substances.
Before mixing different types of lubricants always ask the manufacturer on the compatibility of the lubricants.

5.1 GREASE QUANTITY

TABLE 'C'

Sr. No.	COUPLING SIZE	GREASE QTY. (Kg)	
		RGD	RGS
1	10	0.03	0.015
2	15	0.06	0.030
3	20	0.17	0.085
4	25	0.23	0.115
5	30	0.34	0.170
6	35	0.45	0.225
7	40	0.79	0.395
8	45	1.08	0.540
9	50	1.59	0.795
10	55	1.93	0.965
11	60	3.46	1.730
12	70	6.35	3.175
13	80	9.6	4.8
14	90	13.3	6.65
15	100	17.3	8.65

RECOMMENDED GREASE – RATHI SPECIAL GREASE (RSG) , EXXON MOBIL EP2 , ESSO - HMP , BEACON 2 OR 3, SHELL (δg = 910 Kg/m3)

If the grease quantity filled is not in accordance with the specified quantity, the coupling may become an explosion hazard.

5.2 PROCEDURE BEFORE START-UP

Bolt tightening torques for the coupling and tightening torques for the foundation bolts of the coupled machine must be checked before startup. Enclosures (coupling protection, contact guard) must be fitted. Overload conditions during startup cannot be excluded. If the coupling breaks through overload, metal parts may fly off and cause personal injury and/or material damage.

5.2.1 BOLT TIGHTENING TORQUE

TABLE 'D'

Sr. No.	COUPLING SIZE (RGD/RGS)	BOLT TIGHTENING TORQUE Nm
1	10	6
2	15	21
3	20	50
4	25	97
5	30	97
6	35	167
7	40	167
8	45	167
9	50	265
10	55	265
11	60	265
12	70	396
13	80	334
14	90	653
15	100	653

If the coupling is to be used below ground in potentially explosive areas, the coupling, which is made of steel, must be provided with a robust casing to avoid the risk of ignition from e.g. friction, impact or friction sparks.
The depositing of heavy metal oxides (rust) on the coupling must be avoided by the casing or other suitable precautions.

6. FAILURES - CAUSES AND REMEDIES

6.1 INSTRUCTIONS TO USE IN Ex HAZARDOUS AREAS

General

The following irregularities can serve as a guide for fault tracing.
Where the system is a complex one, all the other component units must be included when tracing faults.
The coupling must run with little noise and without vibration in all operating phases. Irregular behaviour must be treated as a fault requiring immediate remedy. In case of fault the drive must be stopped at once. The necessary measures for repair must be taken in accordance with the safety regulations.

Caution!

RATHI will not be bound by the terms of the guarantee or otherwise be responsible in cases of improper use of the coupling, modifications carried out Without RATHI's agreement or use of spare parts not supplied by RATHI.

Danger!

When correcting the faults and malfunctions, the coupling must always be taken out of service. Secure the drive unit to prevent it from being started up unintentionally. Attach a warning notice to the start switch.

6.2 FAILURE MODES AND FAULT DIAGNOSIS

SR. NO.	FAILURE MODE	PROBABLE CAUSES	CORRECTIVE ACTIONS
1	Worn out Gear teeth Shaft bearing failure	Excessive misalignments.	Replace the coupling Realign the coupling
2	Premature wear of Gear Teeth	Excessive starts and stops High peak load	Use coupling with heat treatment on teeth
3	Noise during running	No lubrication	Refill the grease upto required limit
4	Heat Generation	No lubrication Poor lubrication	Refill the grease upto required limit Refer maintenance guidelines for lubrication frequency
5	Grease leakage	Improper sealing	Ensure proper sealing to avoid grease leakage
6	Loose hubs on shaft with sheared keys.	Torsional shock overload	Find & eliminate causes of overload.
7	Severe corrosion on outer surface	Chemical attack	Apply anticorrosive coating on coupling (*)

(*) - Consult M/s RATHI if required

7. MAINTENANCE AND REPAIR

For grease lubricated couplings, ensure that the recommended quantity of grease is applied on the coupling teeth (internal & external) to such an amount that the teeth are completely covered. After tightening the coupling sleeves, fill the coupling with specified amount of grease from the grease nipple by the use of grease gun.

The level of grease should be checked at regular intervals of 6 months to ensure correct levels. The first grease change should take place before 3 months in operation. To exchange the grease for the first time (after 3 months), dismantle the coupling and thoroughly clean away inside to remove used grease, abrasive powder etc. After cleaning, reassemble the coupling and fill the required quantity of grease again for lubrication.

It is recommended that grease to be renewed at 2 years interval. Remove entire used grease by dismantling the coupling and refill the coupling with new grease.

Maintenance checks:

a. Check for vibration and noise
b. Check for leakage
c. Check for damages on gear teeth
d. Check for damages and deterioration of `O'-ring
e. Check for deterioration of grease.

Checks mentioned above in Sr. No. a & b can be made by observing from outside after comparing with condition under normal operation. The other checks should be carried out every six months by dismantling the coupling.
Damaged ‘O’ rings must be replaced.

In case of high ambient temperature, frequent overloaded condition, frequent reverse operation, large parallel misalignment and angular misalignment, ensure that the checking intervals are shortened.

Note:
Correct initial installation, accurate alignment, usage of right quantity and quality of lubricant will ensure longer life and smooth/trouble free operation of the coupling.

8 STORAGE

All couplings are to be stored and handled in conditions free from compression, tension or other deformation.

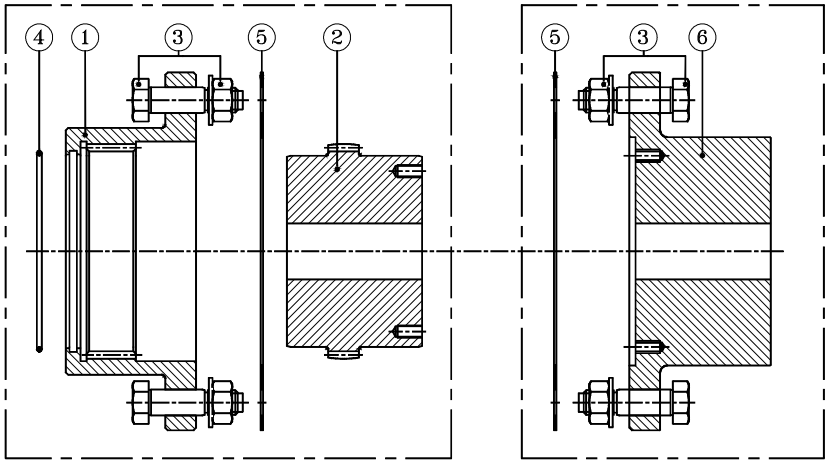
Attention is drawn to the need to keep the product away from heat or continual sunlight.

The coupling components are supplied in storable conditions and can be stored in a dry, covered place for an indefinite time.

9. COUPLING SPARE COMPONENTS

(RGD/RGS)

COUPLING COMPONENTS



SR. NO.	TYPE	PART NO	COUPLING PARTS	QTY
A	**RGD FLEXIBLE GEAR COUPLING HALF**	1	SLEEVE	1
		2	HUB	1
		3	BOLTS, NUTS AND WASHERS	**#**
		4	'O' RING	1
		5	GASKET	1
B	**RGS RIGID GEAR COUPLING HALF**	6	RIGID HUB	1
		5	GASKET	1
		3	BOLTS, NUTS AND WASHERS	**#**
#- ONE FULL SET AS PER COUPLING SIZE				