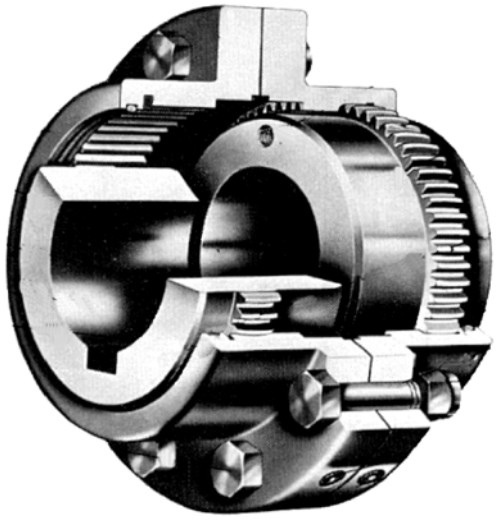
RATHI

RATHI TRANSPOWER PVT. LTD. PUNE - INDIA

PRODUCT MANUAL

GEAR-FLEX COUPLING

TYPE – LFG/LHG



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GEAR-FLEX COUPLING

STANDARD FEATURES OF GEAR-FLEX COUPLING

- Less backlash.
- High power to weight ratio.
- Compact assembly.
- Accommodates angular, parallel & axial misalignments.
- Generally used up to 120°C. Can be used for higher temperatures by using proper grade of oil or grease.
- Can be dynamically balanced to the required grade as per ISO-1940.

AT A GLANCE

SIZES
Full Flexible Type LFG - 100 to 119 (20 sizes)
Half Flexible Type LHG - 100 to 110 (11 sizes)

RATING RANGE
TYPE LFG - 5.9 kW to 17454 kW @ 100 rpm
TYPE LHG- 5.9 kW to 963 kW @ 100 rpm

TORQUE RANGE
TYPE LFG - 559 Nm to 1666744 Nm
TYPE LHG- 559 Nm to 91922 Nm

BORE RANGE
TYPE LFG - 13 mm. to 710 mm.
TYPE LHG- 13 mm. to 260 mm.

ANGULAR MISALIGNMENT - 1.5° per gear mesh Maximum

COMPLIANCE WITH API-671 SPECIFICATIONS, IF REQD.

GEAR-FLEX COUPLING

GEAR FLEX FAMILY

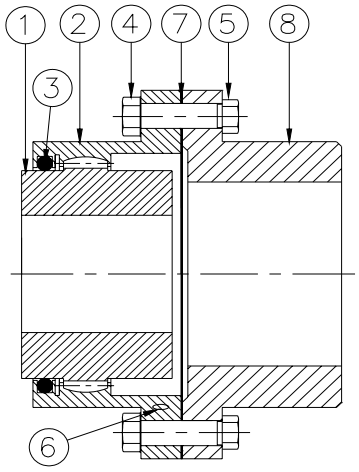
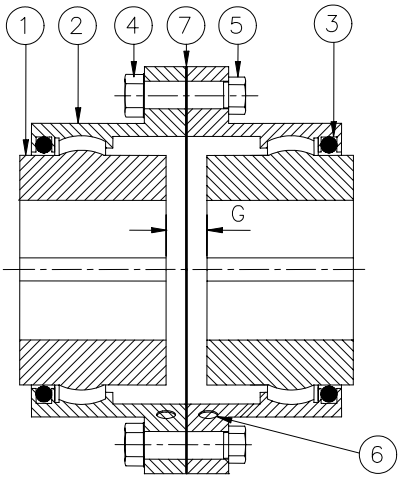


Fig. 1



HALF FLEXIBLE TYPE – LHG

FULL FLEXIBLE TYPE - LFG

1. Hubs with external teeth
2. Sleeves with internal teeth
3. O Ring
4. Bolts
5. Nuts
6. Lubrication plugs
7. Gasket
8. Rigid Hub

STANDARD MATERIAL OF CONSTRUCTION FOR LFG / LHG

Component	Type	Size	Material
Hub	LFG / LHG	100-105	C55 BS EN 10277-2
	LFG / (LHG UPTO 110)	106-119	C45 BS EN 10277-2
Sleeve	LFG / LHG	100-105	C55 BS EN 10277-2
	LFG / (LHG UPTO 110)	106-119	C.S IS 2707 Gr 1
O ring		100-119	NITRILE RUBBER
End Cover		111-119	MS IS: 2062
Hex Fitted Bolt		100-119	HTS Gr 8.8
Hex Nut			HTS Gr 8
Gasket		100-119	Paronite Paper

For other requirements of material of construction, consult RATHI.

GEAR-FLEX COUPLING

RATINGS FOR STANDARD COUPLING

Sr. No.	Coupling Size (LFG/*LHG)	Rated Torque			Rated Power			
		Nm	kg m	Lbs-inch	@100 RPM		@1500 RPM	
					Kw	HP	Kw	HP
1	100	559	57	4948	5.9	8	88	118
2	101	1127	115	9975	11.8	16	177	237
3	102	2804	286	24818	29.4	39	440	591
4	103	5047	515	44670	52.9	71	793	1063
5	104	9557	975	84587	100	134	1501	2013
6	105	14605	1489	129265	153	205	2294	3077
7	106	22444	2289	198646	235	315	3525	4728
8	107	39303	4008	347861	412	552	6174	8279
9	108	50472	5147	446715	529	709	7928	10632
10	109	62821	6406	556013	658	882	9868	13233
11	110	91923	9374	813587	963	1291	14439	19363
12	111	123065	12549	1089218	1289	1728	19331	25923
13	112	164516	16776	1456090	1723	2310	25842	34655
14	113	223793	22821	1980736	2344	3143	35153	47141
15	114	320012	32632	2832346	3351	4494	50267	67410
16	115	388738	39640	3440623	4071	5459	61063	81887
17	116	671165	68440	5940314	7028	9425	105426	141379
18	117	954665	97349	8449501	9997	13407	149958	201098
19	118	1263938	128886	11186799	13236	17750	198539	266245
20	119	1666744	169961	14751934	17454	23406	261812	351095

*Note :- LHG type couplings are available from size 100 to 110 only.

GEAR-FLEX COUPLING

WEIGHT & M.I. FOR STANDARD COUPLING

COUPLING SIZE	Wt. Kg	M.I. kg m^2	GD^2 kg m^2
LFG-100	4.2	0.01	0.04
LFG-101	11	0.04	0.16
LFG-102	15	0.05	0.2
LFG-103	25	0.12	0.48
LFG-104	39	0.24	0.96
LFG-105	57	0.49	1.96
LFG-106	85	0.75	3
LFG-107	103	1.31	5.24
LFG-108	138	2.13	8.5
LFG-109	210	3.75	15
LFG-110	277	7.63	30.5
LFG-111	550	14.5	58
LFG-112	710	22	88
LFG-113	980	34.5	138
LFG-114	1320	72.75	291
LFG-115	1700	88.25	353
LFG-116	2550	172	688
LFG-117	3620	309	1236
LFG-118	4860	491	1964
LFG-119	6380	753	3012

Note : Weight & M.I. are with solid hubs.

WEIGHT & M.I. FOR HALF GEAR COUPLINGS

COUPLING SIZE	Wt. Kg	M.I. kg m^2	GD^2 kg m^2
LHG-100	4.2	0.01	0.04
LHG-101	11	0.04	0.16
LHG-102	15	0.05	0.2
LHG-103	20	0.12	0.48
LHG-104	40	0.25	1
LHG-105	60	0.50	2
LHG-106	80	0.83	3.32
LHG-107	106	1.45	5.8
LHG-108	149	2.38	9.52
LHG-109	170	4.20	16.8
LHG-110	264	8.75	35

Note : Weight & M.I. are with solid hubs.

GEAR-FLEX COUPLING

CUSTOMISED GEAR-FLEX SPECIALS

1. Floating shaft couplings (Fig. 3a & 3b)
2. Spacer couplings (Fig. 4a & 4b)
3. LFG - Type Couplings with one hub reversed (Fig. 5)
4. LFG - Type Couplings with both hub reversed (Fig. 6)
5. LHG - Type with flexible hub reversed (Fig. 7)
6. Couplings with cut off hubs (Fig. 8)
7. Compliance with API 671, if reqd.

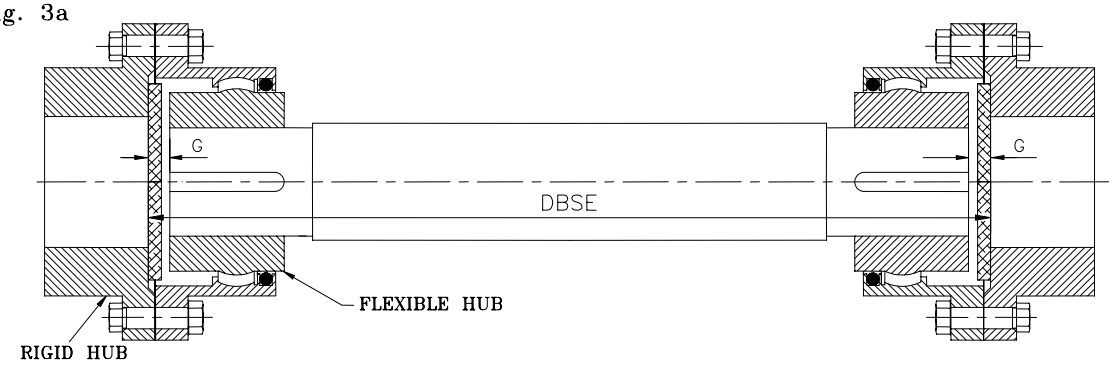
HALF FLEX COUPLINGS WITH FLOATING SHAFTS

A floating shaft can eliminate the need for additional bearing support along spanning shaft because shaft is supported at ends by connected equipment through the half flex couplings. These are generally used for the applications of cooling tower fans.

Flexible hubs on floating shaft (Fig. 3a)

Assembly of flexible hubs on the floating shaft allows for easier replacement in case of wear & allows the rigid hubs with their increased bore capacities to be used on the connected equipment shafts. This frequently means a smaller coupling size to be utilised.

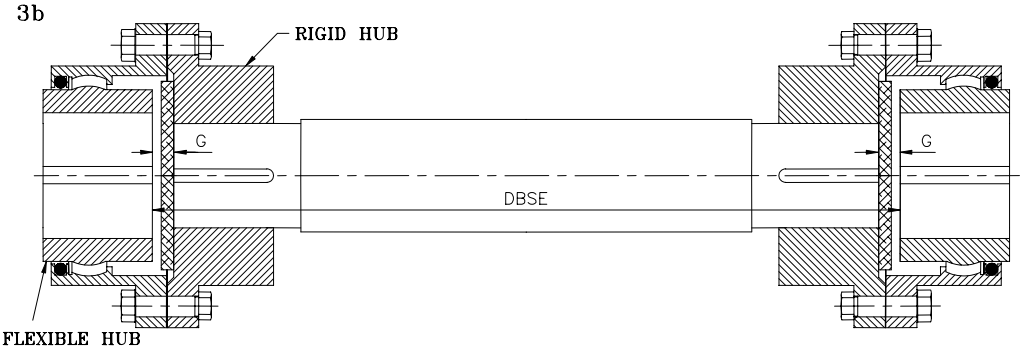
Fig. 3a



Rigid hubs on floating shaft (Fig. 3b)

When the rigid hubs are on floating shaft, shorter shaft spans can be accommodated. Since the flexible hubs are outboard, the planes of gear mesh are further apart, providing greater misalignment capacity.

Fig. 3b

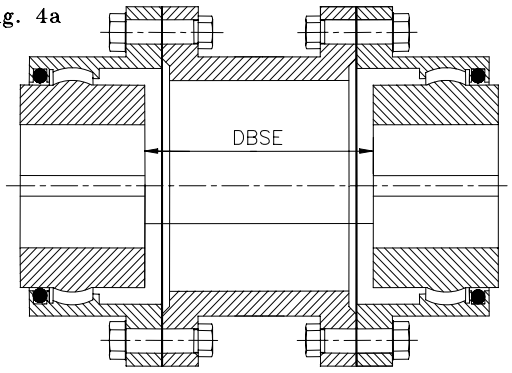


GEAR-FLEX COUPLING

SPACER COUPLINGS

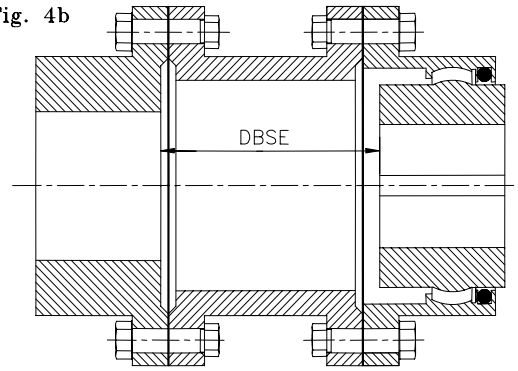
Used on pumps & compressors for ease of servicing without disturbing either of the shafts.

Fig. 4a



TYPE LFG – SPACER COUPLING

Fig. 4b

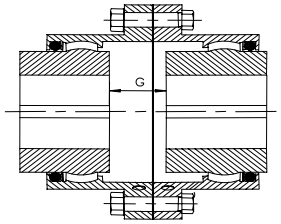


TYPE LHG – SPACER COUPLING

REVERSED HUBS COMBINATIONS

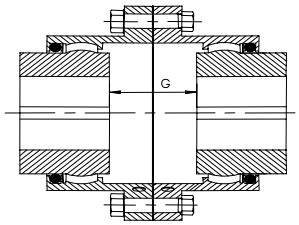
1. LFG - ONE HUB REVERSED

Fig. 5



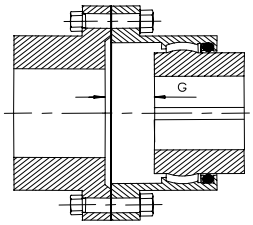
2 . LFG - BOTH HUBS REVERSED

Fig. 6



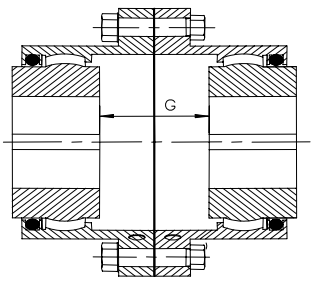
3. LHG - FLEX. HUB REVERSED

Fig. 7



4. LONG HUBS CUT OFF

Fig. 8



GEAR-FLEX COUPLING

LUBRICANTS

1. GREASE LUBRICATION

Coat the coupling case and coupling centre with the specified grease until the teeth are submerged in grease, assemble the coupling, tighten the bolts and then supplement grease through oil plug hole by use of grease gun and so on.

Replacing time of grease is same as gear oil, but replace old grease with new grease in full by overhauling the coupling.

2. RECOMMENDED LUBRICANTS

Recommended Grease is RSG (Rathi Special Grease) having δ**g = 910 Kg/m^3**.
Refer Table 'C' for grease qty. reqd. per coupling size.

REQUIREMENTS OF API 671

- Double engagement type couplings
- Material of construction - Alloy Steel EN-19
- Component balancing - Gr. 2.5 as per ISO-1940
- Unless otherwise specified, the coupling assembly shall permit total axial displacement of at least 1/4" (6.4 mm).
- Antifly Spacer (fail-safe design)
- The coupling design shall ensure that all components are positively centered. The gear meshes shall be centered at the crown diameter of the external teeth & at the root diameter of the internal teeth.
- The involute tooth form shall be used at the vendor's discretion. External teeth shall be relieved or chamfered at the tips and edges to provide the required misalignment capability & torque capacity.
- The hardness of the gear teeth shall be at least 45 Rc. The hardness of the teeth with the greater face width (generally the sleeve teeth) shall be greater than or equal to the hardness of the mating teeth.

GEAR-FLEX COUPLING

SELECTION OF SIZE OF COUPLING

Requirements

Application : Driver -
Driven -

Application Rating : kW - RPM -

Shaft sizes : Driver - Driven -

Distance between shaft ends (DBSE) if reqd. :

Service Factor (S.F.) to be taken :

Selection Procedure

(a) Service Factor
Determine appropriate SERVICE FACTOR from table

(b) Design Power
Multiply running power of driven machinery by the service factor. This gives DESIGN POWER which is used as a basis for coupling selection.

(c) Coupling Size
Refer to rating table for your required coupling size and read from the appropriate speed column until a power equal to or greater than the DESIGN POWER is found.

(d) Bore Size
Refer respective coupling dimensional table to check that the required bores can be accommodated. If bore size of selected coupling can't accommodate the shaft size, then go for next coupling size where shaft size can be accommodated.

GEAR-FLEX COUPLING

TYPICAL SERVICE FACTORS

Values listed are intended only as a general guide, and are typical of usual service requirements. For systems which frequently utilize the peak torque capability of the power source, verify that the magnitude of this peak torque does not exceed the 1.0 Service Factor Rating of the coupling selected. Applications which involve extreme repetitive shock or high-energy load absorption characteristics should be referred - with full particulars - to GEAR-FLEX.
Values contained in the table are to be applied to smooth power sources such as electric motors and steam turbines. For drives involving internal combustion engines of four or more cylinders, add 1.0 to the values listed, for six or more cylinders, add 0.5 to the values listed.

Application	Typical Service Factor	Application	Typical Service Factor
AGITATORS		**DREDGES**	
Pure Liquids	1	Cable Reels	1.75
Liquids & Solids	1.25	Conveyors	1.5
Liquids-Variable Density	1.25	Cutter Head Jig Drives	2.5
BLOWERS		Maneuvering Winches	1.75
Centrifugal	1	Pumps	1.75
Lobe	1.5	Screen Drives	1.75
Vane	1.25	Stackers	1.75
BRIQUETTE MACHINES	2	Utility Winches	1.5
CAR PULLERS-Intermittent Duty	1.5	**ELEVATORS**	
CLAY WORKING MACHINERY	1.75	Bucket	1.75
COMPRESSORS		Centrifugal & Gravity Discharge	1.5
Centrifugal	1	Escalators	1.5
Centriaxial	1.25	Freight	2.5
Lobe	1.5	**FANS**	
Reci-procating-Multi Cylinder	2	Centrifugal	1
CONVEYORS-Light Duty Uniformly Fed		Cooling Towers	1.5
Apron, Bucket, Chain, Flight, Screw	1.25	Forced Draft	1.5
Assembly, Belt	1.25	Induced Draft without Damper	
Oven	2.5	Control	2
CONVEYORS-Heavy Duty		**FEEDERS**	
Not Uniformly Fed		Apron, Belt, Disc, Screw	1.25
Apron, Bucket, Chain, Flight, Oven	1.5	Reciprocating	2.5
Assembly, Belt	1.25	**GENERATORS-**	
Reciprocating Shaker	2.5	(Not Welding)	1
CRANES AND HOISTS		**HAMMER MILLS**	2
Main Hoists, Reversing	2.5	**LAUNDRY WASHERS**	
Skip Hoists, Trolley & Bridge Drives	2	Reversing	2
Slope	2	**LAUNDRY TUMBLERS**	2
CRUSHERS		**LINE SHAFT**	1.5
Ore Stone	3		

GEAR-FLEX COUPLING

TYPICAL SERVICE FACTORS

Application	Typical Service Factor	Application	Typical Service Factor
LUMBER INDUSTRY		**METAL ROLLING MILLS**	
Barkers-Drum Type	2	Coilers, hot mill	2
Edger Feed	2	Coilers, cold mill	1.5
Live Rolls	2	Cold Mills	2
Log Haul-Incline	2	Cooling Beds	1.75
Log Haul-Well Type	2	Door Openers	2
Off bearing Rolls	2	Draw Benches	2
Planer Feed Chains	1.75	Edger Drives	1.75
Planer Floor Chains	1.75	Feed Rolls, Reversing Mills	3.5
Planer Tilting Hoist	1.75	Furnace Pushers	2.5
Slab Conveyor	1.5	Hot Mills	3
Sorting Table	1.5	Ingot Cars	2.5
Trimmer Feed	1.75	Kick-outs	2.5
MACHINE TOOLS		Manipulators	3
Bending Roll	2	Merchant Mills	3
Plate Planer	1.5	Piercers	3
Punch Press-Gear Driven	2	Pusher Rams	2.5
Tapping Machines	2.5	Reel Drives	1.75
Other Machine Tools		Reel Drums	2
Main Drives	1.5	Reelers	3
Auxiliary Drives	1.25	Rod and Bar Mills	3
METAL MILLS		Roughing Mill Delivery Table	3
Draw Bench-Carriage	2	Runout Tables	2.5
Draw Bench-Main Drive	2	Saws, hot & cold	2.5
Forming Machines	2	Screwdown Drives	3
Slitters	1.5	Skelp Mills	3
Table Conveyors		Slitters	3
Non-reversing	2.25	Slabbing Mills	3
Reversing	2.5	Soaking Pit Cover Drives	3
Wire Drawing & Flattening Machine	2	Straighteners	2.5
Wire Winding Machine	1.75	Tables, transfer & runout	2.5
MILLS, ROTARY TYPE		Thrust Block	3
Ball	2.25	Traction Drive	3
Dryers & Coolers	2	Tube Conveyor Rolls	2.5
Hammer	1.75	Unscramblers	2.5
Kilns	2	Wire Drawing	1.75
Pebble & Rod	2	**PRINTING PRESSES**	1.5
Pug	1.75	**PULLERS-Barge Haul**	2
Tumbling Barrels	2	**OIL INDUSTRY**	
MIXERS		Chillers	1.25
Concrete Mixers	1.75	Paraffin Filter Press	1.75
Drum Type	1.5		

GEAR-FLEX COUPLING

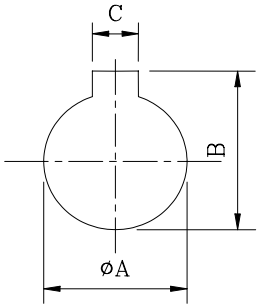
TYPICAL SERVICE FACTORS

Application	Typical Service Factor	Application	Typical Service Factor
RUBBER INDUSTRY		**PUMPS**	
Mixed-Banbury	2.5	Centrifugal	1
Rubber Calender	2	Reciprocating	
Rubber Mill (2 or more)	2.25	Single Acting	
Sheeter	2	1 or 2 Cylinders	2.25
Tire Building Machines	2.5	3 or more Cylinders	1.75
Tire & Tube Press Openers	1	Double Acting	2
Tubers & Strainers	2	Rotary, Gear, Lobe, Vane	1.5
PAPER MILLS		**SCREEN**	
Barker Auxiliaries, Hydraulic	2	Air Washing	1
Barker, Mechanical	2	Grizzly	2
Barking Drum Spur Gear Only	2.25	Rotary-Stone or Gravel	1.5
Beater & Pulper	1.75	Traveling Water Intake	1.25
Bleacher	1	Vibrating	2.5
Calenders	2	**SEWAGE DISPOSAL EQUIPMENT**	
Chippers	2.5	Bar Screens	1.25
Coaters	1	Chemical Feeders	1.25
Converting Machines, except		Collectors, Circuline or Straightime	1.25
Cutters, Platers	1.5	Dewatering Screens	1.25
Couch Roll	1.75	Grit Collectors	1.25
Cutters, Platers	2	Scum Breakers	1.25
Cylinders	1.75	Slow or Rapid Mixers	1.25
Disc Refiners	1.75	Sludge Collectors	1.25
Dryers	1.75	Thickeners	1.25
Felt Stretcher	1.25	Vacuum Filters	1.25
Felt Whipper	2	**STEERING GEAR**	1
Jordans	1.75	**STOKERS**	1
Line Shaft	1.5	**WINCH**	1.5
Log Haul	2	**WINDLASS**	1.75
Pulp Grinder	1.75		
Press Roll	2		
Reel	1.5		
Stock Chests	1.5		
Suction Roll	1.75		
Washers & Thickeners	1.5		
Winders	1.5		

GEAR-FLEX COUPLING

STANDARD TOLERANCES FOR FINISH BORE & KEYWAY

Unless otherwise specified, couplings are supplied with finish bore & keyway in H7 & JS9 tolerances respectively as per standard IS 919 (part 2) : 1993.



∅A - Bore
B - Keyway Depth
C - Keyway Width

Basic Size (mm.)		H7 For Bores (mm.)	JS9 For Keyway Width (mm.)	For Keyway Depth (mm.)
Above	Upto & including			
3	6	+ 0.012 0	± 0.015	+ 0.1 0
6	10	+ 0.015 0	± 0.018	
10	18	+ 0.018 0	± 0.021	
18	30	+ 0.021 0	± 0.026	+ 0.2 0
30	50	+ 0.025 0	± 0.031	
50	80	+ 0.030 0	± 0.037	
80	120	+ 0.035 0	± 0.043	
120	180	+ 0.040 0	± 0.050	+ 0.3 0
180	250	+ 0.046 0	± 0.057	
250	315	+ 0.052 0	± 0.065	+ 0.4 0
315	400	+ 0.057 0	± 0.070	
400	500	+ 0.063 0	± 0.077	+ 0.5 0

APPLICATIONS

Equipments :

Agitators, Hammer mills, Blowers, Line shafts, Conveyors, Machine tools, Crushers, Metal forming machines, Elevators, Mixers, Escalators, Pulverisers, Extruders, Pumps, Feeders, Screens, Generators, Wenches.

Industry:

Cement Brewing & Distilling Food, Rolling Mills, Oil & Petroleum, Chemical & Fertiliser, Paper Mills, Rubber, Sewage Disposal, Sugar, Textile, Thermal Power Houses.

GEAR FLEX COUPLING

COMPETITORS FOR GEAR-FLEX COUPLING

SR	COMPETITOR	MAX. kW @ 1500 RPM	MAX. BORE (mm.)
1	David Brown Link Master Gear Coupling (AUSTRALIA)	46050	300
2	Fenner Power Tran (INDIA)	190500	600
3	Lovejoy Flanged Sleeve Series Type - F (USA)	32451	340

GEAR FLEX COUPLING

EQUIVALENT RATHI GEAR-FLEX COUPLING FOR DAVID BROWN LINK MASTER GEAR COUPLING

LINK MASTER GEAR					RATHI GEAR-FLEX LFG				
COUPLING SIZE	kW AT 1500 RPM	MAX. BORE (MM.)	O.D. (MM.)	TOT. LGTH (MM.)	COUPLING SIZE	kW AT 1500 RPM	MAX. BORE (MM.)	O.D. (MM.)	TOT. LGTH (MM.)
02	315	50	152	101	102	440	60	185	145
03	559.5	65	178	127	103	793	75	220	175
04	984	80	213	158	104	1501	90	250	215
05	1680	95	240	187	105	2294	110	290	230
06	2235	110	279	218	106	3525	125	320	260
07	3360	130	318	247	107	6174	140	350	290
08	4470	140	346	278	107	6174	140	350	290
09	6150	155	389	314	108	7928	160	380	320
10	8400	175	421	344	109	9868	180	430	340
11	12750	200	475	408	110	14439	220	490	370
12	16200	220	505	450	111	19331	260	545	410
13	19800	240	560	490	112	25842	300	590	490
14	30750	260	605	530	113	35153	330	680	535
15	35100	280	630	562	114	50267	370	730	575
16	46050	300	690	602	115	61063	410	780	655
17	79200	320			116	105426	455	900	720
18	94050	340			116	105426	455	900	720
19	107400	360			116	105426	455	900	720
20	120750	380			117	149958	520	1000	820
21	190500	400			119	261812	710	1250	1000
22	219000	420			119	261812	710	1250	1000
23	250500	440			NOT AVAILABLE				

NOTE : Above comparison is done on the basis of both, kW rating & maximum bore sizes.

GEAR FLEX COUPLING

EQUIVALENT RATHI GEAR-FLEX COUPLING (Type LFG) FOR FENNER POWER TRAN

FENNER POWER TRANS. - NGC				RATHI GEAR FLEX COUPLING - LFG			
COUPLING SIZE	kW AT 1500 RPM	MAX. BORE (MM.)	O.D. (MM.)	COUPLING SIZE	kW AT 1500 RPM	MAX. BORE (MM.)	O.D. (MM.)
NGC 1	172.5	50	170	LFG-101	177	50	170
NGC 2	427.5	60	190	LFG-102	440	60	185
NGC 3	772.5	75	220	LFG-103	793	75	220
NGC 4	1447.5	90	250	LFG-104	1501	90	250
NGC 5	2250	110	290	LFG-105	2294	110	290
NGC 6	3450	125	330	LFG-106	3525	125	320
NGC 7	5850	140	350	LFG-107	6174	140	350
NGC 8	7725	160	380	LFG-108	7928	160	380
NGC 9	9660	200	430	LFG-109	9868	180	430
NGC 10	13950	220	490	LFG-110	14439	220	490
NGC 11	18975	260	545	LFG-111	19331	260	545
NGC 12	24000	300	590	LFG-112	25842	300	590
NGC 13	43200	320	680	LFG-113	35153	330	680
NGC 14	59700	340	730	LFG-114	50267	370	730
NGC 15	71475	360	760	LFG-115	61063	410	780
NGC 16	102000	450	900	LFG-116	105426	455	900
NGC 17	125625	490	1000	LFG-117	149958	520	1000
NGC 18	160950	540	1100	LFG-118	198539	610	1100
NGC 19	190500	600	1250	LFG-119	261812	710	1250

NOTE : Above comparison is done on the basis of both, kW rating & maximum bore sizes.

GEAR FLEX COUPLING

EQUIVALENT RATHI FULL GEAR COUPLING (LFG Type) FOR LOVEJOY FLANGED SLEEVE SERIES (Type - F) COUPLINGS

LOVEJOY FLANGED SLEEVE COUPLING (TYPE-F)			RATHI FULLGEAR (LFG)		
SIZE TYPE - F	kW @ 1500 RPM	MAX. BORE (MM.)	SIZE TYPE - LFG	kW @ 1500 RPM	MAX. BORE (MM.)
7/8	134.3	42	101	177	50
1 ½	335.7	56	102	440	60
2	559.5	73	103	793	75
2 ½	1007	88	104	1501	90
3	1678.5	107	105	2294	110
3 ½	2685.6	124	106	3525	125
4	3916.5	143	107	6174	140
4 ½	5371.2	162	108	7928	160
5	7721	176	109	9868	180
5 ½	10183	201	110	14439	220
6	13316	225	111	19331	260
7	17904	254	112	25842	300
8	23499	312	113	35153	330
9	32451	340	114	50267	370
NOT AVAILABLE			115	61063	410
			116	105426	455
			117	149958	520
			118	198539	610
			119	261812	710

NOTE : Above comparison is done on the basis of both, kW rating & maximum bore sizes.