



(SG) Steel Gear Couplings



Why Choose Guardian?

For more than 70 years, Guardian has been designing and manufacturing world-class couplings and other power transmission components. Utilizing advanced manufacturing technologies and processes, Guardian provides highly-reliable coupling and component solutions to meet the most challenging industrial application requirements.

Guardian provides a wide range of standard and custom products including flywheel couplings, hydraulic pump mounts, bearing supported stub shafts, flexible shaft-to-shaft couplings, motion control couplings as well as compression pipe couplings.

Durable Guardian products are utilized in key industries including mobile hydraulics, farm & ag, tree care, concrete, food & beverage, material handling, automation, power generation, and oil & gas on applications such as skid steers, aerial lifts, harvesters, wood chippers, concrete pumps, dewatering pumps, baggage handlers, conveyors, robotics, compressors, and generator sets.

FEATURES AND ADVANTAGES

The crowned gear tooth ensures maximum contact at the strongest part of the tooth resulting in high torque capacities. The Steel Gear product line offers our largest capacity for torque. Available in double engagement full flex or single engagement flex rigid designs. Exposed bolt sleeve design allows for ease of assembly. Size 10 through 60 stocked in minimum plain bores, size 70 thru 120 made to order. Clearance or interference fit bores available as requested. Coupling assemblies can be interchanged one half of other gear couplings made to AGMA standards.



Fully Interchangeable

Coupling assemblies are fully interchangeable with other gear couplings made to AGMA standards.

Crowned Gear Teeth

Advanced CAD design ensures maximum contact at the strongest part of the tooth.

Ease of Assembly

The "SG" design incorporates exposed bolts with captive nuts for ease of assembly.

High Torque Capacity

With careful selections of material and optimization of pitch circle diameter, torque rating up to 1 million inch pounds can be achieved.

"SG" STEEL GEAR COUPLING

Coupling Selection Basics

In selecting couplings, the characteristics of driving and driven machines must be considered. Factors in Tables 1 and 2, in conjunction with the following procedure, are for general guidance and are complimentary to customers' specialist knowledge of their own equipment.

1. Select coupling type from page 4.
2. Select Service Factor (SF) from Table 2.
3. Calculate required minimum rating thus:
 - a) Normal Service (Nominal Torque):

$$\text{Rating} = \frac{(\text{HP})(63025)(\text{SF})}{\text{Ft\#} (12)(\text{RPM})}$$
 - b) Repetitive High Peak Torque applications
 - i. Non-Reversing Duty;
 Rating, Ft# = Peak Torque
 - ii. Reversing Duty:
 Rating Ft# = Peak Torque x 1.5

NOTE: Occasional peak torques of twice the catalog rating can be accommodated providing they occur less than a 1000 times during the life of the coupling.

4. Select coupling which has a rating equal to or above that arrived in item 3 above.

Determine maximum coupling bore from Table 1 (pg. 4). Hub Boss Diameters are given in the following dimension tables (pg. 5, Dimension "D").

Check that the above max. bore is suitable for shafts. If not, go to next coupling size and repeat check.

5. Having found a suitable coupling to satisfy the above conditions, check that the coupling is capable of speed required.

Misalignment

"SG" Steel Gear Couplings are designed to accommodate parallel and angular misalignment and axial movement.

While some sizes of "SG" Steel Gear Couplings are capable of static misalignment of up to $1\frac{1}{2}^\circ$ per gear hub, it is recommended that all couplings be aligned on initial installation.

Care should be taken to ensure that misalignment during operation is kept to an absolute minimum, as excesses will cause wear of the product together with high loading on associated machinery. This will have a great influence on the life of the product.

Selection Examples

EXAMPLE 1:

Select a double engagement coupling to connect a 4- cylinder reciprocating compressor to a 350HP, 1000RPM motor. Motor shaft 3.25 diameter, compressor shaft 2.875 diameter.

1. Type SG.
2. Service Factor 2.00 (1.00 plus 1.00) See pg. 3 for further details
3. Rating = $\frac{(350)(63025)(2)}{(12)(1000)} = 3676.46 \text{ Ft\#}$
4. Coupling Size is 25: (capacity 4731 Ft#)
 Application is non-reversing with cycle torque, i.e. (from table 1) Medium duty, requiring a minimum Hub OD/Bore ratio of 1.45 : 1.
 Hub OD of Size 25 coupling is 5.16

$$\therefore \text{Max. bore} = \frac{D}{1.45} = \frac{5.16}{1.45} = 3.56$$

$\therefore$ Coupling size 25 will accommodate 3.25 diameter shaft.

5. Coupling Size 25 is suitable for duty, capable of accepting 3.25 bore and suitable for operating at 1000RPM.

EXAMPLE 2:

Select a double engagement coupling for a heavy duty pulveriser with a normal demand of 250 HP from a motor running at 750 RPM. Shafts are 3.50 and 4.00 diameters.

1. Type SG.
2. Service Factor 1.75
3. Rating = $\frac{(250)(63025)(1.75)}{(12)(750)} = 3063.72 \text{ Ft\#}$
4. Coupling Size is 25: (capacity 4731 Ft#) Application is heavy duty requiring a minimum Hub Boss/Bore ratio of 1.5 : 1.

Boss of Size 25 coupling is 5.16

$$\therefore \text{Max. bore} = \frac{D}{1.5} = \frac{5.16}{1.5} = 3.44$$

As the shaft sizes are 3.50 and 4.00 then the coupling size will need to be increased to accommodate the 4.00 shaft.

Boss of Size 30 is 5.98

$$\therefore \text{Max. bore} = \frac{5.98}{1.5} = 3.99$$

Coupling size of 30 is suitable for the duty and of accepting shafts of 90mm and 100mm.

5. Check speed capability.

“SG” STEEL GEAR COUPLING

Keyway Sizes/Bore Tolerances

Fractional Bores and Keyways

Nominal Bore Diameter	Nominal Keyway Size Width x Depth	Bore Tolerance Industry Std. for Class 1, Clearance Fit	
1/2 to 9/16	1/8 x 1/16	+0.001	-0.000
5/8 to 7/8	3/16 x 3/32	+0.001	-0.000
15/16 to 1-1/4	1/4 x 1/8	+0.001	-0.000
1-5/16 to 1-1/4	5/16 x 5/32	+0.001	-0.000
1-7/16 to 1-3/4	3/8 x 3/16	+0.001	-0.000
1-13/16 to 2	1/2 x 1/4	+0.001	-0.000
2-1/16 to 2-1/4	1/2 x 1/4	+0.0015	-0.000
2-5/16 to 2-3/4	5/8 x 5/16	+0.0015	-0.000
2-13/16 to 3-1/4	3/4 x 3/8	+0.0015	-0.000
3-5/16 to 3-3/4	7/8 x 7/16	+0.0015	-0.000
3-13/16 to 4	1 x 1/2	+0.0015	-0.000
4-1/16 to 4-1/2	1 x 1/2	+0.002	-0.000
4-9/16 to 5-1/2	1-1/4 x 5/8	+0.002	-0.000
5-9/16 to 6-1/2	1-1/2 x 3/4	+0.002	-0.000
6-9/16 to 7-1/2	1-3/4 x 7/8	+0.0025	-0.000
7-9/16 to 9	2 x 1	+0.003	-0.000
9-1/16 to 11	2-1/2 x 1-1/4	+0.003	-0.000

Metric Bores and Keyways

Diameter Over	To	Keyway Width x Depth	Tolerance H7, MM	
12	17	5 x 2.3	+0.018	-0.000
17	22	6 x 2.8	+0.021	-0.000
22	30	8 x 3.3	+0.021	-0.000
30	38	10 x 3.3	+0.025	-0.000
38	44	12 x 3.3	+0.025	-0.000
44	50	14 x 3.8	+0.025	-0.000
50	58	16 x 4.3	+0.030	-0.000
58	65	18 x 4.4	+0.030	-0.000
65	75	20 x 4.9	+0.030	-0.000
75	85	22 x 5.4	+0.030	-0.000
85	95	25 x 5.4	+0.035	-0.000
95	110	28 x 6.4	+0.035	-0.000
110	130	32 x 7.4	+0.035	-0.000
130	150	36 x 8.4	+0.040	-0.000
150	170	40 x 9.4	+0.040	-0.000
170	200	45 x 10.4	+0.046	-0.000
200	230	50 x 11.4	+0.046	-0.000
230	260	56 x 12.4	+0.046	-0.000
260	290	63 x 12.4	+0.052	-0.000

Reciprocating Engine Service Factors

For engine drives where good flywheel regulation prevents excessive torque fluctuations.

No. of Cylinders	Service Factor
6 and over	0.5 + S.F. TABLE 2
4 or 5	1.0 + S.F. TABLE 2
Less than 4	Refer to GUARDIAN

For drives where the operation is near or actually passes through a major torsional natural frequency, a mass elastic analysis of the system is advised.

Table 1: Max. Coupling Bore Sizes

Duty Class	Load Classification	Coupling Bore
Uniform	Steady load, very rarely subjecting to maximum loading	Use maximum bores from tables
Medium	Steady load with superimposed cyclic load fluctuation	Max. = $\frac{D}{1.45}$
Heavy	Repeated maximum load fluctuation/shock loads	Max. = $\frac{D}{1.5}$
Extra Heavy	Regularly subjected to fully reversing maximum loads	Max. = $\frac{D}{1.6}$

Minimum Service Factors (SF)

For “SG” Steel Gear Coupling

These service factors are for general guidance only and are complimentary to customers' knowledge of their own equipment.

Table 2

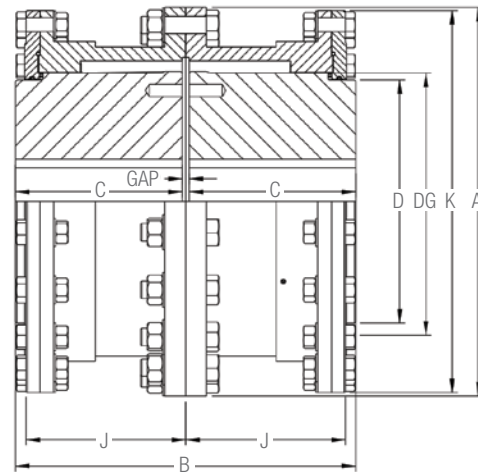
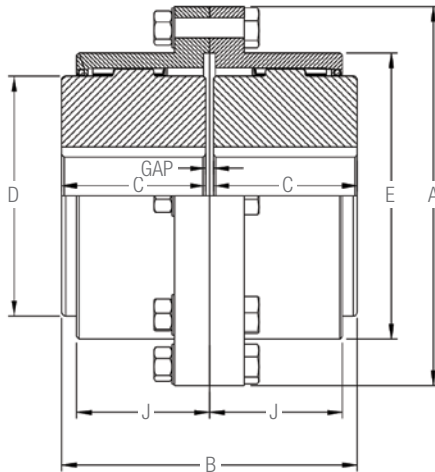
Application	Service Factor	Application	Service Factor
AGITATORS	1.0	PAPER MILLS	
BLOWERS		Bleacher.....	1.0
Centrifugal.....	1.0	Felt stretcher.....	1.25
Lobe/Vane.....	1.25	Stock chest/stock pump-rotary/winder.....	1.5
CLAY WORKING MACHINES		Blealer and pulper/Calender/Couch/Dryer/Forndrinier/Press/Pulp grinder/Suction roll.....	1.75
Brick press, Pug mill, Briquette machine.....	1.75	Jordan/Stock pump-reciprocating.....	2.0
COMPRESSORS		Barking drum/Chipper.....	2.5
Centrifugal.....	1.0	PLASTIC	
Lobe/Rotary.....	1.25	Calenders/Crushers.....	1.5
Reciprocating		Extruders/Mixers	
1 to 3 cylinders.....	3.0	PULVERISERS	
4 or more cylinders.....	1.75	Roller/Hammer mill, light duty.....	1.5
CONVEYORS		Hog/Hammer mill, heavy duty.....	1.75
Uniformly fed horizontal: Screw, Apron, Assembly, Belt, Chain, Flight, Oven.....	1.0	PUMPS	
Heavy Duty Dredge, Inclined belt and screw.....	1.5	Centrifugal.....	1.0
Reciprocating.....	3.0	Descaling with accumulators/ Rotary gear, Lobe and Vane.....	1.25
CRANES AND HOISTS		Reciprocating:	
Main hoist - medium duty/ Mine hauling.....	2.5	1 cylinder, single or double acting.....	3.0
Main hoist - heavy duty.....	3.0	2 cylinders, single acting.....	2.0
Long or cross travel/Slew or luff skip, hoise/slope.....	1.75	2 cylinders, double acting.....	1.75
CRUSHERS	2.5	3 cylinders or more.....	1.5
DREDGERS	2.0	RUBBER INDUSTRY	
ELEVATORS		Extruder.....	1.75
Centrifugal and gravity discharge.....	1.25	Calender.....	2.0
FANS		Banbury mixer/Cracker/ Mixing mill/Plasticator/Refiner.....	2.5
Centrifugal.....	1.0	STEEL INDUSTRY	
Forced Draught.....	1.5	Soaking pit/Cover drive - Lift.....	1.0
Induced draught with damper		Travel.....	2.0
Mine/Cooling tower.....	2.0	Coilers (up or down) Hot mills only	
Induced draught without control		Coilers (up or down) Cold mills only.....	1.5
FOOD		Coke Plants:	
Beet slicer.....	1.75	Pusher ram drive.....	2.5
Dough mixer		Door Opener.....	2.0
Meat grinder		Straighteners	
Cereal cooker.....	1.25	Cold mills-Strip and temper mills	
Bottling, can filling.....	1.0	Drawbench/Furnace pusher/hot and cold saws/Ingot cars/Reelers/ Seamless tube mills piercer/ Rod mills/mill tables/Manipulators/ Feed rolls-blooming mills.....	3.0
GENERATORS		Hot mills-Strip and sheet mills	
Even load.....	1.0	Pusher and Lorry car traction drive.....	3.0
Hoist and Railway service.....	1.5	Cooling beds.....	1.5
Welder load.....	2.0	Wire drawing/Sitters, steel mills only.....	1.75
KILN	2.0	SUGAR INDUSTRY	
LAUNDRY MACHINES	2.0	Cane carrier and leveller.....	1.75
MACHINE TOOLS		Can knife and crusher.....	2.0
Main drives.....	1.5	Mill stands, Turbine driven-Helical or Herringbone gears.....	1.5
Notching press/Planer/Punch.....	1.75	Electric drive or steam driven with all Helical or Herringbone or spur gears with any prime mover.....	1.75
Auxiliary and traverse drives.....	2.0	TEXTILES	
METAL WORKING		Batcher.....	1.25
Bending.....	1.5	Dyeing machinery	
Shears.....	2.0	Calender/Card machine/ Dry can/Loom.....	1.5
Presses.....	2.0	TOBACCO AND CIGARETTE MACHINERY	1.5
Hammers		WATER AND WASTE TREATMENT	
Straighteners		Aerators.....	1.5
Punching		Screw pumps	
MILLS (Rotary Type)		Screens	
Ball or Pebble.....	2.0	WIND TURBINES	1.25
Rod or Tube		WOOD WORKING MACHINERY	
Dryer and Cooler.....	1.75	Trimmers, haulage, barkers, planes, saws.....	2.0
MIXERS			
Drum.....	1.5		
Concrete			
(continuous or intermittent).....	1.75		
Grizzly.....	2.0		
OIL INDUSTRY			
Chiller.....	1.25		
Oil well pumping (return 150% peak torque).....	2.0		

STEEL GEAR COUPLING FLEX / FLEX DESIGN

Type 1
Sizes 10-60



Type 2
Sizes 70-120



Type 1

Size	HP Per 100 rpm	Max. Speed (rpm)	Basic Torque (ft-lbs)	Bore Dia. (in)		Dimensions (in)						Gap	Cplg weight (lbs)	Lube weight (lbs)	Size
				Max.	Min.	A	B	C	D	E	J				
10	12	8,000	622	1.89	0.51	4.57	3.50	1.69	2.72	3.31	1.54	0.12	9.92	0.09	10
15	27	6,500	1,398	2.36	0.75	5.98	3.98	1.93	3.39	4.13	1.89	0.12	20.06	0.15	15
20	50	5,600	2,590	2.87	0.98	7.01	5.00	2.44	4.13	4.96	2.32	0.12	35.05	0.24	20
25	90	5,000	4,662	3.62	1.26	8.39	6.26	3.03	5.16	6.10	2.83	0.20	57.10	0.51	25
30	150	4,400	7,769	4.13	1.50	9.45	7.36	3.58	5.98	7.09	3.31	0.20	95.02	0.79	30
35	230	3,900	11,913	4.88	2.01	10.98	8.58	4.17	7.01	8.31	3.86	0.24	149.91	1.19	35
40	350	3,600	18,128	5.75	2.52	12.52	9.76	4.76	8.27	9.65	4.37	0.24	214.95	2.01	40
45	480	3,200	24,862	6.50	2.99	13.62	10.94	5.31	9.25	10.79	4.84	0.31	300.05	2.29	45
50	650	2,900	33,667	7.01	3.50	15.31	12.36	6.02	10.00	12.05	5.55	0.31	419.98	1.70	50
55	850	2,650	44,026	7.76	4.02	16.73	13.54	6.61	10.98	13.15	6.22	0.31	550.05	4.89	55
60	1,100	2,450	56,975	8.74	4.49	17.99	15.12	7.40	12.01	13.23	6.26	0.31	675.05	7.01	60

Type 2

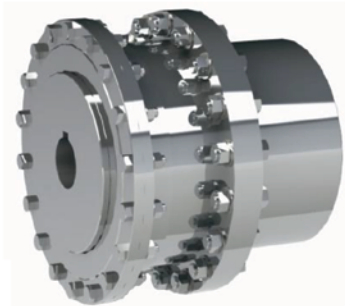
Size	HP Per 100 rpm	Max. Speed (rpm)	Basic Torque (ft-lbs)	Bore Dia. (in)		Dimensions (in)								Cplg* weight (lbs)	Lube weight (lbs)	Size
				Max.	Min.	A	B	C	D	DG	J	K	Gap			
70	1,600	2,150	82,873	10.00	3.50	20.75	17.78	8.70	13.50	14.02	7.72	20.35	0.37	1070.11	9.59	70
80	2,100	1,750	108,771	10.98	4.02	23.27	19.98	9.80	14.02	14.49	9.57	22.52	0.37	1550.05	21.01	80
90	2,850	1,550	147,617	12.01	4.49	25.98	22.24	10.87	15.51	16.50	10.43	25.24	0.51	2169.99	27.01	90
100	4,000	1,450	207,182	13.50	5.00	27.99	24.53	12.01	17.52	18.50	11.57	27.52	0.51	2870.39	33.00	100
110	5,500	1,330	284,876	15.24	5.51	30.51	26.73	13.11	19.49	20.51	12.68	29.49	0.51	3699.98	39.00	110
120	7,000	1,200	362,569	16.73	5.98	32.99	28.31	13.90	21.50	22.52	13.43	32.52	0.51	4660.08	46.01	120

* Coupling weight, without bore machining

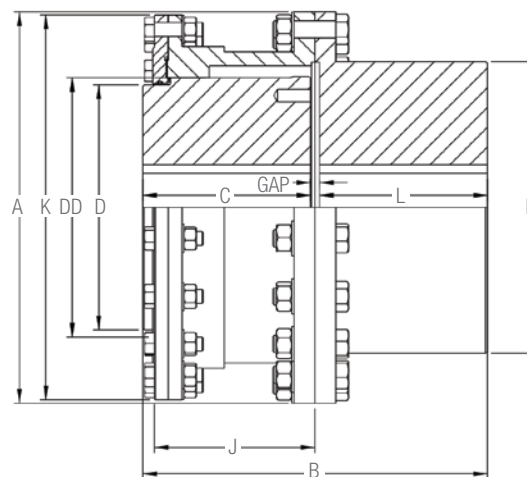
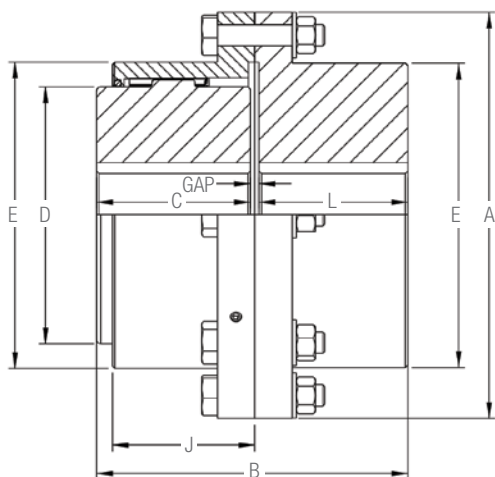
STEEL GEAR COUPLING FLEX / RIGID DESIGN



Type 3
Sizes 10-60



Type 4
Sizes 70-120

**Type 3**

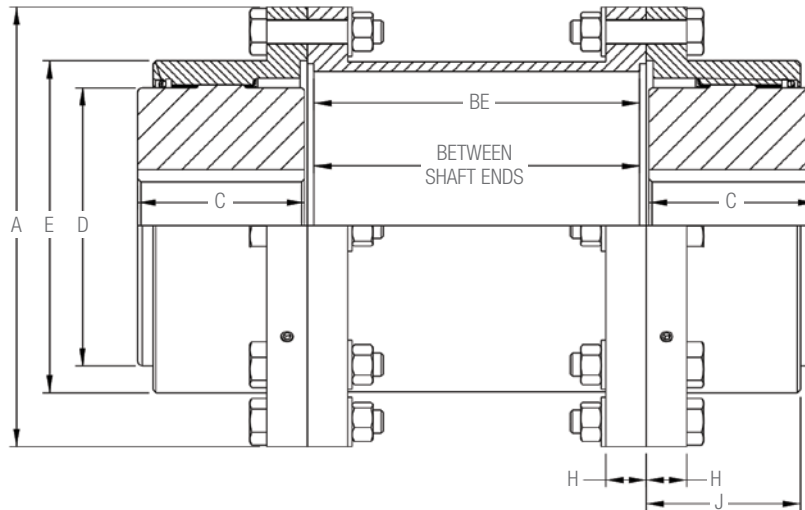
Size	HP Per 100 rpm	Max. Speed (rpm)	Basic Torque (ft-lbs)	Bore Dia. (in)			Dimensions (in)								Cplg weight (lbs)	Lube weight (lbs)	Size
				Max.		Min.	A	B	C	D	E	J	L	Gap			
				DE	DA												
10	12	8,000	622	2.36	1.89	0.51	4.57	3.43	1.69	2.72	3.31	1.54	1.57	0.16	9.92	0.04	10
15	27	6,500	1,398	2.95	2.36	0.75	5.98	3.90	1.93	3.39	4.13	1.89	1.81	0.16	20.06	0.09	15
20	50	5,600	2,590	3.62	2.87	0.98	7.01	4.88	2.44	4.13	4.96	2.32	2.28	0.16	35.05	0.15	20
25	90	5,000	4,662	4.37	3.62	1.26	8.39	6.14	3.03	5.16	6.10	2.83	2.91	0.20	59.97	0.26	25
30	150	4,400	7,769	5.12	4.13	1.50	9.45	7.24	3.58	5.98	7.09	3.31	3.46	0.20	95.02	0.40	30
35	230	3,900	11,913	5.87	4.88	2.01	10.98	8.39	4.17	7.01	8.31	3.86	4.02	0.22	134.92	0.60	35
40	350	3,600	18,128	6.73	5.75	2.52	12.52	9.57	4.76	8.27	9.65	4.37	4.53	0.28	220.02	1.04	40
45	480	3,200	24,862	7.64	6.50	2.99	13.62	10.79	5.31	9.25	10.79	4.84	5.16	0.31	300.05	1.26	45
50	650	2,900	33,667	8.74	7.01	3.50	15.31	12.17	6.02	10.00	12.05	5.55	5.79	0.35	429.90	2.01	50
55	850	2,650	44,026	9.76	7.76	4.02	16.73	13.78	6.61	10.98	13.15	6.22	6.81	0.35	580.03	2.49	55
60	1,100	2,450	56,975	10.51	8.74	4.49	17.99	15.12	7.40	12.01	14.41	6.65	7.32	0.39	714.95	3.75	60

Type 4

Size	HP Per 100 rpm	Max. Speed (rpm)	Basic Torque (ft-lbs)	Bore Dia. (in)			Dimensions (in)										Cplg* weight (lbs)	Lube weight (lbs)	Size
				Max.		Min.	A	B	C	D	DD	E	J	L	K	Gap			
				DE	DA														
70	1,600	2,150	82,873	12.01	10.00	3.50	20.75	17.87	8.70	13.50	14.02	16.73	7.72	8.66	20.35	0.51	1119.94	5.00	70
80	2,100	1,750	108,771	13.50	10.98	4.02	23.27	20.12	9.80	14.02	14.49	17.76	9.57	9.80	22.52	0.51	1539.91	11.00	80
90	2,850	1,550	147,617	15.00	12.01	4.49	25.98	22.28	10.87	15.51	16.50	20.00	10.43	10.87	25.24	0.55	2170.43	14.00	90
100	4,000	1,450	214,414	15.98	13.50	5.00	27.99	24.65	12.01	17.91	18.50	20.87	11.57	12.01	27.52	0.63	2759.94	17.00	100
110	5,500	1,330	284,876	17.52	15.24	5.51	30.51	26.85	13.11	19.49	20.51	22.99	12.68	13.11	29.49	0.63	3610.03	20.00	110
120	7,000	1,200	362,569	19.49	16.73	5.98	32.99	28.43	13.90	21.50	22.52	25.51	13.43	13.90	32.52	0.63	4580.06	24.01	120

* Coupling weight, without bore machining

STEEL GEAR COUPLING SPACER FLEX / FLEX DESIGN



Type 5

Size	HP Per 100 rpm	Max. Speed (rpm)	Basic Torque (ft-lbs)	Bore Dia. (in)		Dimensions (in)								Cplg weight (lbs)	Lube weight (lbs)	Size
				Max.	Min.	A	BE		C	D	E	H	J			
10	12	7,000	622	1.89	0.51	4.57	3.27	12.24	1.69	2.72	3.31	0.55	1.54	14.99	0.09	10
15	27	5,500	1,398	2.36	0.75	5.98	3.27	12.24	1.93	3.39	4.13	0.75	1.89	29.98	0.15	15
20	50	4,600	2,590	2.87	0.98	7.01	3.27	12.24	2.44	4.13	4.96	0.75	2.32	44.97	0.24	20
25	90	4,000	4,662	3.62	1.26	8.39	3.74	12.24	3.03	5.16	6.10	0.87	2.83	85.10	0.51	25
30	150	3,600	7,769	4.13	1.50	9.45	3.74	12.24	3.58	5.98	7.09	0.87	3.31	119.93	0.79	30
35	230	3,100	11,913	4.88	2.01	10.98	4.72	12.24	4.17	7.01	8.31	1.10	3.86	195.11	1.19	35
40	350	2,800	18,128	5.75	2.52	12.52	4.72	12.24	4.76	8.27	9.65	1.10	4.37	270.06	2.01	40
45	480	2,600	24,862	6.50	2.99	13.62	4.72	12.24	5.31	9.25	10.79	1.10	4.84	365.08	2.29	45
50	650	2,400	33,667	7.01	3.50	15.31	5.75	12.24	6.02	10.00	12.05	1.50	5.55	524.92	3.90	50
55	850	2,200	44,026	7.76	4.02	16.73	5.75	12.24	6.61	10.98	13.15	1.50	6.22	675.05	4.89	55
60	1,100	2,100	56,975	8.74	4.49	17.99	5.75	12.24	7.40	12.01	14.41	0.98	6.65	789.91	7.01	60

- Coupling weight without Bore machining and Min BE.
- Application of spacer
 - 1 When it is impossible to connect hubs due to long distance between shaft ends.
 2. When it is necessary to prevent transmitting heat and electric currency.
- “BE” is the distance between shaft ends. State “BE” number when you order.

Guardian Couplings Facilities

North America

USA

300 Indiana Highway 212
Michigan City, IN 46360
219-874-5248

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Europe

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