Engineering/Technical

Selection Methods
DODGE Gear Couplings (DGC)

Two methods may be used in selecting a DODGE Gear Coupling: the HP/100 method or the torque method. In both cases, the following information is required for proper selection:

* application or type of equipment to be connected,
* horsepower or torque,
* RPM or coupling,
* shaft diameters,
* and shaft spacing.

Other information that may be used to refine your selection includes: system peak torque and frequency, hours/day of operation, special bore fits or tolerances, and space limitations.

HP/100 Method

Step 1 Obtain required Service Factor from Service Factor Table on Page 5.

Step 2 Determine the application HP per 100 RPM:

$$\text{HP/100 RPM} = \frac{\text{Motor HP x 100 x Service Factor}}{\text{Coupling RPM}}$$

Step 3 From the Rating Table on Page 6, find a rating equal to or greater than the HP/100 RPM. Note coupling size from left-hand column.

Step 4 Check maximum RPM capability.

Step 5 Check maximum bore capacity. If maximum bore is exceeded, move to larger size with adequate bore, but be sure maximum RPM of coupling is not exceeded.

Note: If spring set motor brake is used, and brake HP is greater than prime mover, use brake HP in place of motor HP.

Torque Method

Step 1 Obtain required Service Factor (SF) from Service Factor Table on Page 5.

Step 2 Determine torque required for application:

$$\text{Torque (in-lb)} = \frac{63025 \times \text{HP} \times \text{SF}}{\text{RPM}}$$

Step 3 From the Rating Table on Page 6, find a rating equal to or greater than the torque. Note coupling size from left-hand column.

Step 4 Check maximum RPM capacity.

Step 5 Check maximum bore capacity. If maximum bore is exceeded, move to larger size with adequate bore, but be sure maximum RPM of coupling is not exceeded.

Note: If system peak torque is known and is non-reversing, start at Step 3. If system peak torque is known and reversing, multiply by 2.0 and start at Step 3.

Information extracted from AGMA Standard 511.02 for bores through 6 inches.

		Interference Flt[1]			Clearance Flt [2,3]		
Nominal Shaft Size		Nominal Shaft	Bore Tolerance		Nominal Shaft	Bore Tolerance	
Over	Thru	Size Minus	Plus	Minus	Size Minus	Plus	Minus
-	1.5000	0.0010	0.0005	0.0000	0.0000	0.0010	0.0000
1.5000	2.0000	0.0020	0.0010	0.0000	0.0000	0.0010	0.0000
2.0000	3.0000	0.0020	0.0010	0.0000	0.0000	0.0015	0.0000
3.0000	4.0000	0.0030	0.0015	0.0000	0.0000	0.0015	0.0000
4.0000	5.0000	0.0035	0.0015	0.0000	0.0000	0.0020	0.0000
5.0000	6.0000	0.0040	0.0015	0.0000	0.0000	0.0020	0.0000
6.0000	7.0000	0.0050	0.0020	0.0000	-	-	-
7.0000	8.5000	0.0060	0.0020	0.0000	-	-	-
8.5000	10.0000	0.0070	0.0020	0.0000	-	-	-
10.0000	12.0000	0.0080	0.0020	0.0000	-	-	-
12.0000	13.0000	0.0090	0.0025	0.0000	-	-	-

Nominal Bore Size		Preferred Standard Keyway Dimensions[4]	Preferred Standard Key Dimensions[4]	Shallow Key Dimensions[5]	Shallow Keyway Dimensions[5]
Over	Thru				
0.3125	0.4375	3/32 x 3/64	3/32 x 3/32	-	-
0.4375	0.5625	1/8 x 1/16	1/8 x 1/8	-	-
0.5625	0.8750	3/16 x 3/32	3/16 x 3/16	-	-
0.8750	1.2500	1/4 x 1/8	1/4 x 1/4	-	-
1.2500	1.3750	5/16 x 5/32	5/16 x 5/16	-	-
1.3750	1.7500	3/8 x 3/16	3/8 x 3/8	-	-
1.7500	2.2500	1/2 x 1/4	1/2 x 1/2	1/2 x 1/8	1/2 x 3/8
2.2500	2.7500	5/8 x 5/16	5/8 x 5/8	5/8 x 3/16	5/8 x 1/2
2.7500	3.2500	3/4 x 3/8	3/4 x 3/4	3/4 x 3/16	3/4 x 9/16
3.2500	3.7500	7/8 x 7/16	7/8 x 7/8	7/8 x 1/4	7/8 x 11/16
3.7500	4.5000	1 x 1/2	1 x 1	1 x 1/4	1 x 3/4
4.5000	5.5000	1-1/4 x 5/8	1-1/4 x 1-1/4	1-1/4 x 1/4	1-1/4 x 7/8
5.5000	6.5000	1-1/2 x 3/4	1-1/2 x 1-1/2	1-1/2 x 1/4	1-1/2 x 1
6.5000	7.5000	1-3/4 x 3/4	1-3/4 x 1-1/2	1-3/4 x 1/4	1-3/4 x 1
7.5000	9.0000	2 x 3/4	2 x 1-1/2	2 x 3/8	2 x 1-1/8
9.0000	11.0000	2-1/2 x 7/8	2-1/2 x 1-3/4	2-1/2 x 3/8	2-1/2 x 1-1/4
11.000	13.0000	3 x 1	3 x 2	3 x 3/8	3 x 1-3/8

1. Gear couplings are bored for interference fit unless other wise specified.
2. Clearance Fit not recommended for bore sizes exceeding 6 inches.
3. Based on AGMA Class 1 Clearance Fit.
4. Square key recommended through 6-1/2 inches, rectangular key is recommended for larger bores.
5. Shallow keyways are required for maxium bore capacity.

Service Factors

Application	Server Factor
AREATOR	2.0
AGGREGATE PROCESSING,	
CEMENT, MINING KILNS; TUBE, ROD, and BALL MILLS	
Direct or on L. S. Shaft of Reducer, with Final Drive:	
Machined Spur Gears	2.0
Single Helical or Herringbone Gears	1.75
Crushers, Ore, or Stone	2.5
Dryer, Rotary	1.75
Grizzly	2.0
Hammermill or Hog	1.75
Tumbling Mill or Barrel	1.75
AGITATORS	
Vertical and Horizontal Screw	
Propeller Paddle	1.0
BADGE HAUL PULLER	1.5
BLOWERS	
Centrifugal	1.0
Lobe or Vane	1.25
BREWING and DISTILLING	
Bottle and Can Filling Machines	1.0
Brew Kettle	1.0
Cookers, Continuous Duty	1.25
Lauter Tub	1.5
Mash Tub	1.25
Scale Hopper, Frequent Peaks	1.75
CAR DUMPERS	2.5
CAR PULLERS	1.5
CLARIFIER or CLASSIFIER	1.0
CLAY WORKING INDUSTRY	
Brick Press, Briquette Machine, Clay Working	
Machine, Pug Mill"	1.75
COMPRESSORS	
Centrifugal	1.0
Rotary, Lobe, or Vane	1.25
Rotary Screw	1.0
Reciprocating–	
With Flywheel and Gear Between	
Compressor and Prime Mover**	
1 Cylinder-Single Acting	3.0
1 Cylinder-Double Acting	3.0
2 Cylinders-Single Acting	3.0
2 Cylinders-Double Acting	3.0
3 Cylinders-Single Acting	3.0
3 Cylinders-Double Acting	2.0
4 or More Cylinders-Single Acting	1.75
4 or More Cylinders-Double Acting	1.75
CONVEYORS	
Apron, Assembly, Belt, Chain, Flight Screw	1.0
Bucket	1.25
Live Roll, Shaker, and Reciprocating	3.0
CRANES and HOISTS	
Main Hoist	1.75
Skip Hoist	1.75
Slope	1.5
Bridge, Travel or Trolley	1.75
DREDGES	
Cable Reel	1.75
Conveyors	1.25
Cutter Head, Jig Drive	2.0
Maneuvering Winch	1.5
Pumps (Uniform Load)	1.5
Screen Drive, Stacker	1.75
Utility Winch	1.5
DYNAMOMETER	1.0
ELEVATORS	
Bucket, Centrifugal Discharge	1.25
Gravity Discharge	1.25
EXCITER, GENERATOR	1.0
EXTRUDER, PLASTIC	1.5
FANS	
Centrifugal	1.0
Cooling Tower	2.0
Forced Draft Across the Line Start	1.5
Forced Draft Motor Driven thru Fluid	
or Electric Slip Clutch	1.0
Gas Recirculating	1.5
Induced Draft with Damper Control or	
Blade Cleaner	1.25
Induced Draft without Controls	2.0
FEEDERS	
Apron, Belt, Disc, Screw	1.0
Reciprocating	2.5
FOOD INDUSTRY	
Beet Slicer	1.75
Bottling, Can Filling Machine	1.0
Cereal Cooker	1.25
Dough Mixer, Meat Grinder	1.75
GENERATORS	
Even Load	1.0
Hoist or Railway Service	1.5
Welder Load	2.0
HAMMERMILL	1.75
LAUNDRY WASHER or TUMBLER	2.0
LINE SHAFTS Any Processing Machinery	1.5
LUMBER	
Band Resaw	1.5
Circular Resaw, Cut-Off	1.75
Edger, Head Rig, Hog	2.0
Log Haul	2.0
Planer	1.75
Rolls, Non-Reversing	1.25
Rolls, Reversing	2
Sawdust Conveyor	1.25
Slab Conveyor	1.75
Sorting Table	1.5
Trimmer	1.75
MACHINE TOOLS	
Auxiliary and Traverse Drive	1.0
Bending Roll, Notching Press,	
Punch Press, Planer, Plate Reversing	1.75
Main Drive	1.5
METAL FORMING MACHINES	
Draw Bench Carriage and Main Drive	2.0
Extruder	2.0
Forming Machine and Forming Mills	2.0
Slitters	1.0
Wire Drawing or Flattening	1.75
Wire Winder	1.5
Coliers and Uncoilers	1.5
METAL ROLLING MILLS	
Hot Mills-	
Strip or Sheet Mills,	
Reversing Blooming, or Slabbing Mills	2.5
Edger Drives	1.5
Cold Mills–	
Strip Mills, Temper Mills	2.0
Rod Mills	2.0
Reel Drives	1.75
Screwdown	2.0
Manipulators	3.0
Sideguards	3.0
Feed Rolls-Blooming Mills	3.0
Ingot Cars	2.0
Soaking Pit Cover Drives–	
Lift	1.0
Travel	2.0
Furnace Pushers	2.0
Cooling Beds	1.5
Straighteners	2.0
Unscramblers (Billet Bundle Busters)	2.0
Hot and Cold Saws	2.0
Coilers (Up or Down) Hot Mills Only	2.0
Coilers (Up or Down) Cold Mills Only	1.5
Slitters, Steel Mill Only	1.75
Wire Drawing Machinery	1.75
Drawbench	2.0
Mill Tables	
Roughing Breakdown Mills	3.0
Hot Bed or Transfer, Non-Reversing	1.5
Runout, Reversing	3.0
Runout, Non-Reversing, Non-Plugging	2.0
Seamless Tube Mills	
Piercer	3.0
Thrust Block	2.0
Tube Conveyor Rolls	2.0
Reeler	2.0
Kick Out	2.0
Coke Plants	
Pusher Ram Drive	2.5
Door Opener	2.0
Pusher or Larry Car Traction Drive	3.0
MIXERS (See Agitators)	
Concrete	1.75
Muller	1.5
OIL INDUSTRY	
Chiller	1.25
Oil Well Pumping	2.0
Paraffin Filter Press	1.5
Rotary Kiln	2.0
PAPER MILLS	
Barker Auxiliary, Hydraulic	2.0
Barker, Mechanical	2.0
Barking Drum	
L.S. Shaft of Reducer with Final	
Drive-Helical or Herringbone Gear	2.0
Machined Spur Gear	2.5
Cast Tooth Spur Gear	3.0
Beater and Pulper	1.75
Bleachers, Coaters	1.0
Calender and Super Calender	1.75
Chipper	2.5
Converting Machine	1.25
Couch	1.75
Cutter, Felt Whipper	2.0
Cylinder, Dryer	1.75
Felt Stretcher	1.25
Fourdrinier	1.75
Jordan	2.0
Log Haul	2.0
Line Shaft	1.5
Press	1.75
Pulp Grinder	1.75
Reel, Reqinder, Winder	1.5
Stock Chest, Washer, Thickener	1.5
Stock Pumps, Centrifugal	
Constant Speed	1.0
Frequent Speed Changes Under Load	1.25
Suction Roll	1.75
PRESS, PRINTING	1.5
PUG MILL	1.75
PULVERIZERS	
Hammermill and Hog	1.75
Roller	1.5
PUMPS	
Centrifugal-	
Constant Speed	1.0
Frequent Speed Changes Under Load	1.25
Descaling, with Accumulators	1.25
Gear, Rotary, or Vane	1.25
Reciprocating–	
1 Cylinder-Single or Double Acting	3.0
2 Cylinders-Single Acting	2.0
2 Cylinders-Double Acting	1.75
3 or More Cylinders	1.5
RUBBER INDUSTRY	
Calender	2.0
Cracker, Plasticator	2.5
Extruder	1.75
Intensive or Banbury Mixer	2.5
Mixing Mill, Refiner, or Sheeter	
One or Two in Line	2.5
Three or Four in Line	2.0
Five or More in Line	1.75
Tire Building Machine	2.5
Tire and Tube Press Opener (Peak Torque)	1.0
Tuber, Strainer, Pelletizer	1.75
Warming Mill	
One or Two Mills in Line	2.0
Three or More Mills in Line	1.75
Washer	2.5
SCREENS	
Air Washing	1.0
Grizzly	2.0
Rotary Coal or Sand	1.5
Vibrating	2.5
Water	1.0
SEWAGE DISPOSAL EQUIPMENT	
Bar Screen, Chemical Feeders, Collectors,	
Dewatering Screen, Grit Collector	1.0
STEERING GEAR	1.0
STOKER	1.0
SUGAR INDUSTRY	
Cane Carrier and Leveler	1.75
Cane Knife and Crusher	2.0
Mill Stands, Turbine Driven with All Helical	
or Herringbone Gears	1.5
Electric Drive or Steam Engine Drive with	
Helical, Herringbone, or Spur Gears with	
Any Prime Mover	1.75
TEXTILE INDUSTRY	
Batcher	1.25
Calender, Card Machine	1.5
Cloth Finishing Machine	1.5
Dry Can, Loom	1.5
Dyeing Machinery	1.25
Mangle, Napper, Soaper	1.25
Spinner, Tenter Frame, Winder	1.5
TUMBLING BARREL	1.75
WINCH, MANEUVERING	
Dredge, Marine	1.5
WINDLASS	1.5
WOODWORKING MACHINERY	1.0

System Service Factor (SF) Calculation

To determine the system SF, the Driver Service Factor adder must be added to the driven SF.

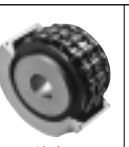
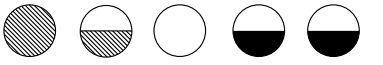
Example: determine the system SF for a Gear Coupling used to couple a barking drum with machined spur gear and a six-cylinderdiesel engine driven SF + Driver SF Adder = System SF, 2.5 + .5 = 3.0 The service factors listed are intended only as a general guide.Where substantial shock occurs, or where starting and stopping is frequent as on some"inching" drives and on some reversing drives, or where the power source is an internal combustion engine with less than four cylinders-consult DODGE. Where torsional vibrations occur as with an internal combusion engine or in reciprocating compressoror pump applications, check the couping stiffness for the possible developemnt of damaging large-amplitude vibrations. A complete system torsional analysis may be necessary.

◆ Consult DODGE for selection assistance.

** Add 0.5 to factor if without flywheel.

Type of Coupling	Electric Motor Std Torque	High Torque Motors	Turbines	Reciprocating Engine Number of Cylinders				
				12 or more	8 to 11	6 to 7	4 to 5	Less than 4
Gear	0.0	0	0.0	0.0	0.5	0.5	1.0	◆

DODGE	Falk G20 Seies	Kop-Flex KoppersH Series	Amerigear ZurnF Series	Lovejoy/ Sier-Bath
1	1010	1H	201	-
1.5	1015	1 1/2 H	201 1/2	1.5
2	1020	2H	202	2
2.5	1025	2 1/2 H	202 1/2	2.5
3	1030	3H	203	3
3.5	1035	3 1/2 H	203 1/2	3.5
4	1040	4H	204	4
4.5	1045	4 1/2 H	204 1/2	4.5
5	1050	5H	205	5
5.5	1055	5 1/2 H	205 1/2	5.5
6	1060	6H	206	6
7	1070	7H	207	-

Coupling	 PARA-FLEX Finished Bore	 PARA-FLEX TAPER-LOCK®	 D-FLEX Couplings	 GRID-LIGN Couplings	 Chain Couplings	 Gear Couplings	 Best Worst
Selection Criteria							
Misalignment							Better alignment provides longer life and lowers the reaction forces imposed on bearings. In all situations, misalignment should be minimized as much as possible.
Temperature Range							Rubber seals and elastomeric elements are generally the most heat limited coupling component. Also, most nonsynthetic lubricants should not be used much above 220°F.
Torque-Bore Capability							This relationship describes torque and bore capabilities relative to the physical size of the coupling. This consideration may be important if the coupling must operate in a limited space.
Speed Capability							As the diameter of a coupling increases, its speed capability decreases due to centrifugal forces exerted on materials. Further, couplings with all-machined parts can operate at higher speeds.
Torsionally Soft							Generally allows application wind-up to cushion shock loads and vibration. “Soft” coupling helps protect motor and reducer from shock loads in the driven equipment.
Installation Cost							Account of initial installation cost including equipment requirements, difficulty, alignment time, and manpower.
Ease of Maintenance							Based on frequency and difficulty of routine parts or coupling replacement, lubrication, or other scheduled maintenance.
Repair Cost							Based on cost and difficulty of replacement of a failing or failed coupling.

www.rockwellautomation.com **www.ptplace.com** **www.dodge-pt.com** **www.reliance.com** **www.ptplace.com**

Corporate Headquarters
Rockwell Automation, 777 East Wisconsin Avenue, Suite 1400, Milwaukee, WI, 53202-5302 USA, Tel: (1) 414.212.5200, Fax: (1) 414.212.5201

Headquarters for Dodge and Reliance Electric Products
Americas: Rockwell Automation, 6040 Ponders Court, Greenville, SC 29615-4617 USA, Tel: (1) 864.297.4800, Fax: (1) 864.281.2433
Europe/Middle East/Africa: Rockwell Automation, Br¸hlstrafle 22, D-74834 Elztal-Dallau, Germany, Tel: (49) 6261 9410, Fax: (49) 6261 17741
Asia Pacific: Rockwell Automation, 55 Newton Road, #11-01/02 Revenue House, Singapore 307987, Tel: (65) 6356-9077, Fax: (65) 6356-9011

Headquarters for Allen-Bradley Products, Rockwell Software Products and Global Manufacturing Solutions
Americas: Rockwell Automation, 1201 South Second Street, Milwaukee, WI 53204-2496 USA, Tel: (1) 414.382.2000, Fax: (1) 414.382.4444
Europe/Middle East/Africa: Rockwell Automation SA/NV, Vorstlaan/Boulevard du Souverain 36, 1170 Brussels, Belgium, Tel: (32) 2 663 0600, Fax: (32) 2 663 0640
Asia Pacific: Rockwell Automation, 27/F Citicorp Centre, 18 Whitfield Road, Causeway Bay, Hong Kong, Tel: (852) 2887 4788, Fax: (852) 2508 1846

DMR-1720-3 9/02-5M-K