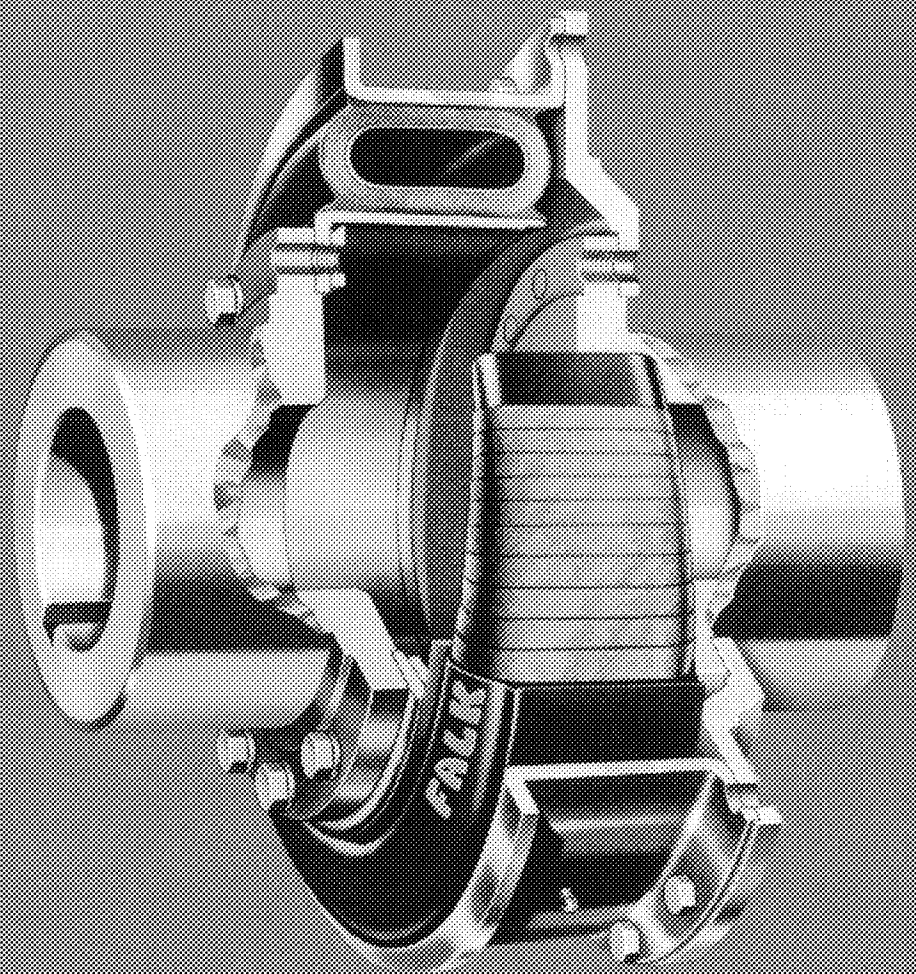
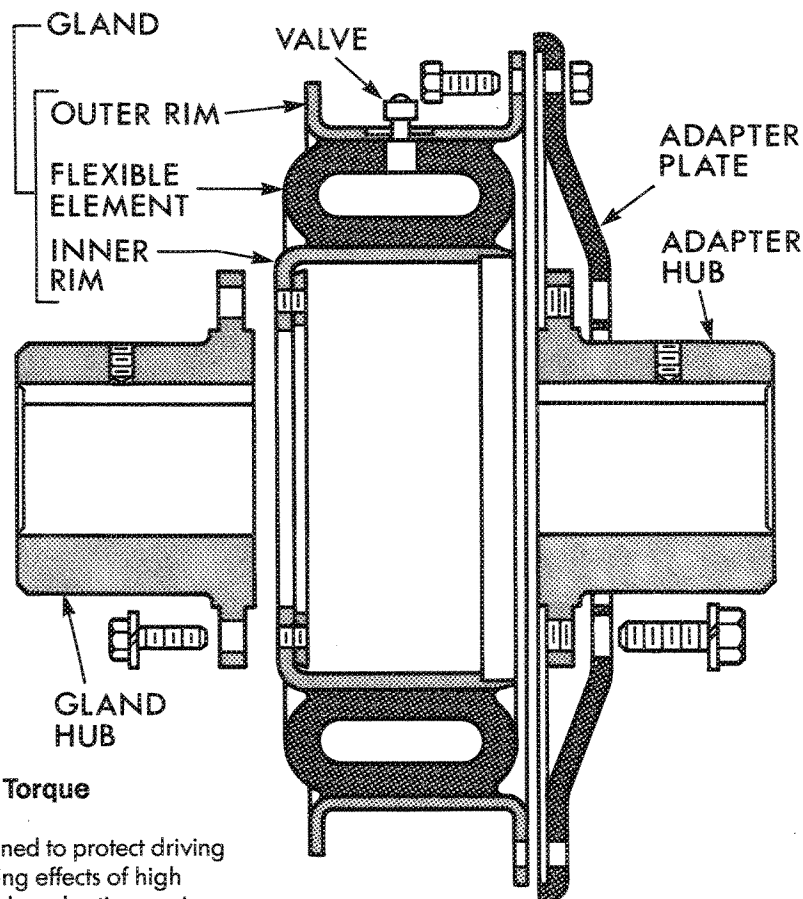


A-AIRFLEX

FALK COUPLINGS



A-Airflex Couplings



Protects Equipment Against High Torque Fluctuations

The Falk Type A Airflex Coupling is designed to protect driving and driven machinery from the damaging effects of high torque fluctuations associated with internal combustion engines, reciprocating pumps and compressors, and other driven equipment of a similar fluctuating torque nature. The Airflex Coupling is especially suited to applications requiring flange or flywheel mounting and applications that require a low maintenance, non-lubricated coupling with high torque capacity.

Reliability

The reliability of the Falk Airflex Coupling design is proven by over 40 years of successful operations in the field. Today, Falk Airflex Couplings service both the marine and industrial fields . . . exceeding all expectations for dependability and positive, trouble free performance. Your machinery deserves the protection that the Falk Airflex Coupling provides.

Construction

The Falk Airflex Coupling gland consists of steel inner and outer rims bonded to a resilient corded natural rubber flexible element. The gland can be bolted directly to a flange on the connected equipment or to a shaft using the adapter hub and plate. Eleven combinations are available using standard components.

Airflex Gland The Airflex gland is a composition of rubber and polyester cord. The number of layers varies with coupling size; the larger the coupling, the greater the number of plies. The complete multi-ply sandwich is bonded to the inner and outer rims to form a unit which transmits torque and gives the best combination of strength and flexibility. This rubber-polyester bonded element is not affected by dust, dirt or ambient temperatures from -40°F (-40°C) to 150°F (66°C).

Hubs Both hubs are machined with precise registered fits. Hubs are made of steel for rugged service.

Gland Rims Both inner and outer rims are rugged steel, permanently bonded to the gland. The outer rim has an extended flange to allow bolting to a flywheel or adapter.

Adapter Plate The steel adapter plate is designed with an offset between the outer gland rim and coupling hub which allows removal of the gland, for the popular number 5 assembly, without disturbing the connected machines. It is fabricated with machined precise registered fits.

Fasteners Grade 5 or better fasteners are used throughout to provide maximum strength.

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4	Service Factors
5	Quick Selection Method
6	Formula Selection Method
7	Minimum & Maximum Bores, Keys, WR ²
8 & 9	Hub & Flange Mountings and Dimensions
10	Flywheel Mounting and Dimensions
11	How to Order, Recommended Hub Bores

Benefits

Cushions Shock—Reduces Torque Fluctuations When coupling is properly selected, the resilience of the natural rubber, loaded in shear, cushions shock and reduces torque fluctuations.

Accommodates Misalignment Flexible rubber gland accommodates radial, angular and axial misalignment.

Dampens Vibration The natural hysteresis of the rubber in the gland helps dampen vibration.

Operates Quietly Airflex Couplings help prevent the transfer of noise from one machine to the next.

Installs Easily Pilot fits on all components ensure concentricity and easy alignment without special tools.

Never Needs Lubrication Due to the rubber gland design, no lubrication is ever required.

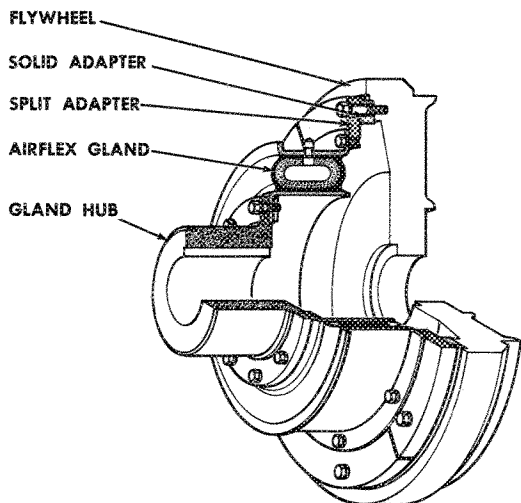
Versatile Design Eleven possible combinations ensure ready application to a wide variety of machine arrangements with no modification of the standard components. Also available, are flywheel mountings, floating shafts and tandem designs.

Other Falk Airflex Designs

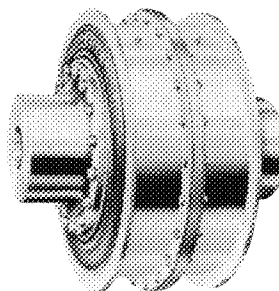
Consult the Factory for complete details:

Airflex Flywheel Design This design simplifies mounting of an Airflex coupling to the flywheel of an industrial engine and permits coupling removal without disturbing driving or driven equipment.

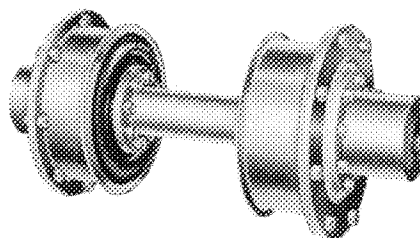
The Airflex flywheel coupling consists of a solid and a split adapter ring fastened to the engine flywheel. The outer rim of the standard Airflex gland is fastened to the split adapter ring and the inner rim to the standard Airflex hub on the driven shaft.



Airflex Tandem Design If vibratory torque characteristics are too great, the Tandem or Double Airflex coupling can be furnished with twice the deflection and one-half the stiffness of a single Airflex.



Airflex Floating Shaft Design Floating shaft type coupling requirements are served by the combination of two standard Airflex glands and an intermediate floating shaft. This design takes advantage of the self-centering characteristics of the gland assembly. It allows for reasonable angular misalignment of the connecting shaft.



The Falk Corporation (the "Company") warrants that, for a period of one year from the date of shipment, the product to be manufactured and delivered hereunder will deliver successfully its rated output as indicated in this bulletin or on the nameplate, provided, it is properly installed and maintained, correctly lubricated and operated in the environment and within the limits of speed, torque or other load conditions for which it was sold. Such product is expressly not warranted against failure or unsatisfactory operation resulting from dynamic vibrations imposed upon it by the drive system in which it is installed unless the nature of such vibrations has been fully defined and expressly accepted in writing by the Company as a condition of operation. Unless otherwise provided herein, Company warrants title to the product manufactured and sold hereunder and that such product shall conform to Company's specifications. Subject to the preceding sentence and except as otherwise expressly stated herein, COMPANY MAKES NO REPRESENTATION OR WARRANTY OF ANY KIND, EXPRESS OR IMPLIED, AS TO MERCHANTABILITY, FITNESS FOR PARTICULAR PURPOSE OR ANY OTHER MATTER WITH RESPECT TO SAID PRODUCT. Company shall not be liable for and Purchaser assumes responsibility for, all personal injury and property damage resulting from the handling, possession or use of said product. The above conditions of sale are from Terms 100-603 which is available upon request.

Install and operate Falk products in conformance with applicable local and national safety codes and per Falk installation manuals which are available upon request. Suitable guards for rotating members may be purchased from Falk as optional accessories. Consult your local Falk Representative for complete details.

WARNING: Lock out power source and remove all external loads from the system before attempting to service any component in the system. Locking out the power source and removing the load will reduce the possibility of an unexpected motion or reaction in the system.

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Bulletin 481-110 May 1992

Table 1 Airflex Coupling Service Factors for Motor and Turbine Drives
Service factors listed are typical values based on normal operation of the drive systems.

For repetitive high peak load applications, use the Formula Selection Method on Page 6, Step 2C.

Alphabetical listing of applications

Service Factor	Service Factor
AERATOR 2.0	GENERATORS
AGITATORS	Even Load 1.0
Vertical and Horizontal	Hoist or Railway Service 1.5
Screw, Propeller, Paddle 1.0	Welder Load 2.0
BARGE HAUL PULLER 1.5	HAMMERMILL 1.75
BLOWERS	LAUNDRY WASHER OR
Centrifugal 1.0	TUMBLER 2.0
Lobe or Vane 1.25	LINE SHAFTS
CAR DUMPERS 2.5	Any Processing Machinery 1.5
CAR PULLERS 1.5	MACHINE TOOLS
CLARIFIER OR CLASSIFIER 1.0	Auxiliary and Traverse Drive 1.0
COMPRESSORS	Bending Roll, Notching Press, Punch Press, Planer, Plate
Centrifugal 1.0	Reversing 1.75
Rotary, Lobe or Vane 1.25	Main Drive 1.5
Rotary, Screw 1.0	MAN LIFTS Not Approved
Reciprocating	METAL FORMING
Direct Connected Refer to Factory	MACHINES
Without Flywheels Refer to Factory	Draw Bench Carriage and
*With Flywheel and Gear	Main Drive 2.0
between Compressor	Extruder 2.0
and Prime Mover	Forming Machine and
1 cylinder, single acting 3.0	Forming Mills 2.0
1 cylinder, double acting 3.0	Slitters 1.0
2 cylinders, single acting 3.0	Wire Drawing or Flattening 1.75
2 cylinders, double acting 3.0	Wire Winder 1.5
3 cylinders, single acting 2.0	Coilers and Uncoilers 1.5
3 cylinders, double acting 1.75	MIXERS (see Agitators)
4 or more cyl., single act. 1.75	Concrete 1.75
4 or more cyl., double act. 1.75	Mutler 1.5
CONVEYORS	PRESS, PRINTING 1.5
Apron, Assembly, Belt, Chain, Flight, Screw 1.0	PUG MILL 1.75
Bucket 1.25	PULVERIZERS
Live Roll, Shaker and	Hammermill and Hog 1.75
Reciprocating 3.0	Roller 1.5
★ CRANES AND HOIST	PUMPS
Main Hoist 1.75▲	Centrifugal—
Skip Hoist 1.75▲	Constant Speed 1.0
Slope 1.5	Frequent Speed Changes
Bridge, Travel or Trolley 1.75	under Load 1.25
DYNAMOMETER 1.0	Descaling, with accumulators 1.25
ELEVATORS	Gear, Rotary, or Vane 1.25
Bucket, Centrifugal Discharge 1.25	Reciprocating
Freight or Passenger Not Approved	1 cyl., single or double act. 3.0
Gravity Discharge 1.25	2 cyl., single acting 2.0
ESCALATORS Not Approved	2 cyl., double acting 1.75
EXCITER, GENERATOR 1.0	3 or more cylinders 1.5
EXTRUDER, PLASTIC 1.5	SCREENS
FANS	Air Washing 1.0
Centrifugal 1.0	Grizzly 2.0
Cooling Tower 2.0	Rotary Coal or Sand 1.5
Forced Draft—Across the	Vibrating 2.5
Line start 1.5	Water 1.0
Forced Draft Motor	SKI TOWS & LIFTS Not Approved
Driven thru fluid or	STEERING GEAR 1.0
electric slip clutch 1.0	STOKER 1.0
Gas Recirculating 1.5	TUMBLING BARREL 1.75
Induced Draft with damper	WINCH, MANEUVERING
control or blade cleaner 1.25	Dredge, Marine 1.5
Induced Draft without controls 2.0	WINDLASS 1.5
FEEDERS	WOODWORKING
Apron, Belt, Disc, Screw 1.0	MACHINERY 1.0
Reciprocating 2.5	WORK LIFT PLATFORMS Not Approved

* For balanced opposed design, refer to Factory.

▲ If people are occasionally transported, refer to Factory for the selection of the proper size Steelflex or Gear coupling and availability of the dual path feature that will meet applicable safety codes.

If the primary purpose of the application is material conveyance and occasionally people are transported, the Falk warranty may remain in effect provided the design load conditions are not exceeded and certification to the appropriate safety codes and load conditions has been obtained by the system designer or end user from the appropriate enforcement authorities.

★ For high peak load applications (such as Metal Rolling Mills) refer to the Formula Selection Method on Page 6, Step 2C.

Table 2 ♦ Engine Drive Service Factors

Service Factors for engine drives are those required for applications where good flywheel regulation prevents torque fluctuations greater than $\pm 20\%$. For drives where torque fluctuations are greater or where the operation is near a serious critical or torsional vibration, a mass elastic study is necessary.

No. of Cylinders	4 or 5♦					6 or more♦				
Table 1 Service Factor	1.0	1.25	1.5	1.75	2.0	1.0	1.25	1.5	1.75	2.0
Engine Service Factor	2.0	2.25	2.5	2.75	3.0	1.5	1.75	2.0	2.25	2.5

♦ To use Table 2, first determine application service factor from Table 1. Use that factor to determine ENGINE Service Factor from Table 2. When service factor from Table 1 is greater than 2.0 or where 1, 2 or 3 cylinder engines are involved, refer complete application details to the Factory for engineering review.

Alphabetical listing of industries

Service Factor	Service Factor
AGGREGATE PROCESSING, CEMENT, MINING KILNS; TUBE, ROD AND BALL MILLS	Thrust Block 2.0
Direct or on L.S. shaft of Reducer, with final drive: Machined Spur Gears 2.0	Tube Conveyor Rolls 2.0
Single Helical or Herringbone Gears 1.75	Reeler 2.0
Conveyors, Feeders, Screens, Elevators See General Listing	Kick Out 2.0
Crushers, Ore or Stone 2.5	Sidewalks 3.0
Dryer, Rotary 1.75	Skelp Mills Refer to Factory
Grizzly 2.0	Slitters, Steel Mill only 1.75
Hammermill or Hog 1.75	Soaking Pit Cover Drives—
Tumbling Mill or Barrel 1.75	Lift 1.0
BREWING AND DISTILLING	Travel 2.0
Bottle and Can Filling Machines 1.0	Straighteners 2.0
Brew Kettle 1.0	Unscramblers (Billet Bundle Busters) 2.0
Cookers, Continuous Duty 1.25	Wire Drawing Machinery 1.75
Lauter Tub 1.5	OIL INDUSTRY
Mash Tub 1.25	Chiller 1.25
Scale Hopper, Frequent Peaks 1.75	Oilwell Pumping (not over 150% peak torque) 2.0
CLAY WORKING INDUSTRY	Paraffin Filter Press 1.5
Brick Press, Briquette Machine, Clay Working Machine, Pug Mill 1.75	Rotary Kiln 2.0
DREDGES	PAPER MILLS
Cable Reel 1.75	Barker Auxiliary, Hydraulic 2.0
Conveyors 1.25	Barker, Mechanical 2.0
Cutter Head, Jig Drive 2.0	Barking Drum
Maneuvering Winch 1.5	L.S. shaft of reducer with final drive—Helical
Pumps (uniform load) 1.5	or Herringbone Gear 2.0
Screen Drive, Stacker 1.75	Machined Spur Gear 2.5
Utility Winch 1.5	Cast Tooth Spur Gear 3.0
FOOD INDUSTRY	Beater & Pulper 1.75
Beet Slicer 1.75	Bleachers, Cooters 1.0
Bottling, Can Filling Machine 1.0	Calender & Super Calender 1.75
Cereal Cooker 1.25	Chipper 2.5
Dough Mixer, Meat Grinder 1.75	Converting Machine 1.25
LUMBER	Couch 1.75
Band Resaw 1.5	Cutter, Felt Whipper 2.0
Circular Resaw, Cut-off 1.75	Cylinder, Dryer 1.75
Edger, Head Rig, Hog 2.0	Felt Stretcher 1.25
Gang Saw (Reciprocating) Refer to Factory	Fourdrinier 1.75
Log Haul 2.0	Jordan 2.0
Planer 1.75	Log Haul 2.0
Rolls, Non-Reversing 1.25	Line Shaft 1.5
Rolls, Reversing 2.0	Press 1.75
Sawdust Conveyor 1.25	Pulp Grinder 1.75
Slab Conveyor 1.75	Reel, Rewinder, Winder 1.5
Sorting Table 1.5	Stock Chest, Washer, Thickener 1.5
Trimmer 1.75	Stock Pumps, Centrifugal
★ METAL ROLLING MILLS	Constant Speed 1.0
Coilers (Up or Down) Cold Mills only 1.5	Frequent Speed Changes
Coilers (Up or Down) Hot Mills only 2.0	Under Load 1.25
Coke Plants	Suction Roll 1.75
Pusher Ram Drive 2.5	RUBBER INDUSTRY
Door Opener 2.0	Calender 2.0
Pusher or Larry Car	Cracker, Plasticator 2.5
Traction Drive 3.0	Extruder 1.75
Cold Mills—	Intensive or Banbury Mixer 2.5
Strip Mills Refer to Factory	Mixing Mill, Refiner or Sheeter
Temper Mills 1.5	One or two in line 2.5
Cooling Beds 2.0	Three or four in line 2.0
Drawbench 2.0	Five or more in line 1.75
Feed Rolls—Blooming Mills 3.0	Tire Building Machine 2.5
Furnace Pushers 2.0	Tire & Tube Press Opener (Peak Torque) 1.0
Hot and Cold Saws 2.0	Tuber, Strainer, Pelletizer 1.75
Hot Mills—	Warming Mill
Strip or Sheet Mills	One or two Mills in line 2.0
Reversing Blooming or Slabbing Mills Refer to Factory	Three or more Mills in line 1.75
Edger Drives 2.0	Washer 2.5
Ingot Cars 3.0	SEWAGE DISPOSAL EQUIPMENT
Manipulators 3.0	Bar Screen, Chemical Feeders, Collectors, Dewatering Screen, Grit Collector 1.0
Merchant Mills Refer to Factory	SUGAR INDUSTRY
Mill Tables	Cane Carrier & Leveler 1.75
Roughing Breakdown Mills 3.0	Cane Knife & Crusher 2.0
Hot Bed or Transfer, non-reversing 1.5	Mill Stands, Turbine Driven with all helical or herringbone gears 1.5
Runout, reversing 3.0	Electric Drive or Steam Engine Drive with Helical, Herringbone, or Spur Gears with any Prime Mover 1.75
Runout, non-reversing, non-plugging 2.0	TEXTILE INDUSTRY
Reel Drives 1.75	Batcher 1.25
Rod Mills Refer to Factory	Calender, Card Machine 1.5
Screwdown 2.0	Cloth Finishing Machine 1.5
Seamless Tube Mills	Dry Can, Loom 1.5
Piercer 3.0	Dyeing Machinery 1.25
	Knitting Machine Refer to Factory
	Mangle, Napper, Soaper 1.25
	Spinner, Tenter Frame, Winder 1.5

Quick Selection Method

1. Determine Service Factor

- A. For MOTOR, TURBINE or ENGINE driven applications, refer to Tables 1 and 2.
B. For BRAKE or HIGH PEAK LOAD applications, refer to the Formula Selection Method shown on Page 6.

2. Determine Equivalent Horsepower

Refer to Table 3—Under the actual motor hp required and opposite the service factor determined in Step 1, read the equivalent hp.

3. Determine Coupling Size and Mounting

- A. **Refer to Table 4**—Trace horizontally from the required speed to a hp value equal to or larger than the hp determined in Step 2. Read the coupling size at top of column.
B. **Refer to Pages 8 and 9**—Select the mounting that best suits the application. For connecting shaft to engine with a standard SAE J620 flywheel, refer to Page 10. If the size of the Airflex coupling determined in Step 3A is smaller or equal to the coupling size shown on Page 10 for your particular flywheel, use the Airflex size shown on Page 10. If the size of the Airflex coupling determined in Step 3A is larger than that shown on Page 10, refer application to the factory.
C. Check shaft diameters against coupling maximum bores shown in Table 6. If a larger bore is required, select a larger coupling.

- D. Check the required speed against the allowable speed shown in Table 5. Note that in Table 5, speeds are listed for standard and balanced couplings.
E. Check application dimension requirements against selected coupling type dimensions shown on Pages 8 thru 10.

Example:

Select a coupling to connect a 450 hp, 8 cylinder engine, operating at 1000 rpm, to a centrifugal compressor. Engine shaft is 3.500" diameter and compressor shaft diameter is 3.000".

1. **Determine Service Factor**—From Table 1, the service factor is 1.0 for a centrifugal compressor. Refer to Table 2 for Engine Drive Service Factors, and find that a service factor of 1.0 with an engine drive of 6 or more cylinders shows a new service factor of 1.5.
2. **Determine Equivalent HP**—From Table 3, the equivalent hp is 675 (1.5 x 450 hp).
3. **Determine Coupling Size and Mounting**—(A) From Table 4, coupling size is 28A. (B) From Pages 8 and 9, select (optional) mounting 5. (C) From Table 6, the maximum bore with square key is 5.500". (D) From Table 5, the allowable speed without balancing is 1500 rpm. (E) Dimensions for the 28A coupling shown on Pages 8 thru 10 satisfy the application requirements.

Table 3 Equivalent Horsepower = (Actual hp x Service Factor)

Service Factor ±	Actual hp																									
	¾	1	1½	2	3	5	7½	10	15	20	25	30	40	50	60	75	100	125	150	200	250	300	350	400	450	500
1.0	.75	1.0	1.5	2.0	3.0	5.0	7.5	10	15	20	25	30	40	50	60	75	100	125	150	200	250	300	350	400	450	500
1.25	.94	1.25	1.9	2.5	3.8	6.3	9.4	12.5	19	25	31	38	50	63	75	94	125	156	188	250	312	375	438	500	563	625
1.5	1.1	1.5	2.3	3.0	4.5	7.5	11.3	15	23	30	38	45	60	75	90	113	150	188	225	300	375	450	525	600	675	750
1.75	1.3	1.8	2.6	3.5	5.3	8.8	13.1	18	26	35	44	53	70	88	105	131	175	219	262	350	438	525	613	700	787	875
2.0	1.5	2.0	3.0	4.0	6.0	10.0	15.0	20	30	40	50	60	80	100	120	150	200	250	300	400	500	600	700	800	900	1000
2.5	1.9	2.5	3.8	5.0	7.5	12.5	18.8	25	38	50	63	75	100	125	150	187	250	312	375	500	625	750	875	1000	1125	1250
3.0	2.3	3.0	4.5	6.0	9.0	15.0	22.5	30	45	60	75	90	120	150	180	225	300	375	450	600	750	900	1050	1200	1350	1500
3.5	2.6	3.5	5.3	7.0	10.5	17.5	26.2	35	52	70	87	105	140	175	210	262	350	437	525	700	875	1050	1225	1400	1575	1750

±For service factor not listed, Equivalent hp = Actual hp x Service Factor.

Table 4 Coupling Selection★... Based on Equivalent hp Ratings

Speed RPM*	Coupling Size												
	15A	16A	18A	21A	24A	28A	33A	39A	46A	53A	62A	72A	85A
1750	253	347	500	708	1055	2000	3055	5276					
1450	209	288	414	587	874	1656	2531	4371	7362				
1170	169	232	334	473	705	1337	2042	3527	5940	9282			
1000	144	198	286	405	603	1142	1745	3015	5077	7933	12060		
870	126	173	248	352	525	994	1518	2624	4417	6902	10500		
720	104	143	206	291	434	823	1257	2171	3656	5712	8682	13940	21705
650	93.9	129	186	263	392	743	1134	1960	3300	5157	7838	12580	15600
580	83.7	115	166	235	350	663	1012	1750	2945	4601	6994	11225	17490
520	75.1	103	149	210	314	594	908	1568	2640	4125	6271	10065	15675
420	60.6	83.3	120	170	253	480	733	1266	2132	3332	5065	8130	12660
350	50.5	69.4	100	142	211	400	611	1055	1777	2777	4221	6775	10550
280	40.4	55.5	80	113	169	320	489	844	1422	2221	3376	5420	8441
230	33.2	45.6	65.7	93.1	139	263	401	693	1168	1825	2774	4452	6934
190	27.4	37.7	54.3	76.9	115	217	332	573	965	1507	2291	3678	5728
155	22.4	30.7	44.3	62.7	93.5	177	271	467	787	1230	1869	3000	4673
125	18.0	24.8	35.7	50.6	75.4	143	218	377	635	992	1507	2420	3768
100	14.4	19.8	28.6	40.5	60.3	114	175	301	508	793	1206	1936	3015
84	12.1	16.7	24.0	34.0	50.6	96	147	253	426	666	1013	1626	2532
68	9.8	13.5	19.4	27.5	41.0	77.7	119	205	345	539	820	1316	2050
56	8.1	11.1	16.0	22.7	33.8	64.0	97.7	169	284	444	675	1084	1688
45	6.5	8.9	12.9	18.2	27.1	51.4	78.5	136	228	357	543	871	1357
37	5.3	7.3	10.6	15.0	22.3	42.3	64.6	112	188	294	446	716	1115
30	4.3	6.0	8.6	12.1	18.1	34.3	52.4	90.4	152	238	362	581	904
25	3.6	5.0	7.1	10.1	15.1	28.6	43.6	75.4	127	198	301	484	754
20	2.9	4.0	5.7	8.1	12.1	22.8	34.9	60.3	102	159	241	387	603
16.5	2.4	3.3	4.7	6.7	9.9	18.8	28.8	49.7	83.8	131	199	319	497
13.5	1.9	2.7	3.9	5.5	8.1	15.4	23.6	40.7	68.5	107	163	261	407
11.0	1.6	2.2	3.1	4.5	6.6	12.6	19.2	33.2	56.0	87.3	133	213	332
9.0	1.3	1.8	2.6	3.6	5.4	10.3	15.7	27.1	45.7	71.4	109	174	271
7.5	1.1	1.5	2.1	3.0	4.5	8.6	13.1	22.6	38.1	59.5	90	145	226

Selections shown in bold face type indicate that a balanced coupling is required.

★ Refer to Falk Representative for selection of special purpose couplings.

* If required speed is not shown, use next lower listed or interpolate between those listed.

If required speed is over 1750 rpm, or under 7.5 rpm, refer to FORMULA method of selection on Page 6.

Those who have occasion to make numerous selections should contact the local Falk Representative for a Falk Coupling Selector.

Formula Selection Method

1. Determine Service Factor or System Peak HP

- A.** For MOTOR, TURBINE or ENGINE driven applications, refer to Tables 1 and 2.
- B.** For BRAKE and HIGH PEAK LOAD applications, refer to Step 2 below.

2. Calculate Required Rating

The coupling hp per 100 rpm rating or torque rating must equal or exceed the application requirements. Determine the required coupling rating using the formula in Step 2A and the applicable formula from Steps 2B and 2C. Use the highest calculated rating to determine the coupling size in Step 3.

A. NORMAL SERVICE:

$$\text{HP per 100 RPM} = \frac{\text{Transmitted HP} \times 100 \times \text{SF}}{\text{RPM}}$$

Transmitted hp equals the measured hp or if not available, the motor or turbine rated hp with the exceptions noted below.

- B. BRAKE APPLICATIONS:** Use the brake hp in the above formula if it exceeds the prime mover hp rating.
- C. REPETITIVE HIGH PEAK LOAD APPLICATIONS:** Use one of the following applicable formulas for applications using motors with torque characteristics that are higher than normal, applications with intermittent operation, shock loading, inertia effects due to starting and stopping and/or system induced repetitive high peak torques. The "System Peak Torque" is the maximum that can exist in the system.
- a.** For NON REVERSING SERVICE:
Req'd Coupling Torque Rating = System Peak Torque
- b.** For REVERSING SERVICE:
Req'd Coupling Torque Rating = 2.0 x System Peak Torque

3. Determine Coupling Size and Mounting

- A. Refer to Table 5**—Trace down the HP per 100 RPM column or the Torque Rating column to a figure equal to or in excess of the highest calculated value in Step 2. Read coupling size at left.
- B. Refer to Pages 8 and 9**—Select the mounting that best suits the application. For connecting shaft to engine with a standard SAE J620 flywheel, refer to Page 10. If the size of the Airflex coupling determined in Step 3A is smaller or equal to the coupling size shown on Page 10 for your particular flywheel, use the Airflex size shown on Page 10. If the size of the Airflex coupling determined in Step 3A is larger than that shown on Page 10, refer application to the Factory.
- C.** Check shaft diameters against coupling maximum bores shown in Table 6. If a larger bore is required, select a larger coupling.
- D.** Check the required speed against the allowable speed shown in Table 5. Note that in Table 5, speeds are listed for standard and balanced couplings.
- E.** Check application dimension requirements against selected coupling type dimensions shown on Pages 8 thru 10.

EXAMPLE: Normal Load Method

Select a coupling to connect a 700 hp, 12 cylinder engine, operating at 1100 rpm, to a dynamometer. The dynamometer shaft diameter is 4.000". Coupling flange will be bolted to engine flywheel per Mounting 3 shown on Pages 8 and 9.

- 1. Determine Service Factor**—From Table 1, the service factor is 1.0 for a dynamometer. Refer to Table 2 for Engine Drive Service Factors, and find that a service factor of 1.0 with an engine drive of 6 or more cylinders shows a new service factor of 1.5.

- 2. Calculate Required Rating**—Use the Normal Service Formula from Step 2A.

$$\text{HP per 100 RPM} = \frac{\text{Transmitted HP} \times 100 \times \text{SF}}{\text{RPM}}$$

$$\text{HP per 100 RPM} = \frac{700 \times 100 \times 1.5}{1100} = 95.45$$

- 3. Select Coupling Size**—**(A)** From Table 5, the coupling size is 28A with a rating of 114 hp per 100 rpm. **(B)** From Table 6, the maximum bore with square key is 5.500". **(C)** From Table 5, the allowable speed without balancing is 1500 rpm. **(D)** Dimensions for the 28A coupling shown on Pages 8 thru 10 satisfy the application requirements.

EXAMPLE: Peak Load Method

Select a coupling for reversing service to connect a gear reducer low speed shaft to a runout mill table roll. The electric motor rating is 50 hp at the base speed and the system peak torque at the coupling is estimated to be 150,000 lb-in. Coupling speed is 77 rpm at the motor base speed. The reducer shaft diameter is 4.000" with a 1.000" x .500" keyway. The runout table roll shaft diameter is 5.250" with a 1.250" x .625" keyway.

- 1. Determine Service Factor**—From Table 1, the service factor is 3.0.

2. Calculate Required Rating

a. NORMAL SERVICE FORMULA (Step 2A)

$$\text{HP per 100 RPM} = \frac{\text{Transmitted HP} \times 100 \times \text{SF}}{\text{RPM}}$$

$$\text{HP per 100 RPM} = \frac{50 \times 100 \times 3.0}{77} = 195$$

b. REVERSING SERVICE FORMULA (Step 2Cb)

$$\text{Req'd Coupling Torque Rating} = 2.0 \times \text{System Peak Torque} \\ \text{or } 2.0 \times 150,000 \text{ lb-in.} \\ \text{or } 300,000 \text{ lb-in.}$$

- 3. Determine Coupling Size**—**(A)** From Table 5, the coupling size is 39A using the Normal Service Formula and 46A using the Reversing Service Formula. Select the larger size (46A) coupling. **(B)** From Table 6, the maximum bore with square key is 8.500". **(C)** From Table 5, the allowable speed without balancing is 900 rpm. **(D)** Dimensions for the 46A coupling shown on Pages 8 thru 10 satisfy the application requirements.

Table 5 Coupling Ratings, Allowable Speeds and Torsional Stiffness

Coupling Size	HP per 100 RPM	Torque Rating (lb-in.)	Allowable Speeds -RPM		Torsional Stiffness* (lb-in./Radian) x 10 ⁶		
			Standard	With Balancing	Single Gland	Tandem Gland	Triple Gland
15A	14.4	9,100	1800	3600	.170	.085	.057
16A	19.8	12,500	1800	3000	.220	.110	.073
18A	28.6	18,000	1800	3000	.290	.145	.097
21A	40.5	25,500	1800	2400	.410	.205	.137
24A	60.3	38,000	1800	2400	.60	.30	.20
28A	114	72,000	1500	2200	1.30	.65	.43
33A	175	110,000	1200	2000	2.10	1.05	.70
39A	301	190,000	1000	1750	3.0	1.5	1.0
46A	508	320,000	900	1500	6.0	3.0	2.0
53A	793	500,000	750	1250	11.0	5.5	3.7
62A	1,205	760,000	650	1000	21.0	10.5	7.0
72A	1,935	1,220,000	500	850	37.0	18.5	12.3
85A	3,015	1,900,000	450	750	70.0	35.0	23.3

* Constant value at zero PSI (gauge) gland pressure. Tolerance is $\pm 35\%$.

Dimensions Inches

Table 6 Airflex Coupling Bore Ranges with Square and Rectangular Keys†

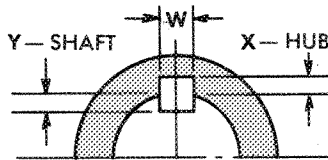


Table 7 Recommended Keys for Bores with One Key

Coupling Size	Min Bore †	For One Square Key			For One Rectangular Key				
		Max Bore	Y = X		Max Bore	Y = X		Max Bore	Y = W/2 Δ
			W	X		W	X		
15A	1.000	2.500	.625	.312	2.687	.625	.218	2.875	.750 .125
16A	1.250	2.625	.625	.312	2.750	.625	.218	2.875	.750 .125
18A	1.500	3.000	.750	.375	3.250	.750	.250	3.375	.875 .187
21A	1.875	3.500	.875	.437	3.750	.875	.312	3.875	1.000 .250
24A	1.875	4.500	1.000	.500	4.625	1.250	.437	5.000	1.250 .250
28A	2.125	5.500	1.250	.625	5.875	1.500	.500	6.125	1.500 .250
33A	2.875	6.250	1.500	.750	6.500	1.500	.500	6.625	1.750 .625
39A	2.625	7.500	1.750	.875	7.750	2.000	.750		
46A	3.750	8.500	2.000	1.000	9.000	2.000	.750		
53A	4.500	9.250	2.500	1.250	9.500	2.500	.875		
62A	5.000	10.750	2.500	1.250	11.000	2.500	.875		
72A	6.000	11.750	3.000	1.500	12.000	3.000	1.000		
85A	7.000	13.000	3.000	1.500	13.250	3.000	1.250		

Shaft Diameters		Key
Over	Thru	
.875	1.250	.250x .250
1.250	1.375	.312x .312
1.375	1.750	.375x .375
1.750	2.250	.500x .500
2.250	2.750	.625x .625
2.750	3.250	.750x .750
3.250	3.750	.875x .875
3.750	4.500	1.000x 1.000
4.500	5.500	1.250x 1.250
5.500	6.500	1.500x 1.500
6.500	7.500	1.750x 1.500
7.500	9.000	2.000x 1.500
9.000	11.000	2.500x 1.750
11.000	13.000	3.000x 2.000
13.000	15.000	3.500x 2.500
15.000	18.000	4.000x 3.000
18.000	22.000	5.000x 3.500
22.000	26.000	6.000x 4.000

Shaded areas indicate maximum bores using standard recommended keys shown in Table 7.

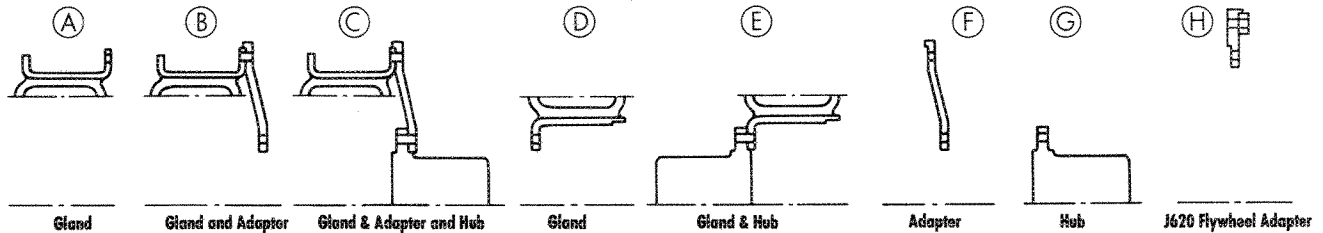
† Unless otherwise specified, Sizes 15A thru 18A will be furnished for CLEARANCE FIT with a set screw OVER the keyway, and Sizes 21A and larger will be furnished for INTERFERENCE FIT without a set screw.

† Minimum bore is the smallest bore to which a RSB (rough stock bore) hub can be bored. Rough stock bore hubs have a small through hole that will permit remachining of the hubs to the minimum bores specified. RSB hubs are not drilled and tapped for set screws.

Δ Shaft keyway depth Y equals one-half of square key W. CHECK KEY STRESSES.

It is general practice in industry to supply coupling hubs without fillet radii in the keyway corners to permit the use of standard commercial keys without chamfered edges. Falk will cut fillet keyways per the established standards shown in Engineering 427-109. Keyway tolerances: Refer to Engineering 427-108.

Table 8 Coupling Component WR²—lb-in² (For coupling WR² add portions of coupling assembly that fit application)



Coupling Size	Outer Members					Inner Members		
	MTG. 1,3,4 A	MTG. 2,12,13 B	MTG. 5,6,9,10,11 C*	MTG. 1,2,10,11 D	MTG. 3,4,5,6,9,12,13 E*	F	G*	H
15A	202	427	449	49	71	225	22	552 (11.5")
16A	273	555	586	88	119	282	31	...
18A	499	911	966	122	177	412	55	...
21A	720	1,498	1,618	216	336	778	120	2,180 (14")
24A	1,035	1,952	2,195	386	629	917	243	3,125 (16")
28A	1,904	2,850	3,615	889	1,654	946	765	4,545 (18")
33A	3,690	10,063	11,571	1,647	3,155	6,373	1,508	10,330 (21")
39A	7,248	15,195	18,512	3,779	7,096	7,947	3,317	15,715 (24")
46A	17,112	30,560	36,684	7,062	13,186	13,448	6,124	...
53A	45,300	79,225	92,975	15,417	29,167	33,925	13,750	...
62A	93,425	189,325	215,145	31,325	57,145	95,900	25,820	...
72A	175,235	355,835	406,235	76,740	127,140	180,600	50,400	...
85A	328,450	613,450	715,950	141,900	244,400	285,000	102,500	...

* Hub WR² values are with no bore.

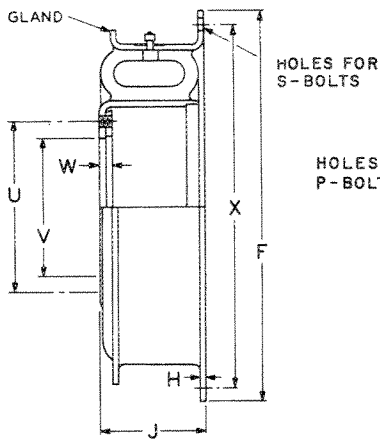
Table 9 Shaft Diameters and Ratings for NEMA 60 Hertz Motors

Frame Size		T Frames																		TS Frames										
		143	145	182	184	213	215	254	256	284	286	324	326	364	365	404	405	444	445	284	286	324	326	364	365	404	405	444	445	
Shaft Dia.—inches		.88	.88	1.13	1.13	1.38	1.38	1.63	1.63	1.88	1.88	2.13	2.13	2.38	2.38	2.88	2.88	3.38	3.38	1.63	1.63	1.88	1.88	1.88	1.88	2.13	2.13	2.38	2.38	
3600 RPM	Drip Proof	1½	2-3	5	7½	10	15	20	25	30	40	50	60	75	100	125	150	200	250	30	40	50	60	75	100	125	150	200	250	
	Enclosed	1½	2	3	5	7½	10	15	20	25	30	40	50	60	75	...	100	125	150	25	30	40	50	60	75	...	100	125	150	
1800 RPM	Drip Proof	1	1½-2	3	5	7½	10	15	20	25	30	40	50	60	75	100	125	150	200	25	30	40	50	60	75	100	125	150	200	
	Enclosed	1	1½-2	3	5	7½	10	15	20	25	30	40	50	60	75	...	100	125	150	25	30	40	50	60	75	...	100	125	150	
1200 RPM		Drip Proof & Enclosed	¾	1	1½	2	3	5	7½	10	15	20	25	30	40	50	60	75	100	125	15	20	25	30	40	50	60	75	100	125
900 RPM		Drip Proof & Enclosed	½	¾	1	1½	2	3	5	7½	10	15	20	25	30	40	50	60	75	100	10	15	20	25	30	40	50	60	75	100

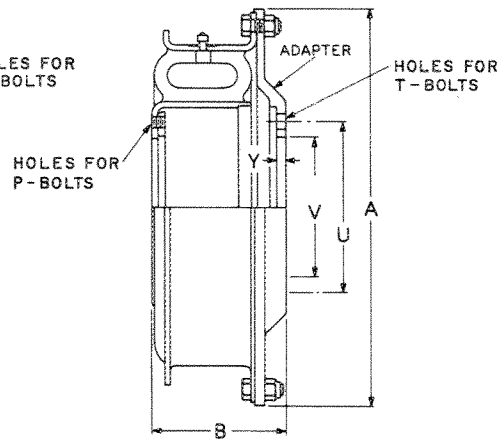
Mountings and Dimensions

For Flywheel Mounting and Dimensions, Refer to Page 10

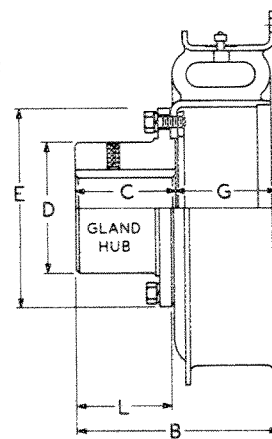
Mounting 1



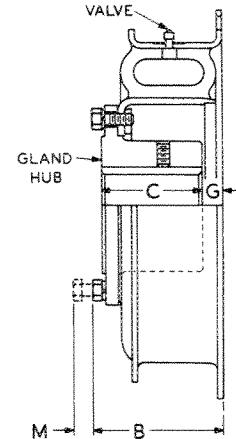
Mounting 2



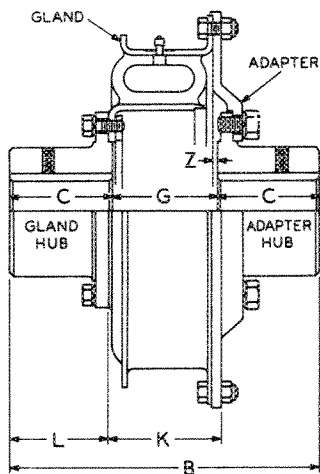
Mounting 3



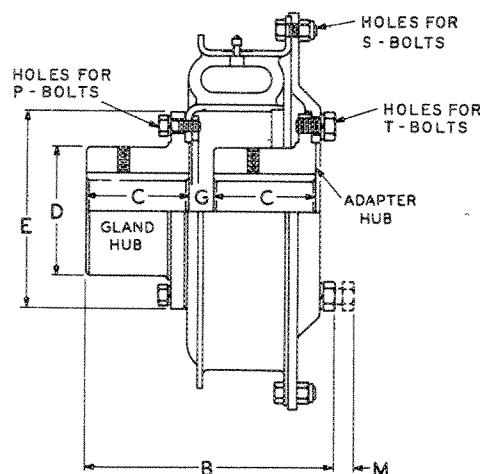
Mounting 4



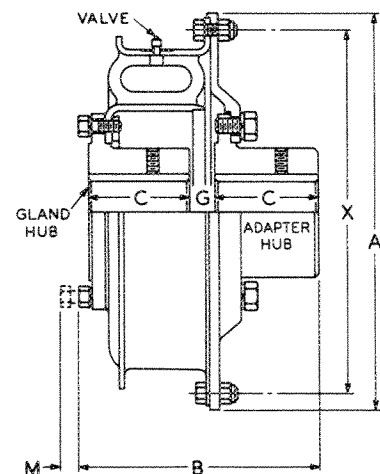
Mounting 5



Mounting 6



Mounting 9



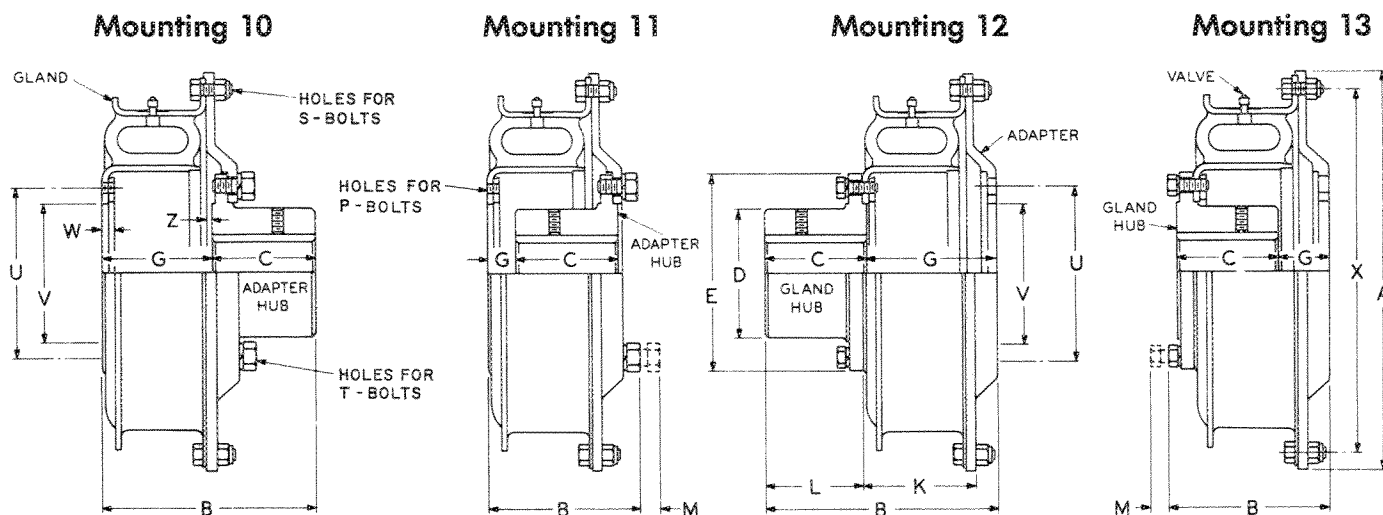
Refer to Pages 6 & 7 for Ratings, Speeds and Bores

DIMENSIONS—INCHES

(Cont'd. on next page)

SIZE ★	A	B										C	D	E	FA	G					
		Mtg. 2	Mtg. 3	Mtg. 4	Mtg. 5	Mtg. 6	Mtg. 9	Mtg. 10	Mtg. 11	Mtg. 12	Mtg. 13					Mtg. 3	Mtg. 4	Mtg. 5	Mtg. 6	Mtg. 9	Mtg. 10
15A	11.62	4.34	6.56	4.19	9.97	7.94	7.56	6.84	4.78	7.47	5.05	3.25	3.50	5.56	11.375	3.31	.69	3.47	.84	.84	3.59
16A	12.62	4.59	7.06	4.44	10.72	8.44	8.06	7.34	5.03	7.97	5.30	3.50	3.75	6.00	12.375	3.56	.69	3.72	.84	.84	3.84
18A	14.25	4.84	7.56	4.69	11.47	8.94	8.56	7.84	5.28	8.47	5.55	3.75	4.38	6.62	13.937	3.81	.69	3.97	.84	.84	4.09
21A	15.69	5.22	7.94	5.00	12.09	9.69	9.19	8.22	5.77	9.09	6.16	4.00	5.12	7.88	15.375	3.94	.69	4.09	.84	.84	4.22
24A	17.38	5.72	8.94	5.50	13.59	10.69	10.19	9.22	6.27	10.09	6.66	4.50	6.25	9.25	17.062	4.44	.69	4.59	.84	.84	4.72
28A	19.62	6.22	10.00	6.06	15.41	12.00	11.50	10.28	6.88	11.34	7.39	5.25	7.88	11.25	19.312	4.75	.38	4.91	.53	.53	5.03
33A	22.94	6.91	11.38	6.69	17.53	13.44	12.88	11.66	7.56	12.78	8.08	6.00	9.00	13.25	22.625	5.38	.25	5.53	.41	.41	5.66
39A	26.50	8.16	13.88	7.94	20.53	15.81	15.06	13.66	8.92	15.03	9.56	7.00	10.50	15.50	26.187	6.38	.38	6.53	.53	.53	6.66
46A	30.50	8.91	14.88	8.69	22.78	17.31	16.56	15.16	9.67	16.53	10.31	7.75	12.00	18.50	30.187	7.12	.38	7.28	.53	.53	7.41
53A	34.88	10.75	17.31	10.38	26.56	20.56	19.62	17.75	11.72	19.56	12.61	9.00	13.75	21.00	34.500	8.31	.69	8.56	.94	.94	8.75
62A	40.75	12.06	19.56	11.62	29.81	22.88	21.88	20.00	13.03	21.88	13.92	10.00	15.50	24.75	40.375	9.56	.94	9.81	1.19	1.19	10.00
72A	46.75	13.69	21.75	13.38	33.06	25.62	24.69	22.31	14.88	24.44	16.03	11.00	17.50	28.50	46.250	10.75	1.50	11.06	1.81	1.81	11.31
85A	54.25	14.69	23.75	14.38	36.06	27.62	26.69	24.31	15.88	26.44	17.03	12.00	19.00	35.38	53.750	11.75	1.50	12.06	1.81	1.81	12.31

★ Dimensions are for reference and subject to change without notice unless certified. All glands are designed to operate at zero psi (gauge) pressure; valves in the glands are required only for manufacturing purposes. Hub Sizes 15 thru 18A will be furnished for a CLEARANCE FIT with a set screw over keyway and Hub Sizes 21 thru 85A will be furnished for an INTERFERENCE FIT without set screw.



FASTENERS & APPROXIMATE WEIGHTS

SIZE	Fasteners†						Approximate Weight—lbs						
	P Inner Rim to Gland Hub		S Outer Rim to Adapter		T Adapter to Adapter Hub		Hub (No Bore)	Adapter Plate	Gland	Gland and Adapter Plate	Gland and One Hub	Gland, Two Hubs and One Adapter	Gland, One Hub and One Adapter
	No.	Size	No.	Size	No.	Size			Mounting 1	Mounting 2	Mountings 3, 4	Mountings 5, 6, 9	Mountings 10, 11, 12, 13
15A	8	.375-24x1.00	6	.375-24x1.00	8	.500-20x1.00	11	13	13	26	24	48	37
16A	10	.375-24x1.00	8	.375-24x1.00	10	.500-20x1.00	13	17	19	36	32	62	49
18A	12	.375-24x1.00	10	.500-20x1.25	12	.500-20x1.00	18	15	22	37	40	73	55
21A	12	.500-20x1.25	12	.500-20x1.25	12	.625-18x1.25	30	20	25	45	55	105	75
24A	12	.500-20x1.25	10	.500-20x1.25	12	.625-18x1.25	45	25	35	60	80	150	105
28A	12	.625-18x1.50	14	.500-20x1.25	12	.750-16x1.50	80	35	50	85	130	245	165
33A	14	.625-18x1.50	14	.625-18x1.50	14	.750-16x1.50	120	45	75	120	195	360	240
39A	12	.750-16x1.75	18	.625-18x1.75	12	.875-14x1.75	195	75	115	190	310	580	385
46A	16	.750-16x1.75	20	.625-18x1.75	16	.875-14x1.75	285	95	155	250	440	820	535
53A	12	1.000-14x2.50	20	.625-18x2.25	12	1.125-12x2.25	440	165	350	515	790	1395	955
62A	16	1.000-14x2.50	24	.750-16x2.25	16	1.125-12x2.25	630	240	475	715	1105	1975	1345
72A	16	1.250-12x3.00	28	.750-16x2.50	16	1.375-12x2.50	910	370	710	1080	1620	2900	1990
85A	16	1.250-12x3.00	32	.750-16x2.75	16	1.375-12x2.50	1270	445	980	1425	2250	3965	2695

†All fasteners are Grade 5 or better.

(Cont'd. from preceding page)

DIMENSIONS—INCHES

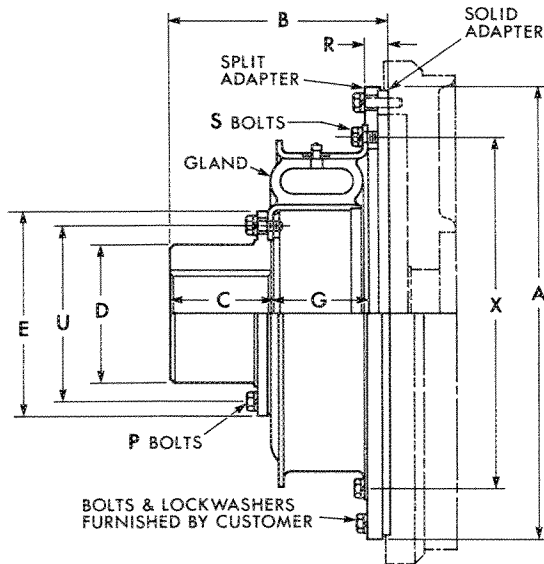
G			H	J	K	L	M					U	V*	W	X	Y	Z	SIZE ★
Mtg. 11	Mtg. 12	Mtg. 13					Mtg. 4	Mtg. 6	Mtg. 9	Mtg. 11	Mtg. 13							
.97	4.22	1.59	.17	3.44	3.69	3.12	.56	.69	.56	.69	.56	4.69	3.688	.41	10.56	.25	.16	15A
.97	4.47	1.59	.19	3.69	3.94	3.38	.56	.69	.56	.69	.56	5.12	4.063	.44	11.56	.25	.16	16A
.97	4.72	1.59	.19	3.94	4.19	3.62	.56	.69	.56	.69	.56	5.75	4.688	.44	12.88	.25	.16	18A
.97	5.09	1.84	.19	4.06	4.38	3.88	.69	.75	.69	.75	.69	6.75	5.500	.53	14.31	.38	.16	21A
.97	5.59	1.84	.19	4.56	4.88	4.38	.69	.75	.69	.75	.69	8.00	6.625	.53	16.00	.38	.16	24A
.66	6.09	1.72	.19	4.88	5.25	5.12	.81	.94	.81	.94	.81	9.88	8.250	.62	18.25	.44	.16	28A
.53	6.78	1.66	.25	5.50	5.88	5.88	.81	.94	.81	.94	.81	11.75	9.625	.62	21.31	.50	.16	33A
.66	8.03	2.03	.25	6.50	7.00	6.88	.88	.94	.88	.94	.88	13.75	11.500	.75	24.94	.62	.16	39A
.68	8.78	2.03	.31	7.25	7.75	7.62	.88	.94	.88	.94	.88	16.62	14.375	.75	28.88	.62	.16	46A
1.12	10.56	2.94	.62	8.50	9.25	8.81	1.31	1.19	1.31	1.19	1.31	19.00	16.625	1.12	32.75	.81	.25	53A
1.38	11.88	3.25	.62	9.75	10.50	9.81	1.31	1.19	1.31	1.19	1.31	22.50	19.875	1.12	38.25	.88	.25	62A
2.06	13.44	4.19	.62	11.00	11.88	10.75	1.50	1.31	1.50	1.31	1.50	25.75	22.500	1.38	44.00	.88	.31	72A
2.06	14.44	4.19	.88	12.00	12.88	11.75	1.50	1.31	1.50	1.31	1.50	32.50	30.000	1.38	51.38	.88	.31	85A

▲ Dimension F tolerances for 15 thru 46A are +.000, —.002 and for 53 thru 85A are +.000, —.003.

* Dimension V tolerances for 15 thru 46A are +.002, —.000 and for 53 thru 85A are +.003, —.000.

Dimensions for Mounting to SAE J620 Flywheels

(Consult Factory for other flywheel mountings)



Refer to Pages 6 & 7 for Ratings, Speeds and Bores

DIMENSIONS—INCHES

SAE Flywheel		Airflex Coupling Size ★	Weight No Bore (lbs)	DIMENSIONS—INCHES										Fasteners - Gr 5			
Nominal Clutch Dia.	Bolt Circle (Inches)			A	B	C	D	E	G	R	U	X	S		P		
													No	Size	No	Size	
11.5"	13.125	16A	46	14.18	7.94	3.50	3.75	6.00	3.56	1.00	5.12	11.56	8	.375-16x .75	10	.375-24x1.00	
14"	17.250	21A	85	18.70	8.94	4.00	5.12	7.88	3.94	1.12	6.75	14.31	12	.500-13x .88	12	.500-20x1.25	
16"	19.250	24A	115	20.70	9.94	4.50	6.25	9.25	4.44	1.12	8.00	16.00	10	.500-13x .88	12	.500-20x1.25	
18"	21.375	28A	170	22.82	11.00	5.25	7.88	11.25	4.75	1.12	9.88	18.25	14	.500-13x .88	12	.625-18x1.50	
21"	25.250	33A	265	26.82	12.52	6.00	9.00	13.25	5.38	1.26	11.75	21.31	14	.625-11x1.25	14	.625-18x1.50	
24"	27.250	33A	290	29.20	12.52	6.00	9.00	13.25	5.38	1.26	11.75	21.31	14	.625-11x1.25	14	.625-18x1.50	

★ Dimensions are for reference and subject to change without notice unless certified. All glands are designed to operate at zero psi (gauge) pressure; valves in the glands are required only for manufacturing purposes. Hub Sizes 16A will be furnished for a CLEARANCE FIT with a set screw over the keyway and Hub Sizes 21 thru 33A will be furnished for an INTERFERENCE FIT without set screw.

How to order Falk Airflex Couplings

The following information is necessary to quote or ship to your exact requirements. Prompt service is assured if this information is given on your inquiry or order:

1. Size of Coupling

If not known or if in doubt, supply the following data:

- Speed of driver.
- Normal and Maximum horsepower of driver.
- Kind of driver (electric motor, combustion engine & number of cylinders, etc.).
- Hours of service per day.
- Type of driven machine (If reciprocating, include number of cylinders). See tables on Page 4.

2. Bore Coupling for

A. CLEARANCE FIT—Sizes 15A thru 18A are furnished for a CLEARANCE FIT with a set screw OVER the keyway, unless otherwise specified.

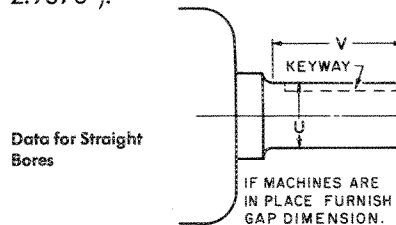
B. INTERFERENCE FIT—Sizes 21A and larger are furnished for an INTERFERENCE FIT without a set screw, unless otherwise specified.

3. Desired mounting

Refer to Pages 8 thru 10.

4. Dimensions

The dimensions requested here are necessary for correct selection of coupling size and for prompt handling of the order—please refer to the following diagram and furnish the dimensions indicated. Also, check table of Recommended Specifications for Bore Dimensions below. Diameter should be given in decimals, (For Example, 2.9375").



FURNISH DIMENSIONS IN INCHES

FOR STRAIGHT SHAFTS

Driving Shaft
Diameter U _____
Length V _____
Keyway _____

Driven Shaft
Diameter U _____
Length V _____
Keyway _____

Refer to Page 7 for recommended keys. When customer desires to rebore couplings, the reboring instruction sheet is furnished with rough bored couplings.

Table 10 Recommended Bores for Falk Steel Coupling Hubs—Inches

Shaft Dia	Clearance Fit		Interference Fit		Shaft Dia	Clearance Fit		Interference Fit		Shaft Dia	Interference Fit		Shaft Dia	Interference Fit	
	Hub Bore	Clearance	Hub Bore	Interference		Hub Bore	Clearance	Hub Bore	Interference		Hub Bore	Interference		Hub Bore	Interference
+ .0000 - .0005	+ .0020 - .0000	.0000 .0025	+ .0003 - .0000	.0000 .0013	+ .0000 - .0005	+ .0020 - .0000	.0000 .0025	+ .0010 - .0000	.0005 .0020	+ .0000 - .0010	+ .0015 - .0008	.0010 .0035	7.000 7.250 7.500 7.750	6.9950 7.2450 7.4950 7.7450	.0025 .0050 ↓
.5000 .5625 .6250 .6875	.5000 .5625 .6250 .6875	↓	.4987 .5612 .6237 .6862	↓	2.2500 2.3125 2.3750	2.2500 2.3125 2.3750	↓	2.2480 2.3105 2.3730	↓	4.0625 4.1250 4.1875 4.2500	4.0590 4.1215 4.1840 4.2465	↓	8.000 8.250 8.500 8.750	7.9945 8.2445 8.4945 8.7445	.0030 .0055 ↓
.7500 .8125 .8750 .9375	.7500 .8125 .8750 .9375	↓	.7487 .8112 .8737 .9362	↓	2.4375 2.5000 2.5625	2.4375 2.5000 2.5625	↓	2.4355 2.4980 2.5605	↓	4.3125 4.3750 4.4375	4.3090 4.3715 4.4340	↓	9.000 9.250 9.500 9.750	8.9940 9.2440 9.4940 9.7440	.0035 .0060 ↓
1.0000 1.0625 1.1250 1.1875	1.0000 1.0625 1.1250 1.1875	↓	.9987 1.0612 1.1237 1.1862	↓	2.6250 2.6875 2.7500	2.6250 2.6875 2.7500	↓	2.6230 2.6855 2.7480	↓	4.6875 4.7500 4.8125	4.6840 4.7465 4.8090	↓	10.000 10.250 10.500 10.750	9.9935 10.2435 10.4935 10.7435	↓
1.2500 1.3125 1.3750 1.4375 1.5000	1.2500 1.3125 1.3750 1.4375 1.5000	↓	1.2487 1.3112 1.3737 1.4362 1.4987	↓	2.8125 2.8750 2.9375	2.8125 2.8750 2.9375	↓	2.8105 2.8730 2.9355	↓	4.8750 4.9375 5.0000	4.8715 4.9340 4.9965	↓	11.000 11.250 11.500 11.750	10.9930 11.2430 11.4930 11.7430	↓
+ .0000 - .0005	+ .0020 - .0000	.0000 .0025	+ .0003 - .0000	.0003 .0015	+ .0000 - .0010	+ .0020 - .0000	.0000 .0030	+ .0010 - .0000	.0005 .0025	+ .0000 - .0010	+ .0015 - .0008	.0010 .0040	12.000 12.250 12.500 12.750	11.9930 12.2430 12.4930 12.7430	.0040 .0070 ↓
1.5625 1.6250 1.6875 1.7500	1.5625 1.6250 1.6875 1.7500	↓	1.5610 1.6235 1.6860 1.7485	↓	3.0000 3.0625 3.1250	3.0000 3.0625 3.1250	↓	2.9980* 3.0600 3.1225	↓	5.0625 5.1250 5.1875	5.0585 5.1210 5.1835	↓	13.000 13.250 13.500 13.750	12.9930 13.2430 13.4930 13.7430	↓
1.8125 1.8750 1.9375 2.0000	1.8125 1.8750 1.9375 2.0000	↓	1.8110 1.8735 1.9360 1.9985	↓	3.1875 3.2500 3.3125	3.1875 3.2500 3.3125	↓	3.1850 3.2475 3.3100	↓	5.2500 5.3125 5.3750	5.2460 5.3085 5.3710	↓	14.000 14.250 14.500 14.750	13.9930 14.2430 14.4930 14.7430	.0045 .0075 ↓
+ .0000 - .0005	+ .0020 - .0000	.0000 .0025	+ .0003 - .0000	.0003 .0015	+ .0000 - .0010	+ .0020 - .0000	.0000 .0030	+ .0010 - .0000	.0005 .0025	+ .0000 - .0010	+ .0015 - .0008	.0010 .0040	15.000 15.250 15.500 15.750	14.9930 15.2430 15.4930 15.7430	.0050 .0080 ↓
2.0625 2.1250 2.1875	2.0625 2.1250 2.1875	↓	2.0610 2.1235 2.1860	↓	3.3750 3.4375 3.5000	3.3750 3.4375 3.5000	↓	3.3725 3.4350 3.4975	↓	5.4375 5.5000 5.5625	5.4335 5.4960 5.5585	↓	16.000 16.250 16.500 16.750	15.9930 16.2430 16.4930 16.7430	.0055 .0085 ↓
2.2500 2.3125 2.3750	2.2500 2.3125 2.3750	↓	2.2480 2.3105 2.3730	↓	3.5625 3.6250 3.6875 3.7500	3.5625 3.6250 3.6875 3.7500	↓	3.5600 3.6225 3.6850 3.7475	↓	5.6250 5.6875 5.7500	5.6210 5.6835 5.7460	↓	17.000 17.250 17.500 17.750	16.9930 17.2430 17.4930 17.7430	↓
2.4375 2.5000 2.5625	2.4375 2.5000 2.5625	↓	2.4355 2.4980 2.5605	↓	3.8125 3.8750 3.9375 4.0000	3.8125 3.8750 3.9375 4.0000	↓	3.8100 3.8725 3.9350 3.9975	↓	5.8125 5.8750 5.9375	5.8085 5.8710 5.9335	↓	18.000 18.250 18.500 18.750	17.9930 18.2430 18.4930 18.7430	↓
2.6250 2.6875 2.7500	2.6250 2.6875 2.7500	↓	2.6230 2.6855 2.7480	↓	4.0625 4.1250 4.1875 4.2500	4.0625 4.1250 4.1875 4.2500	↓	4.0590 4.1215 4.1840 4.2465	↓	6.0625 6.1250 6.1875 6.2500	6.0585 6.1210 6.1835 6.2455	↓	19.000 19.250 19.500 19.750	18.9930 19.2430 19.4930 19.7430	↓
2.8125 2.8750 2.9375	2.8125 2.8750 2.9375	↓	2.8105 2.8730 2.9355	↓	4.3125 4.3750 4.4375	4.3125 4.3750 4.4375	↓	4.3090 4.3715 4.4340	↓	6.2500 6.3125 6.3750 6.4375	6.2460 6.3085 6.3710 6.4335	↓	20.000 20.250 20.500 20.750	19.9930 20.2430 20.4930 20.7430	↓
2.9375 3.0000 3.0625 3.1250	2.9375 3.0000 3.0625 3.1250	↓	2.9362 2.9987 3.0612 3.1237	↓	4.4375 4.5000 4.5625 4.6250	4.4375 4.5000 4.5625 4.6250	↓	4.4340 4.4965 4.5590 4.6215	↓	6.4375 6.5000 6.5625 6.6250	6.4340 6.4965 6.5585 6.6210	↓	21.000 21.250 21.500 21.750	20.9930 21.2430 21.4930 21.7430	↓
3.1250 3.1875 3.2500 3.3125	3.1250 3.1875 3.2500 3.3125	↓	3.1225 3.1850 3.2475 3.3100	↓	4.6250 4.6875 4.7500 4.8125	4.6250 4.6875 4.7500 4.8125	↓	4.6215 4.6840 4.7465 4.8090	↓	6.6250 6.6875 6.7500 6.8125	6.6210 6.6835 6.7460 6.8085	↓	22.000 22.250 22.500 22.750	21.9930 22.2430 22.4930 22.7430	↓
3.3750 3.4375 3.5000	3.3750 3.4375 3.5000	↓	3.3725 3.4350 3.4975	↓	4.8125 4.8750 4.9375 5.0000	4.8125 4.8750 4.9375 5.0000	↓	4.8090 4.8715 4.9340 4.9965	↓	6.8125 6.8750 6.9375 7.0000	6.8085 6.8710 6.9335 6.9955	↓	23.000 23.250 23.500 23.750	22.9930 23.2430 23.4930 23.7430	↓
3.5625 3.6250 3.6875 3.7500	3.5625 3.6250 3.6875 3.7500	↓	3.5600 3.6225 3.6850 3.7475	↓	5.0625 5.1250 5.1875 5.2500	5.0625 5.1250 5.1875 5.2500	↓	5.0585 5.1210 5.1835 5.2460	↓	7.0625 7.1250 7.1875 7.2500	7.0585 7.1210 7.1835 7.2455	↓	24.000 24.250 24.500 24.750	23.9930 24.2430 24.4930 24.7430	↓
3.8125 3.8750 3.9375 4.0000	3.8125 3.8750 3.9375 4.0000	↓	3.8100 3.8725 3.9350 3.9975	↓	5.2500 5.3125 5.3750 5.4375	5.2500 5.3125 5.3750 5.4375	↓	5.2460 5.3085 5.3710 5.4335	↓	7.2500 7.3125 7.3750 7.4375	7.2460 7.3085 7.3710 7.4335	↓	25.000 25.250 25.500 25.750	24.9930 25.2430 25.4930 25.7430	↓
		↓		↓	5.4375 5.5000 5.5625 5.6250	5.4375 5.5000 5.5625 5.6250	↓	5.4335 5.4960 5.5585 5.6210	↓	7.4375 7.5000 7.5625 7.6250	7.4340 7.4965 7.5585 7.6210	↓	26.000 26.250 26.500 26.750	25.9930 26.2430 26.4930 26.7430	↓
		↓		↓	5.6250 5.6875 5.7500 5.8125	5.6250 5.6875 5.7500 5.8125	↓	5.6210 5.6835 5.7460 5.8085	↓	7.6250 7.6875 7.7500 7.8125	7.6210 7.6835 7.7460 7.8085	↓	27.000 27.250 27.500 27.750	26.9930 27.2430 27.4930 27.7430	↓
		↓		↓	5.8125 5.8750 5.9375 6.0000	5.8125 5.8750 5.9375 6.0000	↓	5.8085 5.8710 5.9335 5.9955	↓	7.8125 7.8750 7.9375 8.0000	7.8085 7.8710 7.9335 7.9955	↓	28.000 28.250 28.500 28.750	27.9930 28.2430 28.4930 28.7430	↓
		↓		↓	6.0625 6.1250 6.1875 6.2500	6.0625 6.1250 6.1875 6.2500	↓	6.0585 6.1210 6.1835 6.2455	↓	8.0625 8.1250 8.1875 8.2500	8.0585 8.1210 8.1835 8.2455	↓	29.000 29.250 29.500 29.750	28.9930 29.2430 29.4930 29.7430	↓
		↓		↓	6.2500 6.3125 6.3750 6.4375	6.2500 6.3125 6.3750 6.4375	↓	6.2460 6.3085 6.3710 6.4335	↓	8.2500 8.3125 8.3750 8.4375	8.2460 8.3085 8.3710 8.4335	↓	30.000 30.250 30.500 30.750	29.9930 30.2430 30.4930 30.7430	↓
		↓		↓	6.4375 6.5000 6.5625 6.6250	6.4375 6.5000 6.5625 6.6250	↓	6.4340 6.4965 6.5585 6.6210	↓	8.4375 8.5000 8.5625 8.6250	8.4340 8.4965 8.5585 8.6210	↓	31.000 31.250 31.500 31.750	30.9930 31.2430 31.4930 31.7430	↓
		↓		↓	6.6250 6.6875 6.7500 6.8125	6.6250 6.6875 6.7500 6.8125	↓	6.6210 6.6835 6.7460 6.8085	↓	8.6250 8.6875 8.7500 8.8125	6.6210 6.6835 6.7460 6.8085	↓	32.000 32.250 32.500 32.750	31.9930 32.2430 32.4930 32.7430	↓
		↓		↓	6.8125 6.8750 6.9375 7.0000	6.8125 6.8750 6.9375 7.0000	↓	6.8085 6.8710 6.9335 6.9955	↓	8.8125 8.8750 8.9375 9.0000	6.8085 6.8710 6.9335 6.9955	↓	33.000 33.250 33.500 33.750	32.9930 33.2430 33.4930 33.7430	↓
		↓		↓	7.0625 7.1250 7.1875 7.2500	7.0625 7.1250 7.1875 7.2500	↓	7.0585 7.1210 7.1835 7.2455	↓	9.0625 9.1250 9.1875 9.2500	7.0585 7.1210 7.1835 7.2455	↓	34.000 34.250 34.500 34.750	33.9930 34.2430 34.4930 34.7430	↓
		↓		↓	7.2500 7.3125 7.3750 7.4375	7.2500 7.3125 7.3750 7.4375	↓	7.2460 7.3085 7.3710 7.4335	↓	9.2500 9.3125 9.3750 9.4375	7.2460 7.3085 7.3710 7.4335	↓	35.000 35.250 35.500 35.750	34.9930 35.2430 35.4930 35.7430	↓
		↓		↓	7.4375 7.5000 7.5625 7.6250	7.4375 7.5000 7.5625 7.6250	↓	7.4340 7.4965 7.5585 7.6210	↓	9.4375 9.5000 9.5625 9.6250	7.4340 7.4965 7.5585 7.6210	↓	36.000 36.250 36.500 36.750	35.9930 36.2430 36.4930 36.7430	↓
		↓		↓	7.6250 7.6875 7.7500 7.8125	7.6250 7.6875 7.7500 7.8125	↓	7.6210 7.6835 7.7460 7.8085	↓	9.6250 9.6875 9.7500 9.8125	7.6210 7.6835 7.7460 7.8085	↓	37.000 37.250 37.500 37.750	36.9930 37.2430 37.4930 37.7430	↓
		↓		↓	7.8125 7.8750 7.9375 8.0000	7.8125 7.8750 7.9375 8.0000	↓	7.8085 7.8710 7.9335 7.9955	↓	9.8125 9.8750 9.9375 10.0000	7.8085 7.8710 7.9335 7.9955	↓	38.000 38.250 38.500 38.750	37.9930 38.2430 38.4930 38.7430	↓
		↓		↓	8.0625 8.1250 8.1875 8.2500	8.0625 8.1250 8.1875 8.2500	↓	8.0585 8.1210 8.1835 8.2455	↓	10.0625 10.1250 10.1875 10.2500	8.0585 8.1210 8.1835 8.2455	↓	39.000 39.250 39.500 39.750	38.9930 39.2430 39.4930 39.7430	↓
		↓		↓	8.2500 8.3125 8.3750 8.4375	8.2500 8.3125 8.3750 8.4375	↓	8.2460 8.3085 8.3710 8.4335	↓	10.2500 10.3125 10.3750 10.4375	8.2460 8.3085 8.3710 8.4335	↓	40.000 40.250 40.500 40.750	39.9930 40.2430 40.4930 40.7430	↓
		↓		↓	8.4375 8.5000 8.5625 8.6250	8.4375 8.5000 8.5625 8.6250	↓	8.4340 8.4965 8.5585 8.6210	↓	10.4375 10.5000 10.5625 10.6250	8.4340 8.4965 8.5585 8.6210	↓	41.000 41.250 41.500 41.750	40.9930 41.2430 41.4930 41.7430	↓
		↓		↓	8.6250 8.6875 8.7500 8.8125	8.6250 8.6875 8.7500 8.8125	↓	8.6210 8.6835 8.7460 8.8085	↓	10.6250 10.6875 10.7500 10.8125	8.6210 8.6835 8.7460 8.8085	↓	42.000 42.250 42.500 42.750	41.9930 4	

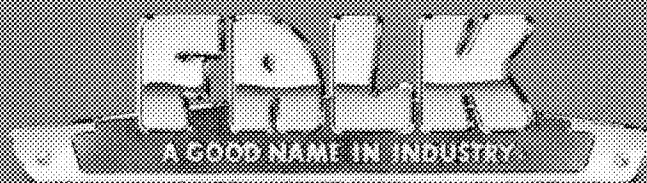
BULLETIN
481-110

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414-937-4284

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