TAB 3 - PERFORMANCE

Technical Performance

Shear Strength

The Shear Strength Table shows the force required to shear low-carbon steel, corrosion-resistant steel, and heat-treated alloy steel Grooved Pins when loaded in double shear using a fixture as described below.

Shaft Size

The recommended pin diameters are maximum for a given shaft size and are based on the low-carbon steel pins in double shear.

Maximum Torque

If the torque to be transmitted by the shaft is known, the proper diameter pin can be selected from the table. The torque figures are also based on low-carbon steel in double shear and include a safety factor of 8. For other materials, torque figures can be adjusted by multiplying by the ratio of double shear strength of the material to that of low-carbon steel.

Horsepower Transmission

The table maximum horsepower which can be transmitted by a shaft to another machine element connected to the shaft by a Groov-Pin under double shear load. The material assumed was low-carbon steel and a safety factor of 8 was used.

Nominal Pin Diameter (in.)	Cross Section Area (sq. in)	Low-Carbon Steel Pin Double Shear Strength (lbs.)	Corrosion-Resistant Steel Pin Double Shear Strength (lbs.)	Alloy Steel Pin (Rockwell C40-48) Double Shear Strength (lbs.)	Shaft Size (in.)	Maximum Torque Low-Carbon Steel Pin (in. lbs.)	Hp Transmitted @100 RPM Low-Carbon Steel Pin (Hp)
1/32	0.0008	100	140	180	3/32	0.5	0.001
3/64	0.0017	220	300	400	9/64	1.9	0.003
1/16	0.0031	400	540	720	3/16	4.7	0.007
5/64	0.0048	620	860	1,120	7/32	8.4	0.014
3/32	0.0069	890	1,240	1,600	1/4	14.0	0.022
7/64	0.0094	1,220	1,680	2,180	5/16	23.8	0.038
1/8	0.0123	1,600	2,200	2,820	3/8	37.4	0.059
5/32	0.0192	2,300	3,310	4,520	7/16 1/2	62.9 71.7	0.100 0.113
3/16	0.0276	3,310	4,760	6,440	9/16	116.4	0.185
7/32	0.0376	4,510	6,480	8,770	5/8 11/16	176.0 193.5	0.280 0.308
1/4	0.0491	5,880	8,460	11,500	3/4 13/16 7/8	275.6 298.6 320.5	0.438 0.474 0.511
5/16	0.0767	7,660	12,700	17,900	5/16 1 1-1/16	448.5 478.3 500.6	0.712 0.759 0.744

3/8	0.1140	11,000	18,200	26,000	1-1/8 1-3/16 1-1/4	773.6 818.0 860.1	1.22 1.30 1.36
7/16	0.1503	15,000	24,800	35,200	1-5/16 1-3/8 1-7/16	1,233 1,290 1,349	1.95 2.05 2.14
1/2	0.1963	19,600	32,400	46,000	1-1/2	1,836	2.91

Double Shear Test

A double shear test should be performed in a suitable fixture such as the one shown at the right. In general, fixture bushings to support the pin and to apply the shear load must have holes conforming to the requirements specified for the pin type being tested. These bushings must have a minimum hardness of Rockwell C58 or equivalent. The clearance between the supporting bushing and the loading bushing must not exceed .005." The load must be aligned perpendicular to the axis of the pin and the rate of load application must be less than or equal to .05 inches per minute. Additionally, the shear planes must be located at least one pin diameter from the ends of the pin and must be at least two pin diameters apart. Pins which are too short to be tested in double shear are evaluated by testing two pins simultaneously in a single shear.

Shear Test Fixture

This schematic drawing shows a standard fixture for performing a double shear test. Hardened bushings support the sample with holes the size of the pin under test. The pin is placed in the fixture where a shear load is applied perpendicular to the pin axis in two places.