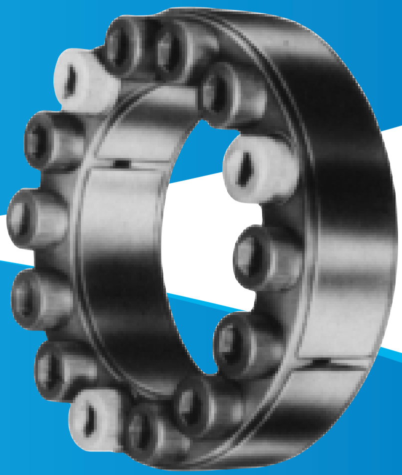
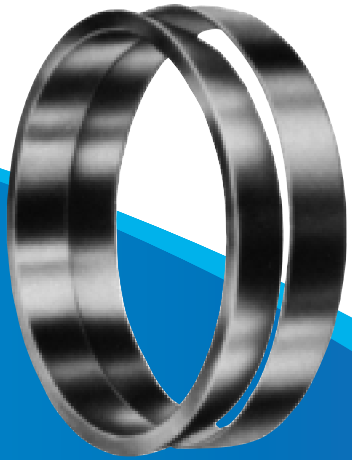
RINGFEDER®

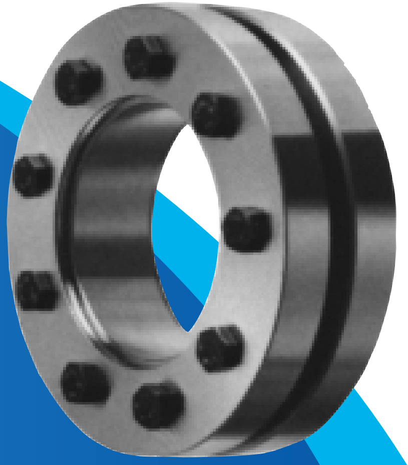
KEYLESS SHAFT/HUB CONNECTIONS



LOCKING ASSEMBLIES™



LOCKING ELEMENTS™



SHRINK DISCS®

RINGFEDER®

W-300-3

1

Ringfeder Corporation
Catalog W-300-3
Shaft-Hub Locking Devices

Ringfeder® unique frictional, keyless shaft-hub locking devices provide an easily adjustable and releasable mechanical shrink-fit. They offer all the advantages of shrink-fits – without the problems. Torque or axial loads are transmitted by radial clamping pressures and friction between the functional surfaces of the locking device, shaft and hub.

Working Principle

Ringfeder® shaft-hub locking devices are based on the inclined plane or taper principle. Clamping forces generated by torqued up locking screws are translated into predetermined contact pressures so as to create mechanical shrink-fit connections.

Applications

Ringfeder® frictional shaft-hub locking devices have successfully solved shaft-hub connection problems involving:

Gears	Rolls	Cams
Levers	Winches	Sprockets
Flanges	Couplings	Brake drums
Sheaves	Flywheels	Hand wheels
Clutches	Fan wheels	Worm gears
Bevel gears	Helical gears	Mixer shafts
Crane wheels	Bucket wheels	Pump impellers
Turbine rotors	Conveyer pulleys	Ship propellers
Windmill propellers	Rock-cutting heads	Shaft-mounted gear units

Advantages

- Elimination of keys, keyways or splines and associated fitting costs
- Completely tight fit around shaft – no backlash
- Impervious to reversing, dynamic or shock loads
- Transmission of high torques and axial loads

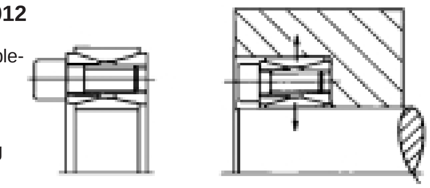
Benefits

- Reduced machining costs
- Easy installation, assembly and disassembly
- Easy axial and angular adjustments and timing

INTERNAL

Locking Assemblies™ RfN 7012

These are the original Ringfeder® Locking Assemblies™ featuring double-tapered thrust rings with self-releasing tapers. They bridge relatively large fit clearances, are easy to install, adjust or remove, but are not self-centering. A precentering hub section is usually required.



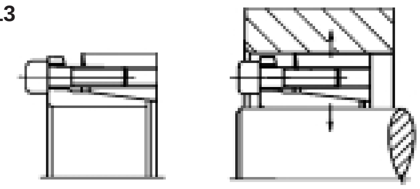
These units are most commonly used on applications in general engineering to transmit high torques and axial loads utilizing larger machining tolerances.
Available sizes:
INCH SERIES for shafts from 3/4” to 7.875” dia.
METRIC SERIES for shafts from 20 mm to 1000 mm dia.

2

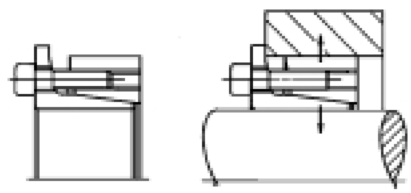
Locking Assemblies™ RfN 7013

These Locking Assemblies™ are of single-taper design with a self-locking taper providing good self-centering action and concentricity, as well as increased torque capacity. A precentering hub section is not required. Integral push-off screws for disassembly are provided.
These assemblies are available in two types:

Straight-thru type: RfN 7013.0
Flange type: RfN 7013.1



Flange type units fix the hub positively against their extended flange preventing axial movement during tightening.



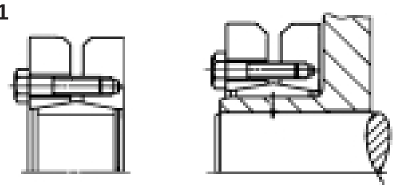
Applied wherever self-centering action and good concentricity of mounted components are essential and hubs with straight-thru bores are used.
Available sizes:
INCH SERIES for shafts from 1” to 4” dia.
METRIC SERIES for shafts from 20 mm to 150 mm dia.

3

EXTERNAL

Shrink Discs® RfN 4071, 4051, 4091

The Shrink Discs® are external locking devices installed over hub projections. By tightening the locking screws, the locking collars exert radial forces on the tapered ring and on the hub. After bridging the fit clearances, radial clamping pressure is generated between shaft and hub establishing a solid, frictional connection. For adjustment or removal, just unscrew the bolts.



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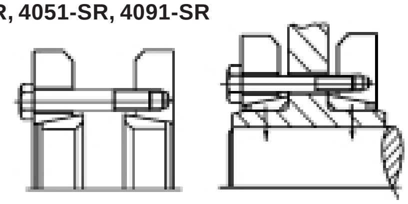
Split Shrink Discs® RfN 4071-SR, 4051-SR, 4091-SR

They are basically the standard Shrink Discs® with two separate half inner rings offering greater mounting versatility and allowing symmetrical hub designs. Split Shrink Discs® can also be used as Half Shrink Discs® transmitting half the catalog rated torque. Then, either clearance or tapered holes need to be provided in the hub for the locking screws.

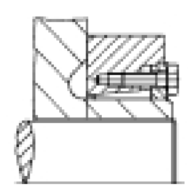


Applied for transmission of very high torques, particularly when external clamping is advantageous and excellent concentricity is required.
Available sizes:
The Shrink Discs® accommodate both inch and metric shafts ranging from 0.75” to 34” dia.

5

Shrink Discs® RfN 4171

This new RfN 4171 Shrink Disc® employs a single, long, shallow taper instead of opposing tapers of the traditional Ringfeder® three-piece series (RfN 4071). Better centering and concentricity result, making the Shrink Disc® especially suitable for high-speed applications where balance is critical.



Installation is also simplified. When the fasteners are properly torqued, the installer has a visual aid to indicate correct installation, i.e., the inner ring face should be flush with the outer ring face.
Available sizes:
Shafts from 3/4” to 16.5”, and torques from 136 lb-ft to 860,000 lb-ft.

6

Low Inertia Series Shrink Disc® for Small Shafts

RfC Low Inertia Series Shrink Discs® Sizes 10 to 50 for smaller shaft sizes.

7

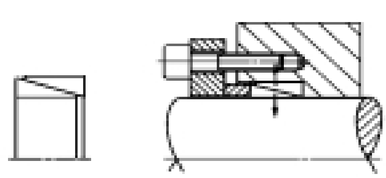
Heavy Duty Shrink Discs® 4091 for Smaller Shafts

7a

INTERNAL

Locking Elements™ RfN 8006/GSA

Locking Elements™ consist of an internal and an external tapered ring. When axial force is exerted on a set of Locking Elements™, radial clamping pressures are generated on the shaft and in the hub bore providing a frictional connection. Upon release of the clamping force, the hub can be adjusted or removed.



Applied for lower torques and smaller shafts. By varying the clamp force, number of Locking Element™ sets and clamping arrangements, different design configurations can be achieved.
Available sizes:
INCH sizes (GSA Series) for shafts from 1/4” to 3” dia.
METRIC sizes (RfN 8006 Series) for shafts from 6 mm to 1000 mm dia.

8

Low Profile Torque Wrenches

9

The ABC’s of Locking Devices

10

2

Ringfeder®

Locking Assemblies™

RfN 7012 & RfN 7012-IN

Ringfeder® Locking Assemblies™ are completely self-contained, frictional shaft-hub locking devices. Designed to generate an easily adjustable and releasable mechanical shrink-fit, they have been used successfully for many years in heavy-duty applications to transmit high torques and dynamic loads and to provide timing and releasability.

Applications Examples

Fig. 1: Drive Pulley
Drive pulley with 280 mm dia. (11.024") Locking Assemblies™ and bend pulley with 95 mm dia. (3.740") Locking Assemblies™.

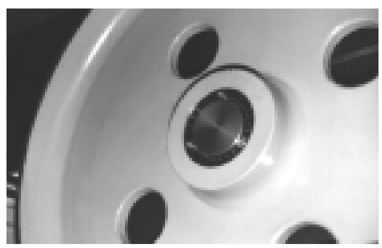


Fig. 2: Lower Band Wheels
Lower band wheels of a twin band saw fastened with 7" RfN 7012-IN Locking Assemblies™.

Fig. 3: Gears
Gears fitted with RfN 7012 Locking Assemblies™.

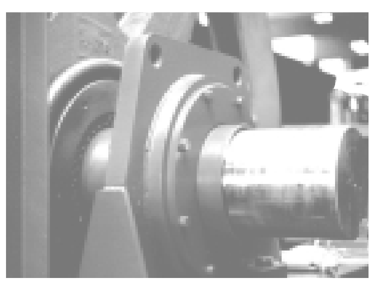


Fig. 5: Drive Pulley
Drive pulley of a gondola ski lift fastened with a 300 x 375 RfN 7012 Locking Assembly™.

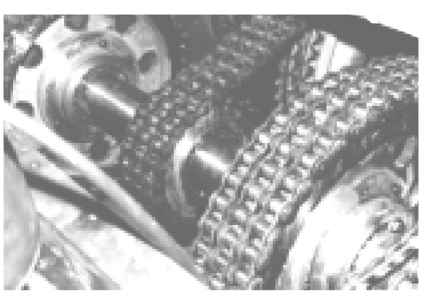


Fig. 4: Sprockets
Input shaft for 750 HP draw works showing applications of Locking Assemblies™ and adaptor flanges.

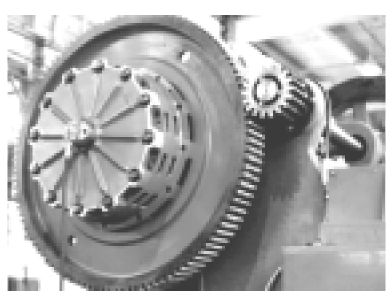


Fig. 6: Pinion Gear
Pinion gear and flywheel both mounted with RfN 7012 Locking Assemblies™.

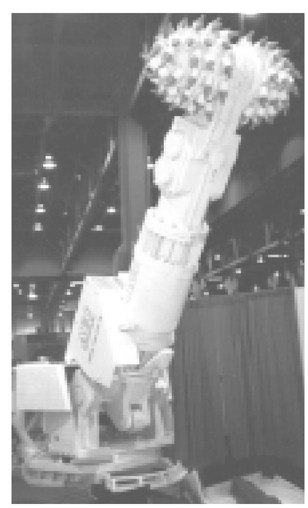


Fig. 7: Cutter Heads
Cutter heads fastened with Locking Assemblies™.

1. Determine the required shaft diameter (d) or maximum torque (M_t) to be transmitted:

$$\text{Torque } M_t = \frac{5252 \text{ x HP}}{\text{RPM}} \text{ (lb-ft)}$$

If combined torsional and axial loads are to be transmitted, calculate the resulting torque as follows:

$$M_{t\ res} = \sqrt{M_t^2 + \left(\frac{P_{ax} \text{ x } d}{24}\right)^2} \leq M_{t\ cat}$$

$M_{t\ res}$ = resultant torque to be transmitted
M_t = actual or maximum torque to be transmitted (lb-ft)
P_{ax} = axial load/thrust to be transmitted (lbs)
d = shaft diameter (inches)
$M_{t\ cat}$ = maximum transmissible torque (lb-ft) of Locking Assembly™ as specified

2. Select a Locking Assembly™ for the shaft diameter (d) from the specification tables and verify that the corresponding maximum transmissible torque (M_t) meets the torque requirement.

If torque is the primary requirement, select the necessary torque (M_t) from the same specification tables and determine the corresponding shaft diameter (d).

Note: Required peak torque should never exceed specified transmissible torque (M_t).

To increase transmissible torque (M_t):

a. Install 2 or 3 Locking Assemblies™ in series, increasing transmissible torque as follows:
- with 2 Locking Assemblies™: $M_{trans.} = 2 \text{ x } M_t$
- with 3 Locking Assemblies™: $M_{trans.} = 3 \text{ x } M_t$

(see Fig. 8: Hub Layout and Fig. 9).

The hub must be long enough to accommodate the assemblies.

b. Increase screw tightening torque (M_A) by up to 20%. Transmissible torque (M_t) and contact pressures (p, p’) increase proportionately.

3. Determine the recommended minimum hub outside diameter (D_N) for the Locking Assembly™ selected from the specification tables or calculate the hub outside diameter (D_N) by using the following equation:

$$D_N \geq D \text{ x } \sqrt{\frac{YP + C_3 \text{ x } p'}{YP - C_3 \text{ x } p'}}$$

Where YP = yield point of hub material (lbs/sq.in.)
p’ = p x d/D (lbs/sq.in.)
B = ≥ min. 2 x l (inches); see *Example*
C_3 = 0.6 (one locking assembly)
C_3 = 0.8 (2 or 3 Locking Assemblies™ in series)

4. Verify that the hub length (B) is adequate for the selected Locking Assembly™; see *Example*.

5. Check the applicable machining tolerance for the shaft and hub bore in the specification tables. A surface finish of 125 micro-inches for shafts and bores is generally adequate.

6. Determine the required Locking Assembly™ by specifying the size (d x D) from Tables 1 & 2 followed by the series number, e.g.: 100 x 145 RfN 7012.

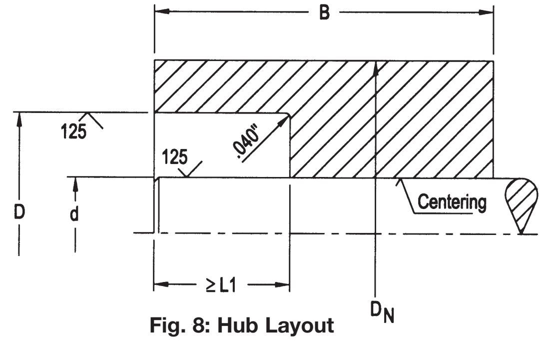


Fig. 8: Hub Layout
Typical layout for a Locking Assembly™ installation.

Note: When accurate centering of the hub is required, establish a proper fit tolerance for the pilot or centering portion of the hub.

EXAMPLE

A spur gear is to be mounted on a 3.9375” dia. shaft capable of transmitting a peak torque of 5,750 lb-ft. The gear is made of 1040 AISI steel (Y.P. 36,000 psi). Select the proper Locking Assembly™ and determine the required hub dimensions and proper machining tolerances.

1. The shaft diameter is specified at 3.9375”.

2. The specification tables indicate that a 3-15/16 Locking Assembly™ is capable of transmitting a torque (M_t) of 6,944 lb-ft, more than the required amount. Select the 3-15/16 Locking Assembly™.

3. The specification tables indicate that the selected 3-15/16 Locking Assembly™ requires a minimum hub outer diameter of 8.000” based on Y.P. 36,000 psi hub material.

4. The hub length (B) should be 2 x L_1. Fig. 8 indicates that L_1 = 1.852”. Therefore, B = 2 x 1.852” = 3.704” (minimum).

Since the gear must be concentric within .0025”, specify the following fit tolerance for the pilot bore:

shaft: 3.9375/3.9365”
bore: 3.9375/3.9390”

5. According to the specification tables, the machining tolerances for the selected Locking Assembly™ are as follows:

shaft: +.000/-.0035”
counter bore: -.000/+.0035”

However, because of the concentricity requirements for the gear, tighter tolerances are needed for the shaft and pilot bore.

The counter bore tolerances for the Locking Assembly™ are -.0000/+.0025” (within the permissible limits and in accordance with the fit tolerance specified in Step 4 above).

6. Order the following assembly:

	Size	RfN	Series
Metric:	100 x 145	RfN	7012
Inch:	3-15/16	RfN	7012-IN

Inch Series Locking Assemblies™ RfN 7012-IN Specifications

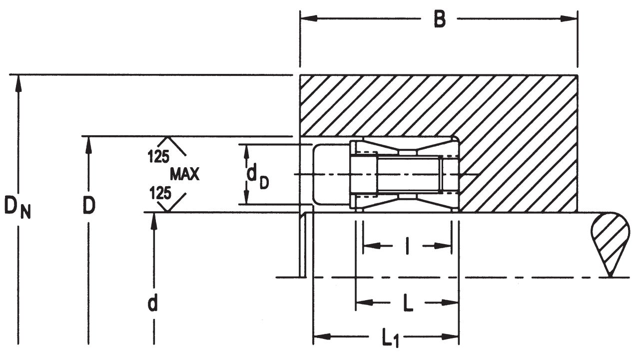


Fig. 9

d = nominal Locking Assembly™ I.D.
= shaft O.D.
T_1 = machining tolerances for shaft (d)
D = nominal Locking Assembly™ O.D.
= hub counter bore I.D.
T_2 = machining tolerances for counter bore (D)
L, l, L_1 = width dimensions, relaxed condition
M_t = maximum transmissible torque
p = contact pressure between Locking Assembly™ and shaft
d_G = metric socket head cap screw size
s = metric hex key size (across flats)
M_A = required tightening torque per locking screw (tighten with torque wrench)
d_D = metric pull-out thread (under zinc-plated screws only)
D_N = minimum hub O.D. for single-unit installation and based on Y.P. 36,000 psi hub material (for other hub materials calculate hub O.D. per step 3 of Selection Guide)

Table 1: Inch Series Locking Assembly™ RfN 7012-IN

Material: Medium Carbon Steel*

RfN 7012-IN Size	Locking Assembly™ dimensions							max. M_t lb-ft	p psi	Locking screws DIN 912 – 12.9					D_N inches
	d	T_1	D	T_2 inches	L	l	L_1			Qty.	size d_G	s mm	M_A lb-ft	d_D	
3/4	.750	+0	1.850	– 0	.787	.669	1.083	185	28 450	8	M 6x18	5	10.13	M 8	2.375
1	1.000	–.002	1.969	+.002	.787	.669	1.083	275	27 000	9	M 6x18	5	10.13	M 8	2.500
1-1/8	1.125		2.165		.787	.669	1.083	345	23 720	10	M 6x18	5	10.13	M 8	2.750
1-3/16	1.1875		2.159		.813	.669	1.108	362	24 900	10	M 6x18	5	10.13	M 8	2.750
1-1/4	1.250		2.362		.787	.669	1.083	459	28 000	12	M 6x18	5	10.13	M 8	3.125
1-3/8	1.375		2.365		.776	.669	1.071	506	25 600	12	M 6x18	5	10.13	M 8	3.125
1-7/16	1.4375		2.559		.787	.669	1.083	608	28 450	15	M 6x18	5	10.13	M 8	3.375
1-1/2	1.500	+0	2.559	– 0	.787	.669	1.083	636	27 000	15	M 6x18	5	10.13	M 8	3.375
1-5/8	1.625	–.0025	2.953	+.0025	.945	.787	1.319	1 070	32 700	12	M 8x22	6	25.32	M 10	4.125
1-11/16	1.6875		2.953		.945	.787	1.319	1 109	28 430	12	M 8x22	6	25.32	M 10	4.125
1-3/4	1.750		2.953		.945	.787	1.319	1 150	30 000	12	M 8x22	6	25.32	M 10	4.125
1-7/8	1.875		3.150		.945	.787	1.319	1 222	28 450	12	M 8x22	6	25.32	M 10	4.250
1-15/16	1.9375		3.150		.945	.787	1.319	1 259	27 000	12	M 8x22	6	25.32	M 10	4.250
2	2.000		3.346		.945	.787	1.319	1 519	30 600	14	M 8x22	6	25.32	M 10	4.750
2-1/8	2.125		3.346		.945	.787	1.319	1 613	29 150	14	M 8x22	6	25.32	M 10	4.750
2-3/16	2.1875		3.543		.945	.787	1.319	1 656	28 450	14	M 8x22	6	25.32	M 10	4.875
2-1/4	2.250		3.543		.945	.787	1.319	1 700	27 000	14	M 8x22	6	25.32	M 10	4.875
2-3/8	2.375		3.531		.996	.787	1.370	1 787	25 600	14	M 8x22	6	25.32	M 10	4.875
2-7/16	2.4375		3.740		.945	.787	1.319	2 098	28 450	16	M 8x22	6	25.32	M 10	5.250
2-1/2	2.500	+0	3.740	– 0	.945	.787	1.319	2 148	27 750	16	M 8x22	6	25.32	M 10	5.250
2-9/16	2.5625	–.003	3.737	+.003	.959	.787	1.333	2 199	27 000	16	M 8x22	6	25.32	M 10	5.250
2-5/8	2.625		4.331		1.102	.945	1.555	3 120	30 514	14	M 10x25	8	50.63	M 12	5.937
2-11/16	2.6875		4.331		1.102	.945	1.555	3 195	29 804	14	M 10x25	8	50.63	M 12	5.937
2-3/4	2.750		4.337		1.079	.945	1.532	3 320	29 850	14	M 10x25	8	50.63	M 12	6.000
2-7/8	2.875		4.528		1.102	.945	1.555	3 450	28 450	14	M 10x25	8	50.63	M 12	6.250
2-15/16	2.9375		4.528		1.102	.945	1.555	3 522	27 750	14	M 10x25	8	50.63	M 12	6.250
3	3.000		4.724		1.102	.945	1.555	3 580	27 000	14	M 10x25	8	50.63	M 12	6.375
3-1/8	3.125		4.724		1.102	.945	1.555	3 731	25 400	14	M 10x25	8	50.63	M 12	6.375
3-1/4	3.250		4.921		1.102	.945	1.555	4 426	26 950	16	M 10x25	8	50.63	M 12	6.875
3-3/8	3.375		4.921		1.102	.945	1.555	4 593	27 750	16	M 10x25	8	50.63	M 12	6.875
3-7/16	3.4375		5.118		1.102	.945	1.555	4 629	26 300	16	M 10x25	8	50.63	M 12	7.125
3-1/2	3.500	+0	5.118	– 0	1.102	.945	1.555	4 716	25 600	16	M 10x25	8	50.63	M 12	7.125
3-3/4	3.750	–.0035	5.305	+0035	1.142	.945	1.594	5 714	27 750	18	M 10x25	8	50.63	M 12	7.500
3-15/16	3.9375		5.708		1.301	1.024	1.852	6 944	27 750	14	M 12x30	10	90.41	M 14	8.000
4	4.000		5.843		1.299	1.024	1.850	7 016	27 000	14	M 12x30	10	90.41	M 14	8.375
4-7/16	4.4375		6.496		1.299	1.024	1.850	8 897	28 450	16	M 12x30	10	90.41	M 14	9.125
4-1/2	4.500		6.496		1.299	1.024	1.850	9 027	27 750	16	M 12x30	10	90.41	M 14	9.125
4-15/16	4.9375		7.087		1.496	1.339	2.047	12 282	24 200	20	M 12x35	10	90.41	M 14	9.500
5	5.000		7.087		1.496	1.339	2.047	12 434	24 200	20	M 12x35	10	90.41	M 14	9.500
5-1/2	5.500	+0	7.492	– 0	1.449	1.339	2.000	15 088	24 200	22	M 12x35	10	90.41	M 14	10.250
6	6.000	–.004	8.268	+.004	1.496	1.339	2.047	19 290	25 600	26	M 12x35	10	90.41	M 14	11.500
6-1/2	6.500		8.858		1.732	1.496	2.362	23 037	23 450	22	M 14x40	12	137.43	M 16	12.000
7	7.000		9.252		1.732	1.496	2.362	27 008	23 450	24	M 14x40	12	137.43	M 16	12.750
7-1/2	7.500	+0	9.823	– 0	2.126	1.811	2.756	33 633	21 350	28	M 14x45	12	137.43	M 16	13.125
7-7/8	7.875	–.0045	10.235	+.0045	2.051	1.811	2.681	37 973	21 350	30	M 14x45	12	137.43	M 16	13.625

****Stainless steel available upon request.***

Notes:

B = at least 2 x l, preferably 2 x L_1 or more

P_{ax} = axial load (thrust capacity)

$= \frac{M_t \times 24}{d}$ lbs (for M_t in lb-ft)

p' = constant pressure between Locking Assembly™ and hub bore

Values of M_t, p, P_{ax}, and p' are based on lightly oiled installation (coefficient of friction μ = 0.12)

$$p' = p \times \frac{d}{D}$$

Table 2: Metric Series Locking Assembly™ RfN 7012

Material: Medium Carbon Steel*

RfN 7012 Size mm	Locking Assembly™ dimensions d	T_1	D	T_2 inches	L	l	L_1	max. M_t lb-ft	p psi	Locking screws DIN 912 – 12.9 Qty.	size d_G	s mm	M_A lb-ft	d_D	D_N inches
20 x 47	.787		1.850		.787	.669	1.083	195	29 850	8	M 6x18	5	10.13	M 8	2.375
22 x 47	.866	+0 –.002	1.850	– 0 +.002	.787	.669	1.083	217	27 750	8	M 6x18	5	10.13	M 8	2.375
24 x 50	.945		1.969		.787	.669	1.083	260	27 750	9	M 6x18	5	10.13	M 8	2.500
25 x 50	.984		1.969		.787	.669	1.083	275	27 000	9	M 6x18	5	10.13	M 8	2.500
28 x 55	1.102		2.165		.787	.669	1.083	340	26 300	9	M 6x18	5	10.13	M 8	2.750
30 x 55	1.181		2.165		.787	.669	1.083	362	24 900	9	M 6x18	5	10.13	M 8	2.750
32 x 60	1.260		2.362		.787	.669	1.083	456	26 397	12	M 6x18	5	10.13	M 8	3.125
35 x 60	1.378	+0 –.0025	2.362	– 0 +.0025	.787	.669	1.083	506	25 600	12	M 6x18	5	10.13	M 8	3.125
38 x 65	1.496		2.559		.787	.669	1.083	630	27 628	15	M 6x18	5	10.13	M 8	3.375
40 x 65	1.575		2.559		.787	.669	1.083	665	25 600	15	M 6x18	5	10.13	M 8	3.375
42 x 75	1.654		2.953		.945	.787	1.319	1 085	32 634	12	M 8x22	6	25.32	M 10	4.125
45 x 75	1.772		2.953		.945	.787	1.319	1 165	29 850	12	M 8x22	6	25.32	M 10	4.125
48 x 80	1.890		3.150		.945	.787	1.319	1 230	28 428	12	M 8x22	6	25.32	M 10	4.250
50 x 80	1.969		3.150		.945	.787	1.319	1 280	27 000	12	M 8x22	6	25.32	M 10	4.250
55 x 85	2.165		3.346		.945	.787	1.319	1 642	28 450	14	M 8x22	6	25.32	M 10	4.750
60 x 90	2.362		3.543		.945	.787	1.319	1 787	25 600	14	M 8x22	6	25.32	M 10	4.875
65 x 95	2.559	+0 –.003	3.740	– 0 +.003	.945	.787	1.319	2 199	27 000	16	M 8x22	6	25.32	M 10	5.250
70 x 110	2.756		4.331		1.102	.945	1.555	3 327	29 850	14	M 10x25	8	50.63	M 12	6.000
75 x 115	2.953		4.528		1.102	.945	1.555	3 544	27 750	14	M 10x25	8	50.63	M 12	6.250
80 x 120	3.150		4.724		1.102	.945	1.555	3 761	25 600	14	M 10x25	8	50.63	M 12	6.375
85 x 125	3.346		4.921		1.102	.945	1.555	4 557	27 750	16	M 10x25	8	50.63	M 12	6.875
90 x 130	3.543		5.118		1.102	.945	1.555	4 774	25 600	16	M 10x25	8	50.63	M 12	7.125
95 x 135	3.740	+0 –.0035	5.315	– 0 +.0035	1.102	.945	1.555	5 714	27 750	18	M 10x25	8	50.63	M 12	7.500
100 x 145	3.937		5.709		1.229	1.024	1.850	6 944	27 750	14	M 12x30	10	90.41	M 14	8.000
110 x 155	4.331		6.102		1.229	1.024	1.850	7 595	25 600	14	M 12x30	10	90.41	M 14	8.375
120 x 165	4.724		6.496		1.229	1.024	1.850	9 475	26 300	16	M 12x30	10	90.41	M 14	9.125
130 x 180	5.118		7.087		1.496	1.339	2.047	12 730	23 450	20	M 12x35	10	90.41	M 14	9.500
140 x 190	5.512		7.480		1.496	1.339	2.047	15 117	23 450	22	M 12x35	10	90.41	M 14	10.250
150 x 200	5.906	+0 –.004	7.874	– 0 +.004	1.496	1.339	2.047	17 504	24 200	24	M 12x35	10	90.41	M 14	10.750
160 x 210	6.299		8.268		1.496	1.339	2.047	20 252	24 200	26	M 12x35	10	90.41	M 14	11.500
170 x 225	6.693		8.858		1.732	1.496	2.362	23 724	22 750	22	M 14x40	12	137.43	M 16	12.000
180 x 235	7.087		9.252		1.732	1.496	2.362	27 341	23 750	24	M 14x40	12	137.43	M 16	12.750
190 x 250	7.480		9.843		2.047	1.811	2.677	33 633	21 350	28	M 14x45	12	137.43	M 16	13.125
200 x 260	7.874	+0 –.0045	10.236	– 0 +.0045	2.047	1.811	2.677	37 973	21 350	30	M 14x45	12	137.43	M 16	13.625
220 x 285	8.661		11.220		2.205	1.969	2.913	49 184	21 350	26	M 16x50	14	213.37	M 20	15.000
240 x 305	9.449		12.008		2.205	1.969	2.913	61 842	22 750	30	M 16x50	14	213.37	M 20	16.500
260 x 325	10.236	+0 –.005	12.795	– 0 +.005	2.205	1.969	2.913	75 223	23 450	34	M 16x50	14	213.37	M 20	17.750
280 x 355	11.024		13.976		2.598	2.362	3.406	92 582	20 600	32	M 18x60	14	292.94	M 22	18.625
300 x 375	11.811		14.764		2.598	2.362	3.406	110 665	21 350	36	M 18x60	14	292.94	M 22	20.000
320 x 405	12.598		15.945		3.071	2.835	3.957	151 893	21 350	36	M 20x70	17	419.51	M 24	21.500
340 x 425	13.386	+0 –.0055	16.732	– 0 +.0055	3.071	2.835	3.957	162 019	20 600	36	M 20x70	17	419.51	M 24	22.250
360 x 455	14.173		17.913		3.543	3.307	4.567	212 650	20 600	36	M 22x80	17	564.17	M 27	23.875
380 x 475	14.961		18.701		3.543	3.307	4.567	222 776	19 200	36	M 22x80	17	564.17	M 27	24.625
400 x 495	15.748		19.488		3.543	3.307	4.567	232 903	18 500	36	M 22x80	17	564.17	M 27	25.250
420 x 515	16.535		20.276		3.543	3.307	4.567	270 514	19 200	40	M 22x80	17	564.17	M 27	26.625
440 x 545	17.323	+0 –.006	21.457	– 0 +.006	4.016	3.780	5.118	329 102	18 500	40	M 24X90	19	723.30	M 30	27.750
460 x 565	18.110		22.244		4.016	3.780	5.118	339 951	17 800	40	M 24X90	19	723.30	M 30	28.625
480 x 585	18.898		23.031		4.016	3.780	5.118	372 450	17 800	42	M 24X90	19	723.30	M 30	29.625
500 x 605	19.685		23.819		4.016	3.780	5.118	405 048	17 800	44	M 24X90	19	723.30	M 30	30.625

Stainless steel available upon request.
For larger sizes or additional information, request catalog S76A.

Ordering Example

	Size	RfN	Series
Metric:	100 x 145	RfN	7012
Inch:	3-15/16	RfN	7012-IN

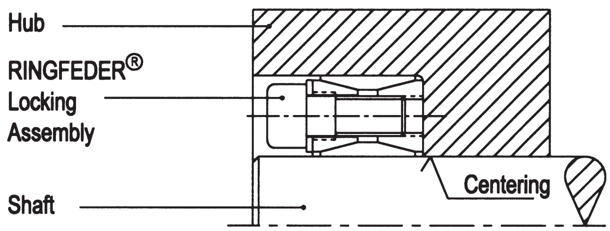


Fig. 10: Locking Assembly™
Typical Ringfeder® Locking Assembly™ connection.

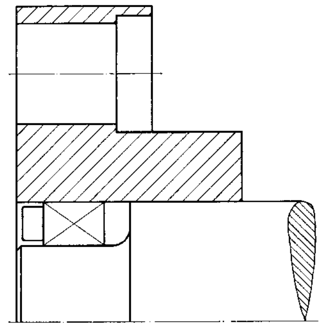


Fig. 11: Coupling
Coupling half-mounted with a RfN 7012 Locking Assembly™. Here, the shaft is stepped to permit the largest possible hub cross-section.

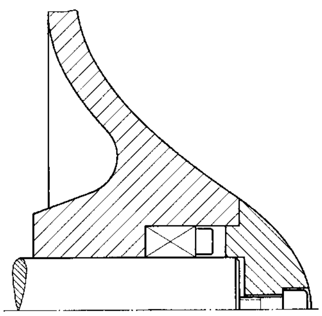


Fig. 12: Impeller
Impeller mounted with a RfN 7012 Locking Assembly™. Here, the locking device is protected from moisture with a bolt-on cap.

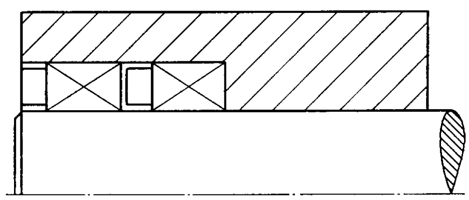


Fig. 13
Hub mounted using two RfN 7012 Locking Assemblies™ to transmit twice the torque.

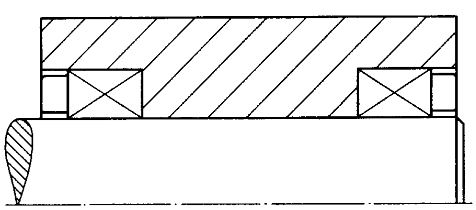


Fig. 14
Hub fastened with two RfN 7012 Locking Assemblies™ located at opposite ends of the hub. In this arrangement twice the torque is transmitted provided the hub length is less than four times the width of the Locking Assembly™. Bores must be concentric to each other.

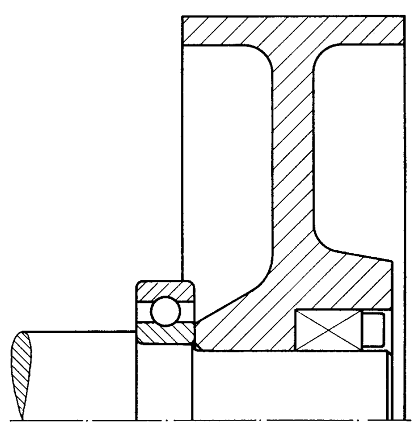


Fig. 15: Flat-Belt Pulley
Flat-belt pulley mounted with a RfN 7012 Locking Assembly™.

INSTALLATION

1. Verify that all contact surfaces, including the screw threads and screw head bearing surfaces, are clean and lightly oiled.

Note: Do NOT use Molybdenum Disulfide, "Molykote" or any other similar lubricants.

2. Slide the Locking Assembly™ onto the shaft and into the hub bore, aligning them as required.

3. Tighten the locking screws gradually in the sequence illustrated in Fig. 16: Tightening Sequence as follows:

- **a)** Hand-tighten 3 or 4 equally spaced locking screws until they make contact. Align and adjust the connection.
- **b)** Hand-tighten and take up all remaining locking screws.
- **c)** Use a torque wrench to tighten the screws further to approximately one-half the specified torque (M_A).
- **d)** Using the torque wrench tighten the screws to full tightening torque (M_A).
- **e)** Verify that the screws are completely tight by applying the specified tightening torque (M_A).

NOTES

- **a)** Even tightening is best accomplished by turning each screw in increments of approximately 90°.
- **b)** For the final pass it is recommended to set the torque wrench by approximately 5% over the specified tightening torque (M_A) to compensate for any possible settling.

INSTALLATION TOOLS

- Standard torque wrench with either 1/4", 3/8", 1/2" or 3/4" square drive and suitable torque range; see Table 3: Locking Assembly™ Tightening Data for specified tightening torques (M_A).
- Metric hexagonal-bit socket (Fig. 17: Square Drives) for torque wrench with suitable dimension across flats (s); see Table 3: Locking Assembly™ Tightening Data.
- Metric hexagonal key with across flats dimension (s).

NOTE: DO NOT USE IMPACT WRENCH!

Since the torque is transmitted by contact pressure and friction between the frictional surfaces, the condition of the contact surfaces and the proper tightening of the locking screws are important.

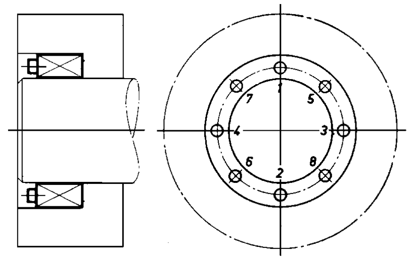


Fig. 16: Tightening Sequence
Tightening sequence for locking screws.

REMOVAL

Ringfeder® Locking Assemblies™ are not self-locking. The individual rings are tapered so that the inner and outer rings spring apart after the last screw has been loosened.

1 Loosen the locking screws in several steps following a diametrically opposite sequence. Do not remove the screws completely.

2 Remove the hub and Locking Assembly™ from the shaft.

REMOVAL TOOL

- Three pull-out bolts or threaded rods with metric thread (d_D) long enough for the specific application; see Table 3: Locking Assembly™ Tightening Data.

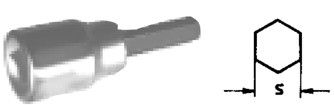


Fig. 17: Square Drives
1/4", 3/8", 1/2" or 3/4" square drive

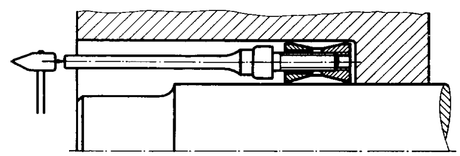


Fig. 18: Rear Thrust Ring Jams
If the rear thrust ring jams, tap lightly against the screw heads to make it snap back.

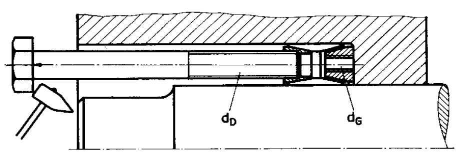


Fig. 19: Front Thrust Ring Jams
If the front thrust ring jams, remove the three zinc-plated screws to expose the pull-out threads (d_D) of the front thrust ring. Screw in suitable bolts or threaded rods and lightly tap in an outward direction to release the front thrust ring. The pull-out threads have only 3 to 5 effective threads; they are unsuitable for strong pulling forces and should be used only to remove the Locking Assembly™.

Table 3: Locking Assembly™ Tightening Data

Locking Assemblies™		Tightening Torque Screw M_A		Screw Size (d_G) Metric	Hex Key Size (s)	Square Drive Size	Pull-Out Thread (d_D) Metric
RfN 7012 Metric Series	RfN 7012-IN Inch Series	(lb-ft)	(Nm)				
20 x 47 to 40 x 65	1 to 1-1/2	10.13	14	M 6	5	1/4"	M 8
42 x 75 to 65 x 95	1-5/8 to 2-9/16	25.32	35	M 8	6	1/4"	M 10
70 x 110 to 95 x 135	2-3/4 to 3-3/4	50.63	70	M 10	8	3/8"	M 12
100 x 145 to 160 x 210	3-15/16 to 6	90.41	125	M 12	10	3/8"	M 14
170 x 225 to 200 x 260	6-1/2 to 7-7/8	137.43	190	M 14	12	1/2"	M 16
220 x 285 to 260 x 325		213.37	295	M 16	14	1/2"	M 20
280 x 355 to 300 x 375		292.94	405	M 18	14	1/2"	M 22
320 x 405 to 340 x 425		419.51	580	M 20	17	3/4"	M 24
360 x 455 to 420 x 515		564.17	780	M 22	17	3/4"	M 27
440 x 545 to 1000 x 1110		723.30	1000	M 24	19	3/4"	M 30

3

Ringfeder®

Locking Assemblies™

RfN 7013 & RfN 7013-IN

SELF-CENTERING SINGLE-TAPER DESIGN

Ringfeder® RfN 7013 Locking Assemblies™ are a single-taper design with a self-locking taper. The assemblies provide good self-centering action and concentricity, as well as increased torque capacity. Integral push-off screws for disassembly are provided. The assemblies are suitable for hubs with straight-thru bores and narrow hubs. A precentering hub section is not required.


RfN 7013.0

These assemblies are available in two types:

- Straight-thru type: RfN 7013.0
- Flange type: RfN 7013.1


RfN 7013.1

Flange type units fix the hub positively against their extended flange to prevent axial movement during tightening.

Applications and Design Examples

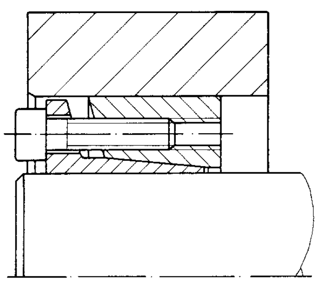


Fig. 20
Hub mounted with a RfN 7013.0 Locking Assembly™ in a straight-thru bore.

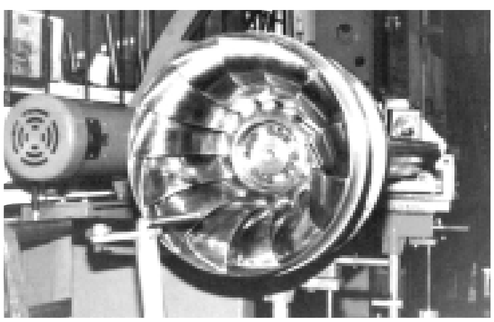


Fig. 21: Turbine Runner
Turbine runner mounted with a Locking Assembly™.

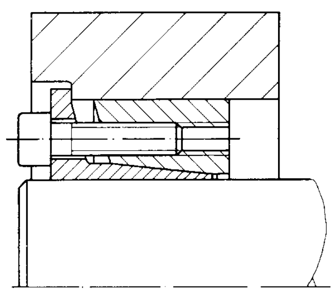


Fig. 22
Hub mounted with a RfN 7013.1 Locking Assembly™ with countersunk flange.

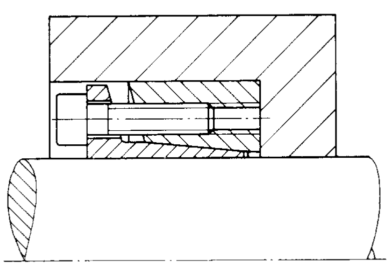


Fig. 23
Hub mounted with a RfN 7013.0 Locking Assembly™ in counterbore.

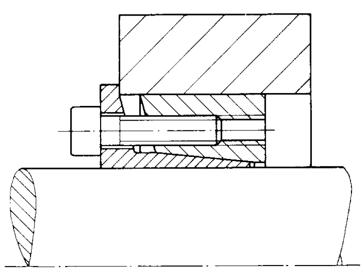


Fig. 24
Hub mounted with a RfN 7013.1 Locking Assembly™ flange outside the hub bore.

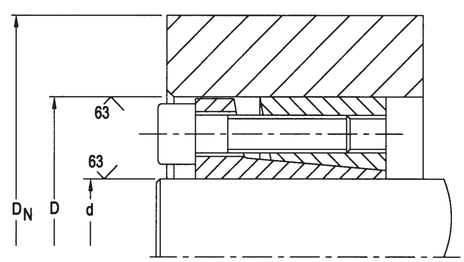


Fig. 25
Typical layout for a Locking Assembly™ installation.

1. Determine the required shaft diameter (d) or maximum torque (M_t) to be transmitted:

$$\text{Torque } M_t = \frac{5252 \text{ x HP}}{\text{RPM}} \text{ (lb-ft)}$$

If combined torsional and axial loads are to be transmitted, calculate the resulting torque as follows:

$$M_{t\,res} = \sqrt{M_t^2 + \left(\frac{P_{ax} \text{ x } d}{24}\right)^2} \le M_{t\,cat}$$

$M_{t\,res}$ = resultant torque to be transmitted
M_t = actual or maximum torque to be transmitted (lb-ft)
P_{ax} = axial load/thrust to be transmitted (lbs)
d = shaft diameter (inches)
$M_{t\,cat}$ = maximum transmissible torque (lb-ft) of Locking Assembly™ as specified

Note: For hollow shaft applications, please consult Ringfeder Corporation.

2. Select a Locking Assembly™ for the shaft diameter (d) from the specification tables and verify that the corresponding maximum transmissible torque (M_t) meets the torque requirement.

If torque is the primary requirement, select the necessary torque (M_t) from the same specification tables and determine the corresponding shaft diameter (d).

Note: Required peak torque should never exceed specified transmissible torque (M_t).

3. Determine the recommended minimum hub outside diameter (D_N) for the Locking Assembly™ selected from the specification tables or calculate the hub outside diameter (D_N) as follows:

$$D_N \ge D \text{ x } \sqrt{\frac{YP + C_3 \text{ x } p'}{YP - C_3 \text{ x } p'}}$$

YP = yield point of hub material (lbs/sq.in.)
p' = contact pressure (lbs/sq.in.) between Locking Assembly™ and hub (see Tables 4 or 5).
C_3 = form factor depending on hub design (see Fig. 26, Fig. 27, or Fig. 28).

4. Determine the applicable machining tolerances for the shaft and hub bores in Table 4 or 5. The required surface finish for shaft and hub bores is RMS 63 or better, but surface finishes should not be RMS 8 or less.

Ordering Example

	Size	RfN	Series
Metric:	55 x 85	RfN	7013.0
Inch:	2-1/4	RfN	7013.1-IN

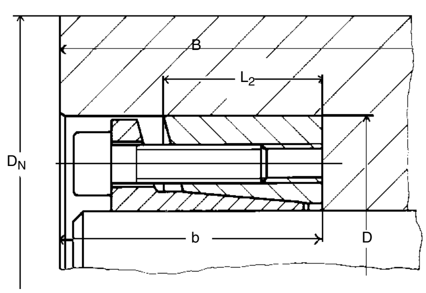


Fig. 26
C_3 = 0.6
Hub pre-centered on shaft
B (hub width) ≥ 2 x L_2, b ≥ L_{tot}

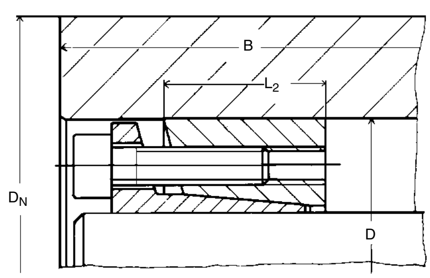


Fig. 27
C_3 = 0.8
Straight-thru bore
B (hub width) ≥ 2 x L_2

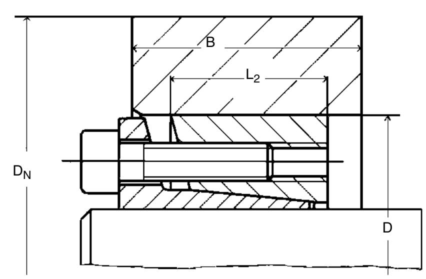


Fig. 28
C_3 = 1
(hub width)
L_2 ≤ B < 2 x L_2

Ordering Example

	Size	RfN	Series
Metric:	60 x 90	RfN	7013.1
Inch:	2-7/8	RfN	7013.1-IN

Inch Series Locking Assemblies™ RfN 7013-IN Specifications

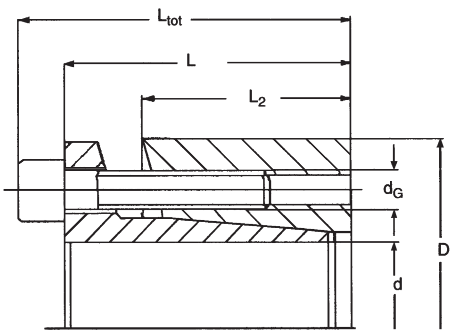


Fig. 29
Ringfeder® RfN 7013.0 Locking Assembly™ (hub moves freely axially during tightening).

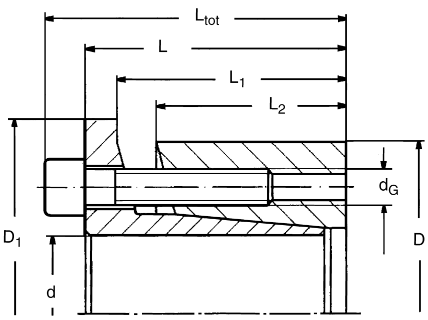


Fig. 30
Ringfeder® RfN 7013.1 Locking Assembly™ (hub axially fixed during tightening).

d = nominal Locking Assembly™ I.D.
= shaft O.D.
T_1 = machining tolerances for shaft (d)
D = nominal Locking Assembly™ O.D.
= hub counter bore I.D.
T_2 = machining tolerances for counter bore (D)
L_{tot}, L, L_1, L_2 = width dimensions, relaxed condition
M_t = maximum transmissible torque
p = contact pressure between Locking Assembly™ and shaft
p' = contact pressure between Locking Assembly™ and hub bore
d_G = metric socket head cap screw size
s = metric hex key size (across flats)
M_A = required tightening torque per locking screw (tighten with torque wrench)
D_N = minimum hub O.D. for single-unit installation based on Y.P. of 36,000 psi hub material (for other hub materials calculate hub O.D. per step 3 of the Selection Guide)

Notes P_{ax} = axial load (thrust capacity) =

$$\frac{M_t \times 24 \text{ lbs}}{d} \quad (\text{for } M_t \text{ in lb-ft})$$

M_t, P_{ax}, p, and p' are based on a lightly oiled installation (coefficient of friction μ = 0.12)

Table 4: Inch Series Locking Assemblies™ RfN 7013.0 & 7013.1-IN

Material: Medium Carbon Steel*

RfN 7013 Size inches	Locking Assembly™ dimensions									max.			Locking screws DIN 912 – 12.9					
	d	T_1	D	T_2 inches	L_{tot}	L	L_1	L_2	D_1	M_t lb-ft	p psi	p' psi	Qty 1)	Qty 2)	Size d_G	s mm	M_A lb-ft	D_N inches
1	1.000	+0	1.969		1.456	1.220	1.012	.854	2.205	323	40 170	15 070	5	7	M 6x20	5	12.5	2.875
1-3/16	1.1875	–.0013	2.165		1.456	1.220	1.012	.854	2.441	385	33 800	13 650	5	7	M 6x20	5	12.5	3.000
1-1/4	1.250		2.362		1.456	1.220	1.012	.854	2.677	531	38 560	15 070	6	9	M 6x20	5	12.5	3.375
1-3/8	1.375		2.362	– 0	1.456	1.220	1.012	.854	2.677	585	35 055	15 070	6	9	M 6x20	5	12.5	3.375
1-7/16	1.4375		2.559	+.0018	1.456	1.220	1.012	.854	2.874	620	33 495	13 935	6	10	M 6x20	5	12.5	3.625
1-1/2	1.500	+0	2.559		1.456	1.220	1.012	.854	2.874	647	32 100	13 935	6	10	M 6x20	5	12.5	3.625
1-5/8	1.625	–.0016	2.953		1.811	1.496	1.193	.996	3.267	1 234	43 870	19 055	6	9	M 8x25	6	30	4.750
1-3/4	1.750		2.953		1.811	1.496	1.193	.996	3.267	1 329	40 740	19 055	6	9	M 8x25	6	30	4.750
1-7/8	1.875		3.150		1.811	1.496	1.193	.996	3.464	1 426	38 070	17 915	6	9	M 8x25	6	30	4.875
1-15/16	1.9375		3.150		1.811	1.496	1.193	.996	3.464	1 473	36 840	17 915	6	9	M 8x25	6	30	4.875
2	2.000		3.150		1.811	1.496	1.193	.996	3.464	1 521	35 690	17 915	6	9	M 8x25	6	30	4.875
2-1/8	2.125		3.346		1.811	1.496	1.193	.996	3.740	1 803	39 125	19 625	7	10	M 8x25	6	30	5.500
2-3/16	2.1875		3.346		1.811	1.496	1.193	.996	3.740	1 856	38 005	19 625	7	10	M 8x25	6	30	5.500
2-1/4	2.250		3.543		1.811	1.496	1.193	.996	3.937	1 908	36 875	18 485	7	10	M 8x25	6	30	5.500
2-3/8	2.375		3.543	– 0	1.811	1.496	1.193	.996	3.937	2 014	34 935	18 485	7	10	M 8x25	6	30	5.500
2-7/16	2.4375	+0	3.740	+.0022	1.811	1.496	1.193	.996	4.134	2 466	38 965	20 050	8	12	M 8x25	6	30	6.125
2-1/2	2.500	–.0018	3.740		1.811	1.496	1.193	.996	4.134	2 530	37 990	20 050	8	12	M 8x25	6	30	6.125
2-9/16	2.5625		3.740		1.811	1.496	1.193	.996	4.134	2 593	37 065	20 050	8	12	M 8x25	6	30	6.125
2-3/4	2.750		4.331		2.362	1.968	1.590	1.315	4.724	3 680	34 770	18 200	7	10	M 10x35	8	60	6.750
2-7/8	2.875		4.528		2.362	1.968	1.590	1.315	4.921	3 845	33 300	16 920	7	10	M 10x35	8	60	6.875
2-15/16	2.9375		4.528		2.362	1.968	1.590	1.315	4.921	3 929	32 590	16 920	7	10	M 10x35	8	60	6.875
3	3.000		4.528		2.362	1.968	1.590	1.315	4.921	4 012	31 910	16 920	7	10	M 10x35	8	60	6.875
3-3/8	3.375		4.921		2.362	1.968	1.590	1.315	5.315	5 434	32 430	18 345	8	12	M 10x35	8	60	7.625
3-7/16	3.4375		5.118		2.362	1.968	1.590	1.315	5.512	5 543	31 810	17 630	8	12	M 10x35	8	60	7.875
3-1/2	3.500	+0	5.118	– 0	2.362	1.968	1.590	1.315	5.512	5 644	31 240	17 630	8	12	M 10x35	8	60	7.875
3-3/4	3.750	–.0022	5.315	+.0025	2.362	1.968	1.590	1.315	5.709	7 180	36 450	21 190	10	15	M 10x35	8	60	9.000
3-15/16	3.9375		5.709		2.677	2.283	1.882	1.606	6.102	7 957	27 300	16 210	10	15	M 10x35	8	60	8.500
4	4.000		5.709		2.677	2.283	1.882	1.606	6.102	8 083	26 870	16 210	10	15	M 10x35	8	60	8.500

1) Number of screws in type RfN 7013.0
2) The number of screws in type RfN 7013.1 is higher to compensate for increased friction when the hub is fixed
** Stainless steel upon request*

Table 5: Metric Series Locking Assemblies™ RfN 7013.0 & 7013.1

Material: Medium Carbon Steel*

RfN 7013 Size mm	Locking Assembly™ dimensions									max. M_t lb-ft	p psi	p' psi	Locking screws DIN 912 – 12.9					D_N inches
	d	T_1	D	T_2 inches	L_{tot}	L	L_1	L_2	D_1				Qty 1)	Qty 2)	Size d_G	s mm	M_A lb-ft	
20x 47	.787		1.850		1.456	1.220	1.012	.854	2.086	217	40 810	12 800	4	6	M 6x20	5	12.5	2.625
22x 47	.866		1.850	– 0 +.0016	1.456	1.220	1.012	.854	2.086	238	36 975	12 800	4	6	M 6x20	5	12.5	2.625
24x 50	.945	+0 –.0013	1.969		1.456	1.220	1.012	.854	2.205	303	42 520	15 070	5	7	M 6x20	5	12.5	2.875
25x 50	.984		1.969		1.456	1.220	1.012	.854	2.205	318	40 810	15 070	5	7	M 6x20	5	12.5	2.875
28x 55	1.102		2.165		1.456	1.220	1.012	.854	2.441	354	36 405	13 650	5	7	M 6x20	5	12.5	3.000
30x 55	1.181		2.165		1.456	1.220	1.012	.854	2.441	383	33 985	13 650	5	7	M 6x20	5	12.5	3.000
32x 60	1.260		2.362		1.456	1.220	1.012	.854	2.667	535	38 250	15 070	6	9	M 6x20	5	12.5	3.375
35x 60	1.378		2.362		1.456	1.220	1.012	.854	2.667	585	34 980	15 070	6	9	M 6x20	5	12.5	3.375
38x 65	1.496		2.559	– 0 +.0018	1.456	1.220	1.012	.854	2.874	640	32 130	13 935	6	10	M 6x20	5	12.5	3.625
40x 65	1.575	+0 –.0016	2.559		1.456	1.220	1.012	.854	2.874	680	30 575	13 935	6	10	M 6x20	5	12.5	3.625
42x 75	1.654		2.953		1.811	1.496	1.193	.996	3.267	1 250	43 085	19 055	6	9	M 8x25	6	30	4.750
45x 75	1.772		2.953		1.811	1.496	1.193	.996	3.267	1 345	40 245	19 055	6	9	M 8x25	6	30	4.750
48x 80	1.890		3.150		1.811	1.496	1.193	.996	3.464	1 430	37 825	17 915	6	9	M 8x25	6	30	4.875
50x 80	1.969		3.150		1.811	1.496	1.193	.996	3.464	1 497	36 260	17 915	6	9	M 8x25	6	30	4.875
55x 85	2.165		3.346		1.811	1.496	1.193	.996	3.740	1 837	38 395	19 625	7	10	M 8x25	6	30	5.500
60x 90	2.362		3.543		1.811	1.496	1.193	.996	3.937	2 003	35 125	18 485	7	10	M 8x25	6	30	5.500
65x 95	2.559	+0 –.0018	3.740	– 0 +.0022	1.811	1.496	1.193	.996	4.134	2 589	37 115	20 050	8	12	M 8x25	6	30	6.125
70x110	2.756		4.331		2.362	1.968	1.590	1.315	4.724	3 688	34 700	18 200	7	10	M10x35	8	60	6.750
75x115	2.953		4.528		2.362	1.968	1.590	1.315	4.921	3 949	32 425	16 920	7	10	M10x35	8	60	6.875
80x120	3.150		4.724		2.362	1.968	1.590	1.315	5.118	4 231	30 430	15 925	7	10	M10x35	8	60	6.937
85x125	3.346		4.921		2.362	1.968	1.590	1.315	5.315	5 388	32 710	18 345	8	12	M10x35	8	60	7.625
90x130	3.543		5.118		2.362	1.968	1.590	1.315	5.512	5 714	30 860	17 630	8	12	M10x35	8	60	7.875
95x135	3.740	+0 –.0022	5.315	– 0 +.0025	2.362	1.968	1.590	1.315	5.709	7 160	36 545	21 190	10	15	M10x35	8	60	9.000
100x145	3.937		5.709		2.677	2.283	1.882	1.606	6.102	7 956	27 300	16 210	10	15	M10x35	8	60	8.500
110x155	4.331		6.102		2.677	2.283	1.882	1.606	6.496	8 751	24 885	15 215	10	15	M10x35	8	60	8.750
120x165	4.724		6.496		2.677	2.283	1.882	1.606	6.890	11 355	27 300	17 065	12	18	M10x35	8	60	9.875
130x180	5.118	+0 –.0025	7.087		3.031	2.560	2.063	1.787	7.480	14 972	26 735	17 065	10	15	M12x40	10	105	10.625
140x190	5.512		7.480	– 0 +.0028	3.031	2.560	2.063	1.787	7.874	16 274	24 885	16 210	10	15	M12x40	10	105	11.250
150x200	5.906		7.874		3.031	2.560	2.063	1.787	8.267	20 614	27 875	18 485	12	18	M12x40	10	105	12.375

1) Number of screws in type RfN 7013.0
2) The number of screws in type RfN 7013.1 is higher to compensate for increased friction when the hub is fixed
**** Stainless steel upon request***

Installation and Removal Instructions

Since the torque is transmitted by contact pressure and friction between the frictional surfaces, the condition of the contact surfaces and the proper tightening of the locking screws are important.

INSTALLATION

1. Verify that all contact surfaces, including the screw threads and screw head bearing surfaces, are clean and lightly oiled.

   Note: Do NOT use Molybdenum Disulfide, "Molykote" or any other similar lubricants.
2. Slide the Locking Assembly™ onto the shaft and into the hub bore, aligning them as required.
3. Tighten the locking screws gradually in a diametrically opposite sequence as follows:
   - **a)** Hand-tighten 3 or 4 equally spaced locking screws until they make contact. Align and adjust the connection.
   - **b)** Hand-tighten and take up all remaining locking screws.
   - **c)** Use a torque wrench to tighten the screws further to approximately one-half the specified torque (M_A).
   - **d)** Using the torque wrench tighten the screws to full tightening torque (M_A).
   - **e)** Verify that the screws are completely tight by applying the specified tightening torque (M_A).

REMOVAL

1. Loosen all screws several turns.
2. Remove the screw adjacent to each threaded jacking hole and screw it into its corresponding jacking hole to press off the outer ring. This releases the connection.
3. Remove the hub and the Locking Assembly™ from the shaft. Leave the screws in the jacking holes until you have completely removed the Locking Assembly™ from the hub.

   Disassemble and clean dirty undamaged Locking Assemblies™ before re-use.

TOOLS REQUIRED FOR ASSEMBLY AND REMOVAL

- **a)** Standard torque wrench with either 1/4" or 3/8" square drive and suitable torque range; see Table for specified tightening torques (M_A).
- **b)** Metric hexagonal bit socket (see Fig. 31: Square Drives) for torque wrench with suitable across flats dim. (s); see Table 3.

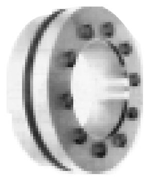
NOTE: DO NOT USE IMPACT WRENCH!

Fig. 31: Square Drives
1/4" or 3/8" square drive

4

Ringfeder®
Shrink Discs®
RfN 4071, RfN 4091 & RfN 4051

Shrink Discs® are used to transmit high torques, particularly when external clamping is advantageous and a high degree of concentricity is required. Ringfeder® Shrink Discs® are self-contained and ready for installation over a hub projection.



Applications Examples

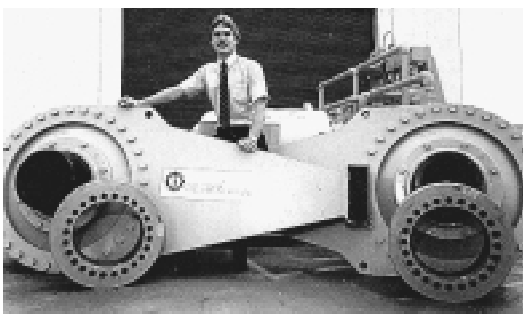


Fig. 32: Apron Feeder Drive
Apron feeder drive; hydraulic power unit, Ridley Island Coal Terminal.

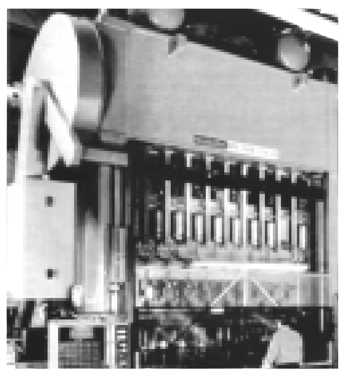


Fig. 33: Gear
Gear mounted with a Shrink Disc® on a straight side press.

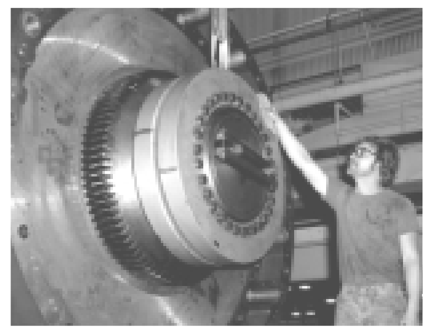


Fig. 34: Clutch
Clutch of a 2,500 ton press shaft mounted with a Shrink Disc®.

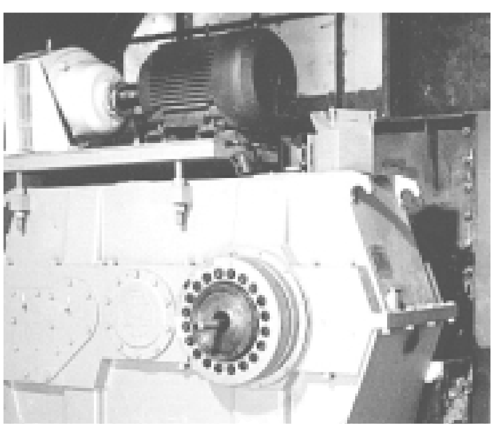


Fig. 35: Speed Reducer
Shaft-mounted speed reducer fastened with a Shrink Disc®.

Fig. 36: Shrink Disc®
RING-flex® torsionally rigid, backlash-free couplings use Ringfeder® Shrink Discs® to give a truly backlash-free shaft to shaft coupling.

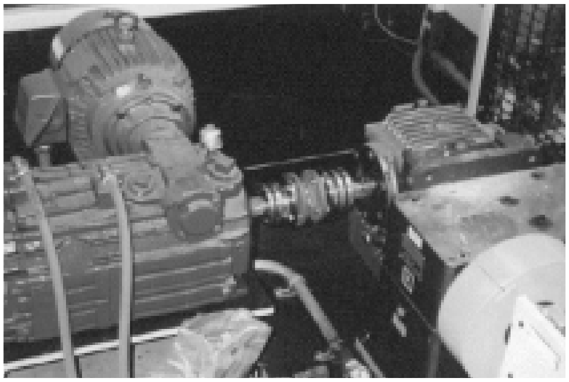


Fig. 37:
RING-flex® coupling in automotive plant main conveyor drive.

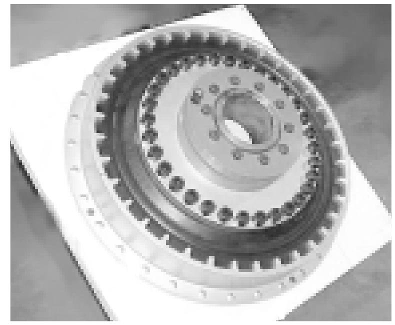


Fig. 38:
Shrink Disc® on engine flywheel coupling for diesel driven compressor.

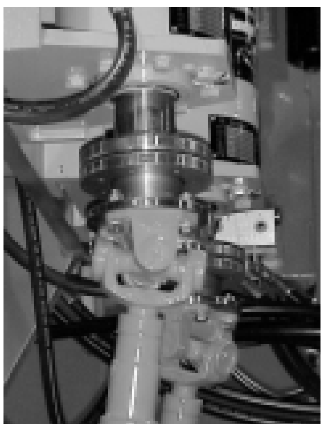


Fig. 39:
Shrink Disc® on U-joint drive in sawmill equipment.

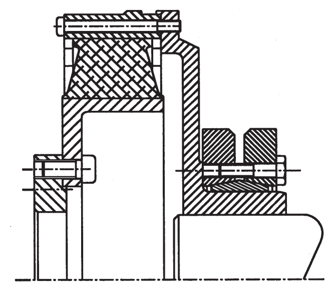


Fig. 40:
Diesel engine flywheel coupling.

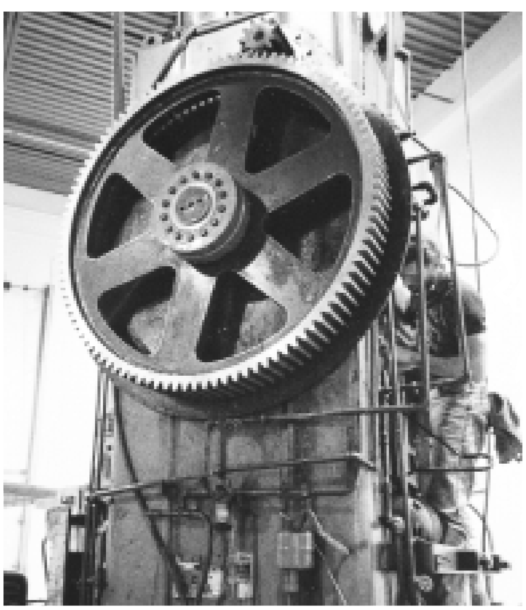


Fig. 41:
Shrink Disc® on bull gear of punch press.

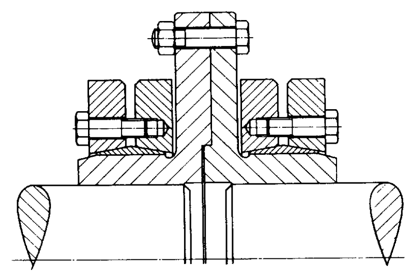


Fig. 42: Rigid Flange Coupling

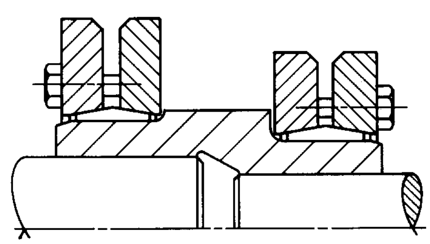


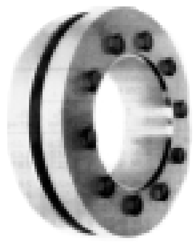
Fig. 43: Stepped Sleeve Coupling
Rigid Shrink Disc® stepped sleeve coupling.

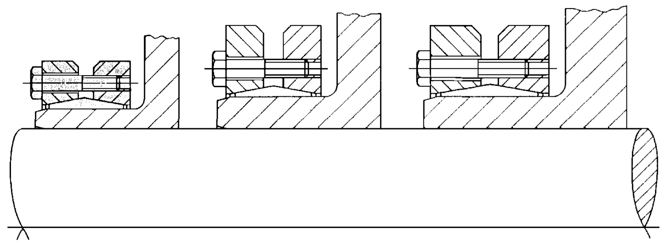
4 Relative Comparison of Shrink Disc® Series

The original Shrink Discs® are available in three series:

Standard Series	RfN 4071
Heavy Duty Series	RfN 4091
Light Duty Series	RfN 4051

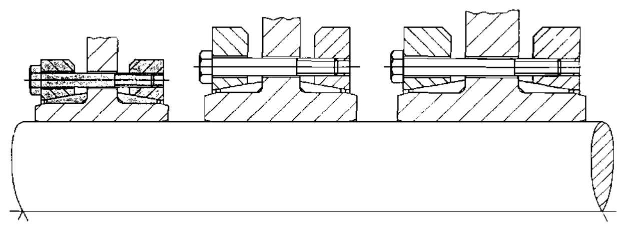
SHRINK DISCS®





RfN 4051	**RfN 4071**	**RfN 4091**
LIGHT DUTY SERIES	STANDARD DUTY SERIES	HEAVY DUTY SERIES

SPLIT SHRINK DISCS®



RfN 4051-SR	**RfN 4071-SR**	**RfN 4091-SR**
LIGHT DUTY SERIES	STANDARD DUTY SERIES	HEAVY DUTY SERIES

More Design Examples

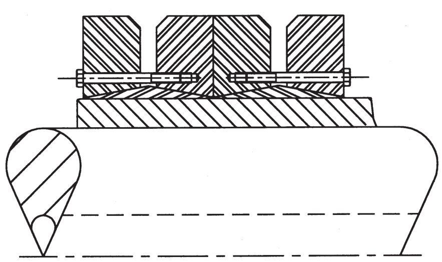


Fig. 44: Two Shrink Discs® in line offer 2X the torque capacity of one.

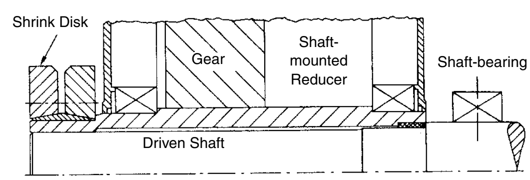


Fig. 45: Speed Reducer
Shaft-mounted speed reducer. Illustrated stepped shaft configuration provides 2-point contact eliminating skewing during installation (installed position shown).

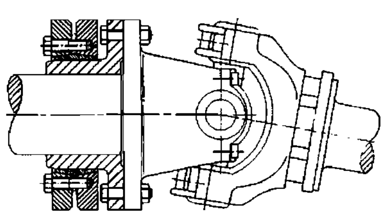


Fig. 46: Universal Joint Connection

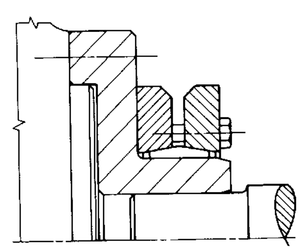


Fig. 47: Adapter Flanges
Type HSDA Shrink Disc® adapter flanges (available for Hägglunds drives).

The *Maximum Transmissible Torque* is a function of the shaft diameter, the coefficient of friction (μ) and the clearance between the shaft and hub. Torque is calculated using the equation:

$$M_t = \frac{P \times \pi \times d_W^2 \times l \times \mu}{24}$$

P = contact pressure between shaft and hub (psi)
d_W = shaft diameter (inches)
l = inner ring length (inches)

Coefficient of friction (μ) can vary widely depending on material and surface finish. A well-accepted number for interference fits that are lightly oiled is μ=0.12. This fig. is used to determine torque capacity listed in this catalog. If shaft and hub are assembled dry, μ=0.15 can be assumed. Tests have shown that grease-free connections can attain coefficients greater than 0.2. The transmissible torque is then increased proportionately.

Hub stress calculation, which determine the material requirements for the hub, are based on multi-directional stresses. The following equation uses the "maximum distortion energy theory" to calculate the maximum combined stress in the hub.

$$\sigma_{V_H} = \sqrt{1/2\left\{(\sigma_{X_H}-\sigma_{Y_H})^2 + (\sigma_{Y_H}-\sigma_{Z_H})^2 + (\sigma_{Z_H}-\sigma_{X_H})^2\right\} + 3\tau_H^2}$$

where:

σ_{V_H} = combined stress (psi)
σ_{X_H} = tangential stress (psi)
σ_{Y_H} = radial stress (psi)
σ_{Z_H} = axial and bending stress (psi)
τ_H = torsional shear stress (psi)

Individual stress components can be determined by using the Lamé thick wall cylinder equations. (See Fig. 48).

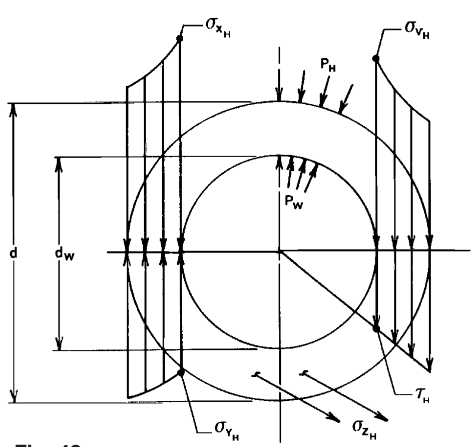


Fig. 48

Fit clearances can also affect torque capacity. Catalog values are calculated using maximum fit clearance. See subsequent data tables for suggested tolerance allowances. These fits will allow easy assembly and disassembly.

If larger clearances are required, torque will be reduced proportionately. Also, hub stresses will increase and could exceed the yield strength of the material, causing plastic deformation. Please contact us if larger fit clearances are required.

Allowable hub O.D. tolerances and maximum radius allowed adjacent to the Shrink Disc® are given in subsequent data tables. Materials with a minimum yield point of 50,000 psi are recommended. Because the hub is in compression, grey cast irons are suitable. Other materials can be used if combined stresses are kept below the yield point of the material. Contact our engineering department for a complete stress analysis.

Hollow shafts do not act the same as solid shafts under compressive radial loads. Depending on the wall thickness there will be varying amounts of elastic deformation and consequently a reduction in torque capacity. Our engineering department can provide complete information based on your requirements.

If combined torsional and axial loads are to be transmitted, calculate the torque as follows:

$$M_{t\,res} = \sqrt{M_t^2 + \left(\frac{P_{ax} \times d}{24}\right)^2} \leq M_{t\,cat}$$

$M_{t\,res}$ = resultant torque to be transmitted (lb-ft)
M_t = actual or maximum torque to be transmitted (lb-ft)
P_{ax} = axial load-thrust to be transmitted (lbs)
d_W = shaft diameter (inches)
$M_{t\,cat}$ = max. transmissible torque (lb-ft) of Shrink Disc™ as specified in catalog

The required surface finish for both shaft and hub projection I.D. and O.D. is RMS 125 microinches or better.

Shrink Discs®

1 Determine the shaft diameter (d_W) to be used or the maximum torque (M_t) to be transmitted.
Note: For hollow shaft applications, consult Ringfeder Corporation.

2 Select a Shrink Disc® from the Table for required shaft dia. (d_W) and verify that the corresponding maximum transmissible torque (M_t) meets the torque requirement.

If torque is the primary requirement, select the necessary torque (M_t) from the same specification table and determine the corresponding shaft diameter (d_W).

3 Incorporate the specified dimensions of the selected Shrink Disc® and required hub into your design and drawing. Indicate the specified tightening torque (M_A) for each locking screw on the drawing.

4 Establish machining tolerances (T_H, T_W) for shaft, hub bore and hub outer diameter from the specification tables.

Ordering Example

	Size	RfN	Series
Example:	90	RfN	4071

Shrink Discs® RfN 4071 Specifications

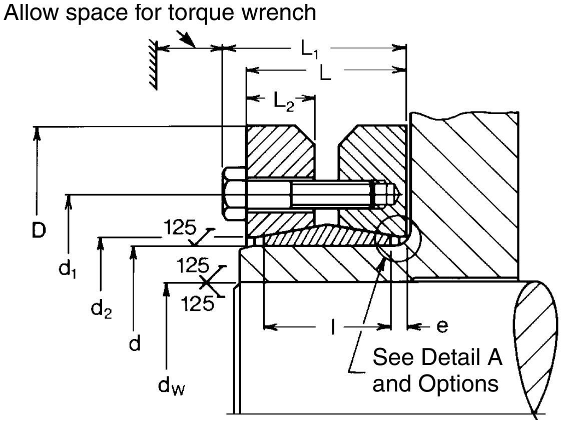
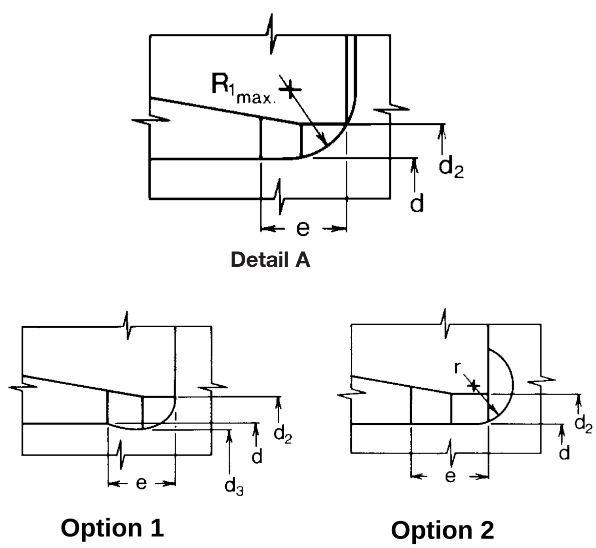


Fig. 49: Shrink Disc® Layout
Shrink Disc® RfN 4071



d = nominal Shrink Disc™ I.D.
= hub projection O.D.
T_H = specified tolerance for hub O.D. (d)
d_W = shaft size range (min.- max.)
T_W = total allowable diametrical clearance between shaft and hub bore (d_W)
M_t = maximum transmissible torque
D = Shrink Disc™ O.D.
d_1 = bolt circle dia.
d_2 = thrust ring I.D.

L, L_1, L_2, e = width dimensions, relaxed condition
s = head dimension across flats (mm)
M_A = required tightening torque per locking screw
d_3 = 0.98 x d (for option 1)
r = customer selectable (for option 2)

$P_{ax} = \frac{M_t \times 24}{d_W}$ lbs (for option 2)

Notes

1 Tapers and screws lubricated with Molykote Gn Paste or equivalent.

2 For Series RfN 4071:
Sizes 24 to 200 have a thru-drilled tapped hole.
All larger sizes have a blind tapped hole.

Table 6: Shrink Disc® Series RfN 4071

Material: Alloy Steel*

RfN 4071 Size	Shaft/Hub dimensions d	T_H	d_W inches	T_W	$R_{1max.}$	max. M_t lb-ft	Shrink Disc® dimensions D	d_1	d_2	l inches	L	L_1	L_2	e	Wt. lbs	Locking screws DIN 931 - 10.9 Qty	Size	s mm	M_A lb-ft
24	.945	+0 –.0013	.625 .827			77 184	1.97	1.417	1.024	.551	.768	.906	.315	.108	.4	6	M 5x 18	8	3
30	1.181		.875 1.024	.0007		160 273	2.36	1.732	1.260	.630	.846	.984	.354	.108	.7	7	M 5x 18	8	3
36	1.417		1.062 1.220		.065	295 465	2.83	2.047	1.496	.709	.925	1.083	.394	.108	.9	5	M 6x 20	10	9
44	1.732	+0 –.0015	1.250 1.437			438 660	3.15	2.402	1.850	.787	1.004	1.161	.433	.108	1.3	7	M 6x 20	10	9
50	1.969		1.496 1.654			693 1 018	3.54	2.756	2.087	.866	1.083	1.240	.472	.108	1.8	8	M 6x 25	10	9
55	2.165		1.654 1.890	.0013		856 1 387	3.94	2.953	2.283	.906	1.201	1.358	.512	.148	2.4	8	M 6x 25	10	9
62	2.441		1.890 2.047			1 365 1 770	4.33	3.386	2.598	.906	1.201	1.358	.512	.148	2.9	10	M 6x 25	10	9
68	2.677	+0 –.0018	1.969 2.362		.105	1 475 2 323	4.53	3.386	2.835	.906	1.201	1.358	.512	.148	3.1	10	M 6x 25	10	9
75	2.953		2.165 2.559			1 844 2 914	5.43	3.937	3.110	.984	1.280	1.496	.551	.148	3.7	7	M 8x 30	13	22
80	3.150		2.362 2.756	.0019		2 360 3 393	5.71	3.937	3.307	.984	1.280	1.496	.551	.148	4.2	7	M 8x 30	13	22
90	3.543		2.559 2.953		.145	3 504 5 348	6.10	4.488	3.701	1.181	1.535	1.752	.669	.177	7.3	10	M 8x 35	13	22
100	3.937	+0 –.0021	2.756 3.150		.165	5 089 6 638	6.69	4.882	4.094	1.339	1.732	1.949	.748	.197	10.4	12	M 8x 35	13	22
110	4.331		2.953 3.346		.185	5 311 7 966	7.28	5.354	4.488	1.535	1.969	2.244	.866	.217	13.0	9	M 10x 40	17	44
125	4.921		3.346 3.740		.205	8 114 11 064	8.46	6.299	5.276	1.654	2.126	2.402	.906	.236	18.3	12	M 10x 40	17	44
140	5.512		3.740 4.134			11 138 14 826	9.06	6.890	5.748	1.811	2.382	2.697	1.024	.285	22.0	10	M 12x 45	19	74
155	6.102	+0 –.0025	4.134 4.528	.0027		16 227 20 653	10.43	7.559	6.496	1.969	2.539	2.854	1.102	.285	33.1	12	M 12x 50	19	74
165	6.496		4.528 4.921		.225	22 866 28 766	11.42	8.268	6.890	2.205	2.795	3.189	1.220	.295	48.5	8	M 16x 55	24	185
175	6.890		4.921 5.315			26 554 33 192	11.81	8.661	7.283	2.205	2.795	3.198	1.220	.295	48.5	8	M 16x 55	24	185
185	7.283		5.315 5.709			38 355 45 731	12.99	9.291	7.677	2.795	3.386	3.780	1.496	.295	81.6	10	M 16x 65	24	185
195	7.677		5.512 6.102	.0031	.265	47 944 60 114	13.78	9.685	8.268	2.795	3.386	3.780	1.496	.295	90.4	12	M 16x 65	24	185
200	7.874	+0 –.0028	5.906 6.299			54 582 63 434	13.78	9.685	8.268	2.795	3.386	3.780	1.496	.295	90.4	12	M 16x 65	24	185
220	8.661		6.299 6.693		.285	70 072 81 136	14.57	10.630	9.055	3.465	4.094	4.488	1.850	.315	119.0	15	M 16x 80	24	185
240	9.449		6.693 7.480			88 512 115 066	15.94	11.614	9.764	3.622	4.291	4.803	1.929	.335	147.7	12	M 20x 80	30	362
260	10.236		7.480 8.268		.305	120 966 151 208	16.93	12.638	10.551	4.055	4.724	5.236	2.126	.335	180.8	14	M 20x 90	30	362
280	11.024	+0 –.0032	8.268 9.055	.0035		160 059 199 152	18.11	13.622	11.339	4.488	5.276	5.787	2.362	.394	224.9	16	M 20x100	30	362
300	11.811		9.055 9.646		.340	202 840 232 344	19.09	14.331	12.126	4.803	5.591	6.102	2.520	.394	260.1	18	M 20x100	30	362
320	12.598		9.449 10.236			230 131 275 862	20.47	15.197	12.913	4.803	5.591	6.102	2.520	.394	288.8	20	M 20x100	30	362
340	13.386		9.843 10.630		.400	287 664 339 296	22.44	16.063	13.701	5.276	6.142	6.654	2.795	.433	410.1	24	M 20x110	30	362
350	13.780		10.630 11.220			326 019 368 800	22.83	17.008	14.094	5.512	6.378	6.890	2.874	.433	429.9	24	M 20x110	30	362
360	14.173	+0 –.0035	11.024 11.614	.0040		341 509 385 027	23.23	17.008	14.488	5.512	6.378	6.890	2.874	.433	449.7	24	M 20x110	30	362
380	14.961		11.417 12.205		.360	418 219 485 341	25.39	18.031	15.236	5.669	6.614	7.205	2.992	.472	526.9	20	M 24x120	36	620
390	15.354		11.811 12.598			460 262 529 597	25.98	18.425	15.630	5.669	6.614	7.205	2.992	.472	573.2	21	M 24x120	36	620
400	15.748		12.402 12.992			494 192 548 774	26.77	18.898	16.024	5.669	6.614	7.205	2.992	.472	617.3	21	M 24x120	36	620
420	16.535		12.992 13.780			575 328 663 840	27.17	19.843	16.811	6.457	7.402	7.992	3.386	.472	696.7	24	M 24x130	36	620
440	17.323		13.386 14.173	.0044	.380	594 506 676 379	29.53	20.748	17.598	6.969	7.953	8.543	3.583	.492	899.5	24	M 24x140	36	620
460	18.110	+0 –.0038	14.173 14.961			737 600 840 864	30.31	21.535	18.425	6.969	7.953	8.543	3.583	.492	925.9	28	M 24x140	36	620
480	18.898		14.961 15.748		.480	862 992 966 256	31.50	22.441	19.213	7.402	8.386	8.976	3.780	.492	1113.3	30	M 24x140	36	620
500	19.685		15.748 16.535	.0048		967 731 1073 208	33.46	23.228	20.000	7.402	8.386	9.055	3.780	.492	1267.6	24	M 27x150	41	922

***** Stainless steel available upon request.*

Additional information is available for Heavy Duty Series RfN 4091 and Light Duty Series RfN 4051.

4 Light Duty Shrink Discs® RfN 4051 Specifications

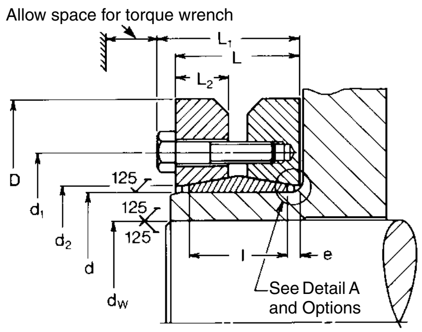
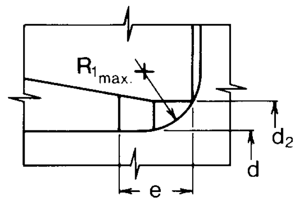
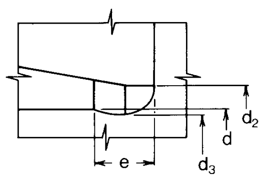


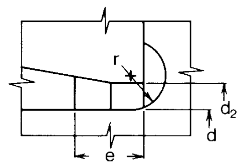
Fig. 50: Shrink Disc®



Detail A



Option 1



Option 2

d	= nominal Shrink Disc® I.D.
	= hub projection O.D.
T_H	= specified tolerance for hub O.D. (d)
d_W	= shaft size range (min.- max.)
T_W	= total allowable diametrical clearance between shaft and hub bore (d_W)
M_t	= maximum transmissible torque
D	= Shrink Disc® O.D.
d_1	= bolt circle dia.
d_2	= thrust ring I.D.
L, L_1, L_2, e	= width dimensions, relaxed condition
P_{ax}	= axial load (thrust capacity)
	$= \frac{M_t \times 24}{d}$ lbs (for M_t in lb-ft)
s	= head dimension across flats (mm)
M_A	= required tightening torque per locking screw
d_3	= 0.98 x d (for Option 1)
r	= to be selected by customer (for Option 2)

Notes

1. Tapers and screws lubricated with Molykote Gn Paste or equivalent.
2. For Series RfN 4051:
   Sizes 125 to 260 have a thru-drilled tapped hole.
   All larger sizes have a blind tapped hole.

Table 7: Light Duty Shrink Disc® RfN 4051

Material: Alloy Steel*

<table>
<tr><th rowspan="2">RfN 4051 Size</th><th colspan="5">Shaft/Hub dimensions</th><th rowspan="2">max. M_t lb-ft</th><th colspan="8">Shrink Disc® dimensions</th><th rowspan="2">Wt. lbs</th><th colspan="4">Locking screws DIN 931 - 10.9</th></tr>
<tr><th>d</th><th>T_H</th><th>d_W inches</th><th>T_W</th><th>$R_{1max.}$</th><th>D</th><th>d1</th><th>d2</th><th>l</th><th>L inches</th><th>L_1</th><th>L_2</th><th>e</th><th>Qty</th><th>Size</th><th>s mm</th><th>M_A lb-ft</th></tr>
<tr><td>125</td><td>4.921</td><td rowspan="5">+0
–.0025</td><td>3.740
4.134</td><td rowspan="2">.0027</td><td rowspan="3">.225</td><td>7 782
10 179</td><td>7.28</td><td>6.220</td><td>5.079</td><td>1.535</td><td>2.008</td><td>2.283</td><td>.866</td><td>.236</td><td>13.2</td><td>8</td><td>M 10x 40</td><td>17</td><td>44</td></tr>
<tr><td>140</td><td>5.512</td><td>4.331
4.921</td><td>10 916
15 121</td><td>8.66</td><td>6.890</td><td>5.669</td><td>1.535</td><td>2.008</td><td>2.283</td><td>.866</td><td>.236</td><td>17.6</td><td>9</td><td>M 10x 40</td><td>17</td><td>44</td></tr>
<tr><td>155</td><td>6.102</td><td>5.118
5.512</td><td rowspan="6">.0031</td><td>17 702
21 390</td><td>9.65</td><td>7.559</td><td>6.260</td><td>1.535</td><td>2.008</td><td>2.283</td><td>.866</td><td>.236</td><td>22.0</td><td>11</td><td>M 10x 40</td><td>17</td><td>44</td></tr>
<tr><td>165</td><td>6.496</td><td>5.315
5.709</td><td rowspan="5">.300</td><td>23 603
28 398</td><td>10.24</td><td>8.268</td><td>6.654</td><td>1.811</td><td>2.441</td><td>2.756</td><td>1.024</td><td>.315</td><td>30.9</td><td>10</td><td>M 12x 50</td><td>19</td><td>74</td></tr>
<tr><td>175</td><td>6.890</td><td>5.709
6.102</td><td>28 766
33 930</td><td>10.83</td><td>8.661</td><td>7.047</td><td>1.811</td><td>2.441</td><td>2.756</td><td>1.024</td><td>.315</td><td>35.3</td><td>11</td><td>M 12x 50</td><td>19</td><td>74</td></tr>
<tr><td>185</td><td>7.283</td><td rowspan="5">+0
–.0028</td><td>6.102
6.496</td><td>34 372
39 830</td><td>11.61</td><td>8.858</td><td>7.441</td><td>1.811</td><td>2.441</td><td>2.756</td><td>1.024</td><td>.315</td><td>44.1</td><td>12</td><td>M 12x 50</td><td>19</td><td>74</td></tr>
<tr><td>195</td><td>7.677</td><td>6.496
6.890</td><td>46 469
53 476</td><td>12.40</td><td>9.331</td><td>7.835</td><td>2.205</td><td>2.835</td><td>3.150</td><td>1.220</td><td>.315</td><td>59.5</td><td>15</td><td>M 12x 55</td><td>19</td><td>74</td></tr>
<tr><td>200</td><td>7.874</td><td>6.890
7.283</td><td>54 582
62 327</td><td>12.99</td><td>9.528</td><td>8.031</td><td>2.205</td><td>2.835</td><td>3.150</td><td>1.220</td><td>.315</td><td>66.1</td><td>16</td><td>M 12x 55</td><td>19</td><td>74</td></tr>
<tr><td>220</td><td>8.661</td><td>7.087
7.874</td><td rowspan="4">.0035</td><td rowspan="3">.340</td><td>61 073
77 448</td><td>13.58</td><td>10.433</td><td>8.819</td><td>2.598</td><td>3.307</td><td>3.701</td><td>1.417</td><td>.354</td><td>77.2</td><td>10</td><td>M 16x 65</td><td>24</td><td>185</td></tr>
<tr><td>240</td><td>9.449</td><td>7.874
8.465</td><td>83 349
99 207</td><td>14.57</td><td>11.417</td><td>9.606</td><td>2.598</td><td>3.307</td><td>3.701</td><td>1.417</td><td>.354</td><td>97.0</td><td>12</td><td>M 16x 65</td><td>24</td><td>185</td></tr>
<tr><td>260</td><td>10.236</td><td rowspan="3">+0
–.0032</td><td>8.661
9.252</td><td>109 902
127 605</td><td>15.55</td><td>12.205</td><td>10.433</td><td>2.835</td><td>3.622</td><td>4.016</td><td>1.575</td><td>.354</td><td>105.8</td><td>14</td><td>M 16x 70</td><td>24</td><td>185</td></tr>
<tr><td>280</td><td>11.024</td><td>9.055
9.843</td><td rowspan="2">.380</td><td>126 130
153 421</td><td>16.73</td><td>13.110</td><td>11.220</td><td>3.307</td><td>4.094</td><td>4.488</td><td>1.811</td><td>.394</td><td>132.3</td><td>16</td><td>M 16x 75</td><td>24</td><td>185</td></tr>
<tr><td>300</td><td>11.811</td><td>9.843
10.630</td><td rowspan="5">.0040</td><td>158 584
188 088</td><td>18.11</td><td>14.094</td><td>12.008</td><td>3.307</td><td>4.094</td><td>4.488</td><td>1.811</td><td>.394</td><td>165.3</td><td>18</td><td>M 16x 75</td><td>24</td><td>185</td></tr>
<tr><td>320</td><td>12.598</td><td rowspan="7">+0
–.0035</td><td>10.630
11.417</td><td rowspan="5">.420</td><td>191 776
225 706</td><td>19.49</td><td>14.882</td><td>12.795</td><td>3.307</td><td>4.173</td><td>4.567</td><td>1.890</td><td>.433</td><td>185.2</td><td>20</td><td>M 16x 75</td><td>24</td><td>185</td></tr>
<tr><td>340</td><td>13.386</td><td>11.417
12.008</td><td>221 280
248 571</td><td>21.06</td><td>15.827</td><td>13.583</td><td>3.307</td><td>4.173</td><td>4.567</td><td>1.890</td><td>.433</td><td>220.5</td><td>21</td><td>M 16x 75</td><td>24</td><td>185</td></tr>
<tr><td>350</td><td>13.780</td><td>11.811
12.205</td><td>274 387
295 040</td><td>21.46</td><td>16.260</td><td>13.976</td><td>3.937</td><td>4.803</td><td>5.315</td><td>2.126</td><td>.433</td><td>264.6</td><td>16</td><td>M 20x 90</td><td>30</td><td>362</td></tr>
<tr><td>360</td><td>14.173</td><td>11.811
12.598</td><td>265 536
306 104</td><td>21.85</td><td>16.654</td><td>14.370</td><td>3.937</td><td>4.803</td><td>5.315</td><td>2.126</td><td>.433</td><td>275.6</td><td>16</td><td>M 20x 90</td><td>30</td><td>362</td></tr>
<tr><td>380</td><td>14.961</td><td>12.598
12.992</td><td rowspan="6">.0044</td><td>320 856
344 459</td><td>23.03</td><td>17.402</td><td>15.236</td><td>4.409</td><td>5.354</td><td>5.866</td><td>2.362</td><td>.472</td><td>330.7</td><td>18</td><td>M 20x100</td><td>30</td><td>362</td></tr>
<tr><td>390</td><td>15.354</td><td>12.992
13.780</td><td rowspan="4">.460</td><td>372 488
425 595</td><td>23.43</td><td>17.795</td><td>15.630</td><td>4.409</td><td>5.354</td><td>5.866</td><td>2.362</td><td>.472</td><td>343.9</td><td>20</td><td>M 20x100</td><td>30</td><td>362</td></tr>
<tr><td>400</td><td>15.748</td><td>13.386
14.173</td><td>405 680
461 738</td><td>24.21</td><td>18.189</td><td>16.024</td><td>4.409</td><td>5.354</td><td>5.866</td><td>2.362</td><td>.472</td><td>374.8</td><td>21</td><td>M 20x100</td><td>30</td><td>362</td></tr>
<tr><td>420</td><td>16.535</td><td rowspan="5">+0
–.0038</td><td>13.780
14.567</td><td>426 333
483 128</td><td>24.80</td><td>19.094</td><td>16.811</td><td>4.724</td><td>5.669</td><td>6.181</td><td>2.520</td><td>.472</td><td>407.9</td><td>22</td><td>M 20x100</td><td>30</td><td>362</td></tr>
<tr><td>440</td><td>17.323</td><td>14.567
15.354</td><td>499 355
562 051</td><td>25.98</td><td>19.882</td><td>17.598</td><td>4.724</td><td>5.669</td><td>6.181</td><td>2.520</td><td>.472</td><td>451.9</td><td>24</td><td>M 20x100</td><td>30</td><td>362</td></tr>
<tr><td>460</td><td>18.110</td><td>15.354
16.142</td><td rowspan="3">.500</td><td>619 584
689 656</td><td>26.97</td><td>20.748</td><td>18.425</td><td>5.197</td><td>6.220</td><td>6.732</td><td>2.795</td><td>.512</td><td>518.1</td><td>28</td><td>M 20x110</td><td>30</td><td>362</td></tr>
<tr><td>480</td><td>18.898</td><td>16.142
16.732</td><td rowspan="2">.0048</td><td>657 202
712 522</td><td>28.15</td><td>21.535</td><td>19.213</td><td>5.197</td><td>6.220</td><td>6.732</td><td>2.795</td><td>.512</td><td>562.2</td><td>28</td><td>M 20x110</td><td>30</td><td>362</td></tr>
<tr><td>500</td><td>19.685</td><td>16.732
17.323</td><td>727 274
786 282</td><td>29.53</td><td>22.323</td><td>20.000</td><td>5.197</td><td>6.220</td><td>6.732</td><td>2.795</td><td>.512</td><td>628.3</td><td>30</td><td>M 20x110</td><td>30</td><td>362</td></tr>
</table>

***** Stainless steel available upon request.***

Heavy Duty Shrink Discs® RfN 4091 Specifications

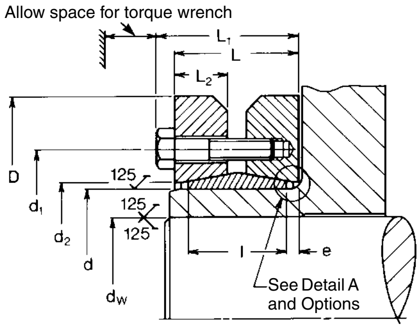
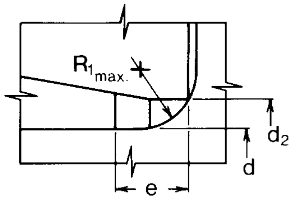
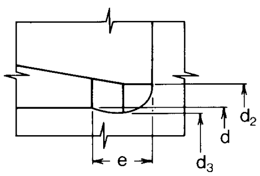


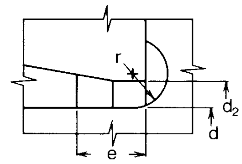
Fig. 51: Shrink Disc®



Detail A



Option 1



Option 2

d = nominal Shrink Disc® I.D.
= hub projection O.D.
T_H = specified tolerance for hub O.D. (d)
d_W = shaft size range (min.- max.)
T_W = total allowable diametrical clearance between shaft and hub bore (d_W)
M_t = maximum transmissible torque
D = Shrink Disc® O.D.
d_1 = bolt circle dia.
d_2 = thrust ring I.D.
L, L_1, L_2, e = width dimensions, relaxed condition
P_{ax} = axial load (thrust capacity)

$$= \frac{M_t \times 24}{d} \text{ lbs (for } M_t \text{ in lb-ft)}$$

s = head dimension across flats (mm)
M_A = required tightening torque per locking screw
d_3 = 0.98 x d (for Option 1)
r = to be selected by customer (for Option 2)

Notes

1. Tapers and screws lubricated with Molykote Gn Paste or equivalent.
2. For Series RfN 4091:
   Sizes 125 to 175 have a thru-drilled tapped hole.
   All larger sizes have a blind tapped hole.

Table 8: Heavy Duty Shrink Disc® RfN 4091

Material: Alloy Steel*

RfN 4091 Size	Shaft/Hub dimensions: d	T_H	d_W inches	T_W	$R_{1max.}$	max. M_t lb-ft	Shrink Disc® dimensions: D	d_1	d_2	l inches	L	L_1	L_2	e	Wt. lbs	Locking screws DIN 931 - 10.9: Qty	Size	s mm	M_A lb-ft
125	4.921		3.346 3.740			11 064 14 752	8.46	6.299	5.079	2.165	2.559	2.874	1.102	.197	24.3	10	M 12x 50	19	74
140	5.512		3.740 4.134		.265	15 195 19 546	9.06	6.890	5.669	2.362	2.913	3.228	1.260	.276	28.7	12	M 12x 55	19	74
155	6.102	+0 –.0025	4.134 4.528	.0027		21 095 26 849	10.43	7.795	6.457	2.598	3.150	3.465	1.378	.276	44.1	15	M 12x 60	19	74
165	6.496		4.528 4.921		.300	30 242 37 396	11.42	8.268	6.850	2.835	3.465	3.858	1.496	.315	57.3	10	M 16x 65	24	185
175	6.890		4.921 5.315			34 667 42 043	11.81	8.661	7.244	2.835	3.465	3.858	1.496	.315	63.9	10	M 16x 65	24	185
185	7.283		5.315 5.709			53 107 63 434	12.99	9.291	7.638	3.622	4.409	4.803	1.969	.394	103.6	14	M 16x 80	24	185
195	7.677		5.512 6.102	.0031	.380	55 320 70 810	13.78	9.685	7.835	3.622	4.409	4.803	1.969	.394	116.8	14	M 16x 80	24	185
200	7.874	+0 –.0028	5.709 6.102			62 696 73 760	13.78	9.685	8.031	3.622	4.409	4.803	1.969	.394	110.2	15	M 16x 80	24	185
220	8.661		6.299 6.693			93 675 108 058	14.57	10.630	8.819	4.488	5.276	5.669	2.362	.394	143.3	20	M 16x 90	24	185
240	9.449		6.693 7.480			114 328 146 045	15.94	11.614	9.606	4.724	5.669	6.181	2.559	.472	191.8	15	M 20x100	30	362
260	10.236		7.480 8.268			157 109 197 677	16.93	12.638	10.433	5.354	6.299	6.811	2.835	.472	220.5	18	M 20x110	30	362
280	11.024	+0 –.0032	8.268 9.055	.0035		210 216 261 848	18.11	13.622	11.220	5.827	6.772	7.283	3.071	.472	291.0	21	M 20x120	30	362
300	11.811		9.055 9.646			251 522 290 614	19.09	14.331	12.008	5.984	6.929	7.441	3.150	.472	308.6	22	M 20x120	30	362
320	12.598		9.449 10.236			278 813 332 658	20.47	15.197	12.795	6.299	7.244	7.756	3.228	.472	363.8	24	M 20x130	30	362
340	13.386		9.843 10.630			361 055 426 333	22.44	16.535	13.583	6.929	7.874	8.465	3.622	.472	529.1	21	M 24x130	36	620
350	13.780		10.630 11.220		.460	410 106 463 950	22.83	16.732	13.976	6.929	7.874	8.465	3.622	.472	544.5	21	M 24x130	36	620
360	14.173	+0 –.0035	11.024 11.614	.0040		451 411 508 206	23.23	17.008	14.370	7.087	8.031	8.622	3.622	.472	551.1	22	M 24x140	36	620
380	14.961		11.417 12.205			455 837 530 334	25.39	18.031	15.236	7.087	8.031	8.622	3.622	.472	705.5	22	M 24x140	36	620
390	15.354		11.811 12.598			522 221 600 775	25.98	18.425	15.630	7.402	8.346	8.937	3.780	.472	771.6	24	M 24x140	36	620
400	15.748		12.402 12.992			564 264 623 272	26.77	18.898	16.024	7.402	8.346	8.937	3.780	.472	815.7	24	M 24x140	36	620
420	16.535		12.992 13.780			736 862 840 864	27.17	19.843	16.811	8.425	9.370	9.961	4.370	.472	903.9	30	M 24x150	36	620
440	17.323		13.386 14.173	.0044		780 381 888 070	29.53	20.748	17.638	8.819	9.921	10.591	4.528	.551	1190.5	24	M 27x170	41	922
460	18.110	+0 –.0038	14.173 14.961			973 632 1 106 400	30.31	21.535	18.425	8.819	9.921	10.591	4.528	.551	1190.5	28	M 27x170	41	922
480	18.898		14.961 15.748		.540	1 132 216 1 268 672	31.50	22.835	19.213	9.685	10.787	11.457	5.039	.551	1433.0	30	M 27x180	41	922
500	19.685		15.748 16.535	.0048		1 290 800 1 430 944	33.46	23.622	20.000	9.685	10.787	11.457	5.039	.551	1653.5	32	M 27x180	41	92

*** Stainless steel available upon request.***

4 Shrink Discs® on Large Diameter Shafts

Fig. 52: Shrink Disc®
900 RfN 4091 Shrink Disc® mounting a flange on a 29.5" dia. shaft for the brake unit of a larger vertical Darius style wind generator.

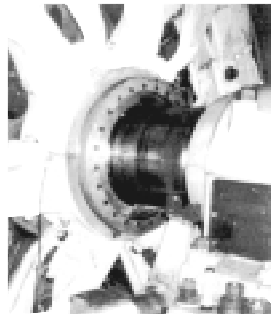


Fig. 53: Hoist Clutch Spider
Gold mine hoist clutch spider mounted on a 30.0" dia. shaft requiring a 950 RfN 4071-SR Split Shrink Disc®.

Extra Large Shrink Discs® RfN 4071 Specifications

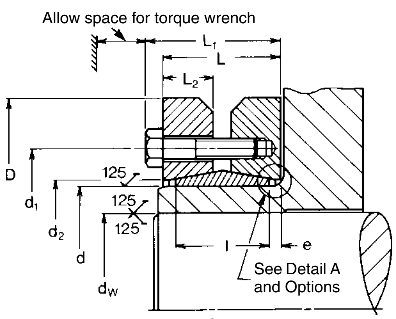
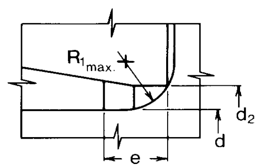
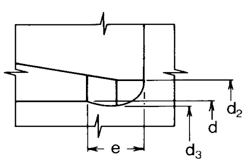


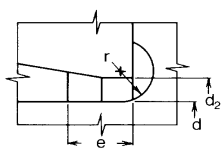
Fig. 54: Shrink Disc®
Shrink Disc® RfN 4071



Detail A



Option 1



Option 2

d = nominal Shrink Disc® I.D.
= hub projection O.D.
T_H = specified tolerance for hub O.D. (d)
d_W = shaft size range (min.- max.)
T_W = total allowable diametrical clearance between shaft and hub bore (d_W)
M_t = maximum transmissible torque
D = Shrink Disc® O.D.
d_1 = bolt circle dia.
d_2 = thrust ring I.D.
l, L_1, L_2, e = width dimensions, relaxed condition
P_{ax} = axial load (thrust capacity)
$= \frac{M_t \times 24}{d}$ lbs (for M_t in lb-ft)
s = head dimension across flats (mm)
p' = contact pressure between Locking Assembly™ and hub bore
M_A = required tightening torque per locking screw
d_3 = 0.98 x d (for Option 1)
r = to be selected by customer (for Option 2)

Note Tapers and screws lubricated with Molykote Gn Paste or equivalent.

Ordering Example

	Size	RfN	Series
Example:	750	RfN	4071

Table 9: Extra Large Shrink Disc® RfN 4071
Material: Alloy Steel

RfN 4071 Size	Shaft/Hub dimensions					max. M_t lb-ft	Shrink Disc® dimensions								Wt. lbs	Locking screws DIN 931 - 10.9			
	d	T_H	d_W inches	T_W	$R_{1max.}$		D	d_1	d_2	l inches	L	L_1	L_2	e		Qty	Size	s mm	M_A lb-ft
530	20.866	+0 −.0043	16.929 17.717	.0048	.480	1 318 829 1 457 498	35.43	24.409	21.181	8.465	9.449	10.118	4.134	.492	1554	30	M 27x180	41	922
560	22.047		17.717 18.504			1 462 661 1 609 443	37.40	25.591	22.362	8.465	9.449	10.118	4.134	.492	1720	32	M 27x180	41	922
590	23.228		18.504 19.291		.580	1 700 168 1 864 653	38.58	26.969	23.622	9.252	10.433	11.102	4.528	.591	1962	36	M 27x180	41	922
620	24.409		19.685 20.472	.0054		1 942 838 2 109 536	40.16	28.150	24.803	9.252	10.433	11.102	4.528	.591	2094	38	M 27x180	41	922
660	25.984	+0 −.0049	20.866 21.654			2 491 613 2 701 091	43.31	29.921	26.378	10.236	11.417	12.165	4.921	.591	2734	38	M 30x220	46	1254
700	27.559		22.047 23.228			2 774 851 3 107 509	47.24	31.496	27.953	10.236	11.417	12.165	4.921	.591	3351	40	M 30x220	46	1254
750	29.528		23.622 25.197		.675	3 271 256 3 749 221	48.43	33.661	30.000	11.024	12.402	13.150	5.433	.689	3616	44	M 30x220	46	1254
800	31.496		25.197 26.772	.0060		3 633 418 4 146 787	51.57	35.630	31.969	11.024	12.402	13.150	5.433	.689	4090	46	M 30x220	46	1254
850	33.465	+0 −.0055	26.772 28.346			4 213 909 4 773 747	52.36	37.992	33.937	12.205	13.583	14.331	5.906	.689	4409	50	M 30x250	46	1254
900	35.433		28.346 29.921			4 623 277 5 200 080	55.12	39.961	35.906	12.205	13.583	14.331	5.906	.689	4850	52	M 30x250	46	1254
950	37.402		29.921 31.496		.775	6 343 360 7 080 960	61.02	42.323	37.874	13.386	14.961	15.866	6.614	.787	6922	48	M 36x260	55	2028
1000	39.370		31.496 33.071	.0067		6 949 667 7 693 168	63.78	44.291	39.843	13.386	14.961	15.866	6.614	.787	7496	50	M 36x260	55	2028

INSTALLATION

Note: Never tighten the locking screws before the shaft is inside the hub, otherwise the hub projection may be deformed.

A. Shrink Discs® and Split Shrink Discs®

1. Remove the shipping spacers and screws, if any, provided for protection during shipping.
2. Verify the lubrication of the supplied locking screw threads, screw head bearing area and tapers of the inner rings. If necessary, lubricate them with a molybdenum disulfide grease, such as Molykote Gn Paste.

   a) Standard Shrink Discs®

   Slide the Shrink Disc® over the corresponding hub projection. The hub outside diameter may be greased.

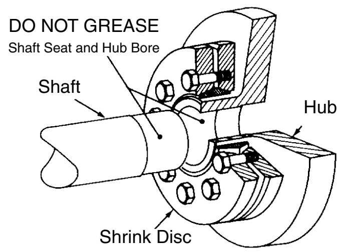


Fig. 55: Shrink Disc®

   b) Split Shrink Discs®

   Slide each half of the Split Shrink Disc® over the corresponding hub projection and align them as required. The hub outside diameter may be greased.

   Insert the locking screws through the collar and web clearance holes and screw them into the opposite collar (see Fig. 56: Split Shrink Disc®).

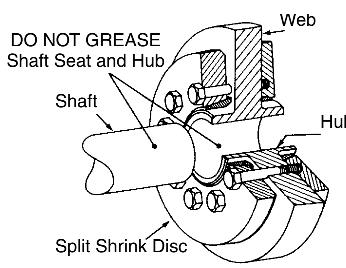


Fig. 56: Split Shrink Disc®

3. Clean and lightly oil the hub bore and shaft seat.
4. Insert the shaft or slide the hub into position over the shaft.
5. Tighten 3 or 4 locking screws that are equally spaced around the diameter to establish a parallel or perpendicular position of Shrink Disc® collar(s) relative to hub web or shaft, respectively. This step properly seats the collar(s) on the taper of the inner ring.
6. Using a torque wrench, tighten all locking screws gradually and in sequence all the way around (not in a diametrically opposite sequence).

   Several passes may be required until all screws are torqued to the specified tightening torque (M_A).
7. Verify that the screws are completely tight by applying the specified tightening torque (M_A). (see page 40, table 23)

   The gap between the Shrink Disc® collars or between the Shrink Disc® collar and the hub should be even all the way around.

B. Half Shrink Discs® - Type HC (clearance holes in collar)

1. Remove the half Shrink Disc® (collar and inner ring) and screws from the shipping container.
2. Verify the lubrication of the supplied locking screw threads, screw head bearing area and tapers of the inner rings. If necessary, lubricate them with a molybdenum disulfide grease, such as Molykote Gn Paste.
3. Slide the half Shrink Disc® (collar and inner ring) over the hub projection and position it as required. The hub outside diameter may be greased.
4. Insert the locking screws through the collar clearance holes and screw them into the corresponding tapped holes (see Fig. 57: Half Shrink Discs®).
5. Perform Steps A3 to A7 above.

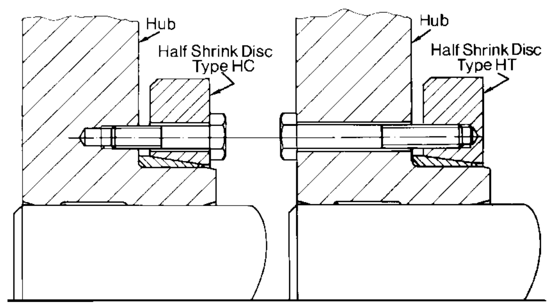


Fig. 57: Half Shrink Discs™

C. Half Shrink Discs® - Type HT (threaded holes in collar)

1. Remove the half Shrink Disc® (collar and inner ring) and screws from the shipping container.
2. Verify the lubrication of the supplied locking screw threads, screw head bearing area and tapers of the inner rings. If necessary, lubricate them with a molybdenum disulfide grease, such as Molykote Gn Paste.
3. Slide the half Shrink Disc® (collar and inner ring) over the hub projection and position it as required. The hub outside diameter may be greased.
4. Insert the locking screws through the web clearance holes and screw them into the corresponding collar holes (see Fig. 57: Half Shrink Discs®).

   Note: Cast-iron webs may require hardened washers under the fastener head. Consult Ringfeder Corporation.
5. Perform Steps A3 to A7 above.

REMOVAL

The removal procedure is the same for all Shrink Disc® types.

1. Gradually release the locking screws all the way around. Begin by releasing each screw only about one-quarter of a turn to avoid jamming the collars.

   Note: Do NOT remove screws completely yet. The collar may spring off.
2. Any rust formed around the hub must first be removed. Once the screws are loose, remove the shaft or pull the hub from the shaft.

REINSTALLATION

After removal of an existing component, disassemble the Shrink Disc®. Clean and inspect all parts. Reinstall the assembly beginning with Step 2 of the applicable section procedure above.

5

Ringfeder®

Split Shrink Discs®

RfN 4071-SR, RfN 4091-SR & RfN 4051-SR

Ringfeder® split Shrink Disc® design is a modified version of our standard Shrink Discs® with split inner rings.

This configuration offers greater mounting versatility, allows symmetrical hub designs and permits the use of half Shrink Discs® in many special applications, while maintaining all the characteristics and advantages of our standard Shrink Discs®.

Applications and Design Examples

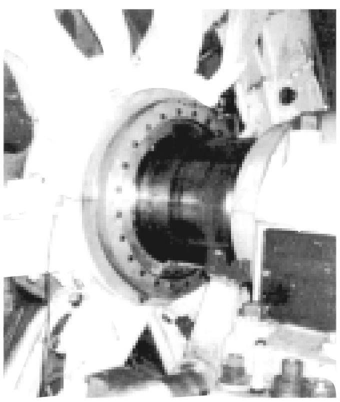


Fig. 58: Hoist Clutch Spider
Gold mine hoist clutch spider mounted with a Split Shrink Disc®.

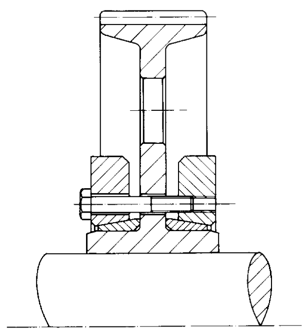


Fig. 59: Gear
Gear mounted with a Split Shrink Disc® RfN 4071-SR. The split Shrink Disc® becomes an integral part of the gear and provides symmetrical clamping.

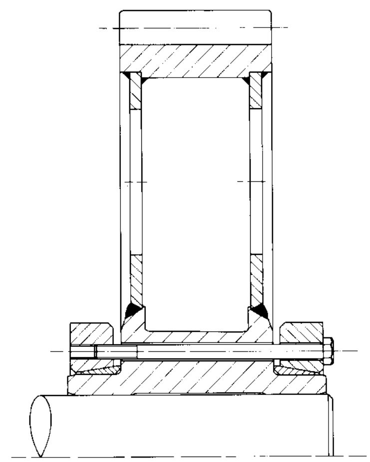


Fig. 60: Large Gear
Large gear mounted with Split Shrink Disc® and extended bolts.

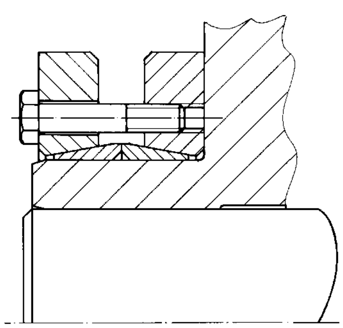


Fig. 61
Split Shrink Disc® RfN 4071-SR mounted on one side of a hub, a projection like type RfN 4071.

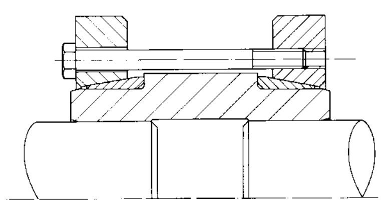


Fig. 62: Rigid Coupling
Split Shrink Disc® rigid coupling. This complete coupling locks onto both shafts at the same time and releases just as quickly. The coupling can join dissimilar shafts, for example in retrofit applications.

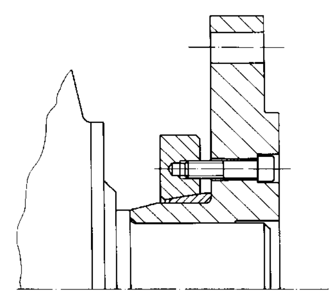


Fig. 63: Adaptor Flange
Split Shrink Disc® adaptor flanges can be made to accommodate a wide variety of constraints.

Fig. 64: Gear
Gear fastened with a Split Shrink Disc®.

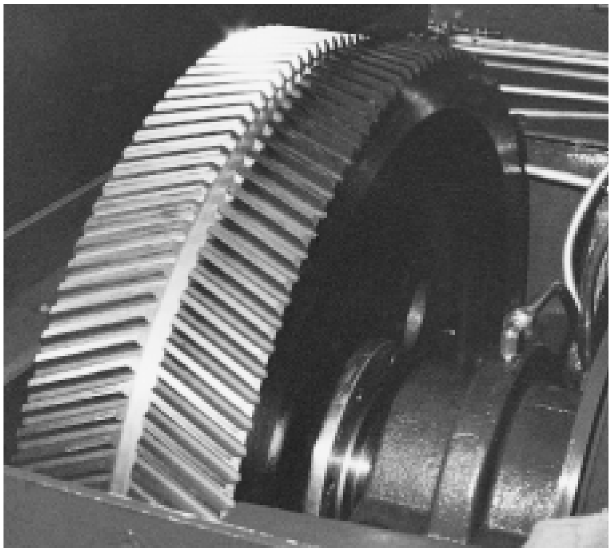


Fig. 65: Split Shrink Disc® 125 RfN 4051 – SR
Used to mount herringbone gear on homogenizer.

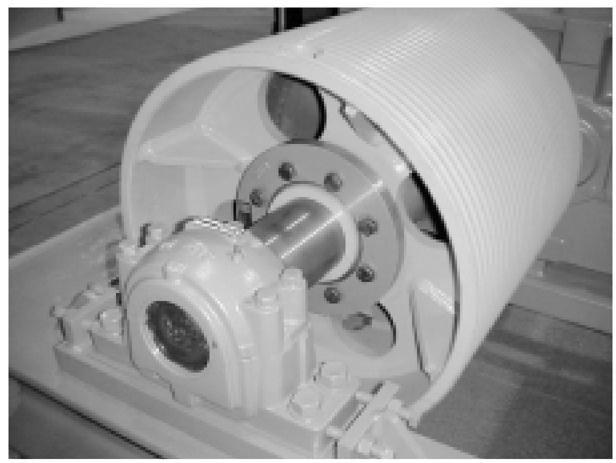


Fig. 66: Split Shrink Disc® 195 RfN 4071 – SR
On carriage drive in sawmill.

Fig. 67-a
Drive coupling consisting of combination torque limiter FC 350 and MMS 1000 coupling for people mover at an airport. The coupling half is mounted with a 4071 Shrink Disc®.

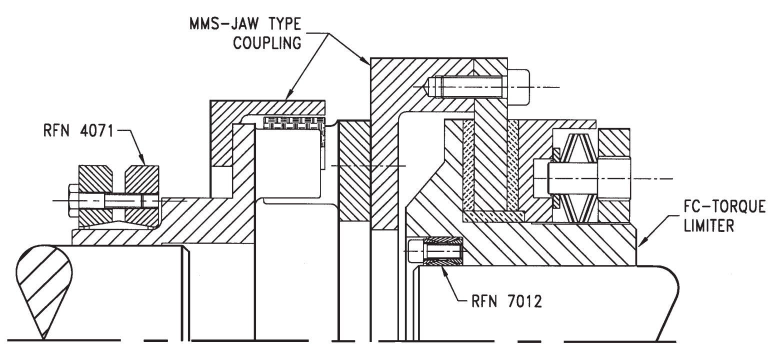


Fig. 67-b

5 Selection Guide

1. Determine the shaft diameter (d_W) to be used or the maximum torque (M_t) to be transmitted.

Note: For hollow shaft applications, please consult Ringfeder Corporation.

2. Select a Shrink Disc® from the appropriate Table for the required shaft diameter (d_W). Verify that the corresponding maximum transmissible torque (M_t) meets the torque requirement. For half Shrink Discs®, Type HC or HT, Consult Ringfeder Corporation for screw length and type.

If torque is the primary requirement, select the necessary torque (M_t) from Table and determine the corresponding shaft diameter (d_W).

3. Incorporate the specified dimensions of the selected Shrink Disc® and required hub into your design and drawing. Indicate the specified tightening torque (M_A) for each locking screw on the drawing.

4. Establish machining tolerances (T_H, T_W) for the shaft, hub bore and hub outer diameter from the specification tables in next section.

Transmissible torque (M_t) is one-half of torque specified in tables, for Half Shrink Discs®.

Screw threads and screw head bearing area must be lubricated with Molykote Gn Paste or the like and tightened to specified torque (M_A).

Ordering Example

	Size	RfN	Series-Type	X = (?)
Split Shrink Disc®:	140	RfN	4071-SR	X = 2”
Half Shrink Disc®:	140	RfN	4071-HT	X = 2”

Split Shrink Discs® and Half Shrink Discs® RfN 4071 Specifications

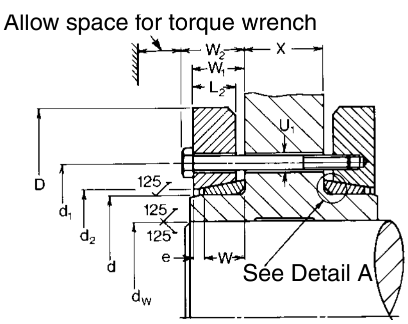


Fig. 68: Split Shrink Disc®

Detail A

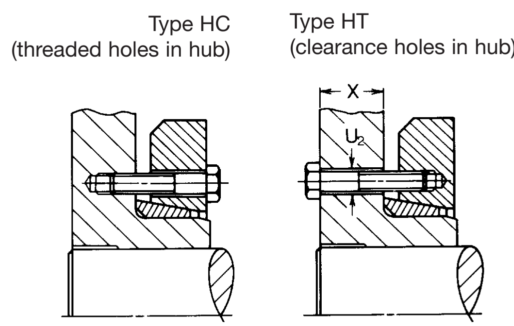


Fig. 69: Half Shrink Discs®

d	= nominal Shrink Disc® I.D.
	= hub projection O.D.
T_H	= specified tolerance for hub O.D. (d)
d_W	= shaft size range (min.- max.)
T_W	= total allowable diametrical clearance between shaft and hub bore (d_W)
M_t	= maximum transmissible torque for split Shrink Disc®
D	= Shrink Disc® O.D.
d_1	= bolt circle dia.
d_2	= thrust ring I.D.
W_1, L_2, W_2, e	= width dimensions, relaxed condition
s	= head dimension across flats (mm)
U_1, U_2	= thru-bolt clearance hole(s) (standard drill sizes expressed in decimals)
M_A	= required tightening torque per locking screw (same for both split and half Shrink Discs®)
P_{ax}	= axial load (thrust capacity)
	$= \frac{M_t \times 24}{d_W}$ lbs (for M_t in lb-ft)

Note: If dimension X is larger than 4 x W_1, M_t may be reduced. With half Shrink Discs® only 50% of stated M_t is transmitted.

Notes for Table 10

1. Tapers and screws lubricated with Molykote Gn Paste or equivalent.
2. For Series RfN 4071: Sizes 24 to 200 have a thru-drilled tapped hole.
3. For Series RfN 4051: Sizes 125 to 260 have a thru-drilled tapped hole.
4. For Series RfN 4091: Sizes 125 to 175 have a thru-drilled tapped hole.
5. All larger sizes have a blind tapped hole.

Table 10: Split Shrink Disc® RfN 4071–SR

Material: Alloy Steel*

RfN 4071 Size	Shaft/Hub dimensions					max. M_t lb-ft	Shrink Disc® dimensions								Locking screws DIN 931 - 10.9					
	d	T_H	d_W inches	T_W	$R_{1max.}$		D	d_1	d_2	W inches	W_1	W_2	L_2	e	Qty	Size	s mm	U_1 inches	U_2	M_A lb-ft
24	.945	+0 –.0013	.748 .827			125 184	1.97	1.417	1.024	.354	.463	.600	.315	.108	6	M 5	8	.281	.219	3
30	1.181		.945 1.024	.0007	.050	221 273	2.36	1.732	1.260	.394	.502	.640	.354	.108	7	M 5	8	.281	.219	3
36	1.417		1.102 1.220			325 465	2.83	2.047	1.496	.433	.541	.699	.394	.108	5	M 6	10	.328	.266	9
44	1.732	+0 –.0015	1.339 1.417			524 634	3.15	2.402	1.850	.492	.600	.758	.433	.108	7	M 6	10	.328	.266	9
50	1.969		1.496 1.654	.0013		693 1 018	3.54	2.756	2.087	.531	.640	.797	.472	.108	8	M 6	10	.328	.266	9
55	2.165		1.654 1.890		.090	856 1 387	3.94	2.953	2.283	.551	.699	.856	.512	.148	8	M 6	10	.328	.266	9
62	2.441		1.890 2.047			1 365 1 770	4.33	3.386	2.598	.551	.699	.856	.512	.148	10	M 6	10	.328	.266	9
68	2.677	+0 –.0018	1.969 2.362			1 475 2 323	4.53	3.386	2.835	.551	.699	.856	.512	.148	10	M 6	10	.328	.266	9
75	2.953		2.165 2.559		.110	1 844 2 914	5.43	3.937	3.110	.630	.778	.994	.551	.148	7	M 8	13	.406	.359	22
80	3.150		2.362 2.756	.0019		2 360 3 393	5.71	3.937	3.307	.630	.778	.994	.551	.148	7	M 8	13	.406	.359	22
90	3.543		2.559 2.953			3 504 5 348	6.10	4.488	3.701	.728	.906	1.122	.669	.177	10	M 8	13	.406	.359	22
100	3.937	+0 –.0021	2.756 3.150		.130	5 089 6 638	6.69	4.882	4.094	.807	1.004	1.220	.748	.197	12	M 8	13	.406	.359	22
110	4.331		2.953 3.346			5 311 7 966	7.28	5.354	4.488	.906	1.122	1.398	.866	.217	9	M10	17	.500	.438	44
125	4.921		3.346 3.740			8 114 11 064	8.46	6.299	5.276	1.024	1.260	1.535	.906	.236	12	M10	17	.500	.438	44
140	5.512		3.740 4.134	.0027		11 138 14 826	9.06	6.890	5.748	1.102	1.388	1.703	1.024	.285	10	M12	19	.594	.531	74
155	6.102	+0 –.0025	4.134 4.528			16 227 20 653	10.43	7.559	6.496	1.181	1.467	1.781	1.102	.285	12	M12	19	.594	.531	74
165	6.496		4.528 4.921		.190	22 866 28 766	11.42	8.268	6.890	1.299	1.594	1.988	1.220	.295	8	M16	24	.750	.719	185
175	6.890		4.921 5.315			26 554 33 192	11.81	8.661	7.283	1.299	1.594	1.988	1.220	.295	8	M16	24	.750	.719	185
185	7.283		5.315 5.709			38 355 45 731	12.99	9.291	7.677	1.594	1.890	2.283	1.496	.295	10	M16	24	.750	.719	185
195	7.677		5.512 6.102	.0031		47 944 60 114	13.78	9.685	8.268	1.594	1.890	2.283	1.496	.295	12	M16	24	.750	.719	185
200	7.874	+0 –.0028	5.906 6.299			54 582 63 434	13.78	9.685	8.268	1.594	1.890	2.283	1.496	.295	12	M16	24	.750	.719	185
220	8.661		6.299 6.693			70 072 81 136	14.57	10.630	9.055	2.028	2.343	2.736	1.850	.315	15	M16	24	.750	.719	185
240	9.449		6.693 7.480		.290	88 512 115 066	15.94	11.614	9.764	2.106	2.441	2.953	1.929	.335	12	M20	30	.906	.875	362
260	10.236		7.480 8.268			120 966 151 208	16.93	12.638	10.551	2.323	2.657	3.169	2.126	.335	14	M20	30	.906	.875	362
280	11.024	+0 –.0032	8.268 9.055			160 059 199 152	18.11	13.622	11.339	2.579	2.972	3.484	2.362	.394	16	M20	30	.906	.875	362
300	11.811		9.055 9.646	.0035		202 840 232 344	19.09	14.331	12.126	2.736	3.130	3.642	2.520	.394	18	M20	30	.906	.875	362
320	12.598		9.449 10.236			230 131 275 862	20.47	15.197	12.913	2.736	3.130	3.642	2.520	.394	20	M20	30	.906	.875	362
340	13.386		9.843 10.630			287 664 339 296	22.44	16.063	13.701	2.972	3.406	3.917	2.795	.433	24	M20	30	.906	.875	362
350	13.780		10.630 11.220		.330	326 019 368 800	22.83	17.008	14.094	3.091	3.524	4.035	2.874	.433	24	M20	30	.906	.875	362
360	14.173	+0 –.0035	11.024 11.614	.0040		341 509 385 027	23.23	17.008	14.488	3.091	3.524	4.035	2.874	.433	24	M20	30	.906	.875	362
380	14.961		11.417 12.205			418 219 485 341	25.39	18.031	15.236	3.169	3.642	4.232	2.992	.472	20	M24	36	1.063	1.031	620
390	15.354		11.811 12.598			460 262 529 597	25.98	18.425	15.630	3.169	3.642	4.232	2.992	.472	21	M24	36	1.063	1.031	620
400	15.748		12.402 12.992			494 192 548 774	26.77	18.898	16.024	3.169	3.642	4.232	2.992	.472	21	M24	36	1.063	1.031	620
420	16.535		12.992 13.780			575 328 663 840	27.17	19.843	16.811	3.720	4.193	4.783	3.386	.472	24	M24	36	1.063	1.031	620
440	17.323		13.386 14.173	.0044		594 506 676 379	29.53	20.748	17.598	3.976	4.469	5.059	3.583	.492	24	M24	36	1.063	1.031	620
460	18.110	+0 –.0038	14.173 14.961		.390	737 600 840 864	30.31	21.535	18.425	3.976	4.469	5.059	3.583	.492	28	M24	36	1.063	1.031	620
480	18.898		14.961 15.748			862 992 966 256	31.50	22.441	19.213	4.193	4.685	5.276	3.780	.492	30	M24	36	1.063	1.031	620
500	19.685		15.748 16.535	.0048		967 731 1 073 208	33.46	23.228	20.000	4.193	4.685	5.354	3.780	.492	24	M27	41	1.188	1.156	922

***** Stainless steel available upon request.***

5 Light Duty Split Shrink Discs® RfN 4051-SR Specifications

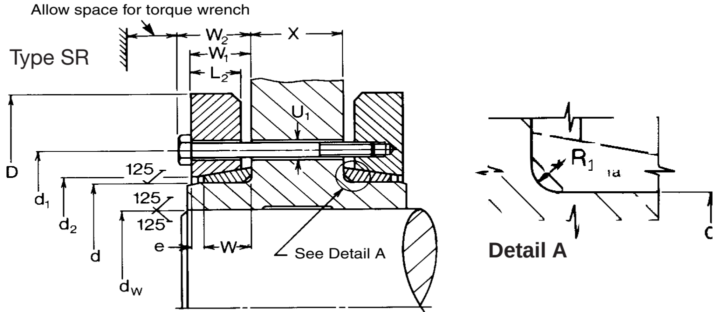


Fig. 70: Split Shrink Disc®

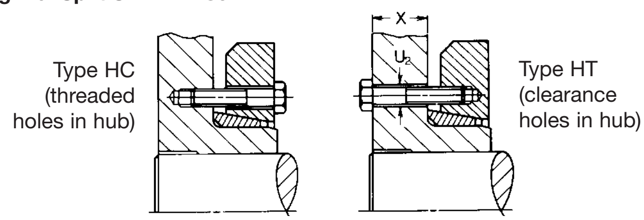


Fig. 71: Half Shrink Discs®

d	=	nominal Shrink Disc® I.D.
	=	hub projection O.D.
T_H	=	specified tolerance for hub O.D. (d)
d_W	=	shaft size range (min.- max.)
T_W	=	total allowable diametrical clearance between shaft and hub bore (d_W)
M_t	=	maximum transmissible torque
D	=	Shrink Disc® O.D.
d_1	=	bolt circle dia.
d_2	=	thrust ring I.D.
P_{ax}	=	axial load (thrust capacity)
	=	$\frac{M_t \times 24}{d_W}$ lbs (for M_t in lb-ft)

Note: If dimension X is larger than $4xW_1$, M_t may be reduced. With half Shrink Discs® only 50% of stated M_t is transmitted.

W_1, W_2, e	=	width dimensions, relaxed condition
s	=	head dim. across flats (mm)
U_1, U_2	=	thru-bolt clearance hole(s) (standard drill sizes expressed in decimals)
M_A	=	required tightening torque per locking screw (same for both split and half Shrink Discs®)

Notes **1.** Tapers and screws lubricated with Molykote Gn paste or equivalent.

Table 11: Light Duty Split Shrink Disc® RfN 4051–SR

Material: Alloy Steel*

RfN 4051 Size	Shaft/Hub dimensions					max. M_t lb-ft	Shrink Disc® dimensions								Locking screws DIN 931 - 10.9					
	d	T_H	d_W inches	T_W	$R_{1max.}$		D	d_1	d_2	W (inches)	W_1	W_2	L_2	e	Qty	Size	s mm	U_1 (inches)	U_2	M_A lb-ft
125	4.921		3.740 4.134	.0027		7 782 10 179	7.28	6.220	5.079	.965	1.201	1.476	.866	.236	8	M10	17	.500	.438	44
140	5.512		4.331 4.921			10 916 15 121	8.66	6.890	5.669	.965	1.201	1.476	.866	.236	9	M10	17	.500	.438	44
155	6.102	+0 –.0025	5.118 5.512			17 702 21 390	9.65	7.559	6.260	.965	1.201	1.476	.866	.236	11	M10	17	.500	.438	44
165	6.496		5.315 5.709			23 603 28 398	10.24	8.268	6.654	1.102	1.417	1.732	1.024	.315	10	M12	19	.594	.531	74
175	6.890		5.709 6.102			28 766 33 930	10.83	8.661	7.047	1.102	1.417	1.732	1.024	.315	11	M12	19	.594	.531	74
185	7.283		6.102 6.496	.0031	.190	34 372 39 830	11.61	8.858	7.441	1.102	1.417	1.732	1.024	.315	12	M12	19	.594	.531	74
195	7.677		6.496 6.890			46 469 53 476	12.40	9.331	7.835	1.299	1.614	1.929	1.220	.315	15	M12	19	.594	.531	74
200	7.874	+0 –.0028	6.890 7.283			54 582 62 327	12.99	9.528	8.031	1.299	1.614	1.929	1.220	.315	16	M12	19	.594	.531	74
220	8.661		7.087 7.874			61 073 77 448	13.58	10.433	8.819	1.496	1.850	2.244	1.417	.354	10	M16	24	.750	.719	185
240	9.449		7.874 8.465			83 349 99 207	14.57	11.417	9.606	1.496	1.850	2.244	1.417	.354	12	M16	24	.750	.719	185
260	10.236		8.661 9.252	.0035		109 902 127 605	15.55	12.205	10.433	1.713	2.067	2.461	1.575	.354	14	M16	24	.750	.719	185
280	11.024	+0 –.0032	9.055 9.843			126 130 153 421	16.73	13.110	11.220	1.949	2.343	2.736	1.811	.394	16	M16	24	.750	.719	185
300	11.811		9.843 10.630			158 584 188 088	18.11	14.094	12.008	1.949	2.343	2.736	1.811	.394	18	M16	24	.750	.719	185
320	12.598		10.630 11.417		.250	191 776 225 706	19.49	14.882	12.795	1.949	2.382	2.776	1.890	.433	20	M16	24	.750	.719	185
340	13.386		11.417 12.008	.0040		221 280 248 571	21.06	15.827	13.583	1.949	2.382	2.776	1.890	.433	21	M16	24	.750	.719	185
350	13.780		11.811 12.205			274 387 295 040	21.46	16.260	13.976	2.264	2.697	3.209	2.126	.433	16	M20	30	.906	.875	362
360	14.173	+0 –.0035	11.811 12.598			265 536 306 104	21.85	16.654	14.370	2.264	2.697	3.209	2.126	.433	16	M20	30	.906	.875	362
380	14.961		12.598 12.992			320 856 344 459	23.03	17.402	15.236	2.500	2.972	3.484	2.362	.472	18	M20	30	.906	.875	362
390	15.354		12.992 13.780			372 488 425 595	23.43	17.795	15.630	2.598	3.071	3.583	2.362	.472	20	M20	30	.906	.875	362
400	15.748		13.386 14.173			405 680 461 738	24.21	18.189	16.024	2.598	3.071	3.583	2.362	.472	21	M20	30	.906	.875	362
420	16.535		13.780 14.567	.0044	.330	426 333 483 128	24.80	19.094	16.811	2.756	3.228	3.740	2.520	.472	22	M20	30	.906	.875	362
440	17.323		14.567 15.354			499 355 562 051	25.98	19.882	17.598	2.756	3.228	3.740	2.520	.472	24	M20	30	.906	.875	362
460	18.110	+0 –.0038	15.354 16.142			619 584 689 656	26.97	20.748	18.425	3.091	3.602	4.114	2.795	.512	28	M20	30	.906	.875	362
480	18.898		16.142 16.732	.0048	.390	657 202 712 522	28.15	21.535	19.213	3.091	3.602	4.114	2.795	.512	28	M20	30	.906	.875	362
500	19.685		16.732 17.323			727 274 786 282	29.53	22.323	20.000	3.091	3.602	4.114	2.795	.512	30	M20	30	.906	.875	362

***** Stainless steel available upon request.*

Heavy Duty Split Shrink Discs® RfN 4091-SR Specifications

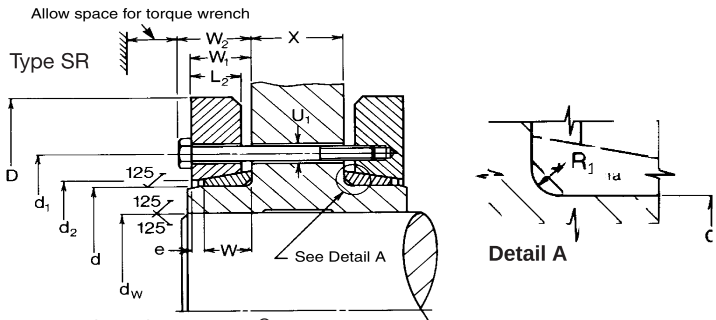


Fig. 72: Split Shrink Disc®

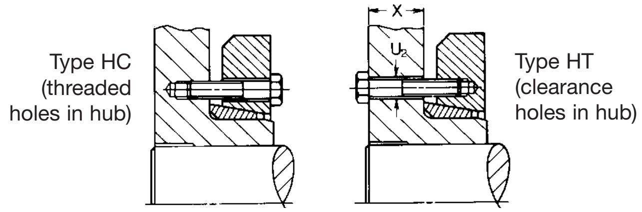


Fig. 73: Half Shrink Discs®

d = nominal Shrink Disc® I.D.
= hub projection O.D.
T_H = specified tolerance for hub O.D. (d)
d_W = shaft size range (min.- max.)
T_W = total allowable diametrical clearance between shaft and hub bore (d_W)
M_t = maximum transmissible torque
D = Shrink Disc® O.D.
d_1 = bolt circle dia.
d_2 = thrust ring I.D.
P_{ax} = axial load (thrust capacity)

$$= \frac{M_t \times 24}{d_W} \text{ lbs (for } M_t \text{ in lb-ft)}$$

Note: If dimension X is larger than $4xW_1$, M_t may be reduced. With half Shrink Discs™ only 50% of stated M_t is transmitted.

W_1, W_2, e = width dimensions, relaxed condition
s = head dim. across flats (mm)
U_1, U_2 = thru-bolt clearance hole(s) (standard drill sizes expressed in decimals)
M_A = required tightening torque per locking screw (same for both split and half Shrink Discs™)

Notes
1. Tapers and screws lubricated with Molykote Gn paste or equivalent.
2. For Series RfN 4091: Sizes 125 to 175 have a thru-drilled tapped hole.
3. All larger sizes have a blind tapped hole.

Table 12: Heavy Duty Split Shrink Disc® RfN 4091–SR

Material: Alloy Steel*

RfN 4091 Size	Shaft/Hub dimensions					max. M_t lb-ft	Shrink Disc® dimensions								Locking screws DIN 931 - 10.9					
	d	T_H	d_W inches	T_W	$R_{1max.}$		D	d_1	d_2	W inches	W_1	W_2	L_2	e	Qty	Size	s mm	U_1 inches	U_2	M_A lb-ft
125	4.921		3.346 3.740		.130	11 064 14 752	8.46	6.299	5.079	1.280	1.476	1.791	1.102	.197	10	M12	19	.594	.531	74
140	5.512		3.740 4.134			15 195 19 546	9.06	6.890	5.669	1.378	1.654	1.969	1.260	.276	12	M12	19	.594	.531	74
155	6.102	+0 –.0025	4.134 4.528	.0027		21 095 26 849	10.43	7.795	6.457	1.496	1.772	2.087	1.378	.276	15	M12	19	.594	.531	74
165	6.496		4.528 4.921			30 242 37 396	11.42	8.268	6.850	1.614	1.929	2.323	1.496	.315	10	M16	24	.750	.719	185
175	6.890		4.921 5.315		.190	34 667 42 043	11.81	8.661	7.244	1.614	1.929	2.323	1.496	.315	10	M16	24	.750	.719	185
185	7.283		5.315 5.709			53 107 63 434	12.99	9.291	7.638	2.008	2.402	2.795	1.969	.394	14	M16	24	.750	.719	185
195	7.677		5.512 6.102	.0031		55 320 70 810	13.78	9.685	7.835	2.008	2.402	2.795	1.969	.394	14	M16	24	.750	.719	185
200	7.874	+0 –.0028	5.709 6.102			62 696 73 760	13.78	9.685	8.031	2.136	2.500	2.894	1.969	.394	15	M16	24	.750	.719	185
220	8.661		6.299 6.693			93 675 108 058	14.57	10.630	8.819	2.539	2.933	3.327	2.362	.394	20	M16	24	.750	.719	185
240	9.449		6.693 7.480		.250	114 328 146 045	15.94	11.614	9.606	2.657	3.130	3.642	2.559	.472	15	M20	30	.906	.875	362
260	10.236		7.480 8.268			157 109 197 677	16.93	12.638	10.433	2.972	3.445	3.957	2.835	.472	18	M20	30	.906	.875	362
280	11.024	+0 –.0032	8.268 9.055			210 216 261 848	18.11	13.622	11.220	3.307	3.780	4.291	3.071	.472	21	M20	30	.906	.875	362
300	11.811		9.055 9.646	.0035		251 522 290 614	19.09	14.331	12.008	3.386	3.858	4.370	3.150	.472	22	M20	30	.906	.875	362
320	12.598		9.449 10.236		.330	278 813 332 658	20.47	15.197	12.795	3.543	4.016	4.528	3.228	.472	24	M20	30	.906	.875	362
340	13.386		9.843 10.630			361 055 426 333	22.44	16.535	13.583	3.858	4.331	4.921	3.622	.472	21	M24	36	1.063	1.031	620
350	13.780		10.630 11.220			410 106 463 950	22.83	16.732	13.976	3.858	4.331	4.921	3.622	.472	21	M24	36	1.063	1.031	620
360	14.173	+0 –.0035	11.024 11.614	.0040		451 411 508 206	23.23	17.008	14.370	4.035	4.508	5.098	3.622	.472	22	M24	36	1.063	1.031	620
380	14.961		11.417 12.205			455 837 530 334	25.39	18.031	15.236	4.035	4.508	5.098	3.622	.472	22	M24	36	1.063	1.031	620
390	15.354		11.811 12.598		.390	522 221 600 775	25.98	18.425	15.630	4.193	4.665	5.256	3.780	.472	24	M24	36	1.063	1.031	620
400	15.748		12.402 12.992			564 264 623 272	26.77	18.898	16.024	4.193	4.665	5.256	3.780	.472	24	M24	36	1.063	1.031	620
420	16.535		12.992 13.780			736 862 840 864	27.17	19.843	16.811	4.705	5.177	5.768	4.370	.472	30	M24	36	1.063	1.031	620
440	17.323		13.386 14.173	.0044		780 381 888 070	29.53	20.748	17.638	4.902	5.453	6.122	4.528	.551	24	M27	41	1.188	1.156	922
460	18.110	+0 –.0038	14.173 14.961			973 632 1 106 400	30.31	21.535	18.425	5.000	5.551	6.220	4.528	.551	28	M27	41	1.188	1.156	922
480	18.898		14.961 15.748		.490	1 132 216 1 268 672	31.50	22.835	19.213	5.433	5.984	6.654	5.039	.551	30	M27	41	1.188	1.156	922
500	19.685		15.748 16.535	.0048		1 200 800 1 430 944	33.46	23.622	20.000	5.433	5.984	6.654	5.039	.551	32	M217	41	1.188	1.156	922

**** Stainless steel available upon request.***

6

Ringfeder® Shrink Disc®
RfN 4171

This new RfN 4171 Shrink Disc® employs a single long shallow taper instead of opposing tapers of the traditional Ringfeder® three-piece series (RfN 4071). Better centering and concentricity result, making the shrink disc especially suitable for high-speed applications where balance is critical.

Installation is also simplified. When the fasteners are properly torqued, the installer has a visual aid to indicate correct installation; i.e., the inner ring face should be flush with the outer ring face. Always use a torque wrench to properly tighten screws.

Two-Piece Type 4171 Specifications

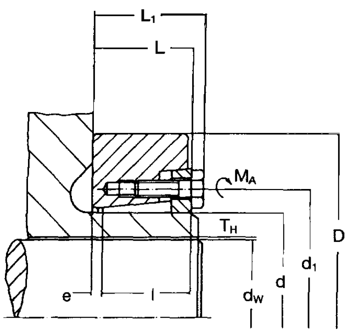


Fig. 74: Installation Dimensions

d = nominal Shrink Disc® I.D.
= hub projection O.D.
T_H = specified tolerance for hub O.D. (d)
d_W = shaft size range (min.-max.)
T_W = total allowable diametrical clearance between shaft and hub bore (d_W)
M_t = maximum transmissible torque
D = Shrink Disc® O.D.
d_1 = bolt circle dia.
L, L_1, l, e = width dimensions, relaxed condition
M_A = required tightening torque per locking screw
P_{ax} = axial capacity
$= \frac{M_t \times 24}{d_W}$ lbs (for M_t lb-ft)

Table 13: Two-Piece Shrink Disc® RfN 4171
Material: Alloy Steel

RfN 4171 size	Shaft/Hub dimensions d	T_H inches	shaft range d_W	T_W	M_t lb-ft	Shrink Disc® dimensions D	L_1	L inches	l	e	d_1	Locking Screws DIN 931 - 10.9 Qty.	Size	M_A lb-ft	Weight lbs
24	0.945	+0 –.0013	0.748 0.827	.0010	136 180	1.97	0.866	0.709	0.630	0.079	1.417	4	M 6	9	0.4
30	1.181		0.945 1.024	.0020	288 353	2.36	0.945	0.787	0.709	0.079	1.732	6	M 6	9	0.7
36	1.417	+0 –.0015	1.102 1.220		483 584	2.83	1.102	0.866	0.787	0.079	2.047	5	M 8	22	1.0
44	1.732		1.339 1.417		535 634	3.15	1.181	0.945	0.866	0.079	2.402	5	M 8	22	1.2
50	1.969		1.496 1.654		907 1 180	3.54	1.260	1.024	0.945	0.118	2.677	7	M 8	22	1.7
55	2.165	+0 –.0018	1.654 1.890		1 124 1 604	3.94	1.378	1.142	1.024	0.118	2.835	8	M 8	22	2.5
62	2.441		1.890 2.047		1 315 1 595	4.33	1.378	1.142	1.024	0.118	3.150	8	M 8	22	2.9
68	2.677		1.969 2.362	.0023	1 447 2 287	4.53	1.378	1.142	1.024	0.118	3.386	9	M 8	22	3.0
75	2.953		2.165 2.559		2 268 3 437	5.43	1.496	1.220	1.063	0.157	3.937	8	M 10	44	4.9
80	3.150		2.362 2.756		2 561 3 754	5.71	1.496	1.220	1.063	0.157	4.094	8	M 10	44	5.3
90	3.543	+0 –.0021	2.559 2.953		3 574 5 112	6.10	1.772	1.496	1.339	0.157	4.488	10	M 10	44	7.3
100	3.937		2.756 3.150		4 595 6 417	6.69	1.969	1.693	1.535	0.157	4.882	12	M 10	44	9.9

Table 14: Two-Piece Shrink Disc® RfN 4171

Material: Alloy Steel

RfN 4171 size	Shaft/Hub dimensions				M_t lb ft	Shrink Disc® dimensions						Locking Screws DIN 931 - 10.9			
	d	T_H inches	shaft range d_W	T_W		D	L_1	L inches	l	e	d_1	Qty.	Size	M_A lb ft	Weight lbs
110	4.331	+0 –.0021	3.150 3.543		6 594 8 639	7.28	2.244	1.929	1.732	0.197	5.354	10	M 12	74	13.5
125	4.921		3.543 3.937	.0027	8 925 11 580	8.46	2.402	2.087	1.890	0.236	6.299	12	M 12	74	19.8
140	5.512		3.937 4.331		11 359 14 014	9.06	2.638	2.283	2.047	0.236	6.811	10	M 14	118	24.3
155	6.102	+0 –.0025	4.331 4.724		15 490 19 178	10.35	2.795	2.441	2.205	0.236	7.480	12	M 14	118	34.4
165	6.496		4.724 5.118		19 915 23 603	11.42	3.071	2.677	2.402	0.276	8.031	10	M 16	184	48.5
175	6.890		5.118 5.512		27 291 32 454	11.81	3.071	2.677	2.362	0.315	8.425	12	M 16	184	50.7
185	7.283		5.512 5.906	.0031	36 511 43 150	12.99	3.740	3.346	3.031	0.315	8.819	14	M 16	184	79.4
200	7.784	+0 –.0028	5.906 6.299		44 994 52 738	13.78	3.740	3.346	3.031	0.315	9.449	16	M 16	184	88.2
220	8.661		6.299 6.693		72 285 82 611	14.57	4.567	4.055	3.701	0.354	10.630	16	M 20	361	116.9
240	9.449		6.693 7.480		84 824 107 690	15.94	4.724	4.213	3.819	0.394	11.654	18	M 20	361	145.5
260	10.236		7.480 8.268	.0035	118 016 147 520	16.93	5.197	4.685	4.291	0.394	12.521	21	M 20	361	178.6
280	11.024	+0 –.0032	8.268 9.055		143 094 176 286	18.11	5.709	5.197	4.803	0.394	13.386	22	M 20	361	224.9
300	11.811		9.055 9.646		206 528 236 770	19.09	6.102	5.512	5.118	0.394	14.173	20	M 24	620	260.2
320	12.598		9.449 10.236		221 280 263 323	20.47	6.102	5.512	5.118	0.394	14.961	21	M 24	620	302.1
340	13.386		10.039 10.630	.0040	263 323 298 728	22.05	6.693	6.102	5.630	0.472	15.827	22	M 24	620	392.5
360	14.173	+0 –.0035	11.024 11.811		331 920 387 240	23.23	6.850	6.260	5.787	0.472	16.693	24	M 24	620	445.4
380	14.961		11.811 12.402		354 048 396 829	25.00	7.087	6.417	5.866	0.551	17.638	18	M 27	922	765.1
390	15.354		12.205 12.598		371 013 396 829	25.00	7.087	6.417	5.866	0.551	18.031	18	M 27	922	529.2
400	15.748		12.402 12.795		418 957 446 248	25.59	7.480	6.811	6.260	0.551	18.701	20	M 27	922	575.3
420	16.535		12.795 13.189	.0044	442 560 473 539	26.38	7.874	7.205	6.614	0.591	19.488	21	M 27	922	648.3
440	17.323		12.992 13.780		499 355 569 427	28.35	8.268	7.598	7.008	0.591	20.394	24	M 27	922	811.4
460	18.110	+0 –.0038	13.780 14.764		562 051 638 024	30.31	8.268	7.598	7.008	0.591	21.181	25	M 27	922	948.2
480	18.898		14.764 15.748		678 592 764 154	31.50	9.055	8.386	7.795	0.591	21.969	27	M 27	922	1133.4
500	19.685		15.748 16.535	.0048	775 955 861 517	33.46	9.055	8.386	7.795	0.591	22.835	28	M 27	922	1301.0

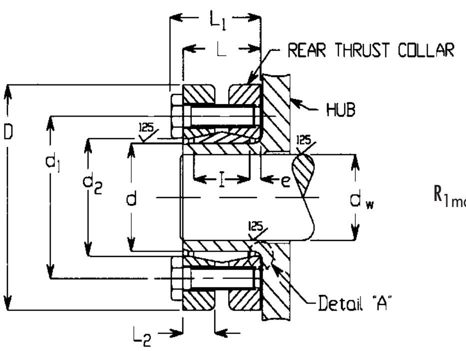
Light Duty and Heavy Duty available upon request.

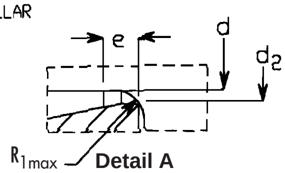
7

RfC Low Inertia Series Shrink Discs®
Sizes 10 to 50

These low inertia units are designed for applications where maximum clamping is needed and minimum weight is desired. These Shrink Discs® offer the flexibility of the standard RfN 4071 units for smaller shaft sizes. Available for shafts from 1/4 to 1-11/16 inches. Special sizes and material on request.

Low Inertia Series Shrink Discs® Specifications





Detail A

Fig. 75: Low Inertia Shrink Disc®

- d = nominal Shrink Disc® I.D.
- = hub projection O.D.
- T_H = specified tolerance for hub O.D. (d)
- d_W = nominal shaft and bore dimension
- T_W = total allowable diametrical clearance between shaft and hub bore (d_W)
- M_t = maximum transmissible torque
- D = Shrink Disc® O.D.
- d_1 = bolt circle dia.
- d_2 = thrust ring I.D.
- L, L_1, e = width dimensions, relaxed condition
- L_2 = thickness of thrust ring
- AF = distance across flats
- M_A = required tightening torque per locking screw
- s = head dimension across flats (mm)

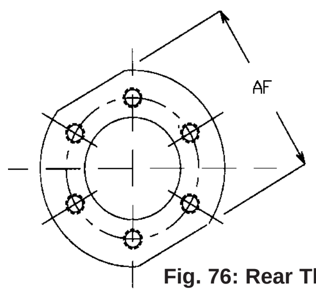


Fig. 76: Rear Thrust Collar

Table 15: RfC Low Inertia Series RfC 4051

Material: Alloy Steel*

Size	Shaft/Hub dimensions						Shrink Disc® dimensions									Locking Screws DIN 933 - 10.9 HHCS				
	d inches	T_H	d_W mm	d_W inches	T_W	R_1 max.	M_t lb-in	D	d_1	d_2	l inches	L	L_1	L_2	e	AF	Qty.	Size	s mm	M_A lb-in
10 RFC 4073	0.394	+0 –.001	6 6.35 8	.236 .250 .315	0.0005	0.065	36 55 144	1.18	0.866	0.472	0.394	.472	.582	0.197	0.039	1.06	4	M4x10	7	12
13 RFC 4073	0.512		9 9.5 11	.354 .375 .433	0.0007		200 250 410	1.30	0.985	0.591	0.394	.472	.610	0.197	0.039	1.25	4	M5x10	8	25
16 RFC 4051	0.630		12 12.7 14	.472 .500 .551			460 554 730	1.50	1.102	0.709	0.394	.551	.689	0.217	0.079	1.44	4	M5x12	8	25
24 RFC 4051	0.945	+0 –.0013	16 19 20	.630 .748 .787			980 1 500 1 750	1.875	1.417	1.024	0.394	.610	.748	0.236	0.108	1.75	6	M5x14	8	30
30 RFC 4051	1.181		22.2 24 26	.875 .945 1.024	0.0010		1 900 2 300 2 800	2.10	1.732	1.260	0.472	.689	.827	0.276	0.108	2.05	7	M5x16	8	30
36 RFC 4051	1.417	+0 –.0015	27 28 28.6 32	1.063 1.102 1.125 1.260			3 500 4 130 4 365 5 690	2.50	2.047	1.496	0.551	.768	.925	0.315	0.108	2.44	5	M6x18	10	75
44 RFC 4051	1.732		34 34.93 37	1.339 1.375 1.457	0.0013		5 400 5 900 6 900	2.85	2.402	1.850	0.630	.847	1.000	0.354	0.108	2.75	6	M6x20	10	75
50 RFC 4051	1.969		38 41.28 42.85	1.496 1.625 1.687			6 400 8 000 9 000	3.19	2.756	2.087	0.709	.925	1.083	0.394	0.108	3.00	6	M6x20	10	75

Stainless steel available upon request.
Larger sizes are available upon request.

Heavy Duty Shrink Disc® 4091: Small Sizes

7a

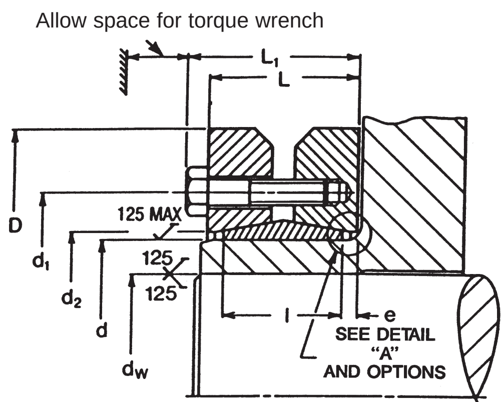
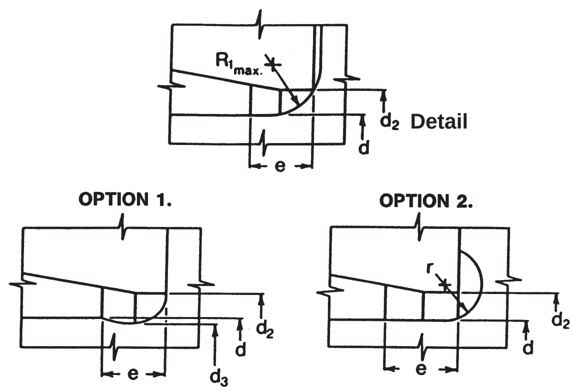


Fig. 77 **SHRINK DISC**



d = nominal Shrink Disc® I.D.
 = hub projection O.D.
T_H = specified tolerance for hub O.D. (d)
d_W = shaft size range (min.–max.)
T_W = total allowable diametrical clearance between shaft and hub bore (d_W)
M_t = maximum transmissible torque
D = Shrink Disc® O.D.

d_1 = bolt circle dia.
d_2 = thrust ring I.D.
L, L_1, e = width dimensions, relaxed condition
s = head dimension across flats (mm)
M_A = required tightening torque per locking screw
d3 = 0.98 x d (for OPTION 1)
r = to be selected by customer (for OPTION 2)

$P_{ax} = \frac{M_t \times 24}{d_W}$ lbs (for M_t in lb-ft)

Table 16: Heavy Duty Shrink Disc® RfN 4091

Material: Alloy Steel*

	Shaft/Hub dimensions						Shrink Disc® dimensions							Locking screws DIN 931 - 10.9			
RfC 4091 Size	d	T_H	d_W inches	T_W	$R_{1max.}$	M_t lb-ft	D	d_1	d_2	l inches	L	L_1	e	Qty	Size	s (mm)	M_A lb-ft
40	1.575		1.18 1.34			693 994	3.15	2.441	1.730	0.984	1.260	1.477	0.14	4	M8x30	13	22
44	1.732	+0/-0.0015	1.34 1.42		0.065	1 070 1 254	3.35	2.598	1.890	1.102	1.339	1.556	0.10	5	M8x30	13	22
50	1.969		1.50 1.65	0.0016		1 600 2 070	3.74	2.874	2.126	1.181	1.535	1.752	0.18	7	M8x35	13	22
55	2.165		1.65 1.89			1 783 2 509	4.13	3.071	2.323	1.181	1.535	1.752	0.18	7	M8x35	13	22
62	2.441		1.89 2.05			2 176 2 655	4.53	3.346	2.598	1.181	1.535	1.752	0.18	7	M8x35	13	22
68	2.677	+0/-0.0018	1.97 2.36		0.105	2 360 3 835	4.72	3.622	2.835	1.181	1.535	1.752	0.18	8	M8x35	13	22
75	2.953		2.17 2.56			3 319 5 163	5.71	4.134	3.307	1.417	1.811	2.086	0.20	7	M10x40	17	44
80	3.150		2.36 2.76			4 204 6 196	5.71	4.134	3.307	1.417	1.811	2.086	0.20	7	M10x40	17	44
90	3.543		2.56 2.95	0.0019	0.145	4 942 7 081	6.30	4.567	3.701	1.575	1.969	2.244	0.20	8	M10x40	17	44
100	3.937	+0/-0.0021	2.786 3.15		0.165	6 491 8 998	6.69	4.961	4.094	1.732	2.126	2.401	0.20	10	M10x45	17	44
110	4.331		2.95 3.35		0.185	8 113 10 842	7.28	5.433	4.488	1.969	2.362	2.637	0.20	12	M10x45	17	44

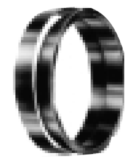
*** Stainless steel available upon request.***

8

Ringfeder®
Locking Elements™
RfN 8006/GSA

For many years Ringfeder® Locking Elements™ have been used successfully in numerous installations and applications in all fields of mechanical engineering, especially with smaller shaft diameters and for lower torque requirements. By varying clamp force, the number of Locking Elements™ and their arrangement, different configurations can be accommodated.

GSA Locking Elements™ are ideal for fastening gears, pulleys, sprockets, cams, etc., to shafts 1/4” to 3” diameter in data processing equipment, computer peripherals, copiers, and other applications where timing and backlash-free connections are required.


RfN 8006


Type GSA

Design Examples

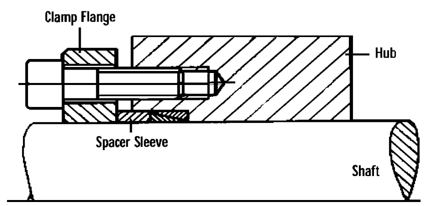


Fig. 78
Hub-bolted clamp flange (hub axially adjustable)

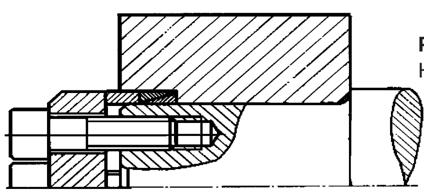


Fig. 79
Shaft-bolted clamp flange (hub axially fixed).

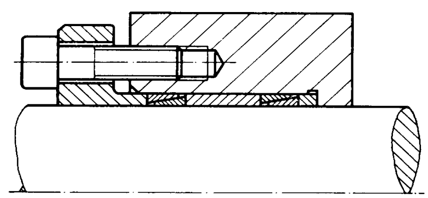


Fig. 80
Hub-bolted Locking Element™ connection. A spacer sleeve between the locking elements provides wider support.

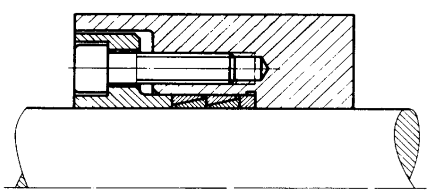


Fig. 81
Hub-bolted Locking Element™ connection. The hub is mounted with two RfN 8006 locking elements in series. The clamp ring is accommodated in the recessed hub.

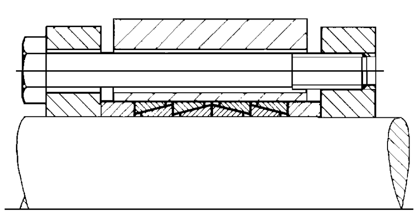


Fig. 82
Hub-bolted Locking Element™ connection, double clamped. Here, four RfN 8006 Locking Elements™ can transmit approximately 300%.

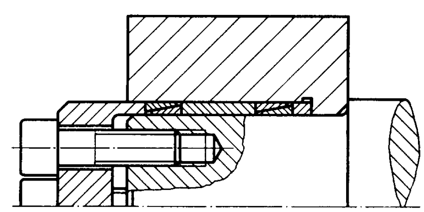


Fig. 83
Shaft-bolted Locking Element™ connection. The hub is mounted using two RfN 8006 Locking Elements™.

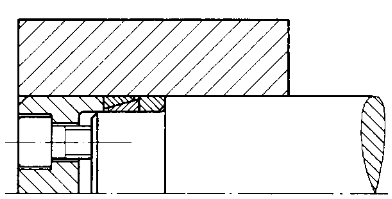


Fig. 84
Shaft-bolted Locking Element™ connection. The hub is mounted with one RfN 8006 Locking Element™.

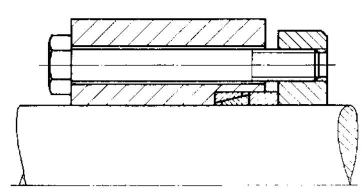


Fig. 85
Hub-bolted Locking Element™ connection. The hub is mounted with one RfN 8006 Locking Element™. Here, the locking screws can be tightened from the left or the right.

Note: Slit and solid Locking Elements™ are available. Slit elements can be expanded or contracted from the nearest listed metric size to accommodate many common inch-size shafts.

Solid elements must be used with metric shaft sizes and are generally applied when frequent locking and releasing is required.

1. Determine the shaft diameter (d) to be used or the maximum transmissible torque (M_t):

$$\textbf{Torque } M_t = \frac{5252 \text{ x HP}}{\text{RPM}} \quad \text{(lb-ft)}$$

If combined torsional and axial loads are to be transmitted, calculate the torque as follows:

$$M_{t\ res} = \sqrt{M_t^2 + \left(\frac{P_{ax} \text{ x } d}{24}\right)^2} \leq M_{t\ cat}$$

$M_{t\ res}$ = resultant torque to be transmitted (lb-ft)
M_t = actual or maximum torque to be transmitted (lb-ft)
P_{ax} = axial load-thrust to be transmitted (lbs)
d = shaft diameter (inches)
$M_{t\ cat}$ = max. transmissible torque of Locking Element™ as specified in catalog (lb-ft)

2. Select a Locking Element™ for the shaft diameter (d) from the specification tables and verify that the corresponding maximum transmissible torque (M_t) meets the torque requirements.

Note: Required peak torque should never exceed specified transmissible torque (M_t).

Catalog values for (M_t) are based on a contact pressure of 14,220 lbs/sq.in (10 kp/mm^2) between the shaft and the Locking Element™ in a lightly oiled installation.

Higher torque capacitites can be obtained by increasing the locking force or using 2 or more Locking Elements™ in series.

Note: When 2 or more Locking Elements™ are used in series, the following transmissible torque capacities are achieved:

2 locking elements: $M_t2 = M_t1 \text{ x } 1.555$
3 locking elements: $M_t3 = M_t1 \text{ x } 1.86$
4 locking elements: $M_t4 = M_t1 \text{ x } 2.03$

3. Determine the required locking force (P_A') from the specification tables on page 36.

Note: For slit Locking Elements™, (P_A') is the actual locking force required to generate a contact pressure of 14,220 lbs/sq.in.

For solid Locking Elements™, in addition to (P_A'), a preload (P_O) is required to bridge the clearance for the specified fit. The required total locking force for solid Locking Elements™ is:

$$P_A = P_O + P_A'$$

(see the specification tables on page 36).

The locking force is normally obtained by using multiple locking screws and a clamp ring or flange.

4. Determine the number, size and grade of screws to be used based on the required locking force and individual screw clamp load (see Table 17).

$$\text{Clamp load/screw} = \frac{\text{required locking force } (P_A) \text{ or } P_A'}{\text{number of screws (z)}}$$

5. Determine the size of clamp ring or flange using the following empirical equations:

a) Bolt circle diameter (dH, dS):
dH = D + 0.375 + db (inches)
dS = d – 0.375 – db (inches)

b) Thickness of clamp ring or flange (SF):
SF ≥ 1.5 x db for screw Grade 2 and 5
SF ≥ 2.0 x db for screws Grade 8

Flange material: steel with YP ≥ 45,000 lbs/sq.in

c) Recommended clearance “x” and maximum values for R are shown in the specification tables on page 36.

6. Calculate the hub outside diameter (D_N) using the following formula:

$$D_N \geq D \text{ x } \sqrt{\frac{Y_P + 0.8 \text{ x } p'}{Y_P - 0.8 \text{ x } p'}} + d_b$$

Where: Y_p = yield point of hub material (lbs/sq.in)
p' = p x d/D (lbs/sq.in) (see page 36)
B ≥ 2x l (inches) (see Fig. 88: Tightening Sequence)
d_b = bolt dia. (inches)

In applications where the locking screws are seated in the shaft, delete d_b and replace 0.8 by 0.6.

See Ordering Example on page 36.

Note: Slit Locking Elements™ have a slit approx. 0.040” wide. If the selected Locking Element™ must be opened up or contracted to place it over a larger or smaller shaft, respectively, the hub bore must be increased or decreased by the same amount in order to maintain the specified space between the hub bore and shaft (D-d). Note the following examples:

To open up an element to 0.016” (e.g. 25 x 30 RfN 8006/Slit) for a 1” shaft, the calculations are as follows:

shaft: 0.984” + 0.016” = 1.000”
hub bore: 1.181” + 0.016” = 1.197”

To contract an element to 0.0155” (e.g. 75 x 84 Rfn 8006/Slit) for a 2-15/16” shaft, the calculations are as follows:

shaft: 2.9530” – 0.0155” = 2.9375”
hub bore: 3.3070” – 0.0155” = 3.2915”

Table 17: Clamp Load – UN Fasteners

Bolt Size	CLAMP LOAD TABLE					
	S.A.E. Grade 2		S.A.E. Grade 5		S.A.E. Grade 8	
	Load* (lbs)	Torque (lb-in)	Load* (lbs)	Torque (lb-in)	Load* (lbs)	Torque (lb-in)
4 - 40	250	5	380	8	540	12
4 - 48	275	6	420	9	600	13
6 - 32	375	10	580	16	820	23
6 - 40	420	12	640	18	920	25
8 - 32	580	19	900	30	1 260	41
8 - 36	610	20	940	31	1 320	43
10 - 24	725	27	1 120	43	1 580	60
10 - 32	825	31	1 285	49	1 800	68
	(lbs)	(lb-ft)	(lbs)	(lb-ft)	(lbs)	(lb-ft)
1/4 - 20	1 300	5	2 000	8	2 850	12
1/4 - 28	1 500	6	2 300	10	3 250	14
5/16 - 18	2 150	11	3 350	17	4 700	24
5/16 - 24	2 400	13	3 700	19	5 200	27
3/8 - 16	3 200	20	4 950	30	6 950	45
3/8 - 24	3 600	22	5 600	35	7 900	50
7/16 - 14	4 400	30	6 800	50	9 600	70
7/16 - 20	4 900	35	7 550	55	10 700	80
1/2 - 13	5 850	50	9 050	75	12 800	105
1/2 - 20	6 550	55	10 200	85	14 400	120
9/16 - 12	7 550	70	11 600	110	16 400	115
9/16 - 18	8 350	80	13 000	120	18 300	170

**** Clamp load (lbs) is equal to 75% of bolt proof load.***
(Courtesy of Modulus Industrial Fasteners).

Locking Elements™ RfN 8006 Specifications

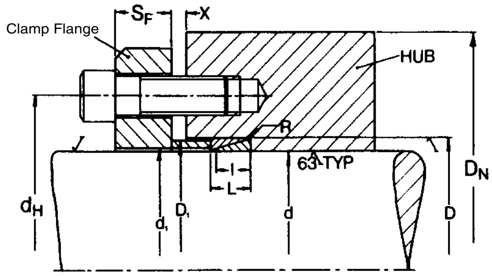


Fig. 86: Hub bolted design

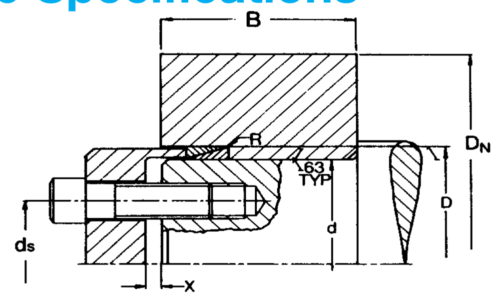


Fig. 87: Shaft bolted design

d = nominal inner ring I.D.
 = shaft O.D.
T_1 = machining tolerances for shaft (d)
T_b = machining tolerances for hub bore (d)
D = nominal outer ring O.D.
 = hub counter bore I.D.
T_2 = machining tolerances for hub counter bore (D)
L, l = width dimensions, relaxed condition
P_O = preload to bridge specified fit clearances
P_A = actual locking force to generate p = 14,220 lbs/sq.in
M_t = transmissible torque of one locking element
p = contact pressure between inner ring and shaft
x = recommended clearance between clamp flange and hub or shaft
R = radius in hub outer bore
d_1 = spacer sleeve I.D.

T_3 = tolerances for spacer sleeve I.D. and O.D.
D_1 = spacer sleeve O.D.
P_{ax} = axial load capacity

$$= \frac{M_t \times 24 \text{ lbs}}{d} \quad (\text{for } M_t \text{ in lb-ft})$$

Note: Values for (M_t) are based on a contact pressure of 14,220 psi (10 kp/mm²) between the shaft and Locking Element™ in a lightly oiled installation and a coefficient of friction of μ = 0.12.

Ordering Example

	Size	RfN	Series-Type
Solid:	25 x 30	RfN	8006/ SOLID
Slit:	25 x 30	RfN	8006/ SLIT

Table 18: Locking Elements™ RfN 8006

Material: Special Spring Steel*

RfN 8006 Size d x D mm	Locking Element™ dimensions inches							P_O lbs	P_A' lbs	M_t (based on p=14220 psi) lb-ft	X Elements inches			R	Spacer sleeve inches		
	d	T_1	T_b	D	T_2	L	l				1	2	3	inches	d_1	T_3	D_1
6 x 9	.236			.354	– 0 +.0006	.177	.146	—	713	1.56	.08	.08	.12	.004	.240		.350
7 x 10	.276	+0 –.0004	– 0 +.0006	.394		.177	.146	—	832	2.13	.08	.08	.12	.004	.280		.390
8 x 11	.315			.433		.177	.146	—	946	2.78	.08	.08	.12	.004	.319		.429
9 x 12	.354			.473		.177	.146	1 672	1 254	4.12	.08	.08	.12	.004	.358	± .001	.468
10 x 13	.394			.512	– 0 +.0007	.177	.146	1 529	1 386	5.06	.08	.08	.12	.004	.398		.508
12 x 15	.473			.591		.177	.146	1 529	1 650	7.23	.08	.08	.12	.004	.476		.586
13 x 16	.512			.630		.177	.146	1 419	1 793	8.53	.08	.08	.12	.004	.516		.626
14 x 18	.551	+0 –.0004	– 0 +.0007	.709		.248	.209	2 464	2 772	14.18	.12	.12	.16	.004	.555		.705
15 x 19	.591			.748		.248	.209	2 365	2 970	16.27	.12	.12	.16	.004	.594		.744
16 x 20	.630			.787		.248	.209	2 222	3 168	18.44	.12	.12	.16	.004	.634		.783
17 x 21	.669			.827		.248	.209	2 101	3 366	20.90	.12	.12	.16	.004	.673		.823
18 x 22	.709			.866	– 0 +.0008	.248	.209	2 002	3 564	23.43	.12	.12	.16	.004	.712		.862
19 x 24	.748			.945		.248	.209	2 772	3 762	26.04	.12	.12	.16	.004	.756		.937
20 x 25	.787			.984		.248	.209	2 561	3 960	28.93	.12	.12	.16	.004	.795	± .0015	.976
22 x 26	.866	+0 –.0005	– 0 +.0008	1.024		.248	.209	1 991	4 356	34.72	.12	.12	.16	.004	.874		1.015
24 x 28	.945			1.102		.248	.209	1 837	4 752	41.95	.12	.12	.16	.004	.952		1.094
25 x 30	.984			1.181		.248	.209	2 178	4 950	44.84	.12	.12	.16	.004	.992		1.173
28 x 32	1.102			1.260		.248	.209	1 628	5 544	56.42	.12	.12	.16	.004	1.110		1.252
30 x 35	1.181			1.378		.248	.209	1 870	5 940	65.10	.12	.12	.16	.004	1.189		1.370
32 x 36	1.260			1.417		.248	.209	1 727	6 336	73.78	.12	.12	.16	.004	1.268		1.409
35 x 40	1.378			1.575	– 0 +.001	.276	.236	2 222	7 832	99.82	.12	.12	.16	.004	1.386		1.567
36 x 42	1.417			1.654		.276	.236	2 552	8 052	106.33	.12	.12	.16	.004	1.425		1.645
38 x 44	1.4986	+0 –.0006	– 0 +.001	1.732		.276	.236	2 420	8 514	117.90	.12	.12	.16	.004	1.504		1.724
40 x 45	1.575			1.772		.315	.260	3 036	9 900	143.94	.12	.16	.20	.004	1.583		1.764
42 x 48	1.654			1.890		.315	.260	3 432	10 340	158.40	.12	.16	.20	.004	1.661		1.882
45 x 52	1.772			2.047		.394	.339	6 204	14 520	237.24	.12	.16	.20	.008	1.779		2.039
48 x 55	1.890			2.165		.394	.339	5 412	15 400	269.79	.12	.16	.20	.008	1.897		2.157
50 x 57	1.969			2.244		.394	.339	5 170	16 060	292.94	.12	.16	.20	.008	1.976		2.236
55 x 62	2.165			2.441		.394	.339	4 796	17 600	354.42	.12	.16	.20	.008	2.173		2.433
56 x 64	2.205			2.520	– 0 +.0018	.472	.409	6 468	21 780	444.83	.12	.16	.20	.008	2.212		2.512
60 x 68	2.362			2.677		.472	.409	6 028	23 320	509.93	.12	.16	.20	.008	2.370	± .002	2.669
63 x 71	2.480	+0 –.0018	– 0 +.0018	2.795		.472	.409	5 786	24 420	564.17	.12	.16	.20	.008	2.488		2.787
65 x 73	2.559			2.874		.472	.409	5 580	25 300	600.34	.12	.16	.20	.008	2.567		2.866
70 x 79	2.756			3.110		.551	.480	6 820	31 900	810.10	.12	.20	.24	.012	2.768		3.098
71 x 80	2.795			3.150		.551	.480	6 820	32 340	839.03	.12	.20	.24	.012	2.807		3.137
75 x 84	2.953			3.307		.551	.480	7 612	34 100	933.06	.12	.20	.24	.012	2.964		3.295
80 x 91	3.150			3.583		.669	.591	10 560	44 660	1 309.17	.16	.20	.24	.012	3.161		3.570
85 x 96	3.346			3.780	– 0 +.0022	.669	.591	10 032	47 520	1 475.53	.16	.20	.24	.012	3.358		3.767
90 x 101	3.543			3.976		.669	.591	9 548	50 380	1 656.36	.16	.20	.24	.012	3.555		3.964
95 x 106	3.740	+0 –.0022	– 0 +.0022	4.173		.669	.591	9 064	53 240	1 844.42	.16	.20	.24	.012	3.752		4.161
100 x 114	3.937			4.488		.827	.736	13 354	69 740	2 546.02	.16	.24	.28	.016	3.949		4.476
110 x 124	4.331			4.882		.827	.736	14 520	76 780	3 074.03	.16	.24	.28	.016	4.342		4.870
120 x 134	4.724			5.276	– 0 +.0025	.827	.736	13 244	83 600	3 652.67	.16	.24	.28	.016	4.736		5.263
130 x 148	5.118	+0 –.0025	– 0 +.0025	5.827		1.102	.996	21 164	122 760	5 822.57	.20	.28	.35	.016	5.134		5.811
140 x 158	5.512			6.220		1.102	.996	19 580	132 000	6 762.86	.20	.28	.35	.016	5.527		6.204
150 x 168	5.906			6.614		1.102	.996	18 590	141 460	7 739.31	.20	.28	.35	.016	5.921		6.598

**** Stainless steel available upon request.***
For larger sizes up to shaft diameters of 1000 mm (39.37"), see Catalog S86A.

Mounting — There are two basic methods for mounting the clamp plate:

1. Hub bolting permits axial positioning of the hub as well as angular adjustment.
2. Shaft bolting requires the hub to be backed against a shoulder to support the clamping force. This method does not allow axial adjustment.

Bolt Circle Diameter (d_H or d_S) — This method permits the locking screws to be as close as possible to the Locking Elements™.

Note: If a single locking screw or nut is located in the center of the shaft it must be secured to prevent loosening.

Thickness (S_F) — Thickness must be sufficient to prevent excessive deflection under the required locking force. Deflection will reduce the induced axial locking force on the elements and may cause the plate to bottom out on the hub or shaft face.

Clearance — Under full applied force, there must be an axial clearance between the clamp plate and hub or shaft face to prevent bottoming out. A spacer sleeve may be necessary. The sleeve outer diameter must be smaller than the hub counter bore by approx. 0.005”, and its inner diameter must be larger than the shaft diameter by the same amount to assure a clearance fit.

Hub Outside Diameter (D_N) — The outside diameter of the hub must be sized to accommodate radial contact pressures.

Installation and Removal Instructions

Since the torque is transmitted by contact pressure and friction between the frictional surfaces, the condition of the contact surfaces and the proper tightening of the locking screws are important.

INSTALLATION

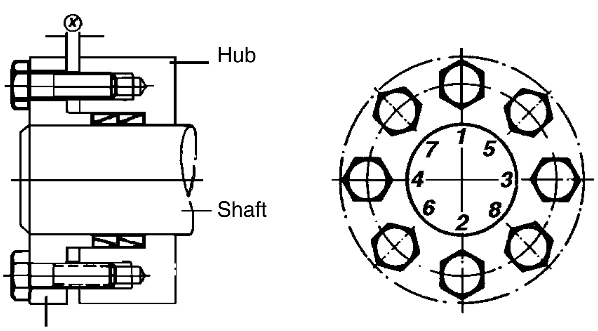


Fig. 88: Tightening Sequence
Tightening sequence for locking screws.

1. Carefully clean and lightly oil the shaft, hub bore, spacer sleeves and Locking Elements™.

Note: Do NOT use a Molybdenum Disulphide LUBRICANT (“MOLYKOTE” OR THE LIKE).

2. Install the parts in the following order:
- **a)** Hub (the play between hub bore and shaft affects the true running of the hub).
- **b)** Spacer sleeve to bridge the undercut (if needed)
- **c)** Outer ring/inner ring (both parts must slide on easily). For one Locking Element™ install the outer ring first. Otherwise, install the inner ring first.
- **d)** Spacer sleeve and clamp flange or clamp ring (both parts should slide on easily).
- **e)** Carefully oil the locking screw threads and head bearing surfaces.

Note: Do NOT use Molybdenum Disulphide.

3. Tighten the locking screws evenly and in several steps following the diametrically opposite sequence illustrated in Fig. 88.
- **a)** Tighten the screws by hand until a slight positive contact is established. Make final alignment adjustments to the connection.
- **b)** Tighten the screws to approx. one-half the specified torque using an extended key or torque wrench.
- **c)** Tighten the screws to full tightening torque using a torque wrench.
- **d)** Verify that the screws are fully tightened by applying the specified torque.

4. Check distance x. The clamp ring should not make contact with the face of the hub. The gap between the clamp ring and hub face should be even all the way around.

REMOVAL

Note: Ringfeder® Locking Elements™ are not self-locking.

1. Remove any accumulated contaminants from the connection.
2. Loosen the locking screws in several stages following a diametrically opposite sequence.
3. Reduce the hub and Locking Elements™ from the shaft. If the Locking Element™ is jammed, loosen it by tapping it with a light hammer.

Locking Elements™ GSA Specifications

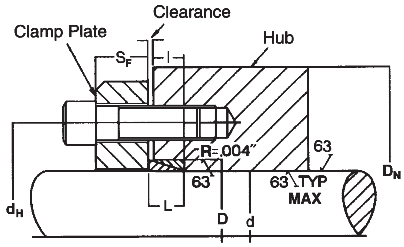


Fig. 89: Hub bolted Clamp Plate
(hub axially adjustable)

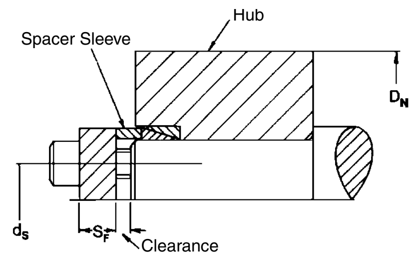


Fig. 90: Shaft bolted Clamp Plate
(hub axially fixed)

- d = shaft diameter
- T_1 = machining tolerances for shaft (d)
- D = counter bore diameter
- T_2 = machining tolerances for counter bore (D)
- L, l = width dimensions, relaxed condition
- R = radius in hub bore
- P_O = preload to bridge specified fit clearances
- P_A = actual locking force to generate M_t

- M_t = transmissible torque for one Locking Element™ based on coefficient of friction of μ = 0.15 and 10,000 psi contact pressure (torque can be increased by up to 50%)
- P_{ax} = axial load (thrust capacity)

$$= \frac{M_t \times 24 \text{ lbs}}{d_W} \quad (\text{for } M_t \text{ lb-ft})$$

Selection Guide

1. Determine the shaft diameter to be used and the maximum torque (T) to be transmitted.

$$T = \frac{63{,}000 \times HP}{RPM} \quad (\text{inch-lbs})$$

2. Select a locking element from the specification table for the shaft diameter. Verify that the transmissible torque (M_t) for the element meets the torque requirement.

Note: Required peak torque should never exceed specified transmissible torque (M_t). Higher torque capacitites can be obtained by increasing the locking force.

3. Determine the required locking force (P_A') from Table 19. A preload (P_O) is required to bridge the clearance for the specified fits. The total required locking force is $P_A = P_O + P_A$'.

The locking force is normally obtained by using one or more screws and a clamp plate (see Fig. 80 and Fig. 81).

4. Refer to Table 16: Clamp Load on page 33 to determine the number, size and grade of screws needed for the required locking force and individual screw clamp load.

$$\text{Clamp load/screw} = \frac{\text{required locking force } (P_A) \text{ of } P_A'}{\text{number of screws } (z)}$$

Table 19: Locking Elements™ Type GSA

Material: Aluminum Alloy*

Size	GSA Locking Element™ dimensions									
	d	T_1	D inches	T_2	L	l	P_O lbs	P_A' lbs	M_t lb-in	Wt. lbs per 1000
GSA–250	.250	+0 –.0005	.375	-0 +.0005	.126	.094	580	450	14	.76
GSA–312	.3125		.4375		.143	.112	686	670	26	1.04
GSA–375	.375		.500		.160	.128	673	920	43	1.35
GSA–437	.4375	+0 –.001	.5937	–0 +.001	.176	.143	796	1 196	65	2.20
GSA–500	.500		.6562		.193	.158	944	1 512	94	2.69
*GSA–562	.5625		.750		.210	.174	1 259	1 872	132	3.97
GSA–625	.625		.8125	–0 +.0015	.226	.187	1 231	2 237	175	4.69
*GSA–687	.6875		.875		.243	.203	1 414	2 670	230	5.47
GSA–750	.750		.9375		.260	.219	1 413	3 145	295	6.33
GSA–812	.8125		1.0312		.276	.234	1 617	3 637	370	8.56
GSA–875	.875		1.0937		.293	.250	1 611	4 188	458	10.14
*GSA–937	.9375		1.1875		.310	.267	2 087	4 790	561	12.36
GSA–1000	1.000		1.250		.326	.284	2 090	5 437	680	14.05
GSA–1125	1.125	+0 –.0015	1.406		.359	.312	2 220	6 620	840	19.55
GSA–1250	1.250		1.531		.393	.344	2 240	8 105	1 140	23.54
GSA–1375	1.375	+0 –.002	1.687	–0 +.002	.426	.376	2 745	9 750	1 510	31.22
GSA–1500	1.500		1.812		.459	.407	3 030	11 510	1 940	36.38
GSA–1625	1.625		1.968		.492	.437	3 295	13 390	2 450	46.43
GSA–1750	1.750		2.125		.526	.469	3 585	15 475	3 045	58.53
GSA–1875	1.875		2.250		.559	.500	3 595	17 675	3 730	66.22
*GSA–2000	2.000	+0 –.003	2.406	–0 +.003	.592	.528	5 365	19 910	4 480	81.09
*GSA–2250	2.250		2.656		.592	.528	4 795	22 400	5 670	90.30
GSA–2437	2.437		2.843		.592	.528	4 430	24 260	6 655	97.07
*GSA–2500	2.500		2.906		.592	.528	4 330	24 885	7 000	99.50
GSA–2687	2.687		3.093		.592	.528	4 035	26 750	8 090	106.26
*GSA–2750	2.750		3.156		.592	.528	3 950	27 370	8 470	108.70
*GSA–3000	3.000		3.406		.592	.528	3 890	29 860	10 080	117.90

***** *Stainless steel available upon request.*
***** *Delivery on request; other sizes stocked. Contact Ringfeder Corporation for additional sizes and information.*

Torque Wrenches

9

Torque wrenches are an integral part of the proper installation of all Ringfeder® locking devices. We, therefore, offer a low profile head torque wrench specifically suited to our products.

For controlled tightening of locking screws of Locking Assemblies™ RINGFEDER®, we offer suitable torque wrenches and attachments. These tools facilitate the installation of our Locking Assemblies™ RfN 7012 particularly on straight through shafts. They can be used, of course, also for mounting of Locking Assemblies™ RINGFEDER® RfN 7013, 7014, 7015, Locking Elements™ RINGFEDER® RfN 8006 and Shrink Discs® RfN 4071, RfN 4051 and RfN 4091.

The rigid square drives SD and hex bit sockets exhibit compact over-all dimensions and can be combined with commercially available extensions. The SD-drives fit with all CCM torque handles. Square drives and hex bit socket drives required for any given Locking Assembly™ size are listed in the following table.

Description and operation

When preset torque is reached, you hear a click and feel the breakover. No inaccuracies are caused by dials and indicators.

Torque setting is achieved by turning the adjustable micrometer torque handle. Every setting point is felt by a distinct stop.

Torque setting cannot accidentally change while wrench is in use. By turning the lock screw located at the end of the handle counter-clockwise (“Lock”), the adjustable handle is locked. By turning it clockwise (“Unlock”), the handle is unlocked.

Frictionless adjustment mechanism permits high torque accuracy even after prolonged use.

Slim design and light weight for better accessibility to fasteners and minimum operator fatigue.

Required attachments slide easily onto the dovetailed and pin locked torque handle. For release of attachments, the spring-loaded lock pin can be easily depressed by a pin or screw driver.

Various accessories are available upon request. Call our technical department for assistance.

Fig. 91: Square Drives
1/4”, 3/8”, 1/2” or 3/4” square drive

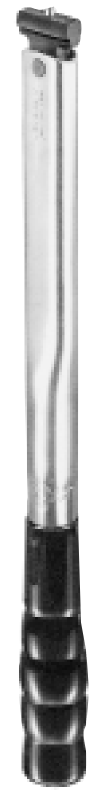


Fig. 92

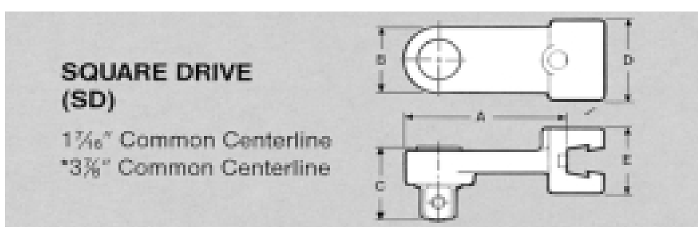


Fig. 93

Table 20: SQUARE DRIVE ENGLISH

PART NUMBER	MODEL NUMBER	DRIVE SIZE	MAX. TORQUE in lbs	A in.	B in.	C in.	D in.	E in.
819057	SD-1/4	1/4	250	1-23/32	9/16	3/4	3/4	11/16
819058	SD-3/8	3/8	1250	1-7/8	7/8	7/8	1-1/8	13/16
819059	SD-1/2	1/2	2500	1-7/8	7/8	1	1-1/8	13/16
819119	SD-3/4*	3/4	4800	4-5/8	1-1/2	1-13/32	1-1/2	1

9 Locking Assembly™ & Shrink Disc® Torque Wrench Selection Charts

Table 21

LOCKING ASSEMBLY™ RfN 7012 SIZE		RfN 7012-IN SIZE		TIGHTENING TORQUE PER SCREW		SCREW SIZE (d_G)	HEX KEY SIZE (s)	SQ DRIVE	TORQUE WRENCH	HYDRAULIC TORQUE WRENCH[1]
FROM	TO	FROM	TO	LB-FT	Nm	mm	mm	IN	MODEL#	MODEL#
20	40	1	1 1/2	10.1	14	M6	5	1/4	CCM 150I	
42	65	1 5/8	2 9/16	25.3	35	M8	6	3/8	CCM 600I	
70	95	2 3/4	3 3/4	50.6	70	M10	8	3/8	CCM 75	
100	160	3 15/16	6	90.4	125	M12	10	3/8	CCM 1200I	
170	200	6 1/2	7 7/8	137.4	190	M14	12	1/2	CCM 150	
220	260			213.4	295	M16	14	3/4	CCM 300	HTM 05
280	300			292.9	405	M18	14	3/4	CCM 300	HTM 05
320	340			419.5	580	M20	17	3/4	6 SD 600	HTM 07
360	420			564.2	780	M22	17	3/4	6 SD 600	HTM 07
440	1000			723.3	1000	M24	19			HTM 10

Table 22

LOCKING ASSEMBLY™ RfN 7013.0 / .1 SIZE		RfN 7013.0 / .1 -IN SIZE		TIGHTENING TORQUE PER SCREW		SCREW SIZE (d_G)	HEX KEY SIZE (s)	SQ DRIVE	TORQUE WRENCH	HYDRAULIC TORQUE WRENCH[1]
FROM	TO	FROM	TO	LB-FT	Nm	mm	mm	IN	MODEL#	MODEL#
20	40	1	1 1/2	12.5	17	M6	5	1/4	CCM 600I	
42	65	1 5/8	2 9/16	30.0	41	M8	6	3/8	CCM 600I	
70	120	2 3/4	4	60.0	83	M10	8	3/8	CCM 75	
130	150			105.0	145	M12	10	1/2	CCM 150	

Table 23

SHRINK DISC® RfN 4071 SIZE		RfN 4051 SIZE		RfN 4091 SIZE		TIGHTENING TORQUE PER SCREW		SCREW SIZE (d_G)	SOCKET SIZE (s)	SQ DRIVE	TORQUE WRENCH	HYDRAULIC TORQUE WRENCH[1]
FROM	TO	FROM	TO	FROM	TO	LB-FT	Nm	mm	mm	IN	MODEL#	MODEL#
24	30					3	4	M5	8	1/4	CCM 50I	
36	68					9	12	M6	10	1/4	CCM 150I	
75	100					22	30	M8	13	3/8	CCM 600I	
110	125	125	155			44	59	M10	17	3/8	CCM 600I	
140	155	165	200	125	155	74	100	M12	19	3/8	CCM 1200I	HTM 05
165	220	220	340	165	220	185	250	M16	24	1/2	CCM 300	HTM 10
240	360	350	500	240	320	362	490	M20	30	3/4	CCM 400	HTM 10
380	480			340	420	620	840	M24	36			HTM 10
500	620			440	500	922	1250	M27	41			HTM 10

Table 24

LOW INERTIA SERIES SHRINK DISC®						TIGHTENING TORQUE PER SCREW		SCREW SIZE (d_G)	SOCKET SIZE (s)	SQ DRIVE	TORQUE WRENCH
		FROM	TO			LB-IN	Nm	mm	mm	IN	MODEL#
		10				12	1.4	M4	7	1/4	CCM 50I
		13	16			25	2.8	M5	8	1/4	CCM 50I
		24	30			30	3.4	M5	8	1/4	CCM 50I
		36	50			75	8.5	M6	10	1/4	CCM 150I

Table 25

SHRINK DISC® RfN 4171 SIZE		TIGHTENING TORQUE PER SCREW		SCREW SIZE (d_G)	SOCKET SIZE (s)	SQ DRIVE	TORQUE WRENCH	HYDRAULIC TORQUE WRENCH[1]
FROM	TO	LB-FT	Nm	mm	mm	IN	MODEL#	MODEL#
24	30	9	12	M6	10	1/4	CCM 150I	
36	68	22	30	M8	13	3/8	CCM 600I	
75	100	44	59	M10	17	3/8	CCM 600I	
110	125	74	100	M12	19	3/8	CCM 1200I	HTM 05
140	155	118	160	M14	22	1/2	CCM 150	HTM 05
165	200	184	250	M16	24	1/2	CCM 300	HTM 10
220	280	361	490	M20	30	3/4	CCM 400	HTM 10
300	360	620	840	M24	36			HTM 10
380	500	922	1250	M27	41			HTM 10

Notes:
1. Hydraulic upon request.
2. Call Ringfeder Corp. with your specific requirements and questions at 1-800-245-2580

The ABC's of the RINGFEDER® Locking Devices

10

Adjustablility
The friction-lock connection by means of locking devices is infinitely variable and can be adjusted with a high degree of accuracy.

Axial force F_{ax}
The axial thrust that can be transmitted by locking devices regardless of the type of load encountered (static, increasing, alternating or impact). F_{ax} can be calculated by dividing the torque by the shaft radius (F_{ax} = 2 x t/d). In comparison with these theoretical values, substantially higher values have been established in practical operations.

Centering action
Guiding action of the shaft in the minor bore of the hub. The clearance between shaft and hub bore and the length of the minor bore have the greatest effect on ⟶ True running of the mounted hub.

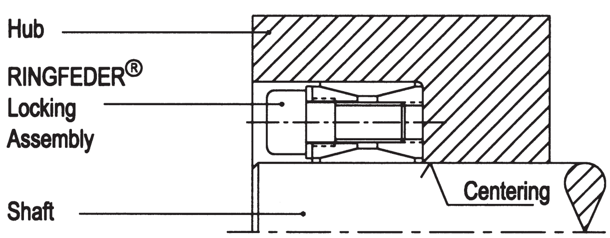


Fig. 94
Locking Assembly™ RINGFEDER® 7012 Connection.
Principle sketch.

Clearances
See appropriate tables.

Coefficient of friction µ
The catalog values apply to µ = 0.12. Surfaces of the Locking Devices, shaft and hub bore slightly oiled.

Contact pressure p, p' (internal devices)
p = contact pressure between inner ring and shaft
p' = contact pressure between outer ring and hub
p and p' – together with the ⟶ Coefficient of friction µ – determine the frictional connection value. In order to avoid deformation in the plastic range, the following values must obtain:

p < yield point at shaft
p' < yield point of hub

Fatigue strength under alternating torsion stresses
The greatest variable stress component oscillating about the mean stress zero that a specimen can resist an unlimited number of times without fracture or inadmissible deformation is Fatigue Strength. This value is influenced by shape and surface finish. The ratio between the fatigue strength of the unnotched and polished specimen and the fatigue strength of the test specimen is referred to as notch factor $ß_k$.

$ß_k$ varies from material to material and decreases in value as the static tensile strength value increases.

When locking devices are used, both shaft and hub retain their full cross-sections, i.e. are not grooved. Consequently, the stress states at the connection point are virtually identical with those of a smooth shaft, i.e. the material is utilized by almost 100%.

Fretting / Galling
Damage to or destruction of shaft, hub bore or locking device surfaces as a result of overloading followed by ⟶ Slip. Fretting can always be avoided by correct dimensioning of the connection.

Fretting corrosion
Corrosion between the contact surfaces of ferrous metals. Even the smallest relative movements favour and accelerate fretting corrosion; lubricants can delay the process, but not stop it altogether. Long-term prevention of fretting corrosion can be achieved only by designing the connection in such a way that relative movement is impossible.

Locking screws – securing of
Screws subjected to static loads need not be secured against slackening (in some cases, lock washers, etc. can even be harmful). The screws used in conjunction with locking devices are normally subjected to static loads only: consequently, they need not be secured against loosening. Tightening down to the specified torque value is quite adequate.

Molykote
Trade name of a lubricant containing molybdenum disulphide (MoS_2). As MoS_2 reduces the ⟶ Coefficient of friction, it is used for frictional connections between shafts and hubs in exceptional cases only. We urgently recommend that our advice be sought if it is intended that lubricants containing MoS_2 be used in conjunction with internal locking devices.

Shrink Discs®, however, utilize MoS_2 greases to lubricate tapers and fasteners to gain the mechanical advantage necessary for their proper function.

Notch factor $ß_k$
Fatigue strength under alternating torsion stresses.

Notch impact strength figure η_k
Product of the ⟶ Shape factor α_k (governed by material configuration) and the ⟶ Notch factor $ß_k$ (governed by material properties):

$$\eta_k = \frac{ß_k - 1}{\alpha_k - 1}$$

Approximate values for η_k:

0,4 ··· 0,8 – light metals and C-steels
0,6 ··· 1 – heat-treatable steels

Play, freedom from
Connections with locking devices are absolutely free of play. Like other frictional connections there is no danger of lateral oscillation.

Polar section modulus W_p
In the case of circular cross sections, Wp is defined thus:

$$W_p = d^3 \times \pi/16$$

The value of W_p is significantly reduced by keyways, grooves for Woodruff keys, etc. When using locking devices the full cross-section of the shaft is available (see Shape factor α_k).

Radial load, admissable
Internal locking devices can also absorb radial loads. It must be considered, however, that the surface pressure resulting from the radial load with respect to the projected surface of the Locking Assembly™, is smaller than the surface pressure generated by the clamping.

10 The ABC's of Locking Devices, continued

Releasability
Locking Assemblies™ RfN 7012 and Locking Elements 8006 are not self-locking. The angle of the tapered rings is such that releasability is guaranteed even after prolonged heavy loading. Extractors are not required.

Rust
Because of the relatively high pressures per unit of area, rusting cannot take place between the effective surfaces of a locking device as well as shaft and hub. Some locking devices have split inner and outer rings and cannot hermetically seal the clamping point. In this case we advise to use corrosion inhibitors, seals, etc. in order to protect the Locking Assemblies™ (locking screws) against corrosion.

Safety
The frictional connection values given in the tables are achieved or even exceeded if designing is correct and the connection properly made. The theoretical values are higher. Frictional connections of all types – including shrink fits and press fits – must be designed in such a way that the load peaks can be dependably transmitted. However, the load peaks vary so greatly from case to case that we are unable to give any recommendations as regards specific safety factors.
locking device connections are insensitive to impact loads (see Fig. 95).

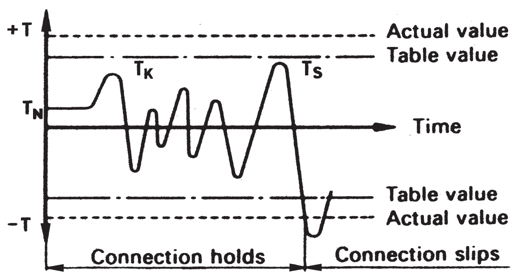


Fig. 95

Shape factor α_k
Proportional factor covering stress conditions at bores, cross-sections transitions, clamping points, grooves, etc. The following applies:

$$\alpha_k = \frac{\sigma_{max}}{\sigma_n} = \frac{\text{maximum stress}}{\text{nominal stress}}$$

(use smallest cross-sections and/or resistance moments when determining σ_n).

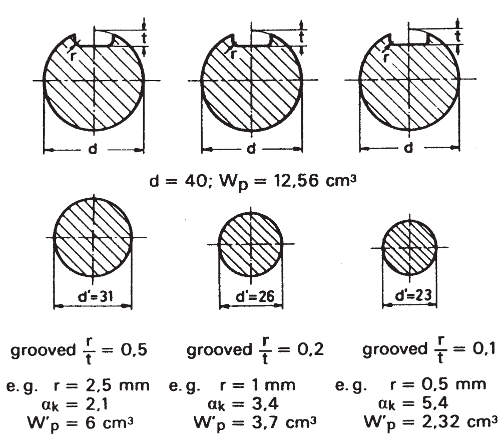


Fig. 96
Influence of the groove shape on shape factor α_k and thus on the ⟶ Polar moment of resistance; extract from the work of Prof. Thum.

For smooth shafts α_k = 1.

Slip
All shrink fits slip when overloading takes place. ⟶ Fretting of the contact (slipping) surfaces is normally unavoidable. Locking Assemblies™ subjected to high pressures per unit of area and rotating at high peripheral speeds can be completely destroyed. Under normal circumstances, the degree and type of destruction do not indicate the cause of slipping.

Slipping clutch
Locking devices are not suitable for use as a slipping clutch without consulting us.

Tangential stresses
Tensile stress in the hub bore or compression stress in the bore of hollow shafts as a result of the ⟶ Contact pressures between outer locking ring and hub and/or inner locking ring and hollow shaft.

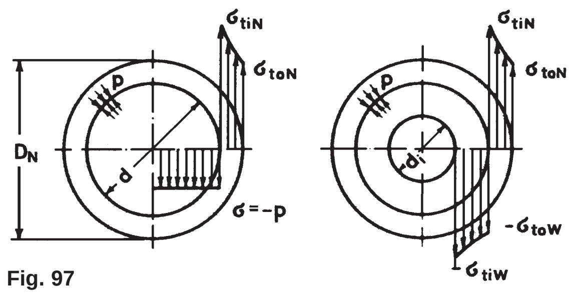


Fig. 97
Tangential stresses in shrink fits.

Temperature, influence of
Shrink fits – and thus locking device connections, too – give perfect service as long as the contact pressure in the joint does not drop below a certain minimum value. Consequently, contact pressure in the joint at operating temperature must be the subject of close attention. Please contact us for advice.

Torque wrench
Standard tool indicating the tightening torque exerted on the screw heads. All Ringfeder® locking devices require a torque wrench for proper installation.

True running
The relatively narrow Locking Assemblies™ RINGFEDER® RfN 7012 serve mainly to transmit high torques and axial forces. They are not self-centering. True running of the hub/boss is thus governed by the ⟶ Centering action and the care taken during ⟶ Fitting.

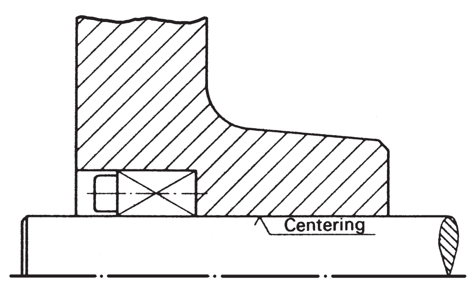


Fig. 98
Pre-centering by selection of correct fit between shaft and hub.

NOTE: DO NOT USE IMPACT WRENCH TO INSTALL RINGFEDER® LOCKING DEVICES!

THE BASICS OF SELECTING A RINGFEDER® SHAFT/HUB LOCKING DEVICE

I. INTRODUCTION

Selecting a Ringfeder® keyless shaft/hub locking device is not a difficult procedure. A few very basic facts about the application must be known and the proper device can be selected. We offer the following guidelines for choosing the best device for the application. This is not intended as a design manual. If technical help is desired, Ringfeder Corporation offers free engineering assistance.

Ringfeder® shaft/hub locking devices can be divided into two major categories; internal and external devices.

1. **Internal** devices fit *inside* a bore or counterbore in a component and clamp internally. Detailed descriptions can be found in the appropriate catalog sections.
2. **External** devices fit *over* a hub projection and clamp the component externally. Shrink Discs® in general, provide a more accurate concentricity (T.I.R. control) than internal devices. Detailed descriptions can be found in the appropriate catalog sections.

II. REQUIRED INFORMATION

Whether the application is new or a repair is to be made to an existing connection, the following must be known:

* **Peak torque required;** include all shock loads and safety factors. Generally the catalog torque ratings of the devices are the maximum allowable.
* **Shaft size**
* **Hub diameter;** for internal devices hubs must have adequate wall thickness to support the forces generated by the device. The material published yield point can be inserted in the equations given in the various catalogs. If the material is not known, and it is not cast iron, it is usually safe to assume the yield point to be 36,000 psi. Avoid grey cast iron products without consulting us.
* **Component rotational speed;** if O.D. of component is turning more than 2000 inches/second, consult us.
* **Environmental conditions;** ambient temperatures, moisture, etc. Above 400 degrees F, contact us.
* **Condition of the shaft;** if the shaft is worn or damaged it must be repaired so as to conform to the shaft tolerances specified by the type of device chosen.
  – one keyseat may be bridged without concern.
  – for broken keys, flats or multiple keys, call us.

III. SELECTION GUIDELINES

There will be many exceptions to these guidelines and we can't cover all possible situations. However, based on our experience the following generalizations can be made to offer a beginning in the selection process.

A. MOUNTING SPROCKETS

Sprockets generally use the internal devices. Sprockets include: roller chain, conveyor chain, HTD, Polychain, etc. Check for an adequate hub diameter for the required device. If the product is steel, assume a hub material yield point of 36,000 psi minimum unless you know more precisely what the material is.

1. SPROCKETS WITH 'B' STYLE HUBS

   For most applications on 'B' type sprockets where the length through the bore is greater than 2 x locking device width; USE 7012 or 7013.

2. PLATE SPROCKETS

   For plate sprockets make sure the plate is thick enough for the critical contact area of the locking device to be completely recessed in the sprocket; USE 7013.

3. MULTI-STRAND SPROCKETS – HIGH TORQUES

   For applications with very high torques, avoid laminated sprockets (plate sprockets butt-welded to hubs); through hub design is preferred; USE 7012, 7013 or Shrink Disc® .

B. MOUNTING GEARS

Gears include spur, miter, bevel, spiral, and helical gears as well as cams, sheaves and other similarly constructed items.

1. NARROW GEARS

   For gears where the LTB (length through bore) is less than 2 x Locking Assembly™ width, 7013's offer better concentricity.

2. WIDE GEARS

   For wide gears where the LTB is greater than 2 x Locking Assembly™ width, any internal device appropriately sized will work.

3. LARGE GEARS

   For large diameter gears (bull gears) with cast iron hubs use Shrink Discs™; with steel construction, Shrink Discs® are preferred, but all devices are possible.

C. MOUNTING COUPLINGS

Couplings include many categories of flexible and rigid types. The most common are addressed here.

1. Flexible disk-type couplings – Shrink Disc® is preferred.
2. Flexible gear or grid-type couplings – all internal devices can be used as well as the Shrink Discs® if hub construction allows.
3. Flexible jaw-type couplings – use Shrink Discs® if hubs are cast iron; all internal devices for steel hubs.
4. Rigid couplings – sleeve or flange type – Shrink Discs™ are preferred but all internal devices will work on steel hubs.

D. MOUNTING CONVEYOR PULLEYS, ROLLS AND DRUMS

Conveyor pulleys, rolls and drums present unique applications in that they are very often subjected to high loads resulting in the shafts deflecting. This deflection must be calculated and minimized in order for the correct device to be selected. We, therefore, strongly suggest that you call us!

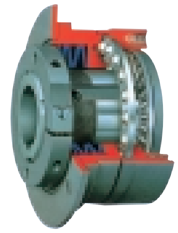
Toll Free: 1–800–245–2580

WEB: www.ringfeder.com

RFC Specialty Products

RFC Specialty Locking Devices

Ringfeder Corporation excels at specialty keyless shaft/hub connection solutions. From 1/4” shafts to 30” shafts, our engineers have the solution.



BALL DETENT TORQUE LIMITERS Type BD

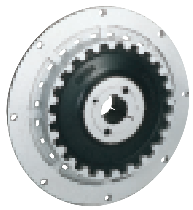
These accurate ball/roller and socket torque limiters are easily adjustable for different torque settings. In the event of an overload, personnel and equipment are protected as these devices disconnect mechanically and make contact with a limit switch that sounds and alarm or otherwise shuts the drive down. Available in various configurations and combinations with couplings.

FRICTION TORQUE LIMITER Type FC

Easily adjustable, these torque limiters rely on friction to transmit the set torque. When an overload occurs, these devices slip until the overload is removed or the machine is reset. Available in various configurations and combinations with couplings.

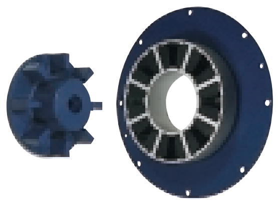
RING-flex® Single Flexing and Double Flexing Couplings with Ringfeder® Shrink Discs®

Assure a totally backlash-free connection with precise synchronization capability. Additional features: Clearance fits for hub/shaft connection allow easy assembly and free axial movement compensation during installation which eliminates unwanted pre-loading or pre-stressing of the flexible elements.



ARCUSAFLEX® Flywheel Couplings

Highly flexible, backlash-free, vulcanized rubber disc couplings designed to couple the flywheel of an internal combustion engine to the shaft of the driven machine. Rubber disc element accepts relatively high angular, axial and parallel misalignments. Flange dimensions according to SAE J620 standards.



Multi Mont OCTA Flywheel Couplings

Torsionally flexible, economical flange couplings for connecting the flywheel of a combustion engine to the input shaft of a driven machine. Rubber elements dampen vibrations and accommodate misalignments.

In accordance with our established policy to constantly improve our products, the specifications contained herein are subject to change without notice.

Since our Engineers cannot be aware of all applications and cannot control all the factors that may affect the function of our products, our warranty applies to our products only.

TECHNICAL ASSISTANCE

Call us Toll Free at 1–800–245–2580

Please let us know what your specific requirements are and we shall be very happy to work out detailed recommendations without any obligation. Just send a sketch with your requirements and specifications.

Call or write for more information.

Visit our website: www.ringfeder.com

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RINGFEDER