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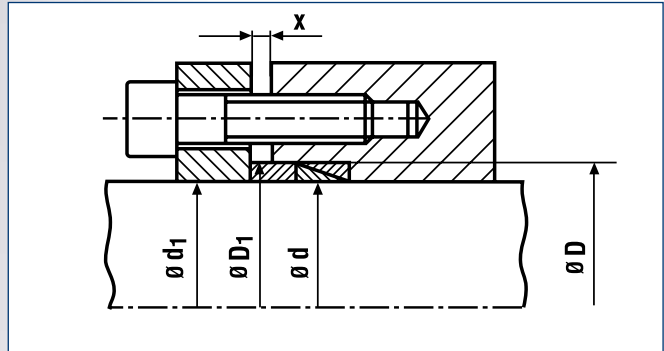
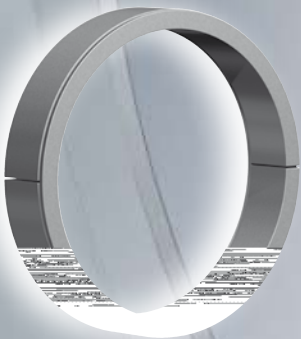
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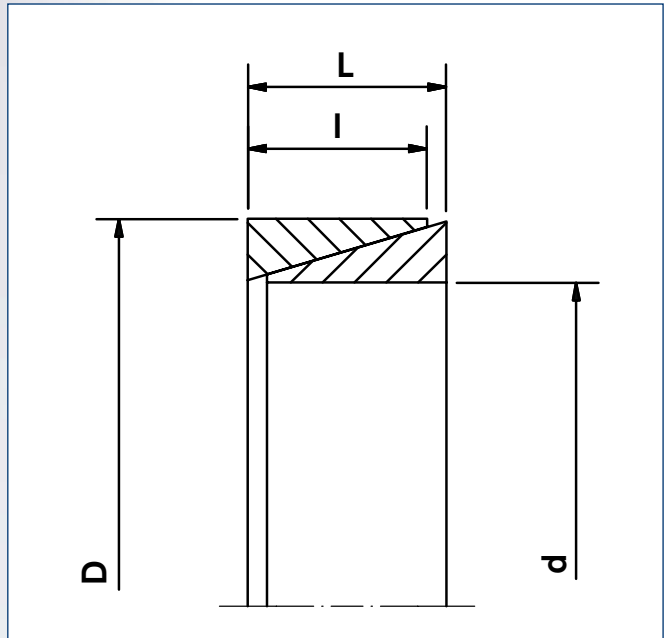
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# RINGFEDER® Locking Elements

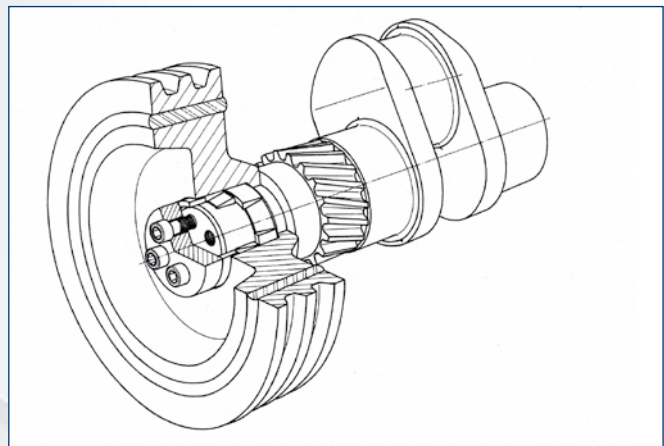
Solid



RINGFEDER® Locking Element RfN 8006 · Typical installation



RINGFEDER® Locking Elements RfN 8006 · Dimensions



V-belt pulley

Locking Assembly dimensions											Transmissible torques or axial forces		Weight							
d x D	d	C1	Cb	D	C2	L	I	At	Fo	FA'	T	Fax	X				WT	d1	D1	Tmax
mm	Inch									psi	lb-ft	lbs	Inch				lbs 10 <sup>-3</sup>	Inch		lb-ft
*6 x 9	0.236			0.354	-0	0.177	0.146	0.107	-	832	1.8	187	0.079	0.079	0.118	0.118	3.3	0.240	0.350	5.8
*7 x 10	0.276			0.394	+0.0006	0.177	0.146	0.124	-	989	2.5	218	0.079	0.079	0.118	0.118	3.1	0.280	0.390	7.6
*8 x 11	0.315			0.433		0.177	0.146	0.140	-	1124	3.2	247	0.079	0.079	0.118	0.118	3.3	0.319	0.429	9.7
9 x 12	0.354			0.472		0.177	0.146	0.163	1709	1281	4.2	286	0.079	0.079	0.118	0.118	3.7	0.358	0.469	6.4
10 x 13	0.394			0.512		0.177	0.146	0.180	1563	1416	5.2	315	0.079	0.079	0.118	0.118	4.0	0.398	0.508	8.9
11 x 14	0.433			0.551		0.177	0.146	0.198	1686	1551	5.9	337	0.079	0.079	0.118	0.118	4.4	0.437	0.547	10.8
12 x 15	0.472			0.591		0.177	0.146	0.215	1551	1686	7.4	375	0.079	0.079	0.118	0.118	4.9	0.476	0.587	13.8
13 x 16	0.512			0.630		0.177	0.146	0.234	1439	1844	8.9	407	0.118	0.079	0.118	0.118	5.1	0.516	0.626	17.2
14 x 18	0.551			0.709		0.248	0.209	0.361	2518	2833	14.8	629	0.118	0.118	0.157	0.197	10.8	0.555	0.705	25
15 x 19	0.591			0.748		0.248	0.209	0.388	2406	3035	17.0	674	0.118	0.118	0.157	0.197	11.7	0.594	0.744	30
16 x 20	0.630			0.787		0.248	0.209	0.412	2271	3237	19.2	717	0.118	0.118	0.157	0.197	12.1	0.634	0.783	36
17 x 21	0.669			0.827		0.248	0.209	0.439	2136	3440	21.4	764	0.118	0.118	0.157	0.197	12.8	0.673	0.823	42
18 x 22	0.709			0.866		0.248	0.209	0.465	2046	3642	24	809	0.118	0.118	0.157	0.197	13.5	0.713	0.862	48
19 x 24	0.748			0.945		0.248	0.209	0.490	2833	3844	27	852	0.118	0.118	0.157	0.197	17.2	0.756	0.937	67
20 x 25	0.787			0.984		0.248	0.209	0.516	2698	4047	30	899	0.118	0.118	0.157	0.197	18.1	0.795	0.976	76
22 x 26	0.866			1.024		0.248	0.209	0.567	2023	4451	35	989	0.118	0.118	0.157	0.197	15.9	0.874	1.016	73
24 x 28	0.945			1.102		0.248	0.209	0.620	1866	4856	43	1079	0.118	0.118	0.157	0.197	17.4	0.953	1.094	90
25 x 30	0.984			1.181		0.248	0.209	0.645	2226	5058	46	1124	0.118	0.118	0.157	0.197	22.1	0.992	1.173	126
28 x 32	1.102			1.260		0.248	0.209	0.722	1664	5665	58	1259	0.118	0.118	0.157	0.197	19.8	1.110	1.252	126
30 x 35	1.181			1.378		0.248	0.209	0.773	1911	6070	66	1349	0.118	0.118	0.157	0.197	26.5	1.189	1.370	186
32 x 36	1.260			1.417		0.248	0.209	0.826	1754	6475	75	1439	0.118	0.118	0.157	0.197	22.1	1.268	1.409	164
35 x 40	1.378			1.575		0.276	0.236	1.021	2271	8004	102	1776	0.118	0.118	0.157	0.197	44.1	1.386	1.567	250
36 x 42	1.417			1.654		0.276	0.236	1.051	2608	8228	108	1844	0.118	0.118	0.157	0.197	44.1	1.425	1.646	324
38 x 44	1.496			1.732		0.276	0.236	1.110	2473	8701	120	1933	0.118	0.118	0.157	0.197	44.1	1.504	1.724	363
40 x 45	1.575			1.772		0.315	0.260	1.285	3103	10117	147	2237	0.118	0.157	0.197	0.236	44.1	1.583	1.764	316
42 x 48	1.654			1.890		0.315	0.260	1.349	3507	10567	162	2338	0.118	0.157	0.197	0.236	66	1.661	1.882	428
45 x 52	1.772			2.047		0.394	0.339	1.883	5868	14838	242	3282	0.118	0.157	0.197	0.236	110	1.780	2.039	553
48 x 55	1.890			2.165		0.394	0.339	2.009	5531	15737	275	3507	0.118	0.157	0.197	0.236	110	1.898	2.157	638
50 x 57	1.969			2.244		0.394	0.339	2.093	5283	16412	299	3642	0.118	0.157	0.197	0.236	110	1.976	2.236	699
55 x 62	2.165			2.441		0.394	0.339	2.302	4901	17986	361	4002	0.118	0.157	0.197	0.236	110	2.173	2.433	859
56 x 64	2.205			2.520		0.472	0.409	2.835	6610	22257	454	4946	0.118	0.157	0.197	0.276	154	2.213	2.512	1007
60 x 68	2.362			2.677		0.472	0.409	3.036	6160	23831	520	5283	0.118	0.157	0.197	0.276	154	2.370	2.669	1170
63 x 71	2.480			2.795		0.472	0.409	3.188	5913	24955	575	5576	0.118	0.157	0.197	0.276	176	2.488	2.787	1299
65 x 73	2.559			2.874		0.472	0.409	3.291	5710	25854	612	5755	0.118	0.157	0.197	0.276	176	2.567	2.866	1389
70 x 79	2.756			3.110		0.551	0.480	4.157	6969	32599	826	7194	0.118	0.197	0.236	0.276	243	2.768	3.098	1816
71 x 80	2.795			3.150		0.551	0.480	4.216	6969	33049	856	7329	0.118	0.197	0.236	0.276	243	2.807	3.138	1869
75 x 84	2.953			3.307		0.551	0.480	4.453	7779	34847	952	7734	0.157	0.197	0.236	0.276	265	2.965	3.295	2067
80 x 91	3.150			3.583		0.669	0.591	5.840	10791	45638	1335	10117	0.157	0.197	0.236	0.315	265	3.161	3.571	2882
85 x 96	3.346			3.780		0.669	0.591	6.206	10252	48561	1505	10791	0.157	0.197	0.236	0.315	441	3.358	3.768	3277
90 x 101	3.543			3.976		0.669	0.591	6.570	9757	51484	1689	11466	0.157	0.197	0.236	0.315	441	3.555	3.965	3696
95 x 106	3.740			4.173		0.669	0.591	6.936	9263	54406	1881	12140	0.157	0.197	0.236	0.315	485	3.752	4.161	4141
100 x 114	3.937			4.488		0.827	0.736	9.102	13647	71268	2596	15737	0.157	0.236	0.276	0.354	882	3.949	4.476	5866
110 x 124	4.331			4.882		0.827	0.736	10.011	14838	78462	3135	17311	0.157	0.236	0.276	0.354	882	4.343	4.870	7060
120 x 134	4.724			5.276		0.827	0.736	10.921	13534	85432	3725	18885	0.197	0.236	0.276	0.354	1103	4.736	5.264	8472
130 x 148	5.118			5.827		1.102	0.996	16.008	21628	125450	5938	27878	0.197	0.276	0.354	0.433	1874	5.134	5.811	12794
140 x 158	5.512			6.220		1.102	0.996	17.239	20009	134892	6897	30126	0.197	0.276	0.354	0.433	2007	5.528	6.205	14930
150 x 168	5.906			6.614		1.102	0.996	18.470	18997	144559	7893	32149	0.197	0.276	0.354	0.433	2139	5.921	6.598	17199
160 x 178	6.299			7.008		1.102	0.996	19.702	17648	154227	8999	34285	0.236	0.276	0.354	0.433	2249	6.315	6.992	19648
170 x 191	6.693			7.520		1.299	1.181	24.822	26416	194469	12023	43165	0.236	0.315	0.394	0.472	3308	6.713	7.500	25739
180 x 201	7.087			7.913		1.299	1.181	26.282	25000	205935	13499	45863	0.236	0.315	0.394	0.472	3528	7.106	7.894	28951
190 x 211	7.480			8.307		1.299	1.181	27.742	23606	217176	15048	48112	0.236	0.315	0.394	0.472	3749	7.500	8.287	32352
200 x 224	7.874			8.819		1.496	1.370	33.874	30126	265288	19326	58903	0.236	0.315	0.433	0.512	5072	7.898	8.795	41035
210 x 234	8.268			9.213		1.496	1.370	35.568	28552	278552	21318	61826	0.236	0.315	0.433	0.512	5513	8.291	9.189	45348
220 x 244	8.661			9.606		1.496	1.370	37.262	27428	291817	23383	64748	0.236	0.315	0.433	0.512	5513	8.685	9.583	49751
230 x 257	9.055			10.118		1.693	1.555	44.217	37095	346223	29063	76888	0.236	0.354	0.472	0.551	7497	9.079	10.094	61131
240 x 267	9.449			10.512		1.693	1.555	46.139	35409	361960	31718	80486	0.276	0.354	0.472	0.551	7718	9.472	10.488	66689
250 x 280	9.843			11.024		1.890	1.732	53.785	42716	420414	38357	93300	0.394	0.512	0.630		10364	9.874	10.992	80543

\* Slit only. For slit Locking Elements F<sub>0</sub> is eliminated in the calculation.

To continue see next page

## Locking screw calculation Locking screw table

The torque transmission capacity of a RINGFEDER® Locking Element connection is directly proportional to the effective clamping force  $F_A$ . As clamping elements normally locking screws are used which act on the Locking Elements via a thrust flange.

**Solid**

**Slit**

Regular thread <sup>1)</sup> , metric						
$d_G$	8.8		10.9		12.9	
	$T_A$	$F_V$	$T_A$	$F_V$	$T_A$	$F_V$
<b>M 4</b>	2.9	3 900	4.1	5 450	4.9	6 550
<b>M 5</b>	6.0	6 350	8.5	8 950	10	10 700
<b>M 6</b>	10	9 000	14	12 600	17	15 100
<b>M 8</b>	25	16 500	35	23 200	41	27 900
<b>M10</b>	49	26 200	69	36 900	83	44 300
<b>M12</b>	86	38 300	120	54 000	145	64 500
<b>M14</b>	135	52 500	190	74 000	230	88 500
<b>M16</b>	210	73 000	295	102 000	355	123 000
<b>M18</b>	290	88 000	405	124 000	485	148 000
<b>M20</b>	410	114 000	580	160 000	690	192 000
<b>M22</b>	550	141 000	780	199 000	930	239 000
<b>M24</b>	710	164 000	1000	230 000	1200	276 000
<b>M27</b>	1050	215 000	1500	302 000	1800	363 000
<b>M30</b>	1450	262 000	2000	368 000	2400	442 000

1 Nm = 0.738 lb-ft  
1 N = 0.225 lb

Regular thread, Inch							
BOLT SIZE	BOLT DIA.	$F_V$	$T_A$	BOLT SIZE	BOLT DIA.	$F_V$	$T_A$
Inch	Inch	lbs	lb-in	Inch	Inch	lbs	lb-ft
4-40	0.112	540	12	1/4"-20	0.25	2850	12
4-48	0.112	600	13	1/4"-28	0.25	3250	14
6-32	0.138	820	23	5/16"-18	0.3125	4700	25
6-40	0.138	920	25	5/16"-24	0.3125	5200	25
8-32	0.164	1260	41	3/8"-16	0.375	6950	45
8-36	0.164	1320	43	3/8"-24	0.375	7900	50
10-24	0.19	1580	60	7/16"-14	0.4375	9600	70
10-32	0.19	1800	68	7/16"-20	0.4375	10700	80
				1/2"-13	0.5	12800	110
				1/2"-20	0.5	14400	120
				9/16"-12	0.5625	16400	150
				9/16"-18	0.5625	18300	170

1)  $T_A$  = tightening torque (Nm)  
 $F_V$  = initial clamping force (N)  
(screws oiled,  $\mu_{total} = 0.14$ )

Locking Assembly dimensions											Transmissible torques or axial forces						Weight			
d x D	d	C <sub>1</sub>	C <sub>b</sub>	D	C <sub>2</sub>	L	I	A <sub>t</sub>	F <sub>0</sub>	FA'	T	F <sub>ax</sub>	X				WT	d <sub>1</sub>	D <sub>1</sub>	T <sub>max</sub>
mm	Inch								psi	lb-ft	lbs	Inch				lbs 10 <sup>-3</sup>	Inch		lb-ft	
260 x 290	10.236			11.417		1.890	1.732	55.955	40917	438399	41676	97797	0.276	0.394	0.512	0.630	10584	10.268	11.386	87249
270 x 300	10.630			11.811	-0	1.890	1.732	58.125	39793	456385	44996	101169	0.276	0.394	0.512	0.630	10805	10.661	11.780	94157
280 x 313	11.024	+0	-0	12.323	+0.0032	2.087	1.929	66.805	46313	523831	53479	116906	0.276	0.433	0.551	0.669	13892	11.055	12.291	111663
290 x 323	11.417			12.717		2.087	1.929	69.130	49910	541817	57167	120279	0.276	0.433	0.551	0.669	14333	11.449	12.685	119337
300 x 333	11.811			13.110		2.087	1.929	71.610	48112	559802	61224	124775	0.276	0.433	0.551	0.669	14774	11.843	13.079	127854
320 x 360	12.598			14.173	-0	2.559	2.323	91.915	65647	719424	84090	159622	0.394	0.591	0.787	0.984	24035	12.638	14.134	177231
340 x 380	13.386			14.961	+0.0035	2.559	2.323	97.650	61151	764388	94786	169739	0.394	0.591	0.787	0.984	25358	13.425	14.921	200420
360 x 400	14.173	+0	-0	15.748	+0.0035	2.559	2.323	103.385	58004	809353	106219	179856	0.394	0.591	0.787	0.984	26901	14.213	15.709	224858
380 x 420	14.961	-0.0035	+0.0035	16.535		2.559	2.323	109.120	60477	854317	118390	189973	0.394	0.591	0.787	0.984	28224	15.000	16.496	249923
400 x 440	15.748			17.323	-0	2.559	2.323	115.010	57554	899281	131299	200090	0.394	0.591	0.787	0.984	29768	15.787	17.283	277097
420 x 460	16.535	+0	-0	18.110	+0.0038	2.559	2.323	120.590	54856	944245	144576	210207	0.394	0.591	0.787	0.984	31091	16.575	18.071	305640
440 x 480	17.323	-0.0038	+0.0038	18.898		2.559	2.323	126.325	52608	989209	158592	220324	0.394	0.591	0.787	0.984	32414	17.362	18.858	335509

More sizes on request

### ■ Mounting of Locking Element

The values for T, F<sub>ax</sub>, P<sub>W</sub> and P<sub>N</sub> apply to Locking Elements installed in oiled condition.

### ■ Surface finishes

For shafts and hub bores

**R<sub>a</sub> ≤ 63 RMS**

Required screw tension force

for Locking Elements solid:  $F_A = F_{A'} + F_0$

for Locking Elements slit:  $F_A = F_{A'}$

Where n-Locking Elements are used one behind the other (series), the following applies to the increase in T and F<sub>ax</sub>:

$$T_n = T_1 \cdot m \quad \text{and} \quad F_{axn} = F_{ax1} \cdot m$$

Retaining the values for T and F<sub>ax</sub> it is possible to reduce F<sub>A'</sub> and p where:

$$F_{A'n} = F_{A'}/m \quad \text{and} \quad p_n = p/m$$

With 2 / 3 / 4 Locking Elements, m = 1.555 / 1.86 / 2.03

For tolerances see table on 39/41.

The fits specified have given excellent service in practical operations. Naturally, the shafts and the bores can feature other clearances. Please contact our Technical Department.

1) approx. values

### ■ Undercut, clearance cut

The relatively narrow RINGFEDER® RfN 8006 Locking Elements mainly serve the purpose of transmitting large torques and axial forces. They are not self-centering. The concentricity accuracy of the clamped hub therefore depends on the centering and care with which installation is carried out. Locking Elements RfN 8006 can center themselves within the framework of their production accuracy if they are absolutely plane-parallel when pressed together.

## Explanations to tables

d, D, L, l = Basic dimensions, Locking Elements not tightened

$C_1$  = shaft tolerances

$C_b$  = hub bore tolerances

$C_2$  = bore tolerances

$A_t$  = effective bearing surface  $A_t = \pi \cdot d \cdot l$

X = travel distance for 1,2,3 or 4 Locking Elements. This value includes a safety allowance to ensure that the thrust flange will not contact the face of the hub or shaft. Any reduction of this value could cause a block and the transmission values of the connection would not be achieved.

T = transmissible torque

$F_{ax}$  = axial forces

T and  $F_{ax}$  refer to a pressure between the Locking Element and shaft of 14500 psi .

When solid Locking Elements the required total clamping force  $F_A$  is obtained by:

$$F_A = F_{A'} + F_O$$

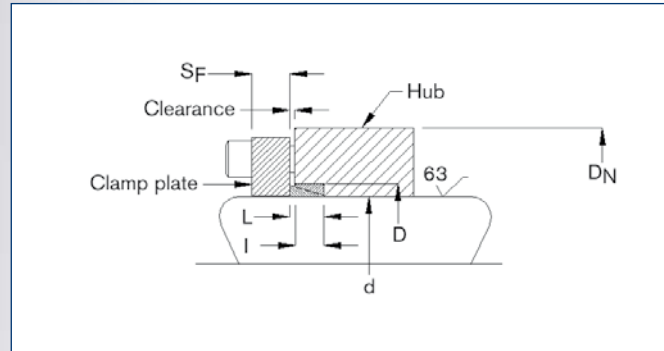
$F_{A'}$  = Screw number x Fv, see screw table page 40

$F_O$  = approximate clamping force required to bridge the clearances where the tolerances given in the table are fully exploited during manufacture, not applicable if slit Locking Elements are used.

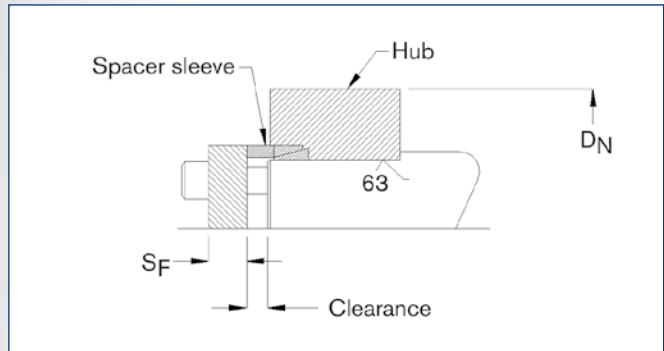
$d_1$  = clamp plate bore

$D_1$  = spacer sleeve OD

$T_{max}$  = transmissible torque by one Locking Element at a shaft contact pressure of = 47850 psi



Hub bolted Clamp Plate (hub axially adjustable)



Shaft bolted Clamp Plate (hub axially fixed)

## Explanations

- d = shaft diameter
- $C_1$  = machining tolerances for shaft (d)
- D = counter bore diameter
- $C_2$  = machining tolerances for counter bore (D)
- L, I = width dimensions, relaxed condition
- R = radius in hub bore
- $F_O$  = preload to bridge specified fit clearances
- $F_A$  = actual locking force to generate T
- T = transmissible torque for one Locking Element  
based on coefficient of friction of  $\mu = 0.15$  and  
10,000 psi contact pressure  
(torque can be increased by up to 50%)
- $F_{ax}$  = axial load (thrust capacity)
- $D_N$  = Hub outer diameter
- $S_F$  = Clamp plate thickness

Size	GSA dimensions						F <sub>o</sub>	F <sub>A</sub> '	Transmissible torques or axial forces		Weight WT
	d	C <sub>1</sub>	D	C <sub>2</sub>	L	I			T	F <sub>ax</sub>	
	Inch								psi	lb-in	
GSA-250	0.2500		0.3750		0.126	0.094	580	450	14	112	0.76
GSA-312	0.3125	+0	0.4375	-0	0.143	0.112	686	670	26	166	1.04
GSA-375	0.3750	-0.0005	0.5000	+0.0005	0.160	0.128	673	920	43	229	1.35
GSA-437	0.4375		0.5937		0.176	0.143	796	1196	65	297	2.20
GSA-500	0.5000		0.6562		0.193	0.158	944	1512	94	376	2.69
GSA-562	0.5625		0.7500	-0	0.210	0.174	1259	1872	132	469	3.97
GSA-625	0.6250		0.8125	+0.001	0.226	0.187	1231	2237	175	560	4.69
GSA-687	0.6875		0.8750		0.243	0.203	1414	2670	230	669	5.47
GSA-750	0.7500	+0	0.9375		0.260	0.219	1413	3145	295	787	6.33
GSA-812	0.8125	-0.001	1.0312		0.276	0.234	1617	3637	370	911	8.56
GSA-875	0.8750		1.0937	-0	0.293	0.250	1611	4188	458	1047	10.14
GSA-937	0.9375		1.1875	+0.0015	0.310	0.267	2087	4790	561	1197	12.36
GSA-1000	1.0000		1.2500		0.326	0.284	2090	5437	680	1360	14.05
GSA-1125	1.1250	+0	1.4060		0.359	0.312	2220	6620	840	1493	19.55
GSA-1250	1.2500	-0.0015	1.5310		0.393	0.344	2240	8105	1140	1824	23.54
GSA-1375	1.3750		1.6870		0.426	0.376	2745	9750	1510	2196	31.22
GSA-1500	1.5000		1.8120	-0	0.459	0.407	3030	11510	1940	2587	36.38
GSA-1625	1.6250	+0	1.9680	+0.002	0.492	0.437	3295	13390	2450	3015	46.43
GSA-1750	1.7500	-0.002	2.1250		0.526	0.469	3585	15475	3045	3480	58.53
GSA-1875	1.8750		2.2500		0.559	0.500	3595	17675	3730	3979	66.22
GSA-2000	2.0000		2.4060		0.592	0.528	5365	19910	4480	4480	81.09
GSA-2250	2.2500		2.6560		0.592	0.528	4795	22400	5670	5040	90.30
GSA-2437	2.4375		2.8430		0.592	0.528	4430	24260	6655	5461	97.07
GSA-2500	2.5000	+0	2.9060	-0	0.592	0.528	4330	24885	7000	5600	99.50
GSA-2687	2.6875	-0.003	3.0930	+0.003	0.592	0.528	4035	26750	8090	6020	106.26
GSA-2750	2.7500		3.1560		0.592	0.528	3950	27370	8470	6160	108.70
GSA-3000	3.0000		3.4060		0.592	0.528	3890	29860	10080	6720	117.90

\* Stainless steel available upon request.

\* Delivery on request; other sizes stocked. Contact Ringfeder Corporation for additional sizes and information.

## ■ Selection Guide

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

$$T = \frac{63,000 \text{ (lb-in)} \times \text{HP}}{\text{RPM}}$$

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

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

3. Determine the required locking force (F<sub>A</sub>'). A pre-load (F<sub>O</sub>) is required to bridge the clearance for the specified fits. The total required locking force is F<sub>A</sub>' = F<sub>O</sub> + F<sub>A</sub>'. The locking force is normally obtained by using one or more screws and a clamp plate.

4. Refer to screw tables on page 40 to determine the number, size and grade of screws needed for the required locking force and individual screw clamp load.

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



## Explanations to tables

d, D, L, l = Basic dimensions, Locking Elements not tightened

$C_1$  = shaft tolerances

$C_b$  = hub bore tolerances

$C_2$  = bore tolerances

$A_t$  = effective bearing surface  $A_t = \pi \cdot d \cdot l$

X = travel distance for 1,2,3 or 4 Locking Elements. This value includes a safety allowance to ensure that the thrust flange will not contact the face of the hub or shaft. Any reduction of this value could cause a block and the transmission values of the connection would not be achieved.

T = transmissible torque

$F_{ax}$  = axial forces

T and  $F_{ax}$  refer to a pressure between the Locking Element and shaft of 14500 psi .

When solid Locking Elements the required total clamping force  $F_A$  is obtained by:

$$F_A = F_{A'} + F_O$$

$F_{A'}$  = Screw number x Fv, see screw table page 40

$F_O$  = approximate clamping force required to bridge the clearances where the tolerances given in the table are fully exploited during manufacture, not applicable if slit Locking Elements are used.

$d_1$  = clamp plate bore

$D_1$  = spacer sleeve OD

$T_{max}$  = transmissible torque by one Locking Element at a shaft contact pressure of = 47850 psi



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