

SIT-LOCK® self locking elements

Advantages of SIT-LOCK® on the shaft-hub connection compared with traditional systems

Easy assembly and disassembly

Both actions take place by locking and unlocking the clamping screws with common tools.
The use of a torque wrench is only necessary when a more precise torque is required.

Superior holding power

The action of the clamping cones creates shaft clamping torque superior to a normal keyed hub.

Overload protection

When the pre-set torque is exceeded SIT-LOCK® will slip, preventing the connected elements from being broken.
Note: SIT-LOCK® units are not friction couplings so, excessive slip will cause damage.

Easy adjustment

Combining the SIT-LOCK® design of smooth cone action with superior holding power, the hub can be clamped at any position along a shaft, eliminating the need for lock washers, spacers, stop rings, etc.

Precision location

With the SIT-LOCK® smooth cone action, the SIT-LOCK® is ideal for clamping cams, timing devices, and indexing mechanisms accurately and precisely.

Temperature

-20 °C ÷ 150 °C

Unlimited use possibilities

SIT-LOCK® units are suitable to connect any type of hub (flywheels, chainwheels, gears, levers, pulleys, eccentrics, coupling, etc).

Various solutions in stock

Available in stock in 10 different types, SIT-LOCK® units can be utilized in a varied range of industrial applications

Order form

SIT-LOCK®	CAL	1	F25 /50
CAL: SIT-LOCK® self locking element			
Type			
Shaft diameter			
External diameter (hub bore)			

Performances

Given values of transmissible torque, axial force, and pressure between shaft and hub are valid for a lubricated installation (friction coefficient $\mu=0,12$). Both hub and shaft, as well as locking unit's contact surfaces and screws, should be lubricated.

Locking unit and screws are supplied already oiled.

Always consider tolerances and roughness values per single locking unit.

To avoid decrease of locking unit performances, do not use molybdenum disulfide lubricant or other substances that drastically reduce coefficient of friction.

Design procedure

For a correct functioning of SIT-LOCK®, the transmissible torque M_T (stated in this catalogue) must always exceed the maximum torque in operation. So, in selecting the SIT-LOCK® dimensions, you must consider the start up torque could be even 4 times larger than the nominal one.

The transmissible axial forces (F_{ax}) given in the tables are valid for cases where there is no torque. If it is necessary to transmit both a torque and an axial force (ex. helical gear), the following formula must be used:

$$M_T \geq \sqrt{M_a^2 + \left(\frac{F_{ax} \cdot d}{2000}\right)^2} \quad [Nm]$$

where:

M_a = maximum torque to be transmitted [Nm]

F_{ax} = axial force in operation [N]

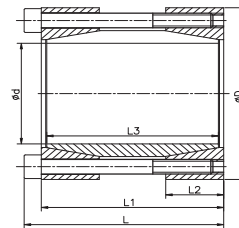
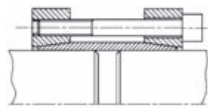
d = shaft diameter [mm]



SIT-LOCK® 10 - External Rigid Shaft Coupling

SIT-LOCK® 10 are shrink disk couplings with double taper design. They offer easy angular timing and axial adjustment of shaft ends.

They transmit high torque and bending moment without keys and offer a low cost solution for shaft to shaft rigid connection.



Installation

Carefully clean contact surfaces of shaft and hub. Then, lightly oil both surfaces with standard mineral oil. Position the SIT-LOCK® on the shaft and into the hub machined bore. Align them as required by the application. Gradually and uniformly tighten the locking screws to the tightening torque (Ms).

You must tighten the screws in diametrically opposite sequence in stages:

- hand tighten the screws until the surfaces are in contact
- carefully check the position of the hub on the shaft
- tighten the screws to half the value of the tightening torque (Ms) stated in the catalogue
- repeat the operation until the tightening torque is reached using the dynamometric screw-driver

- check every locking screw to insure it has been tightened to the specific tightening torque

Note: once the tightening torque is reached, do not continue to tighten the screws. Do not use lubricant like "Molykote" or molybdenum disulfide based oils.

Removal

Loosen all the locking screws in a clockwise sequence until coupling can be moved on shafts. Do not remove screws completely.

Note: Torouse the locking element, carefully oil the screws and the conical surfaces, then follow installation instructions.

Dimensions [mm]					Performances		Clamping screws (DIN 912 - 12,9)		
d x D	L	L1	L2	L3	M _T [Nm]	F _{ax} [kN]	N°	Type	M _s [Nm]
17 x 50	56	50	16	44	179	21	4	M6x45	17
18 x 50	56	50	16	44	190	21	4	M6x45	17
19 x 50	56	50	16	44	200	21	4	M6x45	17
20 x 50	56	50	16	44	211	21	4	M6x45	17
22 x 55	66	60	18,5	54	347	32	6	M6x55	17
24 x 55	66	60	18,5	54	379	32	6	M6x55	17
25 x 55	66	60	18,5	54	394	32	6	M6x55	17
28 x 60	66	60	18,5	54	442	32	6	M6x55	17
30 x 60	66	60	18,5	54	473	32	6	M6x55	17
32 x 63	66	60	18,5	54	505	32	6	M6x55	17
35 x 75	83	75	22	67	682	39	4	M8x70	42
38 x 75	83	75	22	67	741	39	4	M8x70	42
40 x 75	83	75	22	67	780	39	4	M8x70	42
42 x 78	83	75	22	67	819	39	4	M8x70	42
45 x 85	93	85	24,5	76	1.317	59	6	M8x80	42
48 x 90	93	85	24,5	76	1.405	59	6	M8x80	42
50 x 90	93	85	24,5	76	1.463	59	6	M8x80	42
55 x 94	93	85	24,5	76	2.147	78	8	M8x80	42
60 x 100	93	85	24,5	76	2.343	78	8	M8x80	42
65 x 105	93	85	24,5	76	2.538	78	8	M8x80	42
70 x 115	110	100	29	90	3.239	93	6	M10x95	83
75 x 120	110	100	29	90	3.471	93	6	M10x95	83
80 x 125	110	100	29	90	4.938	123	8	M10x95	83

Notes:

Dimensions representing the total length of the hub are indicative; they are calculated according to the geometric rules.

For assemblies requiring larger dimensions, contact our Technical Department.

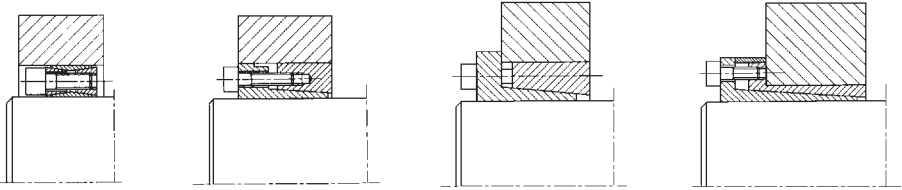
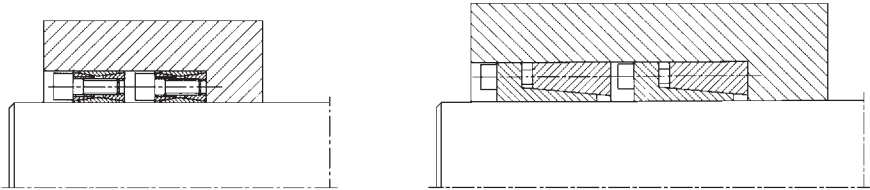
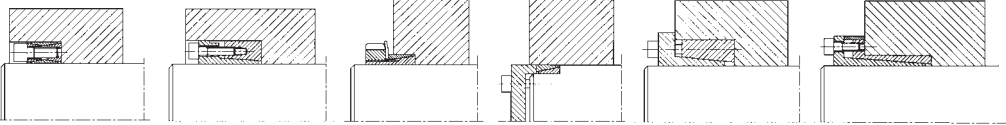
Maximum allowable roughness
Rt 16 µm
Maximum recommended tolerance
shaft h 8

M _S	Screw tightening torque	Nm
M _T	Transmissible torque moment	Nm
F _{ax}	Transmissible axial load	N

Design of hub outside minimum diameter

When using the locking units, the shaft-hub connection is characterized by a pressure on the hub surface, which is exerted by the locking unit outer ring when the clamping screws are tightened to the stated value. It is important to design correctly the hub outside diameter. The following table summarizes the procedure as a simple calculation. To determine the hub outside minimum

diameter, simply multiply the factor K by the SIT-LOCK® outside diameter to obtain the hub outside minimum diameter. The factor K varies depending on the yield limit of hub material, the hub surface pressure (Pn) and the factor (x), variable according to the application type (A, B, C).

<p>Installation type A ($L_M \cong L_C$) X = 1</p> 
<p>Installation type B ($L_M \cong 2 L_C$) X = 0,8</p> 
<p>Installation type C ($L_M > 2 L_C$) X = 0,6</p> 
<p>Hub min diameter $D \times K$ for: K = factor stated in the table D = SIT-LOCK® outside diameter</p>

L_M	Hub length	mm
L_C	SIT-LOCK® length	mm

Hollow shaft

For application with locking-assemblies on hollow shaft, it is important to scale both hub minimum diameter and hollow

shaft diameter. Contact our Technical Department for design.

Coefficient K

Hub surface pressure		Yield limit of hub material σ_{02} [N/mm ²]										
		150	180	200	220	250	270	300	350	400	450	600
		Hub material										Heat treatment steel
P_n [N/mm ²]	Application	GG 20	GG 25 GS 38	GG 30 GTS 35	GS 45 ST 37-2	GG 40 GS 52	ST 50-2 C 35	GG 50 GS 60 ST 60-2	GG 60 GS 62 ST 70-2	GG 70 GS 70 C 60		
60	C	1,29	1,26	1,21	1,19	1,16	1,15	1,13	1,11	1,10	1,09	1,07
	B	1,40	1,31	1,25	1,24	1,23	1,21	1,19	1,16	1,13	1,12	1,09
	A	1,53	1,43	1,37	1,33	1,29	1,26	1,23	1,19	1,17	1,15	1,11
65	C	1,31	1,26	1,23	1,21	1,19	1,16	1,14	1,12	1,11	1,10	1,08
	B	1,45	1,36	1,31	1,29	1,25	1,23	1,21	1,17	1,15	1,13	1,10
	A	1,61	1,46	1,41	1,36	1,31	1,29	1,25	1,21	1,19	1,17	1,13
70	C	1,35	1,27	1,25	1,23	1,19	1,17	1,16	1,13	1,12	1,11	1,08
	B	1,49	1,39	1,35	1,31	1,26	1,24	1,21	1,19	1,16	1,14	1,11
	A	1,66	1,51	1,46	1,41	1,35	1,31	1,26	1,23	1,21	1,18	1,14
75	C	1,31	1,29	1,26	1,24	1,21	1,19	1,16	1,15	1,13	1,12	1,09
	B	1,53	1,43	1,37	1,33	1,29	1,26	1,23	1,19	1,17	1,15	1,12
	A	1,75	1,56	1,49	1,43	1,37	1,34	1,31	1,26	1,21	1,19	1,14
80	C	1,40	1,32	1,29	1,26	1,22	1,21	1,19	1,16	1,14	1,12	1,09
	B	1,59	1,46	1,40	1,36	1,31	1,28	1,25	1,21	1,19	1,16	1,12
	A	1,82	1,62	1,54	1,47	1,40	1,37	1,32	1,27	1,23	1,21	1,15
85	C	1,43	1,35	1,31	1,28	1,24	1,22	1,20	1,17	1,15	1,13	1,10
	B	1,64	1,50	1,43	1,39	1,33	1,30	1,27	1,23	1,20	1,17	1,13
	A	1,91	1,68	1,58	1,51	1,43	1,40	1,35	1,29	1,25	1,22	1,16
90	C	1,47	1,37	1,33	1,29	1,26	1,23	1,21	1,18	1,16	1,14	1,10
	B	1,70	1,54	1,47	1,41	1,35	1,32	1,29	1,24	1,21	1,19	1,14
	A	2,01	1,74	1,63	1,55	1,47	1,42	1,37	1,31	1,27	1,23	1,17
95	C	1,50	1,40	1,35	1,31	1,27	1,25	1,22	1,19	1,16	1,15	1,11
	B	1,76	1,58	1,50	1,44	1,38	1,35	1,31	1,26	1,22	1,20	1,15
	A	2,12	1,81	1,69	1,60	1,50	1,45	1,40	1,33	1,28	1,25	1,18
100	C	1,54	1,42	1,37	1,33	1,29	1,26	1,23	1,20	1,17	1,15	1,12
	B	1,82	1,62	1,54	1,47	1,40	1,37	1,32	1,27	1,23	1,21	1,15
	A	2,25	1,88	1,74	1,64	1,54	1,49	1,42	1,35	1,30	1,26	1,19
105	C	1,57	1,45	1,40	1,35	1,30	1,28	1,25	1,21	1,18	1,16	1,12
	B	1,89	1,67	1,57	1,51	1,43	1,39	1,34	1,29	1,25	1,22	1,16
	A	2,39	1,96	1,80	1,69	1,57	1,52	1,45	1,37	1,32	1,28	1,20
110	C	1,61	1,48	1,42	1,37	1,32	1,29	1,26	1,22	1,19	1,17	1,13
	B	1,97	1,72	1,61	1,54	1,45	1,41	1,36	1,30	1,26	1,23	1,17
	A	2,56	2,05	1,87	1,74	1,61	1,55	1,48	1,39	1,34	1,29	1,21
115	C	1,65	1,51	1,44	1,37	1,34	1,31	1,27	1,23	1,20	1,18	1,13
	B	2,05	1,77	1,65	1,57	1,48	1,44	1,38	1,32	1,27	1,24	1,18
	A	2,76	2,14	1,94	1,80	1,65	1,59	1,51	1,42	1,35	1,31	1,22
120	C	1,70	1,54	1,47	1,40	1,35	1,32	1,29	1,24	1,21	1,19	1,14
	B	2,14	1,82	1,70	1,61	1,51	1,46	1,40	1,34	1,29	1,25	1,19
	A	3,01	2,25	2,01	1,85	1,70	1,62	1,54	1,44	1,37	1,32	1,23
125	C	1,74	1,57	1,49	1,44	1,37	1,34	1,30	1,25	1,22	1,19	1,14
	B	2,25	1,88	1,74	1,64	1,54	1,49	1,42	1,35	1,30	1,26	1,19
	A	3,33	2,36	2,09	1,92	1,74	1,66	1,57	1,46	1,39	1,34	1,25
130	C	1,79	1,60	1,52	1,46	1,39	1,36	1,31	1,26	1,23	1,20	1,15
	B	2,36	1,94	1,79	1,68	1,57	1,51	1,45	1,37	1,31	1,28	1,20
	A	3,75	2,50	2,18	1,98	1,79	1,70	1,60	1,49	1,41	1,36	1,26
135	C	1,84	1,62	1,55	1,48	1,41	1,37	1,33	1,28	1,24	1,21	1,16
	B	2,49	2,01	1,84	1,72	1,60	1,54	1,47	1,39	1,33	1,29	1,21
	A	4,37	2,66	2,28	2,05	1,84	1,74	1,63	1,51	1,43	1,37	1,27
140	C	1,89	1,67	1,57	1,51	1,43	1,39	1,34	1,29	1,25	1,22	1,16
	B	2,64	2,08	1,89	1,76	1,63	1,55	1,49	1,40	1,34	1,30	1,22
	A	5,40	2,84	2,39	2,13	1,89	1,79	1,67	1,54	1,45	1,39	1,28
145	C	1,95	1,70	1,60	1,53	1,45	1,41	1,36	1,30	1,26	1,23	1,17
	B	2,81	2,16	1,95	1,81	1,66	1,59	1,51	1,42	1,36	1,31	1,23
	A	7,67	3,06	2,51	2,22	1,95	1,83	1,70	1,56	1,47	1,41	1,29
150	C	2,01	1,74	1,63	1,55	1,47	1,42	1,37	1,31	1,27	1,24	1,17
	B	3,01	2,25	2,01	1,85	1,70	1,62	1,54	1,44	1,37	1,32	1,24
	A	—	3,33	2,66	2,31	2,01	1,88	1,74	1,59	1,49	1,42	1,30
155	C	2,07	1,78	1,66	1,58	1,49	1,44	1,39	1,32	1,28	1,25	1,18
	B	3,26	2,34	2,07	1,90	1,73	1,66	1,56	1,46	1,39	1,34	1,24
	A	—	3,67	2,81	2,41	2,07	1,93	1,78	1,62	1,52	1,44	1,31
160	C	2,14	1,82	1,70	1,61	1,51	1,46	1,40	1,34	1,29	1,25	1,19
	B	3,56	2,44	2,14	1,95	1,77	1,68	1,59	1,48	1,40	1,35	1,25
	A	—	4,13	3,01	2,53	2,14	1,99	1,82	1,65	1,54	1,48	1,32
165	C	2,22	1,87	1,73	1,63	1,53	1,48	1,42	1,35	1,30	1,26	1,19
	B	3,97	2,56	2,22	2,01	1,81	1,72	1,61	1,50	1,42	1,36	1,26
	A	—	4,81	3,24	2,66	2,22	2,05	1,87	1,68	1,56	1,48	1,34

Note: p_n is stated in the dimensional table of each of the locking assemblies. Installation type (A, B, C) are stated in the previous page.

Example of calculation procedure

Design data

- Power transmission element to be connected: V-pulley
- Shaft diameter: 50 mm
- Maximum Torque in operation (Ma): 1.500 Nm
- V-pulley material: cast iron GG20
- Yield limit of V-pulley material: 150 N/mm²

Calculation

- SIT-LOCK® type: for this kind of application SIT-LOCK® 1 is suggested
- Size selection: 50 x 80 mm (see table SIT-LOCK® 1)
- Performance control: verify $M_T \geq M_a$
From the table obtain $M_T = 1.889$ Nm, so the above condition is verified
- Tolerance: h11 for the shaft - H11 for the SIT-LOCK® bore
- Roughness: $R_t \leq 16$
- Screws tightening torque: $M_s = 37$ Nm (see table SIT-LOCK® 1)
- Hub surface pressure: from the table you can find the value $P_n = 125$ N/mm²
- Application type: in this case it is preferable to adopt the application "C" with the centering guide between shaft and hub

- Coefficient K : obtained through the table "Coefficient K" by considering the following information:
 - yield limit of hub material = 150 N/mm²
 - hub surface pressure = 125 N/mm²
 - installation C
 Then, $K = 1,74$

- Hub outside minimum diameter:

$$\text{Hub } D_{\min} \geq D \cdot K$$

for

- D = SIT-LOCK® outside diameter [mm]
- K = 1,74

Then, hub $D_{\min} = (80 \cdot 1,74) = 140$ [mm]

DIN 912

Screw diameter	P _v [N]			M _s [Nm]		
	8,8	10,9	12,9	8,8	10,9	12,9
M2,5	1.600	2.140	2.565	0,76	1,0	1,2
M3	2.210	3.110	3.730	1,3	1,9	2,2
M4	3.900	5.450	6.550	2,9	4,1	4,9
M5	6.350	8.950	10.700	6	8,5	10
M6	9.000	12.600	15.100	10	14	17
M7	13.200	18.500	22.200	16	23	28
M8	16.500	23.200	27.900	25	35	41
M9	22.000	30.900	37.100	36	51	61
M10	26.200	36.900	44.300	49	69	83
M12	38.300	54.000	64.500	86	120	145
M14	52.500	74.000	88.500	135	190	230
M16	73.000	102.000	123.000	210	295	355
M18	88.000	124.000	148.000	290	405	485
M20	114.000	160.000	192.000	410	580	690
M22	141.000	199.000	239.000	550	780	930
M24	164.000	230.000	276.000	710	1.000	1.200
M27	215.000	302.000	363.000	1.050	1.500	1.800
M30	262.000	368.000	442.000	1.450	2.000	2.400

SIT-LOCK®