

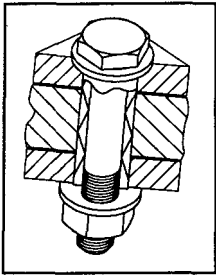


Shur-Lok

Expandable Diameter Fasteners Catalog

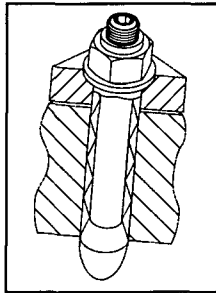
TABLE OF CONTENTS

General Introduction 1/2



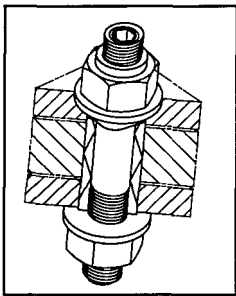
Expandable Dia. Bolt Features and Benefits 3

SL50101 Expandable Dia. Bolts..... 4
SLT50015 Installation Tool - Expandable Dia. Bolts & Shafts 5



Expandable Dia. Blind Bolt Features and Benefits6

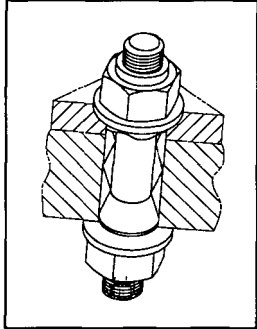
SL51101 Expandable Dia. Blind Bolts..... 7/8



Expandable Dia. Shafts Features and Benefits 9

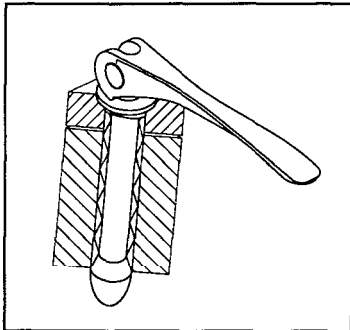
SL52101 Expandable Dia. Shafts 10

TABLE OF CONTENTS CONTINUED



Expandable Dia. Clamp -Up Bolt Features and Benefits.. 11

SL53101	Expandable Dia. Clamp - Up Bolts	12
---------	--	----



Expandable Dia. Cam Actuated Features and Benefits. 13/15

SL54101	Pin Expandable Dia. Cam Actuated.....	16/17
---------	---------------------------------------	-------

EXPANDABLE BUSHING CONCEPT

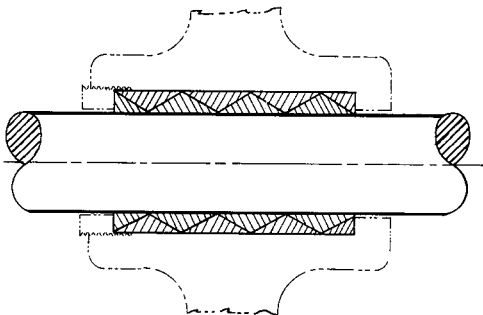
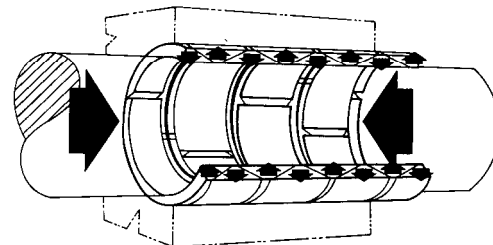
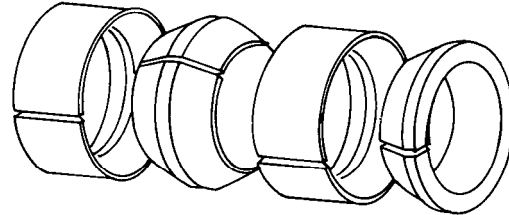
Expandable bushings provide a means of accomplishing a specific cylindrical fit of a round object in a round hole by a simple mechanical adjustment rather than the usual reliance upon expensive, close-tolerance machining, press or "freeze" fits, etc.

Expandable bushings are basically mechanical sleeve type bushings, capable of creating a variable wall thickness which can be adjusted at the time of the initial installation or at any desired time thereafter. Such bushings are made up of an assembly of short bushing elements, alternately tapered on the I.D. and O.D. so as to mate with each other as illustrated. An axial slot thru one wall of each element permits easy diametrical adjustment.

A compressive force applied against the ends of such an assembly, i.e., to shorten its overall length, forces the female segments to expand, creating a larger effective O.D. on the assembly. At the same time the male segments are forced inwards to create a smaller I.D.; the net result being a thicker wall on the bushing assembly. Each individual segment is free to find its own seat or diametrical limit when adjusted, permitting use in stepped or slightly tapered holes.

This design provides a mechanical sleeve type bushing which installs freely and easily and can be adjusted for virtually any desired tightness of cylindrical fit. When the adjusting force is relaxed, the bushing segments return to their original diameters, are easily removed and readily reusable.

Made of appropriate materials they make a plain sleeve bearing that (a) requires no machining at the time of installation in order to establish the proper fit; (b) can be adjusted at any time for a looser or tighter fit, or to compensate for wear; (c) makes replacement simpler to accomplish than with an ordinary pressed fit bushing; (d) when properly arranged with an adjusting mechanism, readily functions as an intermittent clutch, brake, mechanical fuse, etc.



EXPANDABLE BUSHING APPLICATIONS

The expandable bushing performs successfully when utilized as an improved method of mounting anti-friction bearings in applications previously considered impossible due to high inertia or dynamic loads, as in crank journals or other reciprocating machinery applications.

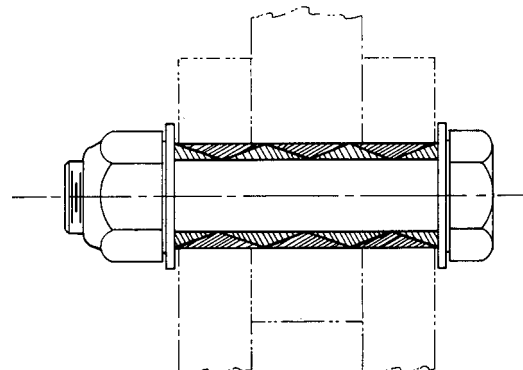
Similarly, expandable bushings are commonly utilized as shaft clamps, or means of securing machine elements such as gears, sprockets, pulleys, etc., onto shafts. Properly arranged, extremely high torque loads can be transmitted in this manner while providing fatigue capabilities superior to more conventional shaft mounting methods. Removal, relocation and indexing of such hub devices on a shaft are simplified.

This expandable bushing concept has been utilized to create a family of expandable diameter fasteners, including expandable diameter bolts, expandable diameter blind bolts, expandable diameter quick-acting pins, and others.

EXPANDABLE DIAMETER BOLTS

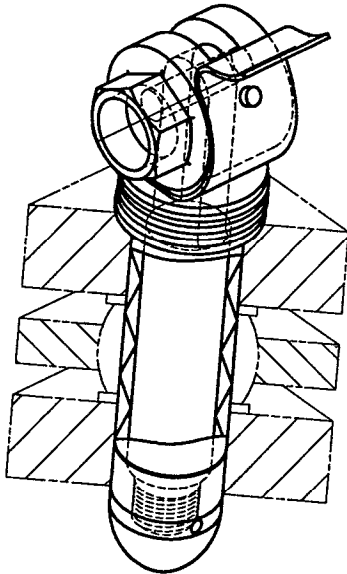
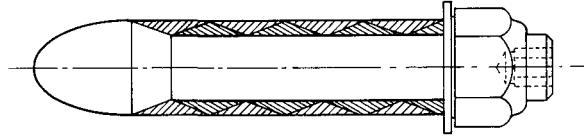
An expandable bushing assembly installed on the shank of an ordinary bolt creates an expandable diameter bolt that installs freely and easily in a hole. When the nut is tightened against the bushing assembly it becomes radially tight in the hole. Such expandable diameter bolts are as easy to remove as an ordinary nut and bolt and every bit as reusable.

Expandable diameter bolts provide the capability of fabricating demountable rigid (minimum deflection under load) structural joints. The extremely tight radial fit of these fasteners makes them ideal for resisting shock loads, severe vibration, reversing, and cyclic shear fatigue type loading.



EXPANDABLE DIAMETER BLIND BOLTS

Modifying an expandable bolt slightly by reducing the head of the core bolt so that it will pass freely thru the structure hole and adding a means by which the core bolt may be restrained against rotation while wrenching the nut gives one a true expandable diameter blind bolt. This type fastener can be installed and tightened from one side of the structure and is ideal for use in blind holes. Further, it is easily removed and readily reusable.



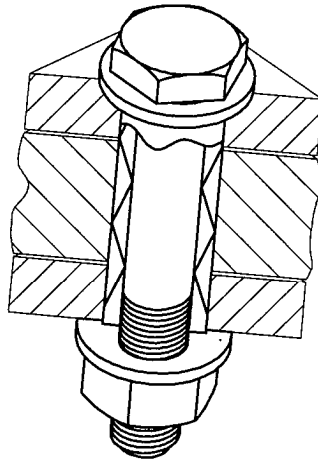
EXPANDABLE DIAMETER QUICK-ACTING PINS

When the blind bolt is modified to utilize a cam type handle to expand the bushings rather than a threaded nut, you have a quick-acting expandable diameter pin. Such a pin can be tightened or relaxed by one simple, quick, easy motion, yet when installed, provides a tight radial fit in the hole. When relaxed, there is ample clearance for installation and removal. This type fastener offers high shear capability and, being radially tight in the hole, is applicable in areas of high shear fatigue, high shock loading, and difficult vibration. Its capability in this area is exhibited by its growing popularity for attaching the blades to the rotor on helicopters where it has provided hundreds of thousands of hours of satisfactory service.

Being hole filling, expandable diameter pins make ideal tooling aids by providing good alignment of attached parts. Additionally, since these pins shorten slightly on being tightened in the hole, they provide a clamp-up capability that is often utilized where a quick-acting clamping method is required such as the closing of hand operated molds, tooling clamps and fixtures, etc.

The radial tightness developed by these installed pins results in their ability to resist a fair tensile load and they are therefore utilized in tensile applications such as anchoring or hoisting operations. Since they are installed and removed entirely from one side of the structural joint they are truly blind fasteners and function perfectly in blind holes.

EXPANDABLE DIA. BOLT FEATURES and BENEFITS



FEATURES AND BENEFITS

- Eliminates all radial clearance.
- Creates a rigid joint.
- Eliminates wear in the joint.
- Provides hole alignment and repeatability.
- Provides high reusability.

LIMITATIONS

- Limited axial clamp-up capability.
- Reusability limited only by thread wear.

STANDARD NOMINAL HOLE SIZES

.1900 through 1.500 inch

SPECIAL OPTIONS

- Captive Segments- To prevent removal of the bushing segments from the core bolt when the nut and washer are removed, thus eliminating loss of the individual segments.
- Lanyard - To secure the removed fastener nears its hole to prevent loss and provide for easier installation.
- Impedance Ring- Prevents loss of the fastener from the hole even if radial tightness is lost.
- Dual locking features such as cotter pins, lock wires, etc.

METRIC SIZES AVAILABLE ON REQUEST

EXPANDABLE DIA. BOLTS

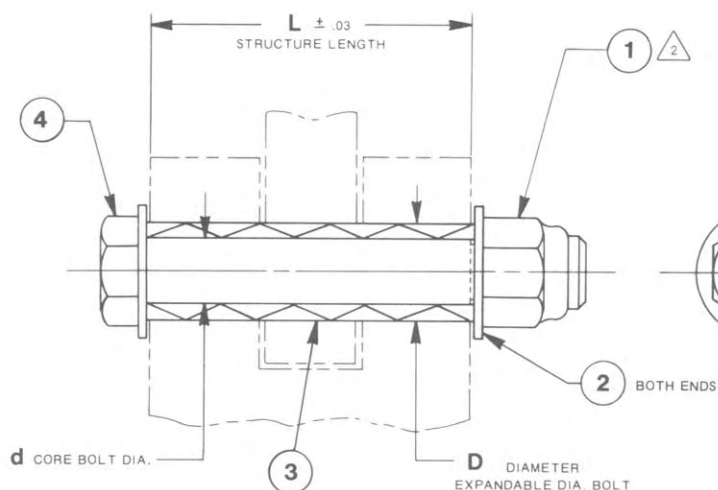


TABLE I

DIAMETER DESIGNATION		RECOMMENDED HOLE DIA.		RELAXED FASTENER DIA.	d CORE BOLT DIA.	L LONGEST STD. LENGTH
DASH NO.	NOM. DIA.	MIN.	MAX.			
3	3/16	.189	.193	.186	.138	1.50
4	1/4	.249	.254	.246	.190	
5	5/16	.312	.317	.307	.216	2.00
6	3/8	.374	.379	.369	1/4	
7	7/16	.437	.442	.431	5/16	3.00
8	1/2	.499	.505	.493	3/8	
9	9/16	.562	.568	.556	7/16	4.00
10	5/8	.624	.630	.617		
12	3/4	.749	.757	.742	9/16	6.00
14	7/8	.874	.882	.866	5/8	
16	1.00	.999	1.010	.991	3/4	
18	1 1/8	1.124	1.135	1.116	7/8	
20	1 1/4	1.249	1.260	1.241	1	
22	1 3/8	1.374	1.385	1.366	1 1/8	
24	1 1/2	1.499	1.510	1.491	1 1/4	

FOR SHADED SIZES CONSULT SHUR-LOK FOR MINIMUM ORDER QUANTITY

TABLE II

	ITEM	MATERIAL	HEAT TREAT	FINISH
1	NUT-SELF LOCKING	CRES 17-4PH	COND. H-1000	PASSIVATE & DRI-FILM LUBE
2	WASHERS	CRES 17-7 PH		
3	BUSHINGS	CRES 17-4PH	COND. H-900	PASSIVATE
4	CORE BOLT			

NOTES:

3. USE OF INSTALLATION TOOL FACILITATES INSTALLATION AND REMOVAL OF EXPANDABLE DIAMETER BOLTS. SEE SHUR-LOK DRWG. NO. SLT 50015

2. NUT DIMENSIONS PER MS 21044; THREAD LOCKING PER MIL-N-25027.

1. OTHER DIAMETERS, LENGTHS, MATERIALS, ETC. ON SPECIAL ORDER.

SHUR-LOK ENGINEERING IS AVAILABLE TO ASSIST IN THE APPLICATION OR ADAPTATION OF EXP. DIA. FASTENERS TO SPECIFIC APPLICATIONS.

EXAMPLE OF PART NUMBER WITH EXPLANATION OF CODING:

SL50101-6 R 24

L STRUCTURE LENGTH IN 1/16 INCH INCREMENTS (24 = 1 1/2 INCH NOM. LENGTH)
 MATERIAL R=SEE LIST OF MATERIAL, TABLE II
 D DIA. DESIGNATION NOM. DIAMETER IN 1/16 INCH INCREMENTS (6 = 3/8 INCH NOM. DIA.)
 BASIC PART NUMBER: STANDARD EXPANDABLE DIAMETER BOLT

UNLESS OTHERWISE SPECIFIED INTERPRET DIMENSIONS & TOLERANCES PER ANSI Y14.5M. ALL DIMENSIONS APPLY AFTER PLATING AND PRIOR TO THE ADDITION OF SOLID FILM LUBRICANT. 125 [3.2] ALL SURFACES
 TOLERANCES
 .XX .XXX ANGLES [X.X] [X.X X]
 ±.03 ±.010 ±2° ±[0.8] ±[0.25]
 DIMENSIONS IN [] ARE MILLIMETERS

SHUR-LOK CORPORATION
 IRVINE, CALIFORNIA 92614
 TELEPHONE: (949) 474-6000

SHUR-LOK

SHUR-LOK INTERNATIONAL, S.A.
 PETIT-RECHAIN, BELGIUM
 TELEPHONE: (32) 87-32.07.11

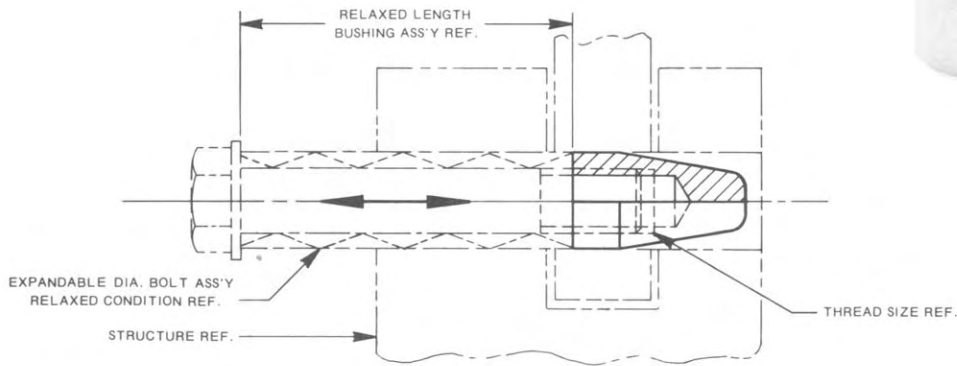
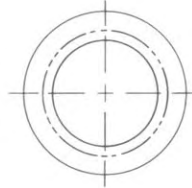
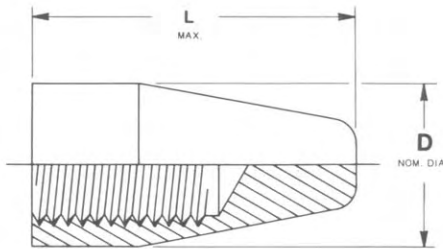
EXPANDABLE DIA. BOLTS

SL50101

SHEET 1 OF 1

REVISION C 06 JAN 1999

INSTALLATION TOOL



INSTALLATION TOOL DESIGNATION		THREAD SIZE REF.	L LENGTH MAX.
DASH NO.	NOM DIA.		
3	3/16	6-32	.53
4	1/4	10-32	.72
5	5/16	12-28	.72
6	3/8	.25-28	.91
7	7/16	.31-24	1.03
8	1/2	.38-24	1.16
9	9/16	.44-20	1.28
10	5/8	.44-20	1.28
12	3/4	.56-18	1.53
14	7/8	.62-18	1.66
16	1.00	.75-16	1.78
18	1 1/8	.88-14	1.91
20	1 1/4	1.00-12	2.03
22	1 3/8	1.12-12	2.28
24	1 1/2	1.25-12	2.53

FOR SHADED SIZES CONSULT SHUR-LOK FOR MINIMUM ORDER QUANTITY

EXAMPLE OF PART NUMBER WITH EXPLANATION OF CODING:

SLT 50015-3

D DASH NO. (NOM. SIZE)
(NOM. DIA. IN 1/16 INCH INCREMENTS)

BASIC PART NUMBER: INSTALLATION TOOL EXPANDABLE DIAMETER BOLTS AND SHAFTS

INSTALLATION AND REMOVAL PROCEDURE EXPANDABLE DIAMETER BOLTS & SHAFTS

1.) INSTALLATION

- REMOVE NUT AND WASHER FROM BOLT ASSEMBLY.
- THREAD APPROPRIATE INSTALLATION TOOL ON END OF CORE BOLT, UNTIL SNUG WITH END OF RELAXED BUSHING ASSEMBLY. (DO NOT EXPAND SEGMENTS).
- INSERT ASSEMBLY THRU STRUCTURE. MANIPULATE STRUCTURAL PARTS TO BRING HOLES INTO SUFFICIENT ALIGNMENT TO PERMIT BOLT ASSEMBLY TO INSTALL FREELY.
- UNTHREAD INSTALLATION TOOL AND REPLACE WASHER AND NUT.
- TORQUE NUT AS REQUIRED TO PROVIDE THE DESIRED RADIAL TIGHTNESS OF THE BOLT ASSEMBLY.

2.) REMOVAL

- REMOVE WASHER AND NUT FROM BOLT ASSEMBLY.
- THREAD APPROPRIATE INSTALLATION TOOL ON END OF CORE BOLT, UNTIL SNUG WITH END OF RELAXED BUSHING ASSEMBLY.
- IF BUSHING ASSEMBLY SHOULD REMAIN TIGHT IN STRUCTURE AFTER WASHER AND NUT ARE REMOVED PROCEED WITH STEP 2B EXCEPT ALLOW APPROX. 1/8 INCH GAP BETWEEN INSTALLATION TOOL AND TIGHT BUSHING ASSEMBLY. TAP LIGHTLY ON END OF INSTALLATION TOOL, WHILE SHIFTING STRUCTURE, TO RELAX THE BUSHING ASSEMBLY.
- MANIPULATE THE STRUCTURAL PARTS WHILE REMOVING THE BOLT ASSEMBLY, THUS RELIEVING THE RESIDUAL LOADS ON THE STRUCTURAL JOINT SO EXPANDABLE BOLT IS LOOSE (NOT UNDER A BIND) AND CAN BE FREELY REMOVED FROM THE HOLE.

SHUR-LOK ENGINEERING IS AVAILABLE TO ASSIST IN THE APPLICATION OR ADAPTATION OF EXP. DIA. FASTENERS TO SPECIFIC APPLICATIONS.

REVISION A 25 NOV 1980

UNLESS OTHERWISE SPECIFIED
INTERPRET DIMENSIONS & TOLERANCES PER
ANSI Y14.5M. ALL DIMENSIONS APPLY AFTER
PLATING AND PRIOR TO THE ADDITION OF SOLID
FILM LUBRICANT. 125 [3.2]

TOLERANCES
.XX .XXX ANGLES [X.X] [X.X X]
±.03 ±.010 ±2° ±[0.8] ±[0.25]
DIMENSIONS IN [] ARE MILLIMETERS

SHUR-LOK CORPORATION
IRVINE, CALIFORNIA 92614
TELEPHONE: (949) 474-6000

SHUR-LOK

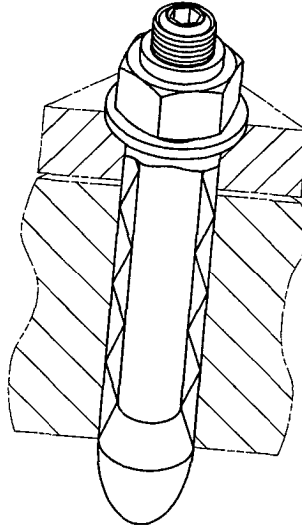
SHUR-LOK INTERNATIONAL, S.A.
PETIT-RECHAIN, BELGIUM
TELEPHONE: (32) 87-32.07.11

INSTALLATION TOOL, EXPANDABLE DIA. BOLTS AND SHAFTS

SLT50015

SHEET 1 OF 1

EXPANDABLE DIA. BLIND BOLT FEATURES and BENEFITS



FEATURES AND BENEFITS

- Eliminates all radial clearance.
- Creates a rigid joint.
- Provides hole alignment and repeatability.
- Provides high reusability.
- Useable in applications where access is limited to one side, or a blind hole is required.
- Provides quick installation and removal.

LIMITATIONS

- Limited axial clamp-up capability.
- Reusability limited only by thread wear.

STANDARD NOMINAL HOLE SIZES

- .1900 through 1.500 inch

SPECIAL OPTIONS

- Lanyard - to secure the removed fastener near installation hole to prevent loss and provide easier installation.
- Lock Ring - A bushing segment that is designed to provide limited expansion greater than the hole diameter. This segment is located outside the hole to enhance the ability of the fastener to resist tensile loads.
- Impedance Ring - Prevents loss of the fastener from the hole even if radial tightness is lost.
- Dual locking features such as cotter pins, lock wires, etc.

METRIC SIZES AVAILABLE ON REQUEST



EXPANDABLE DIA. BLIND BOLTS

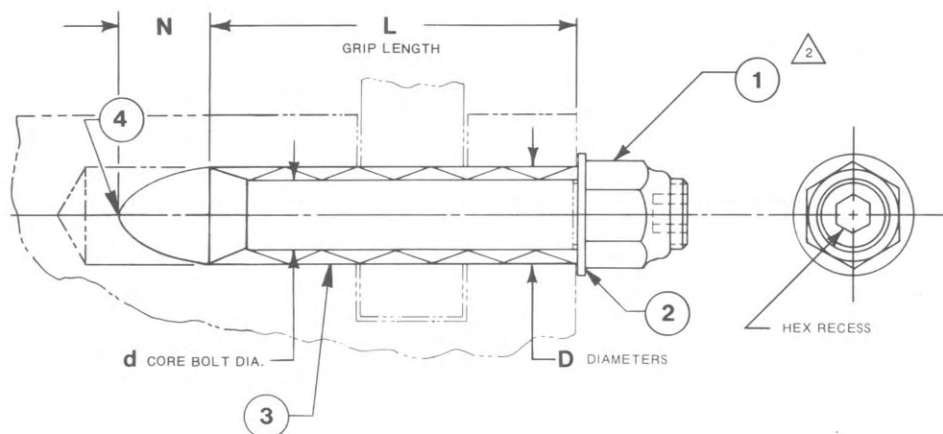


TABLE I

DIAMETER DESIGNATION		D		RELAXED FASTENER DIA.	d CORE BOLT DIA.	N NOSE LENGTH MAX.	L LONGEST STD. LENGTH
		RECOMMENDED HOLE DIA.					
DASH NO.	NOM. DIA.	MIN.	MAX.				
3	3/16	.189	.193	.186	.138	.19	1.50
4	1/4	.249	.254	.246	.190	.25	
5	5/16	.312	.317	.307	.216	.31	2.00
6	3/8	.374	.379	.369	1/4	.38	
7	7/16	.437	.442	.431	5/16	.44	3.00
8	1/2	.499	.505	.493	3/8	.50	
9	9/16	.562	.568	.556	7/16	.56	
10	5/8	.624	.630	.617		.63	4.00
12	3/4	.749	.757	.742	9/16	.75	
14	7/8	.874	.882	.866	5/8	.86	
16	1.00	.999	1.010	.991	3/4	1.00	
18	1 1/8	1.124	1.135	1.116	7/8	1.12	6.00
20	1 1/4	1.249	1.260	1.241	1	1.25	
22	1 3/8	1.374	1.385	1.366	1 1/8	1.36	
24	1 1/2	1.499	1.510	1.491	1 1/4	1.50	

FOR SHADED SIZES CONSULT SHUR-LOK FOR MINIMUM ORDER QUANTITY

TABLE II

	ITEM	MATERIAL	HEAT TREAT	FINISH
1	NUT-SELF LOCKING	CRES 17-4PH	COND. H-1000	PASSIVATE & DRI-FILM LUBE
2	WASHER	CRES 17-7 PH		
3	BUSHINGS	CRES 17-4PH	COND H-900	
4	CORE BOLT			PASSIVATE

NOTES:

3. SEE SHEET 2 FOR OPTIONAL FEATURES

NUT DIMENSIONS PER MS 21044; THREAD LOCKING PER MIL-N-25027

OTHER DIAMETERS, LENGTHS, MATERIALS, ETC. ON SPECIAL ORDER.

EXAMPLE OF PART NUMBER WITH EXPLANATION OF CODING:

SL51101 - 6 R 24

- L** GRIP LENGTH IN 1/16 INCH INCREMENTS (24 = 1 1/2 INCH NOM. LENGTH)
- MATERIAL R** = SEE LIST OF MATERIALS, TABLE II
- D** DIA. DESIGNATION NOM. DIAMETER IN 1/16 INCH INCREMENTS (6 = 3/8 INCH NOM DIA)
- BASIC PART NUMBER:** STANDARD EXPANDABLE DIAMETER BLIND BOLT

SHUR-LOK ENGINEERING IS AVAILABLE TO ASSIST IN THE APPLICATION OR ADAPTATION OF EXP. DIA. FASTENERS TO SPECIFIC APPLICATIONS.

UNLESS OTHERWISE SPECIFIED
INTERPRET DIMENSIONS & TOLERANCES PER
ANSI Y14.5M. ALL DIMENSIONS APPLY AFTER
PLATING AND PRIOR TO THE ADDITION OF SOLID
FILM LUBRICANT. 125 [3.2] ALL SURFACES
TOLERANCES
.XX .XXX ANGLES [X.X] [X.X X]
±.03 ±.010 ±2° ±[0.8] ±[0.25]
DIMENSIONS IN [] ARE MILLIMETERS

SHUR-LOK COPORATION
IRVINE, CALIFORNIA 92614
TELEPHONE: (949) 474-6000

SHUR-LOK

SHUR-LOK INTERNATIONAL, S.A.
PETIT-RECHAIN, BELGIUM
TELEPHONE: (32) 87-32.07.11

**EXPANDABLE DIA.
BLIND BOLTS**

SL51101 SERIES

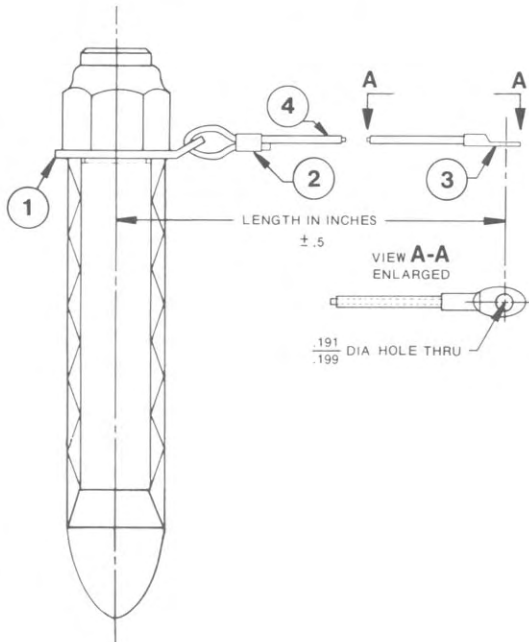
SHEET **1** OF **2**

REVISION (C) 06 JAN 1999

EXPANDABLE DIA. BLIND BOLTS



LANYARD FEATURE



EXAMPLE OF PART NUMBER WITH EXPLANATION OF CODING:

SL51101 - 6R24 L 10

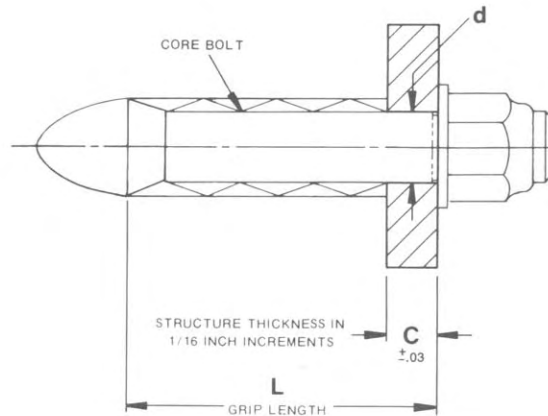
LANYARD LENGTH IN INCHES
LANYARD DESIGNATION
BASIC PART NUMBER INCLUDING DIAMETER, MATERIAL AND GRIP LENGTH (SEE SHEET 1)

TABLE III

ITEM	MATERIAL	FINISH
1 WASHER	CRES	PASSIVATE & DRI-FILM LUBE
2 SLEEVE		PASSIVATE
3 TERMINAL		
4 CABLE 7 X 7	CRES	NYLON COATED

SHUR-LOK ENGINEERING IS AVAILABLE TO ASSIST IN THE APPLICATION OR ADAPTATION OF EXP. DIA. FASTENERS TO SPECIFIC APPLICATIONS.

CAPTIVE FEATURE



EXAMPLE OF PART NUMBER WITH EXPLANATION OF CODING:

SL51101 - 6R 24 C 6

C STRUCTURE THICKNESS IN 1/16 INCH INCREMENTS (6=3/8)

CAPTIVE DESIGNATION

L GRIP LENGTH

BASIC PART NUMBER INCLUDING DIAMETER AND MATERIAL (SEE SHEET 1)

TABLE IV

DASH NO.	CORE BOLT DIA	d RECOMMENDED HOLE DIA.	
		MIN.	MAX.
3	.138	.140	.145
4	.190	.193	.198
5	.216	.219	.224
6	1/4	.255	.260
7	5/16	.315	.320
8	3/8	.377	.382
9	7/16	.440	.445
10	7/16	.440	.445
12	9/16	.565	.570
14	5/8	.630	.635
16	3/4	.755	.760

FOR SHADED SIZES CONSULT SHUR-LOK FOR MINIMUM ORDER QUANTITY

NOTES:

1. TO INSTALL: REMOVE NUT & WASHER FROM ASSY. INSERT THE CORE BOLT THRU THE HOLE IN THE STRUCTURAL MEMBER TO WHICH THE BOLT ASSY. IS TO BE CAPTIVATED. REINSTALL WASHER AND NUT.

REVISION C 06 JAN 1999

UNLESS OTHERWISE SPECIFIED
INTERPRET DIMENSIONS & TOLERANCES PER
ANSI Y14.5M. ALL DIMENSIONS APPLY AFTER
PLATING AND PRIOR TO THE ADDITION OF SOLID
FILM LUBRICANT. 125 [3.2] ALL SURFACES
TOLERANCES
XX .XXX ANGLES [X.X] [X.X X]
±.03 ±.010 ±2° ±[0.8] ±[0.25]
DIMENSIONS IN [] ARE MILLIMETERS

SHUR-LOK CORPORATION
IRVINE, CALIFORNIA 92614
TELEPHONE: (949) 474-6000

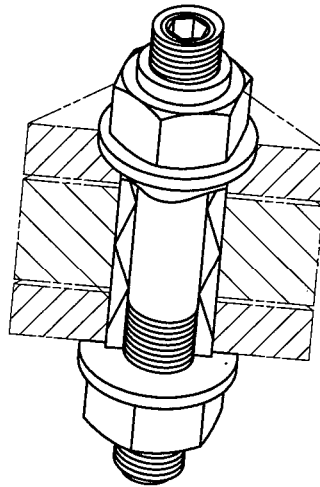
SHUR-LOK

SHUR-LOK INTERNATIONAL, S.A.
PETIT-RECHAIN, BELGIUM
TELEPHONE: (32) 87-32.07.11

**EXPANDABLE DIA. BLIND BOLTS.
OPTIONAL FEATURES**

SL51101 SERIES

SHEET 2 OF 2



FEATURES AND BENEFITS

- Eliminates all radial clearance.
- Creates a rigid joint.
- Eliminates wear in the joint.
- Provides hole alignment and repeatability.
- Provides high reusability.
- Bushing assembly is tightened from both ends.

LIMITATIONS

- Limited axial clamp-up capability.
- Reusability limited only by thread wear.

STANDARD NOMINAL HOLE SIZES

- .1900 through 1.500 inch

SPECIAL OPTIONS

- Captive Segments - To prevent removal of bushing segments from the core shaft when the nuts and washers are removed, eliminating loss of individual segments.
- Lanyard - To secure the removed fastener near installation hole to prevent loss and provide for easier installation.
- Impedance Ring - Prevents loss of the fastener from the hole even if radial tightness is lost.
- Dual locking features such as cotter pins, lock wires, etc.

METRIC SIZES AVAILABLE ON REQUEST

EXPANDABLE DIA. SHAFTS

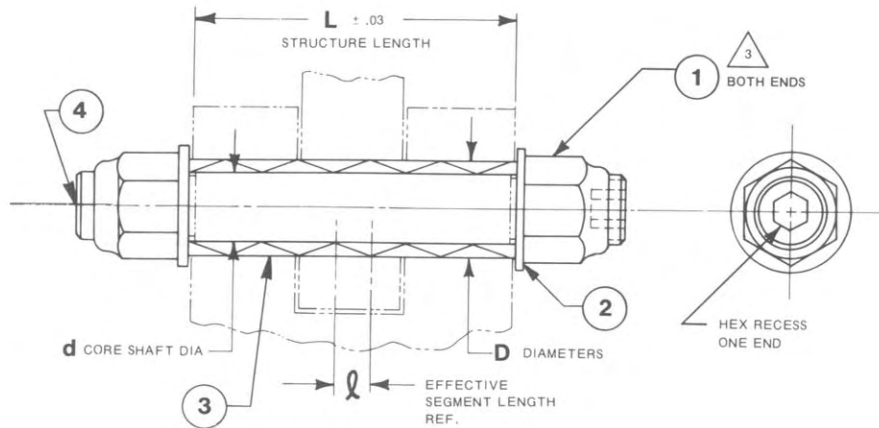


TABLE I

DIA				d CORE BOLT DIA.	L LONGEST STD. LENGTH
DASH NO.	NOM. DIA.	MIN.	MAX.		
3	3/16	.189	.193	.186	.138
4	1/4	.249	.254	.246	.190
5	5/16	.312	.317	.307	.216
6	3/8	.374	.379	.369	1/4
7	7/16	.437	.442	.431	5/16
8	1/2	.499	.505	.493	3/8
9	9/16	.562	.568	.556	7/16
10	5/8	.624	.630	.617	1/2
12	3/4	.749	.757	.742	9/16
14	7/8	.874	.882	.866	5/8
16	1.00	.999	1.010	.991	3/4
18	1 1/8	1.124	1.135	1.116	7/8
20	1 1/4	1.249	1.260	1.241	1
22	1 3/8	1.374	1.385	1.366	1 1/8
24	1 1/2	1.499	1.510	1.491	1 1/4

FOR SHADED SIZES CONSULT SHUR-LOK FOR MINIMUM ORDER QUANTITY

EXAMPLE OF PART NUMBER WITH EXPLANATION OF CODING:

SL52101-6 R 24

L STRUCTURE LENGTH "L" IN 1/16 INCH INCREMENTS
(24 = 1 1/2 INCH STRUCTURE LENGTH)

R MATERIAL R - SEE LIST OF MATERIAL

D DIA. DESIGNATION NOM DIAMETER
IN 1/16 INCH INCREMENTS (6 = 3/8 INCH NOM DIAMETER)

SL BASIC PART NUMBER: EXPANDABLE DIAMETER SHAFTS

TABLE II

ITEM	MATERIAL	HEAT TREAT	FINISH
1 NUT-SELF LOCKING	CRES TYPE 17-4 PH	COND. H-1000	PASSIVATE & DRI-FILM LUBE
2 WASHERS	CRES 17-7 PH		
3 BUSHINGS	CRES TYPE 17-4 PH	COND. H-900	
4 CORE SHAFT			PASSIVATE

NOTES:

- NUT DIMENSIONS PER MS 21044; THREAD LOCKING PER MIL-N-25027.
- USE OF INSTALLATION TOOL FACILITATES INSTALLATION AND REMOVAL OF EXPANDABLE DIAMETER SHAFTS. SEE SHUR-LOK DRAWING SLT 50015
- OTHER DIAMETERS, LENGTHS, MATERIALS, ETC. ON SPECIAL ORDER.

SHUR-LOK ENGINEERING IS AVAILABLE TO ASSIST IN THE APPLICATION OR ADAPTATION OF EXP. DIA. FASTENERS TO SPECIFIC APPLICATIONS.

REVISION B 30 OCT 1998

UNLESS OTHERWISE SPECIFIED
INTERPRET DIMENSIONS & TOLERANCES PER
ANSI Y14.5M. ALL DIMENSIONS APPLY AFTER
PLATING AND PRIOR TO THE ADDITION OF SOLID
FILM LUBRICANT. 125 [3.2] ✓ ALL SURFACES

TOLERANCES
XX .XXX ANGLES [X.X] [X.X X]
±.03 ±.010 ±2° ±[0.8] ±[0.25]

DIMENSIONS IN [] ARE MILLIMETERS

SHUR-LOK CORPORATION
IRVINE, CALIFORNIA 92614
TELEPHONE: (949) 474-6000

SHUR-LOK

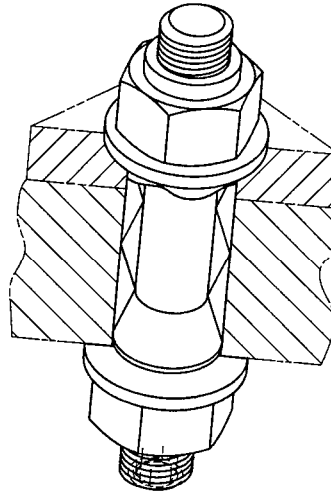
SHUR-LOK INTERNATIONAL, S.A.
PETIT-RECHAIN, BELGIUM
TELEPHONE: (32) 87-32.07.11

EXPANDABLE DIA. SHAFTS

SL52101 SERIES

SHEET 1 OF 1

EXPANDABLE DIA. CLAMP-UP BOLTS, FEATURES and BENEFITS



FEATURES AND BENEFITS

- Eliminates all radial clearance.
- Creates a rigid joint.
- Eliminates wear in the joint.
- Provides hole alignment and repeatability.
- Provides high reusability.
- Designed to provide axial clamp - up of the structure.

SPECIAL OPTIONS

- Lanyard - To secure the removed fastener near installation hole to prevent loss and provide for easier installation.
- Dual locking features such as cotter pins, lock wires, etc.

LIMITATIONS

- Reusability limited only by thread wear.
- Nuts need to be tightened equally from both ends.

METRIC SIZES AVAILABLE ON REQUEST

STANDARD NOMINAL HOLE SIZES

- .1900 through 1.500 inch

EXPANDABLE DIA. CLAMP-UP BOLTS

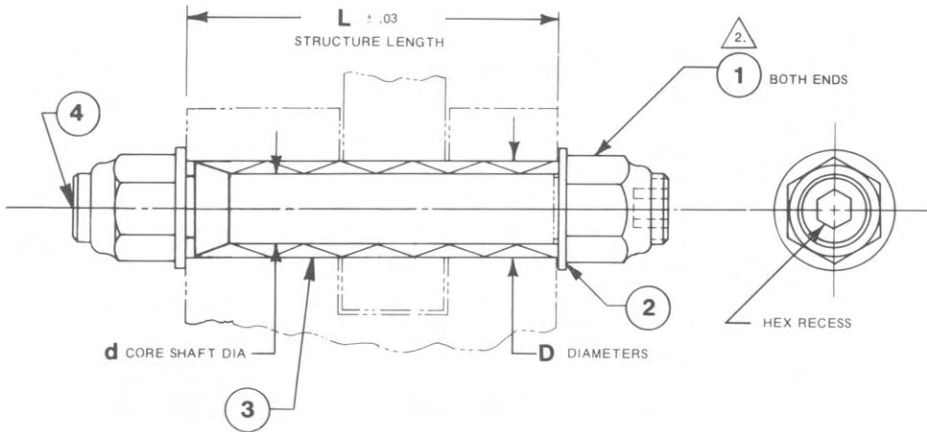


TABLE I

DIAMETER DESIGNATION	DASH NO.	NOM. DIA.	D		RELAXED FASTENER DIA.	d CORE BOLT DIA.	L
			RECOMMENDED HOLE DIA.	MIN. MAX.			LONGEST STD. LENGTH
3	3/16		.189	.193	.186	.138	1.50
4	1/4		.249	.254	.246	.190	
5	5/16		.312	.317	.307	.216	
6	3/8		.374	.379	.369	1/4	3.00
7	7/16		.437	.442	.431	5/16	
8	1/2		.499	.505	.493	3/8	
9	9/16		.562	.568	.556	7/16	4.00
10	5/8		.624	.630	.617		
12	3/4		.749	.757	.742	9/16	
14	7/8		.874	.882	.866	5/8	6.00
16	1.00		.999	1.010	.991	3/4	
18	1 1/8		1.124	1.135	1.116	7/8	
20	1 1/4		1.249	1.260	1.241	1	
22	1 3/8		1.374	1.385	1.366	1 1/8	
24	1 1/2		1.499	1.510	1.491	1 1/4	

FOR SHADED SIZES CONSULT SHUR-LOK FOR MINIMUM ORDER QUANTITY

EXAMPLE OF PART NUMBER WITH EXPLANATION OF CODING:

SL53101 - 6 R 24

- L** STRUCTURE LENGTH IN 1/16 INCH INCREMENTS (24=1 1/2 INCH NOM. LENGTH)
- MATERIAL** R=SEE LIST OF MATERIAL , TABLE II
- D** DIA. DESIGNATION NOM. DIAMETER IN 1/16 INCH INCREMENTS (6=3/8 INCH NOM. DIA.)
- BASIC PART NUMBER:** STANDARD EXPANDABLE DIA. CLAMP-UP BOLTS

TABLE II

	ITEM	MATERIAL	HEAT TREAT	FINISH
1	NUT-SELF LOCKING	CRES 17-4PH	COND. H-1000	PASSIVATE & DRI-FILM LUBE
2	WASHERS	CRES 17-7 PH		
3	BUSHINGS	CRES 17-4PH	COND H- 900	
4	CORE BOLT			PASSIVATE

NOTES:

3. USE OF INSTALLATION TOOL FACILITATES INSTALLATION AND REMOVAL OF EXPANDABLE DIAMETER BOLTS. SEE SHUR-LOK DRWG. NO. SLT 50015

2. NUT DIMENSIONS PER MS 21044; THREAD LOCKING PER MIL-N-25027

1. OTHER DIAMETERS, LENGTHS, MATERIALS, ETC. ON SPECIAL ORDER.

SHUR-LOK ENGINEERING IS AVAILABLE TO ASSIST IN THE APPLICATION OR ADAPTATION OF EXP. DIA. FASTENERS TO SPECIFIC APPLICATIONS.

REVISION A 11 APR 1998

UNLESS OTHERWISE SPECIFIED
INTERPRET DIMENSIONS & TOLERANCES PER
ANSI Y14.5M. ALL DIMENSIONS APPLY AFTER
PLATING AND PRIOR TO THE ADDITION OF SOLID
FILM LUBRICANT. 125 [3.2] ALL SURFACES
TOLERANCES
XX .XXX ANGLES [X.X] [X.X X]
±.03 ±.010 ±2° ±[0.8] ±[0.25]
DIMENSIONS IN [] ARE MILLIMETERS

SHUR-LOK COPORATION
IRVINE, CALIFORNIA 92614
TELEPHONE: (949) 474-6000

SHUR-LOK

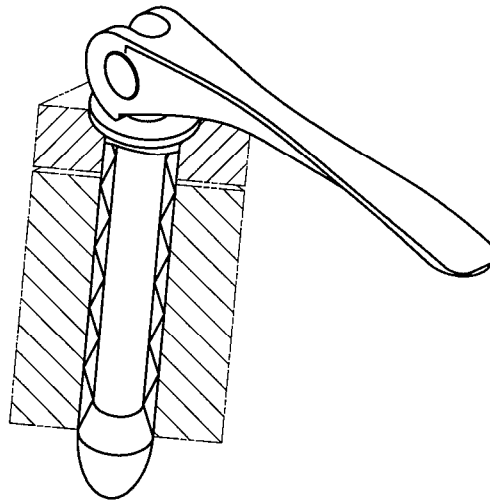
SHUR-LOK INTERNATIONAL, S.A.
PETIT-RECHAIN, BELGIUM
TELEPHONE: (32) 87-32.07.11

**EXPANDABLE DIA.
CLAMP-UP BOLTS**

SL53101 SERIES

SHEET 1 OF 1

EXPANDABLE DIA. CAM ACTUATED, FEATURES and BENEFITS



FEATURES AND BENEFITS

- Eliminates all radial clearance.
- Creates a rigid joint.
- Eliminates wear in the joint.
- Provides hole alignment and repeatability.
- Provides high reusability.
- After initial adjustment for desired radial tightness, no tools are required for subsequent installation or removal in same hole.
- Provides quick installation and removal.

LIMITATIONS

- Limited axial clamp-up capability.
- Less mechanical advantage available to achieve desired radial tightness than other EDF types.
- Core pin must be adjusted for desired radial tightness at initial installation and readjusted if used in another hole.

STANDARD NOMINAL HOLE SIZE

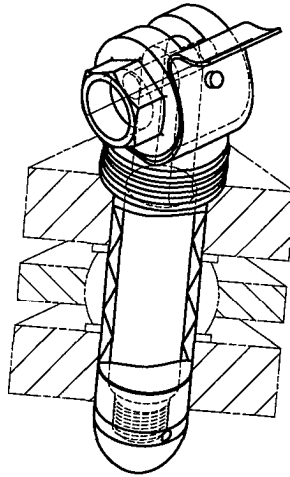
- .1900 through 1.500 inch

SPECIAL OPTIONS

- Lanyard - To secure the removed fastener near installation hole to prevent loss and provide easier installation.
- Lock Ping - A bushing segment that is designed to provide limited expansion greater than the hole dia. This segment is located outside the hole to enhance the ability of the fastener to resist tensile loads.
- Impedance Ping - Prevents loss of the fastener from the hole even if radial tightness is lost.
- Dual locking features such as Locking Cam Handles.

METRIC SIZES AVAILABLE ON REQUEST

EXPANDABLE DIA. CAM ACTUATED, FEATURES and BENEFITS



FEATURES AND BENEFITS

- Eliminates all radial clearance.
- Creates a rigid joint.
- Eliminates wear in the joint.
- Provides hole alignment and repeatability.
- Provides high reusability.
- Useable in applications where access is limited to one side, or a blind hole is required.
- Provides quick installation and removal.
- Factory adjusted to accommodate specific hole diameter and tolerance.
- Spring Clip over cam pin retains cam in located position.

LIMITATIONS

- Requires close tolerance hole.
- Limited clamp-up capability.
- Not adjustable by customer after factory setting.

STANDARD NOMINAL HOLE SIZES

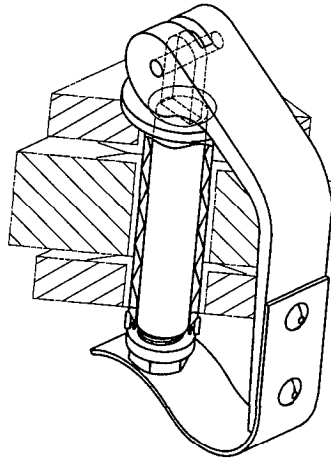
- .375 through 1.500 inch

SPECIAL OPTIONS

- Lanyard-To secure the removed fastener near installation hole to prevent loss and provide for easier installation.
- Lock Ring-A bushing segment that is designed to provide limited expansion greater than the hole diameter. This segment is located outside the hole to enhance the ability of the fastener to resist tensile loads.
- Impedance Ring-Prevents loss of the fastener from the hole even if radial tightness is lost.
- Dual locking feature such as cotter pins, lock wires etc.

METRIC SIZES AVAILABLE ON REQUEST

EXPANDABLE DIA. CAM ACTUATED, FEATURES and BENEFITS



FEATURES AND BENEFITS

- Eliminates all radial clearance.
- Creates a rigid joint.
- Eliminates wear in the joint.
- Provides hole alignment and repeatability.
- Provides high reusability.
- After initial adjustment for desired radial tightness, no tools are required for subsequent installation or removal in the same hole.
- Provides quick installation and removal.
- Spring clip over pin nose retains handle in closed position.

LIMITATIONS

- Limited axial clamp-up capability.
- Less mechanical advantage available to achieve desired radial tightness than other EDF types.
- Nut must be adjusted for desired radial tightness at initial installation, and readjusted if used in another hole.

STANDARD NOMINAL HOLE SIZES

- .375 through 1.500 inch

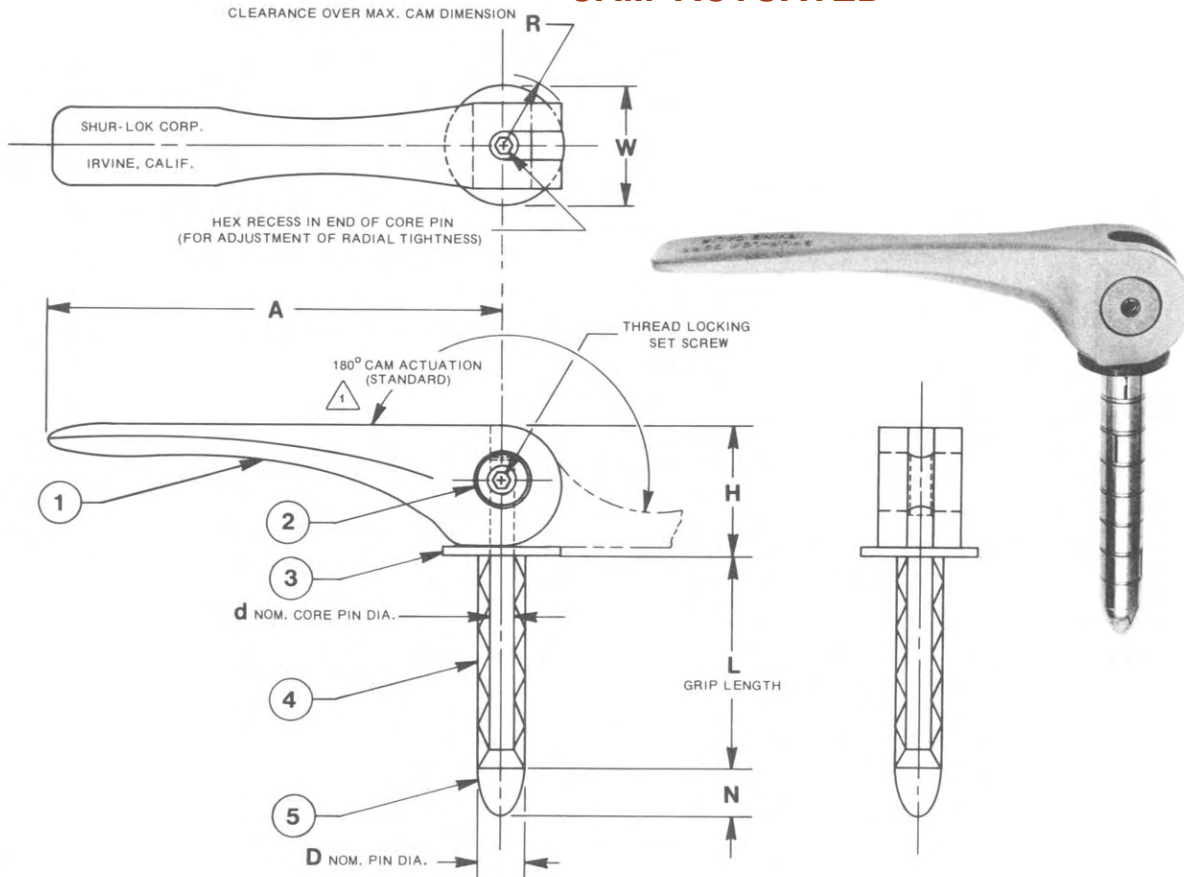
SPECIAL OPTIONS

- Lanyard - To secure the removed fastener near its hole to prevent loss and provide for easier installation.
- Lock Ring - A bushing segment that is designed to provide limited expansion greater than the hole diameter. This segment is located outside the hole to enhance the ability of the fastener to resist tensile loads.
- Impedance Ring - Prevents loss of the fastener from the hole even if radial tightness is lost.
- Dual locking features such as cotter pins, lock wires, etc.

METRIC SIZES AVAILABLE ON REQUEST



EXPANDABLE DIA. CAM ACTUATED



NOTES:

3. ADJUSTMENT IS NECESSARY ON INITIAL INSTALLATION DUE TO VARIATIONS IN HOLE SIZES. TO ADJUST TIGHTNESS: THREAD CORE PIN IN OR OUT OF THE BARREL NUT UNTIL THE DESIRED RADIAL TIGHTNESS IN HOLE IS ACHIEVED WHEN CAM HANDLE IS ACTUATED TO INSTALLED POSITION. TIGHTEN SET SCREW.

2. SEE SHEET 2 FOR OPTIONAL FEATURES

1 OTHER DIAMETERS, LENGTHS, MATERIALS, ETC. ON SPECIAL ORDER.

SHUR-LOK ENGINEERING IS AVAILABLE TO ASSIST IN THE APPLICATION OR ADAPTATION OF EXP. DIA. FASTENERS TO SPECIFIC APPLICATIONS.

TABLE I

DIAMETER DESIGNATION		D ¹ Δ		RELAXED FASTENER NOM. DIA.	d CORE PIN DIA.	N NOSE LENGTH MAX.	L ¹ Δ LONGEST STD. LENGTH	A HANDLE LENGTH MAX.	H HANDLE HEIGHT MAX.	W WASHER O.D. MAX.	R MAX. CAM. DIM.
		MIN.	MAX.								
DASH NO.	NOM. DIA.										
3	3/16	.189	.193	.186	.138	.19	1.50	1.88			
4	1/4	.249	.254	.246	.190	.25		2.50	.81	.64	.46
5	5/16	.312	.317	.307	.216	.31	2.00	3.75	1.09	.77	.62
6	3/8	.374	.379	.369	.269	.38					
7	7/16	.437	.442	.431	.316	.44	3.00	5.00	1.38	1.03	.78
8	1/2	.499	.505	.493	.378	.50					
9	9/16	.562	.568	.556	.456	.56		6.25	1.64	1.30	.95
10	5/8	.624	.630	.617	.516	.63	4.00	7.50	1.91	1.40	1.10
12	3/4	.749	.757	.742	.616	.75		10.00	2.21	1.80	1.27
14	7/8	.874	.882	.866	.716	.88					
16	1.00	.999	1.010	.991	.816	1.00					

FOR SHADED SIZES CONSULT SHUR-LOK FOR MINIMUM ORDER QUANTITY

TABLE II

ITEM	MATERIAL	HEAT TREAT	FINISH
1 CAM HANDLE	ALUM. ALLOY	AS CAST	HARD ANODIZE
2 BARREL NUT	CRES		PASSIVATE & DRI-FILM LUBE
3 THRUST WASHER			
4 BUSHING ASSEMBLY	CRES TYPE 17-4PH	COND. H-900	PASSIVATE
5 CORE PIN			

EXAMPLE OF PART NUMBER WITH EXPLANATION OF CODING:

SL54101-6 R 24

L GRIP LENGTH IN 16THS OF AN INCH (24=1.50)

MATERIAL: R SEE LIST OF MATERIAL, TABLE II

D (DASH NO.) DIA. IN 16THS OF AN INCH (6=3/8)

BASIC PART NUMBER EXPANDABLE DIA. PIN, CAM ACTUATED.

UNLESS OTHERWISE SPECIFIED
INTERPRET DIMENSIONS & TOLERANCES PER
ANSI Y14.5M. ALL DIMENSIONS APPLY AFTER
PLATING AND PRIOR TO THE ADDITION OF SOLID
FILM LUBRICANT. 125 [3.2] ALL SURFACES
TOLERANCES
XX .XXX ANGLES [X.X] [X.X.X]
±.03 ±.010 ±2° ±[0.8] ±[0.25]
DIMENSIONS IN [] ARE MILLIMETERS

SHUR-LOK CORPORATION
IRVINE, CALIFORNIA 92614
TELEPHONE: (949) 474-6000

SHUR-LOK

SHUR-LOK INTERNATIONAL, S.A.
PETIT-RECHAIN, BELGIUM
TELEPHONE: (32) 87-32.07.11

**PIN EXPANDABLE DIA.
CAM ACTUATED**

SL54101 SERIES

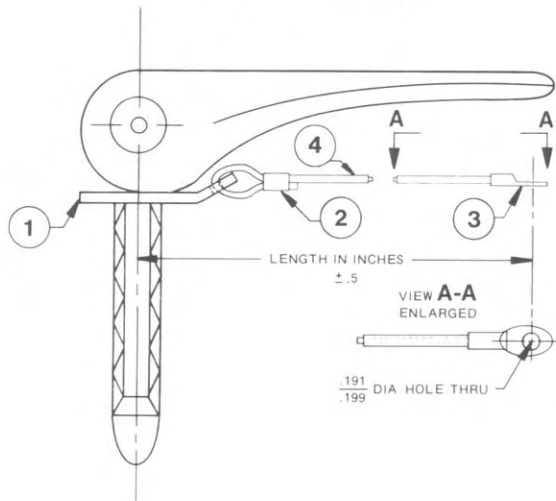
SHEET **1** OF **2**

REVISION A 13 AUG 1980

EXPANDABLE DIA. CAM ACTUATED



LANYARD FEATURE



EXAMPLE OF PART NUMBER WITH EXPLANATION OF CODING:

SL54101 - 6R24 L 10

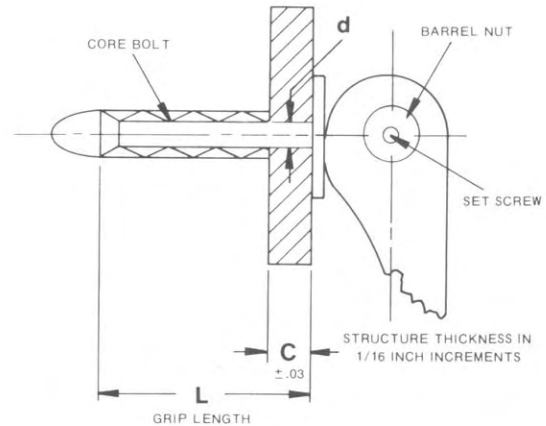
10 LANYARD LENGTH IN INCHES
24 LANYARD DESIGNATION
SL54101 BASIC PART NUMBER INCLUDING DIAMETER, MATERIAL AND GRIP LENGTH (SEE SHEET 1)

TABLE III

ITEM	MATERIAL	FINISH
1 WASHER	CRES	PASSIVATE & DRI-FILM LUBE
2 SLEEVE		PASSIVATE
3 TERMINAL		
4 CABLE 7 X 7	CRES	NYLON COATED

SHUR-LOK ENGINEERING IS AVAILABLE TO ASSIST IN THE APPLICATION OR ADAPTATION OF EXP. DIA. FASTENERS TO SPECIFIC APPLICATIONS.

CAPTIVE FEATURE



EXAMPLE OF PART NUMBER WITH EXPLANATION OF CODING:

SL54101 - 6R 24 C 6

6 C STRUCTURE THICKNESS IN 1/16 INCH INCREMENTS (6=3/8)
24 CAPTIVE DESIGNATION
L GRIP LENGTH
SL54101 BASIC PART NUMBER INCLUDING DIAMETER AND MATERIAL (SEE SHEET 1)

TABLE IV

DASH NO.	CORE BOLT DIA	d RECOMMENDED HOLE DIA.	
		MIN.	MAX.
3	.138	.140	.145
4	.190	.193	.198
5	.216	.219	.224
6	1/4	.255	.260
7	5/16	.315	.320
8	3/8	.377	.382
9	7/16	.440	.445
10	7/16	.440	.445
12	9/16	.565	.570
14	5/8	.630	.635
16	3/4	.755	.760

FOR SHADED SIZES CONSULT SHUR-LOK FOR MINIMUM ORDER QUANTITY

NOTES:

- TO ADJUST TIGHTNESS. THREAD CORE PIN IN OR OUT OF THE BARREL NUT UNTIL THE DESIRED RADIAL TIGHTNESS IN HOLE IS ACHIEVED WHEN CAM HANDLE IS ACTUATED TO INSTALLED POSITION. TIGHTEN SET SCREW TO LOCK SETTING.
- TO INSTALL: UNTHREAD CORE PIN FROM THE BARREL NUT. INSERT THE CORE PIN THRU THE HOLE IN THE STRUCTURAL MEMBER TO WHICH THE PIN IS TO BE CAPTIVATED. RETHREAD THE CORE PIN INTO THE BARREL NUT. ADJUST TIGHTNESS (NOTE 2)

REVISION (A) 13 AUG 1980

UNLESS OTHERWISE SPECIFIED
INTERPRET DIMENSIONS & TOLERANCES PER
ANSI Y14.5M. ALL DIMENSIONS APPLY AFTER
PLATING AND PRIOR TO THE ADDITION OF SOLID
FILM LUBRICANT. 125 [3.2] ALL SURFACES
TOLERANCES
XX .XXX ANGLES [X.X] [X.X X]
±.03 ±.010 ±2° ±[0.8] ±[0.25]
DIMENSIONS IN [] ARE MILLIMETERS

SHUR-LOK CORPORATION
IRVINE, CALIFORNIA 92614
TELEPHONE: (949) 474-6000

SHUR-LOK

SHUR-LOK INTERNATIONAL, S.A.
PETIT-RECHAIN, BELGIUM
TELEPHONE: (32) 87-32.07.11

**PIN EXPANDABLE DIA. CAM ACTUATED
OPTIONAL FEATURES**

SL54101 SERIES

SHEET 2 OF 2