

Link-Seal® Modular Seals Century-Line® Sleeves Cell-Cast® Disks

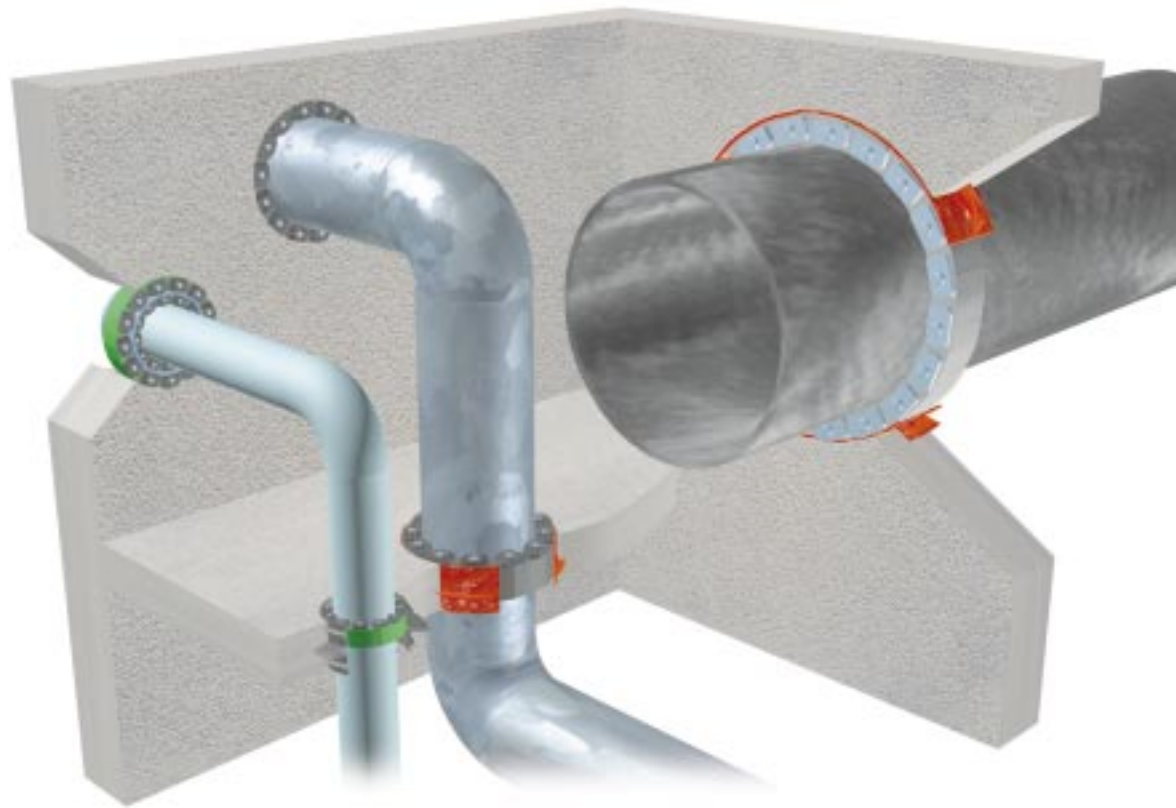


Table of Contents



Applications	2
The system is the solution	3
Link-Seal® Modular Seals	
Features	4
Model Options - Specifications	5
Dimensional Data	6
Sizing Procedure - Method 1	7-9
Sizing Procedure - Method 2	10
Sizing Procedure - Method 2 (Verification)	11-12
Weights	15
Century-Line® Sleeves	
Features	13
Weights and Dimensional Data	13
Ordering	13
Cell-Cast® Disks	
Features	14
Weights and Dimensional Data	14
Ordering	14
Type WS Steel Wall Sleeves	
Weights and Dimensional Data - Ordering	14
Technical/Engineering	
Link-Seal® Modular Seal Bolt Test Results	15
Technical Approvals	15
Typical Specification	16

Link-Seal Modular Seals- Specialty Applications	
Fire Seals	17
Sealing Pipeline Casings	18
Sealing An Oversize Annulus	19
Pressure Testing	20
Sealing Manhole Penetrations	20
Installation Techniques	
Link-Seal® Modular Seal Installation	21
Century-Line® Sleeve Installation	22
Cell-Cast® Disk Installation	23
Frequently Asked Questions	24
Warranty and Conditions of Sale	24
Special Sizing Applications	25
Quotation/Order Submittal Sheets	26-27

Updated engineering catalogs, literature and installation techniques are available on-line at: www.linkseal.com

Performance data included in this manual is intended for guide-line purposes only. Performance suitability for any specific application should be determined by the user. Variation in temperature, pressure, concentration or mixtures acting synergistically may preclude recommended service use.

Applications



- Mechanical Contractors - Interior Piping Systems
- Floor Sleeves
- Wall Sleeves
- Manhole Pipe Entry Seals
- Waste Treatment Plants
- Cased Road Crossings
- Elevator Shafts
- Thermal Storage Systems
- Fire Protection Wall Penetrations
- Cased Railroad Crossings
- Electrical Isolation of Pipes
- Precast Concrete Vault Seals
- Insulated Pipe Seals
- Dual Containment Seals
- Marine Applications
- Noise Dampening
- Flexible Sign & Pole Supports
- Electrical Isolation of Pipe Supports
- Mining
- Pulp & Paper
- Decorative Fountains
- Bank Tube Transfer Systems
- Pool Contractors
- Electrical Contractors
- Marine Applications
- Waste & Water Treatment
- Telecommunications
- Valve Pits
- Refrigeration Buildings
- Overhead Signs
- Guard Post Assemblies
- Power Generation Dams
- Offshore Oil Rigs
- High Pressure Tank Guards
- Underground Steel Tanks
- Precast Concrete Manufacturers
- Perimeter Berm Installations Around Tank Farms
- Flow Restrictors in Sewer Maintenance
- Fluid Overflow Devices
- Noise and Sway Dampener
- Through Deck Fire Breaks
- Parking Garage Column Protectors
- Cable TV Installations
- Bridge Construction
- Septic Tank Installations
- Coal Preparation Plants
- Flag Pole Installations
- Tunneling Operations

The system is the solution...



The best way to permanently seal any cylindrical object, of any size, passing through any type of concrete barrier is to use Link-Seal® modular seals. From ductile iron to pre-stressed concrete to metal or plastic pipe, conduit or cables - whatever your application - Link-Seal® modular seals will effect a hydrostatic seal capable of holding 20 psig (40 feet of head) between the pipe and barrier through which it passes.

Century-Line® sleeves and Cell-Cast® disks...

The best way to guarantee a perfect seal is to use Century-Line® sleeves with Link-Seal® modular seals. They're engineered and sized to provide a stable hole that matches dimensionally with Link-Seal® modular seals. It makes ordering quick and easy and guarantees a perfect fit - and seal - each and every time.

For larger holes in poured concrete structures, (29.25" to 64.75"Ø) Cell-Cast® disks are used to produce a dimensionally stable hole and smooth concrete surface that is perfect for use with Link-Seal® modular seals.



Tighten Your Specifications!

(See Link-Seal® Modular Seal specification on page 16)

PSI-Thunderline/Link-Seal® Modular Seals

Approvals	-----	ISO 9002, Factory Mutual
Elastomers	-----	EPDM, Nitrile, Silicone
Made in America (U.S.A)	-----	YES
Permanent Identification	-----	YES
Corrosion Resistant Fasteners		
316 Stainless as Standard	-----	YES
15 Model Sizes	-----	YES
Hi/Low Temp. Seals	-----	YES
FM Approved Fire Seals	-----	YES
Bolts available in USA or Metric Format	-----	YES
Bolts pass 1470 hour salt spray test	-----	YES
Non-conductive CS Molded		
Sleeve Penetration System	-----	YES
Low torque Pressure Plate and Elastomer	-----	YES
Special "V" Modification	-----	YES
Color Coded elastomers	-----	YES
Cell-Cast® Hole Forms	-----	YES
On Staff Seal Engineering Assistance	-----	YES
Worldwide Stocking Distributors	-----	YES

Link-Seal® Modular Seal Features



Saves time and money...

Link-Seal® modular seals install in up to 75% less time when compared to lead-oakum joints, hand fitted flashings, mastics or casing boots.

Positive hydrostatic seal...

Link-Seal® modular seals are rated at 20 psig (40 feet of head), which exceeds the performance requirements of most applications.

Long seal life...

Link-Seal® modular seals are designed for use as a permanent seal. Seal elements are specially compounded to resist aging and attack from ozone, sunlight, water and a wide range of chemicals.

Maximum protection against corrosion...

Standard fasteners employ the use of a proprietary coating process on carbon steel. For extremely corrosive environments, corrosion resistant 316 stainless steel hardware is offered as a standard.

ISO Quality Assurance...

Link-Seal® modular seals are manufactured in an ISO 9002 certified facility. In addition, they are completely manufactured and assembled in the U.S.A.

Certification/Approvals...

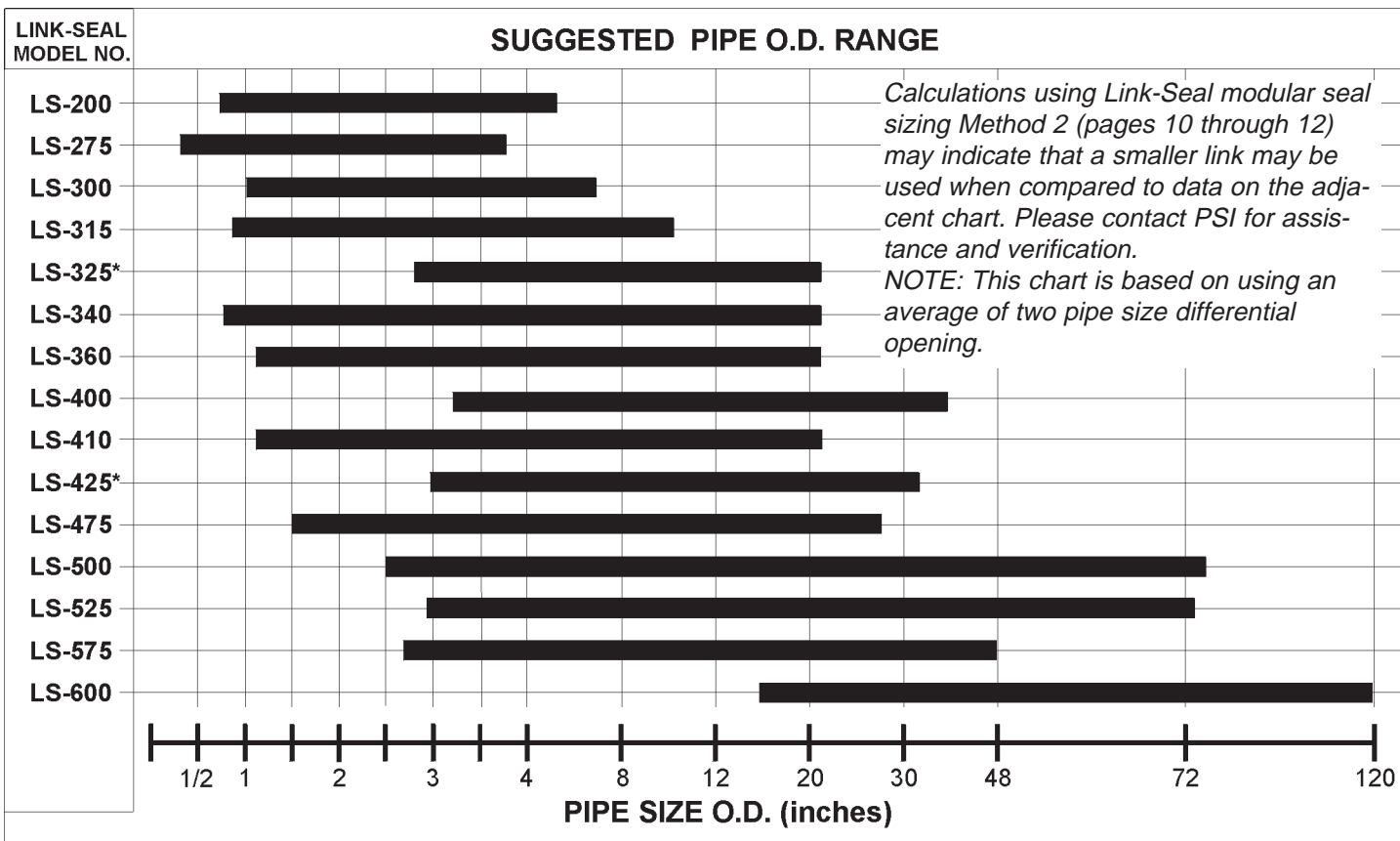
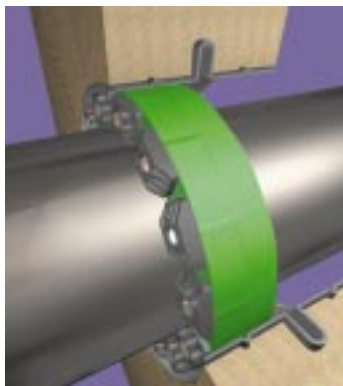
Factory Mutual Fire Approvals. Det Norske Veritas Marine Deck/Bulkhead Penetration Certification. Also a wide variety of approvals from various Federal agencies, associations, code groups, laboratories and organizations.

Configure a Link-Seal® modular seal to match your application...

Color coded EPDM, Nitrile, & Silicone elastomers may be used with various hardware options to match performance characteristics with service conditions.

Choose a Link-Seal® modular seal to match your pipe size and wall opening...

Link-Seal® modular seals are now available in 15 sizes to provide a solution for most all applications.



* = Whenever possible use thicker links, such as the LS-400, LS-475 or LS-500 series to provide more leeway.



Link-Seal® Modular Seal Model Properties

with EPDM Seal Elements



EPDM (Black)

Model “C” Link-Seal Modular Seal

Suitable for use in water, direct ground burial and atmospheric conditions. Provides electrical isolation where cathodic protection is required.

Type: Standard

Seal Element: EPDM (Black)

Pressure Plates: Reinforced Nylon Polymer

Bolts & Nuts: Carbon steel, zinc dichromated with proprietary corrosion inhibiting coating.

Temp. Range: -40 to +250°F (-40 to +121°C)*

Model “S-316” Link-Seal Modular Seal

For chemical processing & waste water treatment. EPDM rubber is resistant to most inorganic acids and alkalis, some organic chemicals (acetone, alcohol, ketones).

Type: Stainless

Seal Element: EPDM (Black)

Pressure Plates: Reinforced Nylon Polymer

Bolts & Nuts: 316 Stainless Steel

Temp. Range: -40 to +250°F (-40 to +121°C)*

with Nitrile Seal Elements



Nitrile (Green)

Model “O” Link-Seal Modular Seal

Nitrile rubber is resistant to oils, fuel and many solvents (gasoline, motor oil, kerosene, methane, jet fuel, hydraulic fluid, water, etc.).

Type: Oil Resistant

Seal Element: Nitrile (Green)

Pressure Plates: Reinforced Nylon Polymer

Bolts & Nuts: Carbon steel, zinc dichromated with proprietary corrosion inhibiting coating.

Temp. Range: -40 to +210°F (-40 to +99°C)*

Model “OS-316” Link-Seal Modular Seal

Combination of oil resistant rubber and stainless steel hardware.

Type: Oil Resistant

Seal Element: Nitrile (Green)

Pressure Plates: Reinforced Nylon Polymer

Bolts & Nuts: 316 Stainless Steel

Temp. Range: -40 to +210 °F (-40 to +99°C)*

with Silicone Seal Elements



Silicone (Grey)

Model “T” Link-Seal Modular Seal

Silicone rubber is ideal for temperature extremes. The “T” model is the one hour Factory Mutual approved fire seal.

Type: High/Low Temperature

Seal Element: Silicone (Grey)

Pressure Plates: Steel zinc dichromate

Bolts: Carbon steel, zinc dichromated with proprietary corrosion inhibiting coating.

Temp. Range: -67 to +400°F (-55 to +204°C)*

Model “FD/FS” Link-Seal Modular Seal

Double seal for added protection.

Type: Fire Seals

Seal Element: Silicone (Grey)

Pressure Plates: Steel zinc dichromate

Bolts: Steel with 2-part zinc dichromate & organic coating

Temp. Range: -67 to +400°F (-55 to +204°C)*

* = Sustained operation near temperature limits may affect life expectancy.

Material Properties of Link-Seal Modular Seal Elements

PROPERTY	ASTM METHOD	EPDM	NITRILE	SILICONE
Hardness (shore A)	D-2240	47 ±3	50 ±5	50 ±5
Tensile	D-412	1450 psi	1300 psi	860 psi
Elongation	D-412	400%	300%	250%
Compression Set	S-395	15%	45%	40%
		22 hrs. @ 158°F (70°C)	22 hrs. @ 212°F (100°C)	22 hrs. @ 350°F (177°C)
Specific Gravity	D-297	1.10	1.42	1.40

Material Properties of Composite Pressure Plates

PROPERTY	ASTM METHOD	VALUE
Izod Impact - Notched	D-256	2.05 ft-lb/in
Tensile Strength @ Yield	D-638	20,000 psi
Tensile Strength - Break	D-638	20,250 psi
Flexural Strength @ Yield	D-790	30,750 psi
Flexural Modulus	D-790	1,124,000 psi
Elongation, Break	D-638	11.07%
Specific Gravity	D-792	1.38
Moisture Content	--	0.18%

Bolt & Nut Specifications

Standard: Carbon Steel

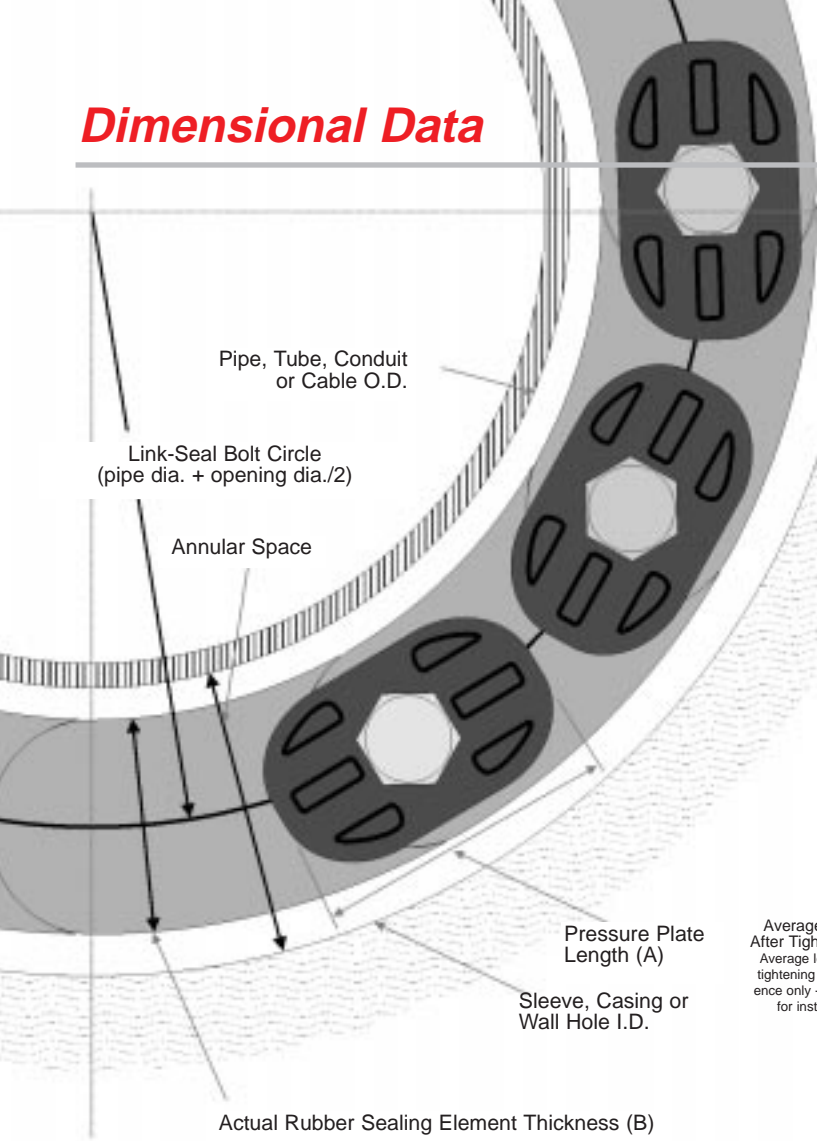
Carbon steel, zinc dichromated per ASTM B633, with an additional corrosion inhibiting proprietary organic coating. (passes 1470 hour salt spray test)
Tensile Strength = 60,000 psi, minimum.

Option: Stainless Steel

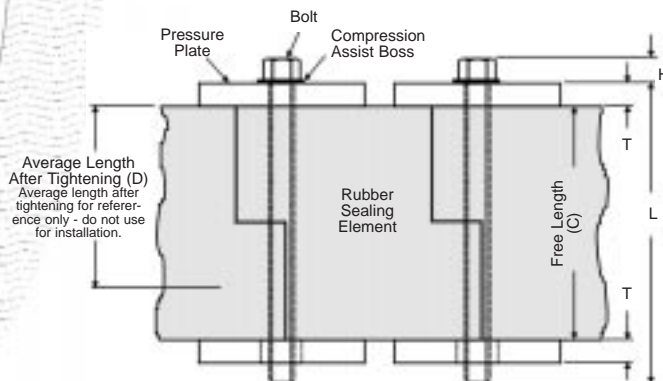
ANSI Type = 316, Per ASTM F593-95
Tensile Strength = 85,000 psi, average.



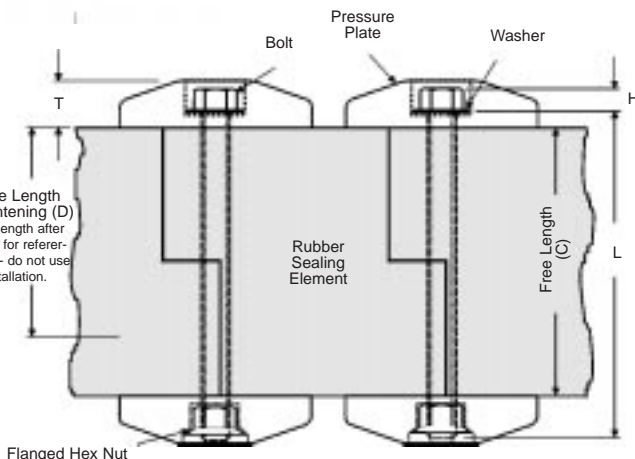
Dimensional Data



For LS-200 through LS-315



For LS-325 through LS-600



Dimensional Data for Models C, O, S-316 and OS-316 (Dimensions in inches except as noted)

LINK-SEAL MODEL NO.	RUBBER SEALING ELEMENT			PRESSURE PLATE		BOLT				WEIGHT FOR 10 LINK SECTION (LBS)	MIN. REQUIRED SEATING WIDTH
	ACTUAL THICKNESS (B)	FREE LENGTH (C)	AVG. LENGTH AFTER TIGHTENING (D)	(A)	(T)	HEX ACROSS FLATS	(H)	THREAD SIZE	(L)		
LS-200-C	0.48	1.75	1.38	1.06	0.31	M5 (slotted hex)	0.18	M5	2.50	0.75	2.25
LS-275-C	0.61	1.75	1.38	0.90	0.31	M5 (slotted hex)	0.18	M5	2.50	0.85	2.25
LS-300-C	0.69	2.37	1.87	1.50	0.44	0.50	0.22	5/16-18	3.50	2.10	3.00
LS-315-C	0.81	2.37	1.87	1.44	0.44	0.50	0.22	5/16-18	3.50	3.00	3.00
LS-325-C	0.88	2.63	2.00	3.13	1.00	0.50	0.22	5/16-18	4.50	5.50	4.00
LS-340-C	1.00	2.70	2.25	1.52	0.67	0.50	0.22	5/16-18	4.50	3.40	4.00
LS-360-C	1.24	2.70	2.25	2.05	0.77	0.50	0.22	5/16-18	4.50	5.00	4.00
LS-400-C	1.38	3.50	2.75	3.50	1.06	0.56	0.25	3/8-16	5.00	12.00	5.00
LS-410-C	1.43	3.37	2.87	2.52	0.88	0.56	0.25	3/8-16	5.00	8.20	5.00
LS-425-C	1.06	3.00	2.25	3.50	1.19	0.56	0.25	3/8-16	5.00	10.00	5.00
LS-475-C	1.56	3.38	2.63	2.63	0.88	0.56	0.25	3/8-16	5.00	10.00	5.00
LS-500-C	2.25	3.75	2.75	3.63	1.06	0.75	0.34	1/2-13	5.50	22.50	5.00
LS-525-C	2.06	3.75	2.87	3.63	1.06	0.75	0.34	1/2-13	5.50	21.00	5.00
LS-575-C	1.81	3.75	3.00	3.00	1.00	0.75	0.34	1/2-13	5.50	15.50	5.00
LS-600-C	3.09	4.00	3.00	6.00	1.90	29.6mm	12.8mm	M20X2.5	180mm	58.00	6.00



Sizing Procedure - Method 1

Link-Seal® Modular Seals may be sized by using one or more methods.

Method 1 - Use the charts provided (Pages 7, 8 & 9) for standard pipe sizes and types.

Method 2 - Use Link-Seal® modular seal calculation method to determine the best size Link-Seal® modular seal for non-standard pipe sizes.

If above calculations result in fewer than 11 links for Models LS-200 through LS-325 or result in fewer than 13 links for Models LS-340 through LS-600, verify using tables on pages 11 and 12.

Method 1 - Link-Seal® Modular Seal Sizing System

(If your pipe type and size matches with standard pipe charts.)

1. From the following seven charts (pages 7, 8 & 9), find the one that applies to your pipe type and locate correct pipe size (Nominal Diameter & Actual Outside Diameter). Verify that your pipe O.D. matches the actual outside diameter shown on the chart.
2. Determine the type of wall opening to be used: Century-Line® (CS Model Sleeve), WS Steel Sleeve or Core Drilled Hole.
3. Begin at column heading "Pipe Size - Nominal". Read across to the sizing section for your sleeve type and wall opening Century-Line® (CS Model Sleeve), WS Steel Sleeve or Core Bit Drilled. The first column identifies the sleeve model or hole diameter...the second column identifies the Link-Seal modular seal size number... and the third column provides the number of links required for a complete seal assembly.
4. Determine the best Link-Seal modular seal Model for your application from Page 5.

"The system is the solution..."

To size Century-Line® Non-metallic Sleeves or WS Steel Sleeves with Link-Seal Modular Seals

(If your pipe type and size matches with standard pipe charts.)

1. When ordering Link-Seal® modular seals, note sleeve part numbers in columns CS Model Number (Century-Line®) or WS Model Number and indicate sleeve length in inches.

NOTE: Century-Line® sleeves shorter than 16" will be shipped as 16" length and should be field cut. Please see page 22 for installation instructions.

Example:

Pipe Type = SDR-35 Gravity Sewer Pipe
Nominal Diameter = 12"
Actual O.D. = 12.50"
Sleeve = Non-metallic Century-Line® (CS) Sleeve

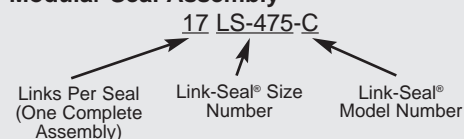
Information Obtained From Chart Below

Link-Seal Size Number: LS-475
(Determined from "Link-Seal® Size" Column)
Links per Seal: 17
(Determined from "Links Per Seal" Column)

Information Obtained from Charts on Page 5

Link-Seal® Model Number = C
(Based on application and usage)

Code for Ordering One Complete Link-Seal Modular Seal Assembly



Example:

Same as Above

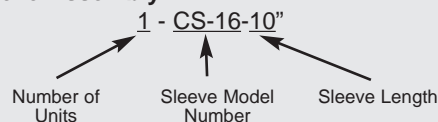
Information Obtained From Chart Below

CS Sleeve Number = CS-16

Determine Sleeve Length

(Based on wall thickness)
Sleeve Length = 10"

Code for Ordering One Complete Century-Line Sleeve Assembly



SDR-35 and DR-28 Gravity Sewer Pipe

PIPE SIZE (Nom.)	ACTUAL O.D. (Inches)	CS MODEL NON-METALLIC SLEEVE			WS MODEL STEEL SLEEVE			CAST OR CORE BIT DRILLED HOLE		
		MODEL NUMBER	LINK-SEAL® SIZE	LINKS PER SEAL	MODEL NUMBER	LINK-SEAL® SIZE	LINKS PER SEAL	HOLE I.D.	LINK-SEAL® SIZE	LINKS PER SEAL
4	4.22	CS-6-*	LS-315-***	11	WS-6-28-S-*	LS-315-***	10	6.000	LS-315-***	10
6	6.28	CS-10-*	LS-575-***	8	WS-10-36-S-*	LS-475-***	10	10.000	LS-475-***	10
8	8.40	CS-12-*	LS-575-***	10	WS-12-37-S-*	LS-475-***	12	12.000	LS-475-***	12
10	10.50	CS-14-*	LS-475-***	14	WS-14-37-S-*	LS-425-***	10	14.000	LS-475-***	14
12	12.50	CS-16-*	LS-475-***	17	WS-16-37-S-*	LS-425-***	12	16.000	LS-475-***	17
15	15.30	CS-20-*	LS-575-***	17	WS-20-37-S-*	LS-575-***	17	20.000	LS-525-***	14
18	18.70	CS-24-*	LS-575-***	21	WS-24-37-S-*	LS-575-***	21	22.000	LS-400-***	17
21	22.05	CC-30-**	LS-600-***	13	WS-26-37-S-*	LS-400-***	20	26.000	LS-575-***	24
24	24.80	CC-30-**	LS-525-***	21	WS-30-37-S-*	LS-525-***	21	28.000	LS-400-***	22
27	27.95	CC-32-**	LS-400-***	25	WS-32-37-S-*	LS-400-***	25	32.000	LS-575-***	30
30	32.00	CC-38-**	LS-500-***	28	WS-38-37-S-*	LS-500-***	28	36.000	LS-575-***	34

* = Specify sleeve length in inches ** = See Cell-Cast® Disk catalog *** = Specify model when ordering

Technically there is no limit to the pipe size that can be sealed using Link-Seal® modular seals. Please contact factory for sizes not listed and for CS model plastic sleeves for walls less than 8" thick.



Sizing Charts for Standard Pipe



Steel and Plastic Pipe with Same Outside Diameter

PIPE SIZE (Nom.)	ACTUAL O.D. (Inches)	CS MODEL NON-METALLIC SLEEVE			WS MODEL STEEL SLEEVE			CAST OR CORE BIT DRILLED HOLE		
		MODEL NUMBER	LINK-SEAL® SIZE	LINKS PER SEAL	MODEL NUMBER	LINK-SEAL® SIZE	LINKS PER SEAL	HOLE I.D.	LINK-SEAL® SIZE	LINKS PER SEAL
1/2	0.840	CS-2-*	LS-200-***	4	WS-2-15-S-*	LS-200-***	4	2.000	LS-200-***	4
3/4	1.050	CS-3-*	LS-315-***	4	WS-2-1/2-20-S-*	LS-275-***	5	2.500	LS-275-***	5
1	1.315	CS-3-*	LS-300-***	4	WS-2-1/2-20-S-*	LS-200-***	5	3.000	LS-300-***	4
1-1/4	1.660	CS-3-*	LS-275-***	8	WS-3-21-S-*	LS-275-***	7	3.000	LS-275-***	7
1-1/2	1.900	CS-3-1/2-*	LS-275-***	8	WS-3-1/2-22-S-*	LS-300-***	5	3.500	LS-300-***	5
2	2.375	CS-4-*	LS-300-***	6	WS-4-23-S-*	LS-300-***	6	4.000	LS-300-***	6
2-1/2	2.875	CS-4-*	LS-200-***	9	WS-4-23-S-*	LS-200-***	9	4.000	LS-200-***	9
3	3.500	CS-5-*	LS-300-***	8	WS-5-25-S-*	LS-300-***	8	5.000	LS-300-***	8
3-1/2	4.000	CS-6-*	LS-325-***	5	WS-6-28-S-*	LS-325-***	5	6.000	LS-325-***	5
4	4.500	CS-6-*	LS-300-***	10	WS-6-28-S-*	LS-300-***	10	6.000	LS-300-***	10
5	5.563	CS-8-*	LS-425-***	6	WS-8-32-S-*	LS-425-***	6	8.000	LS-425-***	6
6	6.625	CS-10-*	LS-475-***	9	WS-10-36-S-*	LS-475-***	9	10.000	LS-475-***	9
8	8.625	CS-12-*	LS-475-***	12	WS-12-37-S-*	LS-475-***	12	12.000	LS-475-***	12
10	10.750	CS-14-*	LS-400-***	10	WS-14-37-S-*	LS-425-***	10	14.000	LS-400-***	10
12	12.750	CS-16-*	LS-400-***	12	WS-16-37-S-*	LS-425-***	12	16.000	LS-400-***	12
14	14.000	CS-18-*	LS-400-***	13	WS-18-37-S-*	LS-400-***	13	18.000	LS-575-***	16
16	16.000	CS-20-*	LS-400-***	15	WS-20-37-S-*	LS-400-***	15	20.000	LS-575-***	18
18	18.000	CS-24-*	LS-525-***	16	WS-24-37-S-*	LS-500-***	16	22.000	LS-575-***	20
20	20.000	CS-25-*	LS-525-***	18	WS-24-37-S-*	LS-400-***	18	24.000	LS-575-***	22
22	22.000	CS-25-*	LS-425-***	20	WS-26-37-S-*	LS-400-***	20	26.000	LS-575-***	24
24	24.000	CC-30-**	LS-500-***	21	WS-30-37-S-*	LS-500-***	21	28.000	LS-575-***	26
26	26.000	CC-32-**	LS-500-***	23	WS-30-37-S-*	LS-400-***	23	30.000	LS-575-***	28
28	28.000	CC-32-**	LS-400-***	25	WS-34-37-S-*	LS-500-***	24	32.000	LS-575-***	30
30	30.000	CC-36-**	LS-525-***	26	WS-36-37-S-*	LS-500-***	26	34.000	LS-575-***	32
32	32.000	CC-38-**	LS-500-***	28	WS-38-37-S-*	LS-500-***	27	36.000	LS-575-***	34
34	34.000	CC-38-**	LS-400-***	30	WS-40-37-S-*	LS-500-***	29	38.000	LS-575-***	36
36	36.000	CC-42-**	LS-500-***	31	WS-42-37-S-*	LS-500-***	31	40.000	LS-575-***	38
42	42.000	CC-48-**	LS-500-***	36	WS-48-37-S-*	LS-500-***	36	46.000	LS-575-***	44
48	48.000	CC-54-**	LS-525-***	40	WS-54-37-S-*	LS-500-***	41	52.000	LS-575-***	50

* = Specify sleeve length in inches ** = See Cell-Cast® Disk catalog *** = Specify model when ordering

Technically there is no limit to the pipe size that can be sealed using Link-Seal® modular seals. Please contact factory for sizes not listed and for CS model plastic sleeves for walls less than 8" thick.

Ductile Iron Pipe (AWWA-C900, C905 and PVC Water Pipe)

PIPE SIZE (Nom.)	ACTUAL O.D. (Inches)	CS MODEL NON-METALLIC SLEEVE			WS MODEL STEEL SLEEVE			CAST OR CORE BIT DRILLED HOLE		
		MODEL NUMBER	LINK-SEAL® SIZE	LINKS PER SEAL	MODEL NUMBER	LINK-SEAL® SIZE	LINKS PER SEAL	HOLE I.D.	LINK-SEAL® SIZE	LINKS PER SEAL
2	2.500	CS-4-*	LS-300-***	6	WS-4-23-S-*	LS-300-***	6	4.000	LS-300-***	6
2-1/4	2.750	CS-5-*	LS-340-***	7	WS-5-25-S-*	LS-325-***	4	5.000	LS-325-***	5
3	3.960	CS-6-*	LS-325-***	5	WS-6-28-S-*	LS-325-***	5	6.000	LS-325-***	5
4	4.800	CS-8-*	LS-400-***	5	WS-8-32-S-*	LS-400-***	5	8.000	LS-400-***	5
6	6.900	CS-10-*	LS-400-***	7	WS-10-36-S-*	LS-400-***	7	10.000	LS-400-***	7
8	9.050	CS-12-*	LS-400-***	9	WS-12-37-S-*	LS-400-***	9	12.000	LS-400-***	9
10	11.100	CS-14-*	LS-400-***	11	WS-16-37-S-*	LS-575-***	13	14.000	LS-400-***	10
12	13.200	CS-16-*	LS-400-***	12	WS-18-37-S-*	LS-575-***	15	18.000	LS-500-***	12
14	15.300	CS-20-*	LS-575-***	17	WS-20-37-S-*	LS-575-***	17	20.000	LS-525-***	14
16	17.400	CS-22-*	LS-400-***	16	WS-22-37-S-*	LS-575-***	19	22.000	LS-525-***	16
18	19.500	CS-24-*	LS-400-***	18	WS-24-37-S-*	LS-475-***	25	24.000	LS-525-***	17
20	21.600	CS-25-*	LS-400-***	20	WS-27-37-S-*	LS-525-***	19	26.000	LS-525-***	19
24	25.800	CC-32-**	LS-500-***	23	WS-30-37-S-*	LS-400-***	23	30.000	LS-575-***	28
30	32.000	CC-38-**	LS-500-***	28	WS-38-37-S-*	LS-500-***	28	36.000	LS-575-***	34
36	38.300	CC-44-**	LS-500-***	33	WS-44-1/2-37-S-*	LS-500-***	33	43.000	LS-525-***	33
42	44.500	CC-50-**	LS-500-***	38	WS-50-1/2-37-S-*	LS-500-***	38	49.000	LS-525-***	38
48	50.800	CC-56-**	LS-500-***	43	WS-57-37-S-*	LS-500-***	43	56.000	LS-500-***	43

* = Specify sleeve length in inches ** = See Cell-Cast® Disk catalog *** = Specify model when ordering

Technically there is no limit to the pipe size that can be sealed using Link-Seal® modular seals. Please contact factory for sizes not listed and for CS model plastic sleeves for walls less than 8" thick.



Sizing Charts for Standard Pipe



Copper Tubing

PIPE SIZE (Nom.)	ACTUAL O.D. (Inches)	CS MODEL NON-METALLIC SLEEVE			WS MODEL STEEL SLEEVE			CAST OR CORE BIT DRILLED HOLE		
		MODEL NUMBER	LINK-SEAL® SIZE	LINKS PER SEAL	MODEL NUMBER	LINK-SEAL® SIZE	LINKS PER SEAL	HOLE I.D.	LINK-SEAL® SIZE	LINKS PER SEAL
1/2	0.625	CS-2-*	LS-275-***	4	WS-2-15-S-*	LS-275-***	4	2.000	LS-275-***	4
3/4	0.875	CS-3-*	LS-315-***	4	WS-2-15-S-*	LS-200-***	4	2.000	LS-200-***	4
1	1.125	CS-3-*	LS-300-***	4	WS-2-1/2-20-S-*	LS-275-***	5	3.000	LS-315-***	4
1-1/4	1.375	CS-3-*	LS-300-***	4	WS-3-21-S-*	LS-300-***	4	3.000	LS-300-***	4
1-1/2	1.625	CS-3-*	LS-275-***	7	WS-3-21-S-*	LS-275-***	7	3.000	LS-275-***	7
2	2.125	CS-4-*	LS-315-***	6	WS-3-1/2-22-S-*	LS-275-***	8	3.500	LS-275-***	9
2-1/2	2.625	CS-4-*	LS-275-***	10	WS-4-23-S-*	LS-275-***	10	4.000	LS-275-***	10
3	3.125	CS-5-*	LS-325-***	4	WS-5-25-S-*	LS-315-***	8	5.000	LS-315-***	8
4	4.125	CS-6-*	LS-325-***	5	WS-6-28-S-*	LS-315-***	10	6.000	LS-315-***	10
6	6.125	CS-8-*	LS-325-***	7	WS-8-32-S-*	LS-315-***	15	8.000	LS-315-***	15
8	8.125	CS-10-*	LS-325-***	9	WS-10-36-S-*	LS-315-***	19	10.000	LS-315-***	19
10	10.125	CS-12-*	LS-325-***	11	WS-14-37-S-*	LS-400-***	10	14.000	LS-575-***	12
12	12.125	CS-14-*	LS-325-***	13	WS-16-37-S-*	LS-400-***	12	16.000	LS-575-***	14

Cast Iron Soil Pipe (Extra Heavy)

PIPE SIZE (Nom.)	ACTUAL O.D. (Inches)	CS MODEL NON-METALLIC SLEEVE			WS MODEL STEEL SLEEVE			CAST OR CORE BIT DRILLED HOLE		
		MODEL NUMBER	LINK-SEAL® SIZE	LINKS PER SEAL	MODEL NUMBER	LINK-SEAL® SIZE	LINKS PER SEAL	HOLE I.D.	LINK-SEAL® SIZE	LINKS PER SEAL
2	2.380	CS-4-*	LS-300-**	6	WS-4-23-S-*	LS-300-**	6	4.000	LS-300-**	6
3	3.500	CS-5-*	LS-300-**	8	WS-5-25-S-*	LS-300-**	8	5.000	LS-300-**	8
4	4.500	CS-6-*	LS-300-**	10	WS-6-28-S-*	LS-300-**	10	6.000	LS-300-**	10
5	5.500	CS-8-*	LS-425-**	6	WS-8-32-S-*	LS-425-**	6	8.000	LS-425-**	6
6	6.500	CS-10-*	LS-475-**	10	WS-10-36-S-*	LS-475-**	9	10.000	LS-475-**	9
8	8.620	CS-12-*	LS-475-**	12	WS-12-37-S-*	LS-475-**	12	12.000	LS-475-**	12
10	10.750	CS-14-*	LS-400-**	10	WS-14-37-S-*	LS-425-**	10	14.000	LS-400-**	10
12	12.750	CS-16-*	LS-400-**	12	WS-16-37-S-*	LS-425-**	12	16.000	LS-400-**	12
15	15.880	CS-20-*	LS-400-**	15	WS-20-37-S-*	LS-400-**	15	20.000	LS-575-**	18

Cast Iron Soil Pipe (Service Weight)

PIPE SIZE (Nom.)	ACTUAL O.D. (Inches)	CS MODEL NON-METALLIC SLEEVE			WS MODEL STEEL SLEEVE			CAST OR CORE BIT DRILLED HOLE		
		MODEL NUMBER	LINK-SEAL® SIZE	LINKS PER SEAL	MODEL NUMBER	LINK-SEAL® SIZE	LINKS PER SEAL	HOLE I.D.	LINK-SEAL® SIZE	LINKS PER SEAL
2	2.300	CS-4-*	LS-315-**	6	WS-4-23-S-*	LS-315-**	6	4.000	LS-315-**	6
3	3.300	CS-5-*	LS-315-**	8	WS-5-25-S-*	LS-315-**	8	5.000	LS-315-**	8
4	4.300	CS-6-*	LS-315-**	11	WS-6-28-S-*	LS-315-**	10	6.000	LS-315-**	10
5	5.300	CS-8-*	LS-425-**	6	WS-8-32-S-*	LS-425-**	6	8.000	LS-425-**	6
6	6.300	CS-8-*	LS-325-**	7	WS-10-36-S-*	LS-475-**	10	10.000	LS-475-**	10
8	8.380	CS-12-*	LS-575-**	10	WS-12-37-S-*	LS-475-**	12	12.000	LS-475-**	12
10	10.500	CS-14-*	LS-475-**	14	WS-14-37-S-*	LS-425-**	10	14.000	LS-475-**	14
12	12.500	CS-16-*	LS-475-**	17	WS-16-37-S-*	LS-425-**	12	16.000	LS-475-**	17
15	15.620	CS-20-*	LS-475-**	20	WS-20-37-S-*	LS-475-**	21	20.000	LS-575-**	18

Electrical Metallic Tubing (Thin Wall)

PIPE SIZE (Nom.)	ACTUAL O.D. (Inches)	CS MODEL NON-METALLIC SLEEVE			WS MODEL STEEL SLEEVE			CAST OR CORE BIT DRILLED HOLE		
		MODEL NUMBER	LINK-SEAL® SIZE	LINKS PER SEAL	MODEL NUMBER	LINK-SEAL® SIZE	LINKS PER SEAL	HOLE I.D.	LINK-SEAL® SIZE	LINKS PER SEAL
1/2	0.706	CS-2-*	LS-275-**	4	WS-2-15-S-*	LS-275-**	4	2.000	LS-275-**	4
3/4	0.922	CS-3-*	LS-315-**	4	WS-2-15-S-*	LS-200-**	4	2.000	LS-200-**	4
1	1.163	CS-3-*	LS-300-**	4	WS-3-21-S-*	LS-315-**	4	3.000	LS-315-**	4
1-1/4	1.510	CS-3-1/2-*	LS-315-**	5	WS-3-21-S-*	LS-300-**	4	3.000	LS-300-**	4
1-1/2	1.740	CS-3-1/2-*	LS-300-**	5	WS-3-1/2-22-S-*	LS-315-**	5	3.500	LS-315-**	5
2	2.197	CS-4-*	LS-315-**	6	WS-4-23-S-*	LS-315-**	6	4.000	LS-315-**	6
2-1/2	2.875	CS-4-*	LS-200-**	9	WS-4-23-S-*	LS-200-**	9	4.000	LS-200-**	9
3	3.500	CS-5-*	LS-300-**	8	WS-5-25-S-*	LS-300-**	8	5.000	LS-300-**	8
4	4.500	CS-6-*	LS-300-**	10	WS-6-28-S-*	LS-300-**	10	6.000	LS-300-**	10

* = Specify sleeve length in inches ** = Specify model when ordering

Technically there is no limit to the pipe size that can be sealed using Link-Seal® modular seals. Please contact factory for sizes not listed and for CS model plastic sleeves for walls less than 8" thick.



Sizing Procedure - Method 2



Method 2 - Link-Seal® Modular Seal Sizing

If your pipe size does not appear in the charts on pages 7, 8 or 9, use the following method to select the correct Link-Seal® modular seal for your application.

1. Calculate the annular space. The annular space is half the difference between your pipe size and the wall opening diameter. Use the following formula.

$$\text{Annular Space} = \frac{\text{Wall Opening I.D.} - \text{Actual Pipe O.D.}}{2}$$

2. From the adjacent chart, select the size closest to the annular space calculated in step 1. You have selected the correct size Link-Seal® modular seal if....the free state thickness is less than the annular space...and the expanded state thickness is greater than the annular space.

3. Calculate the number of links required to fit around the pipe and seal the annular space.

A. Determine the bolt circle for your Link-Seal® modular seal assembly by using the following formula.

$$\text{Bolt Circle} = \frac{\text{Wall Opening I.D.} + \text{Pipe Diameter O.D.}}{2}$$

B. Find the Link-Seal® modular seal chord length (Column 4) and use the following formula to determine required number of links per Link-Seal® modular seal assembly.

$$\text{Links Per Seal} = \frac{\text{Bolt Circle} \times 3.14}{\text{Chord Length}}$$

The result must be **rounded down** to the next whole number. The figures are accurate if the calculation results in **11** or more links for Models LS-200 through LS-325 or result in more than **12** links for Models LS-340 through LS-600. If results are fewer than **11** links for Models LS-200 through LS-325 or result in fewer than **13** links for Models LS-340 through LS-600 verify using tables on pages 11 and 12.

Example 1.

Wall Opening I.D. = 24"
Actual Pipe O.D. = 19.5"

$$\text{Annular Space} = \frac{24 - 19.5}{2} = 2.25$$

Calculate the annular space (2.25"). Select the Link-Seal® modular seal size closest to the annular space. LS-525 is chosen from the chart, because 2.25" falls between 2.18 & 2.50 (the free state thickness and expanded state thickness.)

Determine the number of links for a complete assembly:

$$\text{Bolt Circle} = \frac{24 + 19.5}{2} = 21.75$$

Chord Length for LS-525 = 3.86"

$$\text{Links Per Seal} = \frac{21.75 \times 3.14}{3.86} = 17.69$$

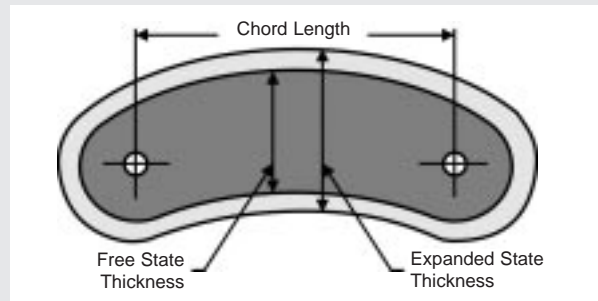
Links Per Seal = 17.69, rounded down = 17

With a final calculation of 17 links (greater than 10 links) the result is accurate.

Link-Seal® modular seals may be ordered by using one of two methods:

Method 1 - Use the charts provided (Pages 7, 8 & 9) for standard pipe sizes and types.

Method 2 - Use Link-Seal® modular seal calculation method to determine the best size Link-Seal® modular seal for non-standard pipe sizes. Verify the accuracy of the calculation by referring to tables on pages 11 and 12.



LINK-SEAL SIZE	FREE STATE THICKNESS	EXPANDED STATE THICKNESS	CHORD LENGTH
LS-200	0.50"	0.62"	1.125"
LS-275	0.62"	0.78"	0.910"
LS-300	0.71"	0.89"	1.510"
LS-315	0.82"	1.04"	1.470"
LS-325	0.94"	1.18"	3.100"
LS-340	1.05"	1.32"	1.575"
LS-360	1.29"	1.65"	2.106"
LS-400	1.43"	1.81"	3.625"
LS-410	1.48"	1.91"	2.600"
LS-425	1.13"	1.46"	3.625"
LS-475	1.62"	1.90"	2.625"
LS-500	2.37"	2.81"	3.860"
LS-525	2.18"	2.50"	3.860"
LS-575	1.88"	2.35"	3.100"
LS-600	3.20"	4.00"	6.000"

* = Free state thickness includes an insertion tolerance, and therefore, differs from the actual thickness as listed in Link-Seal modular seal dimensional data on page 6.

Example 2.

Wall Opening I.D. = 12"
Actual Pipe O.D. = 9.05"

$$\text{Annular Space} = \frac{12 - 9.05}{2} = 1.475$$

Calculate the annular space (1.475"). Select the Link-Seal® modular seal size closest to the annular space. LS-400 is chosen from the chart, because 1.475" falls between 1.43 & 1.81 (the free state and expanded state thickness.)

Determine the number of links for a complete assembly.

$$\text{Bolt Circle} = \frac{12 + 9.05}{2} = 10.525$$

Chord Length for LS-400 = 3.625"

$$\text{Links Per Seal} = \frac{10.525 \times 3.14}{3.625} = 9.12$$

Links Per Seal = 9.12, rounded down = 9

Since the final calculation results in fewer than 10 links, it is advisable to verify the accuracy of the calculation by using pages 11 and 12.





Sizing Procedure- Method 2 (Verification)

Verification - Link-Seal® Modular Seal Sizing

You already have Link-Seal® modular seal size and quantity information from Sizing Procedure Method 2 but have a calculated number of links less than **11** for Models LS-200 through LS-325 or calculations have resulted in fewer than **13** links for Models LS-340 through LS-600. The following charts will allow you to confirm the accuracy of this information.

1. Refer to the chart for the Link-Seal® modular seal size calculated in Sizing Procedure - Method 2. (LS-200, LS-300 etc.)
2. Find the range your pipe O.D. falls within.
(It may fall in either Range #1 or Range #2).
3. Your minimum wall opening is determined as follows:
If your pipe O.D. falls within Range #1:
Min. Wall Opening = A
If your pipe O.D. falls within Range #2:
Min. Wall Opening = Pipe O.D. + B
4. Your maximum wall opening is determined as follows:
If your pipe O.D. falls within either Range #1 or Range #2:
Max. Wall Opening = Pipe O.D. + C

You now have minimum and maximum wall opening dimensions. If your wall opening size falls between these dimensions, your Link-Seal® modular seal size is correct. You may also verify the number of links from column 6. If your wall opening size is not in the range indicated by the chart, either choose another Link-Seal® modular seal size, change your wall opening size or call PSI for assistance: 1-800-423-2410

Example:

Link-Seal® Size = LS-300
Actual Pipe O.D. = 2.900

2.900 falls within Range #2
on LS-300 Chart.

Determine Minimum Wall Opening = 2.900 + B

$$\text{Minimum Wall Opening} = 2.900 + 1.437 = 4.337$$

Determine Maximum Wall Opening = 2.900 + C

$$\text{Maximum Wall Opening} = 2.900 + 1.750 = 4.650$$

$$\text{Number of Links} = 7$$

Link-Seal® LS-200 Sizing Chart

PIPE O.D. RANGE #1	PIPE O.D. RANGE #2	A	B	C	Links/ Seal
0.687 - 0.937	0.937 - 1.125	1.937	1.00	1.25	4
1.125 - 1.375	1.375 - 1.500	2.375	1.00	1.25	5
1.625 - 1.875	1.875 - 1.937	2.875	1.00	1.25	6
2.000 - 2.125	2.125 - 2.375	3.125	1.00	1.25	7
2.375 - 2.500	2.500 - 2.812	3.500	1.00	1.25	8
2.687 - 2.812	2.812 - 3.125	3.812	1.00	1.25	9
3.125 - 3.375	3.375 - 3.625	4.375	1.00	1.25	10

Link-Seal® LS-275 Sizing Chart

PIPE O.D. RANGE #1	PIPE O.D. RANGE #2	A	B	C	Links/ Seal
0.580 - 0.660	0.660 - 0.720	1.870	1.220	1.560	4
0.830 - 0.940	0.940 - 1.050	2.220	1.280	1.560	5
1.070 - 1.220	1.220 - 1.370	2.530	1.320	1.560	6
1.300 - 1.480	1.480 - 1.660	2.850	1.360	1.560	7
1.570 - 1.780	1.780 - 2.000	3.150	1.400	1.560	8
1.770 - 2.030	2.030 - 2.280	3.460	1.420	1.560	9
2.050 - 2.330	2.330 - 2.620	3.750	1.420	1.560	10

Link-Seal® modular seals may be ordered by using one of two methods:

Method 1 - Use the charts provided (Pages 7, 8 & 9) for standard pipe sizes and types.

Method 2 - Use Link-Seal® modular seal calculation method to determine the best size Link-Seal® modular seal for non-standard pipe sizes.

Link-Seal® LS-300 Sizing Chart

PIPE O.D. RANGE #1	PIPE O.D. RANGE #2	A	B	C	Links/ Seal
1.125 - 1.312	1.312 - 1.437	2.875	1.562	1.750	4
1.562 - 1.875	1.875 - 2.000	3.312	1.437	1.750	5
2.062 - 2.375	2.375 - 2.687	3.812	1.437	1.750	6
2.562 - 2.875	2.875 - 3.125	4.312	1.437	1.750	7
3.062 - 3.375	3.375 - 3.812	4.812	1.437	1.750	8
3.562 - 3.937	3.937 - 4.125	5.312	1.374	1.750	9
4.000 - 4.375	4.375 - 4.750	5.750	1.374	1.750	10

Link-Seal® LS-315 Sizing Chart

PIPE O.D. RANGE #1	PIPE O.D. RANGE #2	A	B	C	Links/ Seal
0.870 - 0.995	0.995 - 1.065	2.930	1.920	2.060	4
1.260 - 1.545	1.545 - 1.670	3.320	1.780	2.060	5
1.670 - 2.070	2.070 - 2.260	3.730	1.660	2.060	6
2.140 - 2.575	2.575 - 2.820	4.200	1.620	2.060	7
2.270 - 3.025	3.025 - 3.330	4.700	1.660	2.060	8
2.740 - 3.485	3.485 - 3.800	5.190	1.700	2.060	9
3.610 - 3.940	3.940 - 4.260	5.675	1.720	2.060	10

Link-Seal® LS-325 Sizing Chart

PIPE O.D. RANGE #1	PIPE O.D. RANGE #2	A	B	C	Links/ Seal
2.875 - 2.875	2.875 - 3.125	5.250	2.375	2.375	4
3.625 - 4.000	4.000 - 4.250	6.000	2.000	2.375	5
4.625 - 5.000	5.000 - 5.250	7.000	2.000	2.375	6
5.625 - 6.000	6.000 - 6.500	8.000	2.000	2.375	7
6.625 - 7.000	7.000 - 7.625	9.000	2.000	2.375	8
7.625 - 8.000	8.000 - 8.625	10.000	2.000	2.375	9
8.625 - 9.000	9.000 - 9.625	11.000	2.000	2.375	10

Link-Seal® LS-340 Sizing Chart

PIPE O.D. RANGE #1	PIPE O.D. RANGE #2	A	B	C	Links/ Seal
0.52 - 1.000	1.000 - 1.120	3.180	2.180	2.640	4
0.99 - 1.560	1.560 - 1.760	3.650	2.090	2.640	5
1.460 - 2.100	2.100 - 2.370	4.120	2.020	2.640	6
1.970 - 2.630	2.630 - 2.960	4.630	2.000	2.640	7
2.510 - 3.120	3.120 - 3.500	5.170	2.050	2.640	8
3.030 - 3.600	3.600 - 4.050	5.690	2.090	2.640	9
3.550 - 4.100	4.100 - 4.610	6.210	2.110	2.640	10
4.070 - 4.590	4.590 - 5.160	6.730	2.140	2.640	11
4.580 - 5.080	5.080 - 5.720	7.241	2.156	2.640	12

FORMULA FOR WALL OPENING (Min./Max. Diameter) WHEN YOUR PIPE O.D. FALLS WITHIN RANGE #1

Minimum Wall Opening Dia. = A

Maximum Wall Opening Dia. = Pipe O.D. + C

FORMULA FOR WALL OPENING (Min./Max. Diameter) WHEN YOUR PIPE O.D. FALLS WITHIN RANGE #2

Minimum Wall Opening Dia. = Pipe O.D. + B

Maximum Wall Opening Dia. = Pipe O.D. + C

A = Minimum Wall Opening Dia. for Pipe in Range #1

B = Minimum Wall Opening Add-on Factor for Pipe in Range #2

C = Maximum Wall Opening Add-on Factor



Sizing Procedure- Method 2 (Verification)



Link-Seal® LS-360 Sizing Chart

PIPE O.D. RANGE #1	PIPE O.D. RANGE #2	A	B	C	Links/ Seal
0.850 - 1.400	1.400 - 1.570	4.150	2.750	3.300	4
1.470 - 2.150	2.150 - 2.420	4.770	2.620	3.300	5
2.100 - 2.880	2.880 - 3.240	5.400	2.520	3.300	6
2.790 - 3.590	3.590 - 4.040	6.090	2.500	3.300	7
3.470 - 4.260	4.260 - 4.800	6.770	2.510	3.300	8
4.180 - 4.920	4.920 - 5.530	7.470	2.560	3.300	9
4.870 - 5.580	5.580 - 6.270	8.170	2.590	3.300	10
5.560 - 6.240	6.240 - 7.020	8.860	2.630	3.300	11
6.250 - 6.900	6.900 - 7.760	9.550	2.650	3.300	12

Link-Seal® LS-400 Sizing Chart

PIPE O.D. RANGE #1	PIPE O.D. RANGE #2	A	B	C	Links/ Seal
2.875 - 2.875	2.875 - 3.500	6.500	3.625	3.625	4
3.875 - 4.250	4.250 - 4.750	7.500	3.250	3.625	5
5.000 - 5.250	5.250 - 6.125	8.625	3.375	3.625	6
6.125 - 6.500	6.500 - 7.250	9.750	3.250	3.625	7
7.250 - 7.875	7.875 - 8.500	10.875	3.000	3.625	8
8.375 - 9.125	9.125 - 9.750	12.000	2.875	3.625	9
9.500 - 10.250	10.250 - 11.250	13.125	2.875	3.625	10
10.625 - 11.370	11.370 - 12.125	14.250	2.875	3.625	11
11.750 - 12.500	12.500 - 13.375	15.375	2.875	3.625	12

Link-Seal® LS-410 Sizing Chart

PIPE O.D. RANGE #1	PIPE O.D. RANGE #2	A	B	C	Links/ Seal
1.190 - 1.750	1.750 - 1.970	5.010	3.260	3.820	4
1.960 - 2.690	2.690 - 3.020	5.780	3.090	3.820	5
2.730 - 3.580	3.580 - 4.030	6.550	2.960	3.820	6
3.580 - 4.460	4.460 - 5.020	7.400	2.940	3.820	7
4.400 - 5.320	5.320 - 5.990	8.220	2.900	3.820	8
5.240 - 6.160	6.160 - 6.930	9.060	2.900	3.820	9
6.090 - 6.970	6.970 - 7.840	9.920	2.940	3.820	10
6.950 - 7.790	7.790 - 8.760	10.770	2.980	3.820	11
7.790 - 8.600	8.600 - 9.680	11.620	3.010	3.820	12

Link-Seal® LS-425 Sizing Chart

PIPE O.D. RANGE #1	PIPE O.D. RANGE #2	A	B	C	Links/ Seal
3.000 - 3.500	3.500 - 3.500	6.000	2.500	3.000	4
4.125 - 4.500	4.500 - 4.875	7.125	2.625	3.000	5
5.250 - 5.750	5.750 - 6.250	8.250	2.500	3.000	6
6.500 - 7.000	7.000 - 7.500	9.500	2.500	3.000	7
7.625 - 8.250	8.250 - 8.750	10.750	2.500	3.000	8
8.750 - 9.250	9.250 - 10.000	11.750	2.500	3.000	9
9.875 - 10.500	10.500 - 11.000	12.875	2.375	3.000	10
10.937 - 11.562	11.562 - 12.187	13.937	2.375	3.000	11
12.125 - 12.875	12.875 - 13.500	15.125	2.375	3.000	12

Link-Seal® LS-475 Sizing Chart

PIPE O.D. RANGE #1	PIPE O.D. RANGE #2	A	B	C	Links/ Seal
1.375 - 1.687	1.687 - 2.000	5.375	3.688	4.000	4
2.250 - 2.562	2.562 - 2.812	6.250	3.688	4.000	5
3.125 - 3.562	3.562 - 3.875	7.125	3.563	4.000	6
3.875 - 4.375	4.375 - 4.750	7.875	3.500	4.000	7
4.875 - 5.375	5.375 - 5.750	8.875	3.500	4.000	8
5.625 - 6.125	6.125 - 6.500	9.625	3.500	4.000	9
6.375 - 6.875	6.875 - 7.375	10.375	3.500	4.000	10
7.250 - 7.750	7.750 - 8.375	11.250	3.500	4.000	11
8.000 - 8.625	8.625 - 9.250	12.000	3.375	4.000	12

A = Minimum Wall Opening Dia. for Pipe in Range #1
B = Minimum Wall Opening Add-on Factor for Pipe in Range #2
C = Maximum Wall Opening Add-on Factor

Link-Seal® modular seals may be ordered by using one or more methods:

Method 1 - Use the charts provided (Pages 7, 8 & 9) for standard pipe sizes and types.

Method 2 - Use Link-Seal® modular seal calculation method to determine the best size Link-Seal® modular seal for non-standard pipe sizes.

Link-Seal® LS-500 Sizing Chart

PIPE O.D. RANGE #1	PIPE O.D. RANGE #2	A	B	C	Links/ Seal
2.375 - 2.375	2.375 - 2.500	8.000	5.625	5.625	4
3.375 - 3.625	3.625 - 4.000	9.000	5.375	5.625	5
4.375 - 4.812	4.812 - 5.375	10.000	5.188	5.625	6
5.625 - 6.250	6.250 - 7.000	11.250	5.000	5.625	7
6.750 - 7.500	7.500 - 8.375	12.375	4.875	5.625	8
8.000 - 8.750	8.750 - 9.500	13.625	4.875	5.625	9
9.125 - 10.000	10.000 - 10.750	14.750	4.750	5.625	10
10.500 - 11.375	11.375 - 12.250	16.125	4.750	5.625	11
11.750 - 12.625	12.625 - 13.500	17.375	4.750	5.625	12

Link-Seal® LS-525 Sizing Chart

PIPE O.D. RANGE #1	PIPE O.D. RANGE #2	A	B	C	Links/ Seal
2.750 - 2.750	2.750 - 2.875	7.750	5.000	5.000	4
3.750 - 3.750	3.750 - 4.250	8.750	5.000	5.000	5
5.000 - 5.000	5.000 - 5.625	10.000	5.000	5.000	6
6.000 - 6.250	6.250 - 7.062	11.000	4.750	5.000	7
7.125 - 7.625	7.625 - 8.250	12.125	4.500	5.000	8
8.562 - 9.062	9.062 - 9.750	13.562	4.500	5.000	9
9.750 - 10.375	10.375 - 10.875	14.750	4.375	5.000	10
10.811 - 11.437	11.437 - 12.312	15.811	4.375	5.000	11
12.124 - 12.750	12.750 - 13.625	17.125	4.375	5.000	12

Link-Seal® LS-575 Sizing Chart

PIPE O.D. RANGE #1	PIPE O.D. RANGE #2	A	B	C	Links/ Seal
1.570 - 1.570	1.570 - 1.760	6.280	4.710	4.710	4
2.400 - 2.730	2.730 - 2.960	7.110	4.380	4.710	5
3.300 - 3.830	3.830 - 4.120	8.010	4.180	4.710	6
4.250 - 4.900	4.900 - 5.250	8.960	4.060	4.710	7
5.200 - 5.940	5.940 - 6.360	9.910	3.970	4.710	8
6.170 - 6.980	6.980 - 7.460	10.870	3.900	4.710	9
7.130 - 8.000	8.000 - 8.560	11.840	3.840	4.710	10
8.110 - 9.020	9.020 - 9.650	12.810	3.800	4.710	11
9.080 - 10.030	10.030 - 10.730	13.790	3.760	4.710	12

Link-Seal® LS-600 Sizing Chart

PIPE O.D. RANGE #1	PIPE O.D. RANGE #2	A	B	C	Links/ Seal
7.040 - 8.270	8.270 - 9.510	14.770	6.510	7.740	6
8.990 - 10.330	10.330 - 11.790	16.720	6.390	7.740	7
11.050 - 12.360	12.360 - 13.880	18.780	6.430	7.740	8
13.040 - 14.360	14.360 - 16.200	20.780	6.420	7.740	9
15.020 - 16.320	16.320 - 18.260	22.750	6.430	7.740	10
16.980 - 18.200	18.200 - 20.970	24.710	6.510	7.740	11
18.930 - 20.090	20.090 - 22.410	26.660	6.570	7.740	12

FORMULA FOR WALL OPENING (Min./Max. Diameter)
WHEN YOUR PIPE O.D. FALLS WITHIN RANGE #1

Minimum Wall Opening Dia. = A

Maximum Wall Opening Dia. = Pipe O.D. + C

FORMULA FOR WALL OPENING (Min./Max. Diameter)
WHEN YOUR PIPE O.D. FALLS WITHIN RANGE #2

Minimum Wall Opening Dia. = Pipe O.D. + B

Maximum Wall Opening Dia. = Pipe O.D. + C





Century-Line® Engineered Sleeves

Century-Line® Sleeves

are used to create circular holes in concrete poured barriers of all types including; walls, floors and ceilings. Molded from non-conductive, high impact resistant HDPE, Century-Line® sleeves are lightweight and easily installed by one construction worker without use of cranes or hoists. They are available in 16 diameters ranging from 2" to 25" (51mm - 635mm) and shipped, from stock, in any desired length.

Features

16 sizes - 2" to 25" in diameter

In the event of a field or engineering change, sleeves may be cut shorter at the job site using ordinary hand tools. Standard sleeves are 16" (40.6mm) in length. Longer length models may also be quickly fabricated as a custom ordered item.

1/8 the weight of steel

Century-Line® sleeves are light enough for one worker to install without a crane, hoist or helper which reduces installation time and costs. Century-Line® sleeves are easy to stock and far less expensive to ship, when compared to steel sleeves.

Resists water migration.

The 2" (50.8mm) water stop collar not only anchors the sleeve in position but creates a path against the migration of water around the outside of the sleeve.

Adjusts to wall thickness.

Century-Line sleeves' unique hollow water stop collar acts like an expansion joint, adjusting (up to 1/2" - 12.7mm) to the thickness of the wall. This compressive force reacts against the forms like a spring, creating pressure and maintains proper sleeve location within the form.

Nailer end caps position sleeve precisely in form.

Specially designed end caps provide an ideal method for attaching Century-Line® sleeves to the concrete forms. The end caps assure that the sleeve holds its circular configuration during the pour. In addition to keeping out wet concrete, they also prevent dirt from entering the sleeve during backfill operations or the interim construction period.

Tough high density polyethylene (HDPE) construction.

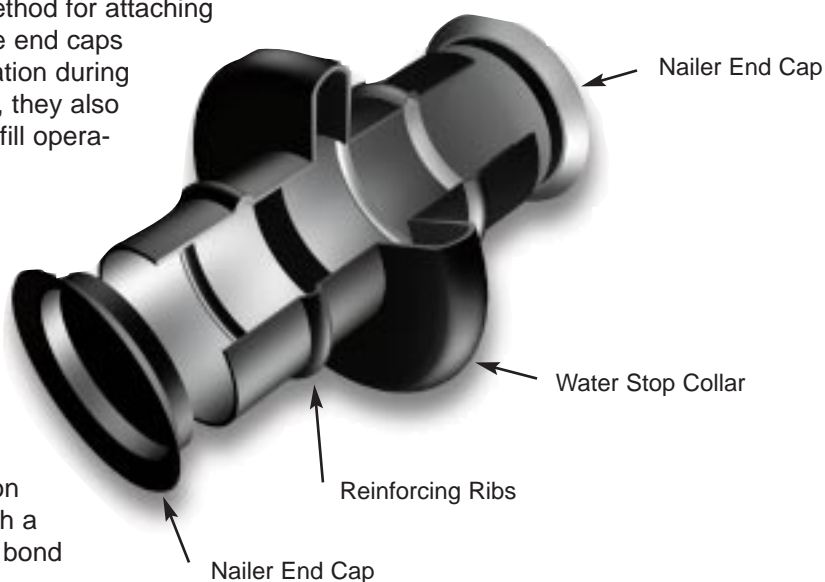
High impact resistant HDPE also provides excellent resistance to acids, alkalis and other organic solvents. Ideal for cathodic protection systems, these non-conductive sleeves will neither rust, corrode or degrade. Low-temperature properties are such that they may be installed under any weather conditions suitable for pouring concrete. High temperature application limit is 150° F. (66° C.). The sleeve is molded with a texture on the outside surface to assure a better bond than most plastic to concrete interfaces.

How To Order

Please see page 7 for ordering information on Link-Seal® modular seals and Century-Line® sleeves.

Weights and Dimensional Data Model CS (16" length)

MODEL	I.D. (In.)	I.D. (mm)	lbs.	Kg.
CS-2	2.09	53.1	0.70	0.32
CS-3	2.94	74.7	1.30	0.59
CS-3-1/2	3.38	85.9	1.50	0.68
CS-4	4.03	102.4	2.00	0.90
CS-5	5.14	130.6	2.80	1.27
CS-6	6.14	156.0	3.60	1.63
CS-8	8.21	208.5	4.80	2.18
CS-10	10.19	258.8	6.40	2.90
CS-12	12.26	311.4	7.20	3.27
CS-14	14.14	359.2	11.20	5.08
CS-16	16.18	411.0	12.00	5.44
CS-18	17.45	443.2	15.50	7.03
CS-20	19.12	485.6	17.50	7.94
CS-22	20.32	516.1	21.00	9.53
CS-24	22.76	578.1	22.00	9.98
CS-25	24.81	630.2	23.00	10.43



Cell-Cast® Interlocking Hole Forming Disks



Cell-Cast® Interlocking Hole Forming Disks are designed to produce large diameter holes in poured concrete structures. Molded from non-conductive plastic, Cell-Cast® disks are lightweight and may be installed by one construction worker. They are available in a wide range of diameters using 3" and 4" modular disks.



Features

Economy

- Reduces material costs by 30 to 50%.
- Cuts labor costs by 50 - 70%.
- Minimizes freight and handling charges.

Quality

- Consistently produces dimensionally accurate openings.
- Eliminates galvanic corrosion.
- Avoids potential leak path between sleeve and concrete.

Installation

- Lightweight - 1/8 the weight of steel pipe sleeves.
- Complete assembly accomplished in minutes.
- Easily installed by one construction worker.

Availability

- Cell-Cast® Disks are stocked in a variety of diameters up to 64.75" (164cm) and available for immediate delivery.
- Larger sizes are available by special order.

Flexibility

- Cell-Cast® Disks are produced in 3" and 4" thicknesses and can be assembled to fit virtually any wall. For example:
- Combine two 3" cells and one 4" cell for 10" walls.
- Combine two 4" cells and one 3" cell for 11" walls.
- Combine three 4" cells for 12" walls.

Cell-Cast® Hole Forming Disks

CELL-CAST® MODEL NO.	HOLE I.D.	3" THICKNESS		4" THICKNESS	
		LBS	KG	LBS	KG
CC-30	29.25	10.0	4.53	10.4	4.71
CC-32	31.13	10.8	4.89	11.2	5.08
CC-36	34.75	12.6	5.71	13.1	5.94
CC-38	37.25	13.9	6.30	14.4	6.53
CC-42	41.38	16.3	7.39	16.8	7.62
CC-44	43.75	17.7	8.02	18.3	8.30
CC-48	47.25	20.0	9.07	20.7	9.38
CC-50	50.00	22.0	9.97	22.6	10.25
CC-54	52.63	23.9	10.84	24.6	11.15
CC-56	56.00	26.5	12.02	27.3	12.38
CC-60	59.25	29.2	13.24	30.0	13.60
CC-64	62.75	32.2	14.60	33.1	15.01
CC-66	64.75	34.0	15.42	34.9	15.83

How To Order

Please see Pages 7, 8 and 9 for standard size pipe and Cell-Cast® Disk ordering numbers.

WS Steel Wall Sleeves

WS Wall Sleeves are constructed from steel and available in a wide range of diameters and lengths.

They are an excellent choice for installations where the Link-Seal® Modular Seal and WS sleeve assembly would be subject to extremely high temperatures or where fire seals are specified.



How To Order

Please see Page 7 for ordering information on Link-Seal® modular seals and WS Steel Sleeves.

For diameters larger than 24", contact PSI at 1-800-423-2410

Model WS (12" length)

MODEL	I.D.	lbs.	Kg.
WS-2-21-S-12	1.94	5.90	2.67
WS-2-15-S-12	2.07	5.53	2.51
WS-2-1/2-27-S-12	2.32	9.78	4.43
WS-2-1/2-20-S-12	2.47	7.91	3.58
WS-3-30-S-12	2.90	12.60	5.71
WS-3-21-S-12	3.07	9.93	4.51
WS-3-1/2-22-S-12	3.55	11.70	5.31
WS-4-23-S-12	4.03	13.61	6.17
WS-5-25-S-12	5.05	17.91	8.12
WS-6-28-S-12	6.07	22.73	10.31
WS-6-18-S-12	6.25	14.82	6.72
WS-8-32-S-12	7.98	33.55	15.22
WS-8-18-S-12	8.25	21.94	9.95
WS-10-36-S-12	10.02	46.12	20.92
WS-10-25-S-12	10.25	33.67	15.27
WS-12-37-S-12	12.00	60.14	27.28
WS-14-37-S-12	13.25	62.04	28.14
WS-16-37-S-12	15.25	71.04	32.22
WS-18-37-S-12	17.25	79.98	36.28
WS-20-37-S-12	19.25	90.00	40.82
WS-22-37-S-12	21.25	98.00	44.45
WS-24-37-S-12	23.25	107.00	48.53



Link-Seal® Modular Seal Bolt Test

An independent 1,470 hour salt spray test run in accordance to ASTM B117-97 has proven Link-Seal® modular seals' Zinc Dichromated Carbon Steel bolts, with proprietary corrosion inhibiting coating, to be superior when compared with competitive manufacturers.

Test Criteria

Bolts subject to exposure in Salt Spray Cabinet for 1,470 hours according to ASTM B117-97.

The new Link-Seal Zinc Dichromated Carbon Steel bolt with proprietary corrosion inhibiting coating will provide greater resistance to the most hostile environmental conditions on earth.



1,470 hour salt spray test performed by an independent laboratory. Test results are available on request.

**1,470 Hour
Salt Spray
Test Results**



Link-Seal® Modular Seal Technical Approvals

The following is a partial listing of the many Federal agencies, associations, code groups, laboratories and organizations which have approved, listed, specified, tested or otherwise indicated acceptance of Link-Seal® modular seals.

General Code Groups, Associations, Laboratories and Approval Authorities

AWWA - American Water Works Association
API - American Petroleum Institute
TUV - Technischer Überwachungs-Verein
Bureau Veritas - Marine Division
ASME - American Society of Mechanical Engineers
DNV - Det Norske Veritas
FM - Factory Mutual Engineering Corporation
LLOYD'S - Lloyd's Register of Shipping
NFPA - National Fire Protection Association
NACE - National Association of Corrosion Engineers

Governmental Agencies

Bureau of Public Roads - Division of Bridges
United States Coast Guard
Corps. of Engineers
GSA - General Services Administration
Military Specifications
TVA - Tennessee Valley Authority



Typical Specification

1.0 General

Under this section there shall be furnished and installed a complete Link-Seal® modular seal assembly, manufactured by PSI-Thunderline/Link-Seal® located at 6525 Goforth Street, Houston, TX 77021, as shown on drawings and specifications. For clarification, complete assembly is defined as a combined:

- A. Wall opening (i.e. steel sleeve, Thermoplastic (HDPE) sleeve, cored hole or formed hole). The wall opening size and/or type shall be selected according to recommendations found in the most recent Link-Seal® modular seal catalog.
- B. Sufficient quantity and type of Link-Seal® modular seals required to effectively provide a hydrostatic and/or fire-rated seal.
- C. Each individual link shall be conspicuously and permanently identified with the name of the manufacturer and model number. Manufacturers other than the above-named company wishing to quote equipment in this section shall submit detail drawings of their proposed equipment and suitable evidence of a minimum of 25 years of experience and results to the engineer to obtain written approval to quote at least ten (10) days prior to bid opening.

2.0 Link-Seal® Modular Seal Rubber Links

Shall be modular, mechanical type, consisting of inter-locking synthetic rubber links shaped to continuously fill the annular space between the pipe and the wall opening. The elastomeric element shall be sized and selected per manufacturer's recommendations and have the following properties as designated by ASTM. Coloration shall be throughout elastomer for positive field inspection. Each link shall have a permanent identification of the size and manufacturer's name molded into it.

- A. For Standard Service Applications
-40 to +250°F (-40 to +121°C)
EPDM = ASTM D2000 M3 BA510
Color = Black
- B. For Hydrocarbon Service Applications
-40 to +210°F (-40 to +99°C)
Nitrile = ASTM D2000 M1BF510
Color = Green
- C. For High Temperature or Fire Seal Applications
-67 to +400°F (-55 to +204°C)
Silicone = ASTM D2000 M1GE505
Color = Gray
Reference shall always be made to the latest published Link-Seal® modular seal selection guide for the service intended.

2.1 Link-Seal® Modular Seal Pressure Plates

- A. Link-Seal® modular seal pressure plates shall be molded of glass reinforced Nylon Polymer with the following properties:
Izod Impact - Notched = 2.05ft-lb/in. per ASTM D-256
Flexural Strength @ Yield = 30,750 psi per ASTM D-790
Flexural Modulus = 1,124,000 psi per ASTM D-790
Elongation Break = 11.07% per ASTM D-638
Specific Gravity = 1.38 per ASTM D-792

- B. Models LS200-275-300-315 shall incorporate the most current Link-Seal® Modular Seal design modifications and shall include an integrally molded compression assist boss on the top (bolt entry side) of the pressure plate, which permits increased compressive loading of the rubber sealing element. Models 315-325-340-360-400-410-425-475-500-525-575-600 shall incorporate an integral recess known as a "Hex Nut Interlock" designed to accommodate commercially available fasteners to insure proper thread engagement for the class and service of metal hardware. All pressure plates shall have a permanent identification of the manufacturer's name molded into it.
- C. For fire and Hi-Temp service, pressure plates shall be steel with 2-part Zinc Dichromate Coating.

2.2 Link-Seal® Modular Seal Hardware

All fasteners shall be sized according to latest Link-Seal® modular seal technical data. Bolts, flange hex nuts shall be either:

- A. Mild Steel with a 60,000 psi minimum tensile strength and 2-part Zinc Dichromate coating per ASTM B-633 and Organic Coating, tested in accordance with ASTM B-117 to pass a 1,470 hour salt spray test.
- B. 316 Stainless Steel per ASTM F593-95, with a 85,000 psi average tensile strength.

3.0 Wall Opening

- A. **Century-Line® Sleeves - for openings to 24.81" diameter.**

Where pipes must pass through walls and floors of new structures, unless otherwise shown or specified, install molded non-metallic high density polyethylene Model CS Century-Line® sleeves as manufactured by PSI-Thunderline/Link-Seal®. Model CS sleeves shall have integrally formed hollow water stop sized having a minimum of four inches larger than the outside diameter of the sleeve itself and allowing 1/2" movement between wall forms to resist pour forces. Each sleeve assembly shall have end caps manufactured of the same material as the sleeve itself and installed at each end of the sleeve so as to prevent deformation during the initial concrete pour, and to facilitate attaching the sleeve to the wall forms. End caps shall remain in place to protect the opening from residual debris and rodent entry prior to pipe insertion.

- B. **Cell-Cast® Disks - for openings from 29.25" to 64.74" diameter.**

The contractor shall install Cell-Cast® disks, providing a round hole in conformance with Link-Seal® modular seal sizing data. Cell-Cast® disks shall consist of 3" and/or 4" lightweight inter-locking polyethylene cells stacked to form the thickness of the poured concrete wall. Molded into each cell shall be a cavity to accept a 2" x 4" nailer.

4.0 Quality Assurance

Link-Seal® Modular Seal components and systems shall be domestically manufactured at a plant with a current ISO-9002 registration. Copy of ISO-9002 registrations shall be a submittal item.

NOTE: Link-Seal Modular Seals are specifically designed as hydrostatic and/or fire rated seals and are not considered to be pipe supports. When appropriate, Link-Seal Modular Seals should be used with proper pipe supports on both ends.



Link-Seal® Modular Fire Seals

1-Hour Factory Mutual Approved

Link-Seal® modular fire seals provide up to one-hour protection against flames, smoke, gases and water, even when exposed to temperatures up to 1900°F. (1038°C.).

These seals are a proprietary Link-Seal® modular seal design formulated from Hi-Temp inorganic silicone and incorporate special designed carbon steel pressure plates.

For installations from 1/2" to 120" diameter Link-Seal® modular fire seals are used with WS wall sleeves or core bit drilled openings.

Model T

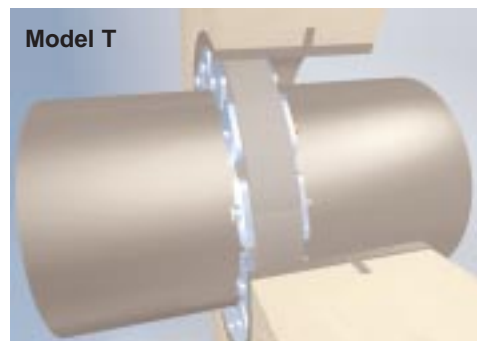
One Hour FM Approved

Approved by Factory Mutual as a 1-hour fire stop in accordance with ASTM E814-81 Fire & Hose Stream Criteria Listing #J.I.OH4A5.AC

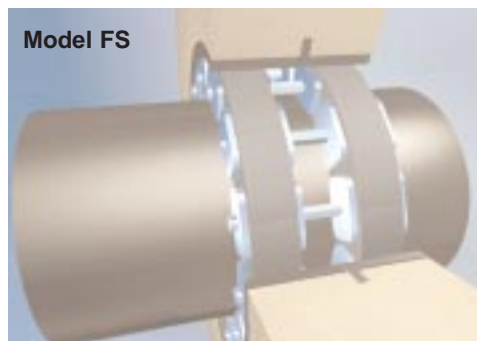
Model FD or FS

these are essentially two T Models back-to-back for added protection. In Model FS, a tie rod tightens both seals simultaneously - for use when only one side of a hole is accessible.

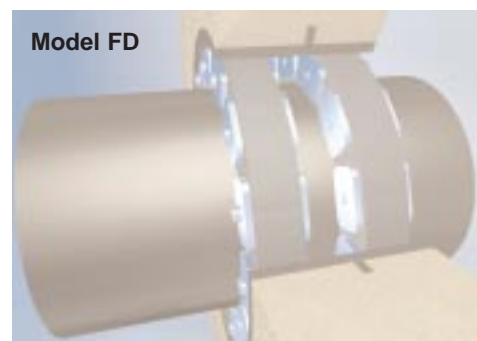
Model T



Model FS



Model FD



Minimum Wall & Floor Thickness for Model T Fire Rated Seals

LINK-SEAL® MODEL	MINIMUM WALL OR FLOOR THICKNESS
LS-200-T	2.25" (57 mm)
LS-275-T	2.25" (57 mm)
LS-300-T	3.00" (76 mm)
LS-315-T	3.00" (76 mm)
LS-325-T	4.00" (102 mm)
LS-340-T	4.00" (102 mm)
LS-360-T	4.00" (102 mm)
LS-400-T	5.00" (127 mm)
LS-410-T	5.00" (127 mm)
LS-425-T	5.00" (127 mm)
LS-475-T	5.00" (127 mm)
LS-500-T	5.00" (127 mm)
LS-525-T	5.00" (127 mm)
LS-575-T	5.00" (127 mm)

Minimum Wall & Floor Thickness for Model FD or FS Fire Rated Seals

LINK-SEAL® MODEL	MINIMUM WALL OR FLOOR THICKNESS
LS-200-FD or FS	4.50" (114 mm)
LS-275-FD or FS	4.50" (114 mm)
LS-300-FD or FS	6.00" (152 mm)
LS-315-FD or FS	6.00" (152 mm)
LS-325-FD or FS	8.00" (203 mm)
LS-340-FD or FS	8.00" (203 mm)
LS-360-FD or FS	8.00" (203 mm)
LS-400-FD or FS	10.00" (254 mm)
LS-410-FD or FS	10.00" (254 mm)
LS-425-FD or FS	10.00" (254 mm)
LS-475-FD or FS	10.00" (254 mm)
LS-500-FD or FS	12.00" (305 mm)
LS-525-FD or FS	12.00" (305 mm)
LS-575-FD or FS	12.00" (305 mm)

Link-Seal® Modular Fire Seals - Testing Procedure



Certified test furnace with pipe and cable penetrations and fire rated Link-Seal® modular seal installed in concrete floor slab. Twenty-seven thermo couples were used per slab.

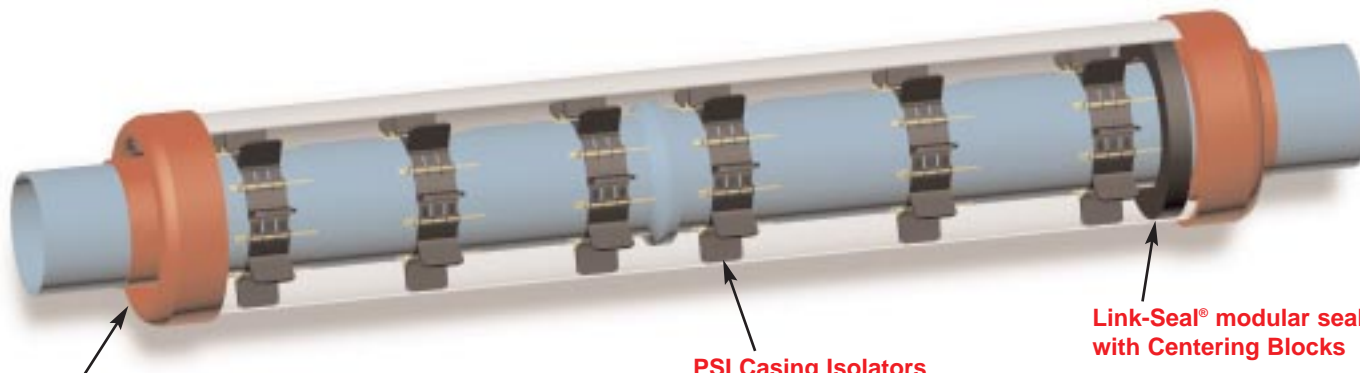


Test slab being raised from furnace at completion of test. (Slab was next positioned vertically for hose stream test.)



Test slab after hose stream. Cold water striking the 1900°F slab caused scalling of concrete, but left Link-Seal® modular seal intact. Unexposed side showed no evidence of water damage.

Sealing Pipeline Casings



PSI End Seals

Model "C" Custom Pull-on

Individually designed to accommodate all types of water and sewer pipes and carrier/casing combinations. Made of 1/8" thick, specially compounded synthetic rubber for long life and easy installation.

Model "W" Wrap Around End Seals

Specially designed for ease of installation. Simply remove plastic backing from self-curing rubber and press exposed surfaces together. Available for all carrier/casing differentials.

Model "S" Standard Pull-on End Seals

Made of special synthetic rubber for long life and easy installation, the highly flexible "S" shaped seal is available for ANSI steel pipe specifications. Band locating ribs are on the outside, with special sealing ribs on the inside under the band to prevent leakage.

All PSI End Seals include stainless steel closure clamps.

Link-Seal® Modular Seals with Reinforced Centering Blocks.

A Link-Seal® modular seal assembly installed at each end of pipeline casings provides positive, hydrostatic protection against the entry of water, soil or other backfill materials and eliminates corrosion and ice damage.



PSI Casing Isolators

Metallic

Model A (painted) is available with 8" (208mm) or 12" (305mm) wide steel bands for 4" (10cm) to 120" (305cm) carrier pipe diameters.

Model C (coated) is available with 8" (208mm) or 12" (305mm) wide steel bands for 4" (10cm) to 120" (305cm) carrier pipe diameters.

Model S (stainless steel) is available with 8" (208mm) or 12" (305mm) wide steel bands for 4" (10cm) to 120" (305cm) carrier pipe diameters.

Plastic

Model PE (polyethylene) is available for 3/4" (19mm) through 48" (1210mm) and larger carrier pipe.

Ranger II all non-metallic spacers are available for 0.83" (21mm) through 37.60" (955mm) carrier pipe diameters.

400 Series

For Casings Two Pipe Sizes Larger than Carrier Pipe

CARRIER X CASING PIPE	COMPLETE CASING SEAL ASSEMBLY CONSISTS OF: PLAIN LINKS	LINKS WITH CENTERING BLOCKS	TOTAL LINKS	BASIC LINK-SEAL SIZE USED	COMPLETE ASSEMBLY ORDER NO.
2" X 6"	5	0	5	LS-410	26*
3" X 6"	4	0	4	LS-425	36*
4" X 8"	7	0	7	LS-410	48*
6" X 10"	10	0	10	LS-410	610*
8" X 12"	12	0	12	LS-475	812*
10" X 14"	10	0	10	LS-425	1014*
12" X 16"	12	0	12	LS-425	1216*
14" X 18"	9	4	13	LS-400	1418
16" X 20"	11	4	15	LS-400	1620
18" X 22"	13	4	17	LS-400	1822
20" X 24"	13	5	18	LS-400	2024
22" X 26"	16	5	20	LS-400	2226
24" X 28"	17	5	22	LS-400	2428
26" X 30"	17	6	23	LS-400	2630
28" X 32"	18	7	25	LS-400	2832
30" X 34"	20	7	27	LS-400	3034
32" X 36"	21	8	29	LS-400	3236
34" X 38"	22	8	30	LS-400	3438
36" X 40"	24	8	32	LS-400	3640

* = Centering Blocks are not required and not available for these models.

(Maximum coating 3/16" thick - Casing pipe walls should not exceed 0.500" except for casing sizes 12", 14" and 16", which should not have a wall thickness greater than 0.312")

500 Series

For Casings Two Pipe Sizes Larger than Carrier Pipe

CARRIER X CASING PIPE	COMPLETE CASING SEAL ASSEMBLY CONSISTS OF: PLAIN LINKS	LINKS WITH CENTERING BLOCKS	TOTAL LINKS	BASIC LINK-SEAL SIZE USED	COMPLETE ASSEMBLY ORDER NO.
4" X 10"	6	0	6	LS-500	410**
6" X 12"	8	0	8	LS-500	612**
8" X 14"	9	0	9	LS-500	814**
10" X 16"	7	3	10	LS-525	1016
12" X 18"	9	3	12	LS-525	1218
14" X 20"	9	4	13	LS-500	1420
16" X 22"	11	4	15	LS-500	1622
18" X 24"	12	4	16	LS-500	1824
20" X 26"	13	5	18	LS-500	2026
22" X 28"	14	5	19	LS-500	2228
24" X 30"	15	6	21	LS-500	2430
26" X 32"	17	6	23	LS-500	2632
28" X 34"	18	6	24	LS-500	2834
30" X 36"	19	7	26	LS-500	3036
32" X 38"	20	7	27	LS-500	3238
34" X 40"	21	8	29	LS-500	3440
36" X 42"	23	8	31	LS-500	3642
42" X 48"	27	9	36	LS-500	4248
48" X 54"	30	11	41	LS-500	4854
54" X 60"	33	12	45	LS-500	5460

** = Centering Blocks are not required for these applications.

(Maximum coating 3/16" thick - Casing pipe walls should not exceed 0.500" except for casing sizes 16" and 18" which should not have a wall thickness greater than 0.312")





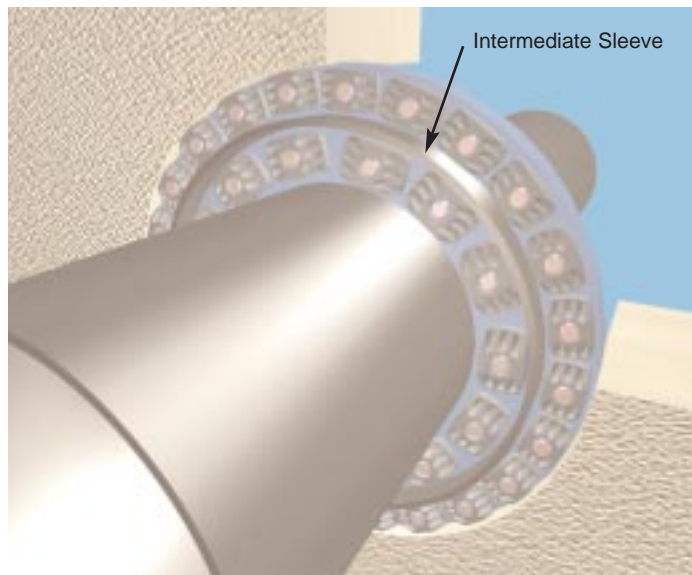
Sealing An Oversize Annulus

The Double Row Method

Sometimes the wall opening represents a differential up to five pipe sizes larger than the carrier pipe itself. This creates an annular space that is larger than the expanded thickness of a single Link-Seal® modular seal assembly. A typical example is a flanged spool piece or an existing opening where piping has been removed to make way for a new installation. As a result it is necessary to use an intermediate sleeve and another belt of Link-Seal® modular seals.

Key design considerations when sizing an intermediate wall sleeve are:

- A. The intermediate sleeve should be sized correctly to accommodate both belts of Link-Seal® modular seals.
- B. Be sure to support the actual carrier pipe properly.
Neither belt of links should be responsible for supporting the carrier pipe.
- C. Let economics guide your selection when sizing Link-Seal modular seals. However do not undersize, refer to adjacent example or call PSI for sizing assistance 1-800-423-2410



Typical Application

Wall Opening = 40" Cored Hole
Carrier Pipe = 30" API Type (30.00" O.D.)
This is a differential of five pipe sizes
(32, 34, 36, 38, 40)

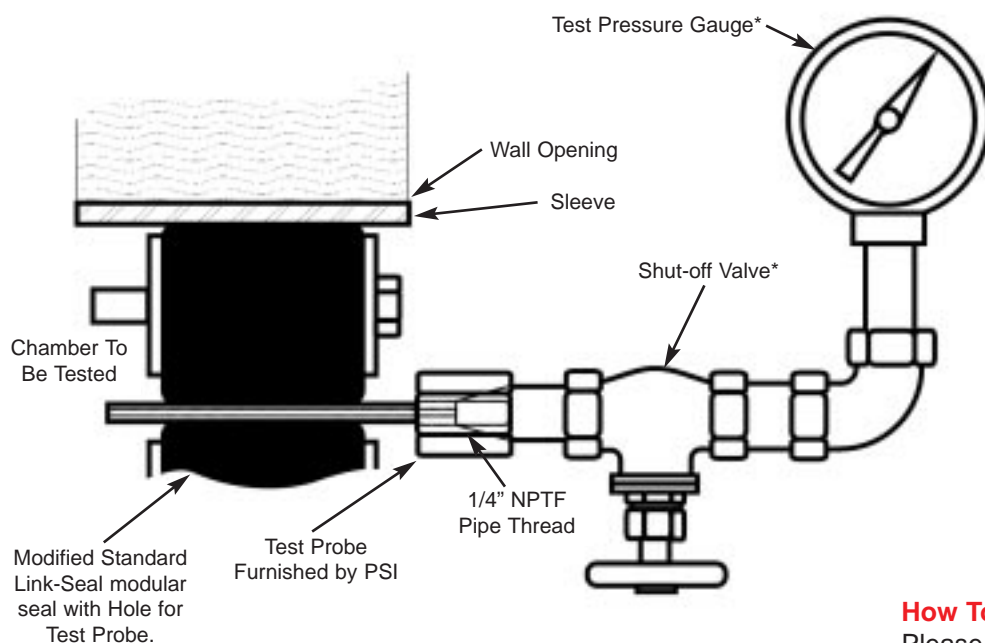
Solution:

Use an inner belt of LS-500
and an outer belt of LS-575.

Intermediate sleeve must be three pipe sizes larger than the 30" carrier pipe. A 36" pipe with a 3/8" wall would be an excellent choice. Checking the Link-Seal® modular seal sizing chart on page 8 indicates a 30 x 36 annulus requires 26 links of LS-500. The outer annulus of 36 x 40 will require 38 links of LS-575.

For sizing assistance call our toll free number:
1-800-423-2410.

Pressure Testing with Link-Seal® Modular Seals



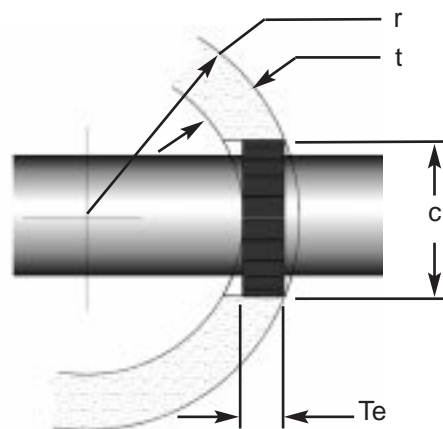
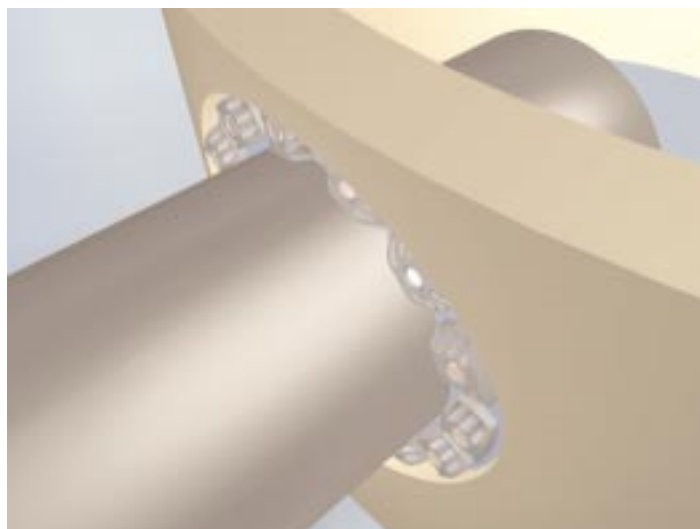
* = Not Provided by PSI

To determine the amount of pressure that has built up behind a Link-Seal® modular seal, install our "V" modification. It is a standard Link-Seal® modular seal assembly in which one link has a hole molded to accept a test probe. The probe has a NPT female connection and is inserted prior to tightening the assembly. The probe is firmly sealed by expansion of the rubber link. A pressure gauge can then be attached to monitor for leaks or pressure build-up.

How To Order

Please specify "V" with Link-Seal modular seal Model Number Example: LS-400-C-V. "V" modification is available in **all** sizes.

Sealing Manhole Penetrations with Link-Seal® Modular Seals



When Link-Seal modular seals are specified for a penetration through a curved wall, the thickness must be checked to assure an adequate sealing surface. A minimum (effective) wall thickness (T_e) is required. This can be found by a scale drawing or by using the adjacent formula.

$$T_e = t - (r - 1/2 \sqrt{4r^2 - c^2})$$

Where t = wall thickness

r = wall outside radius

c = penetration opening I.D.

Link-Seal Model Selected for Penetration	(T_e) Minimum
LS-200/275	2.25"
LS-300/315	3.00"
LS-325/340/360/410	4.00"
LS-400/425/475	5.00"
LS-500/525/575	5.00"
LS-600	6.00"

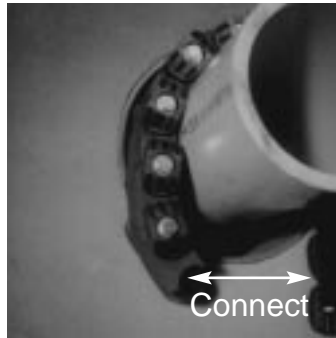
(T_e) = Required bearing surface based on the footprint of respective Link-Seal modular seal model.



Installation Techniques - Link-Seal® Modular Seals



1. Center the pipe, cable or conduit in wall opening or casing. Make sure the pipe will be adequately supported on both ends. Link-Seal® modular seals are not intended to support the weight of the pipe.



2. Loosen rear pressure plate with nut just enough so links move freely. Connect both ends of belt around the pipe.



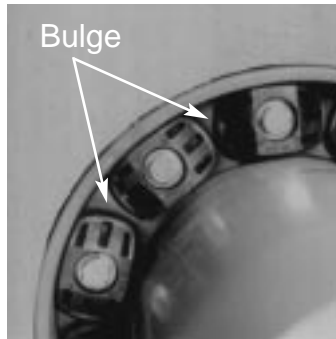
3. Check to be sure all bolt heads are facing the installer. Extra slack or sag is normal. Do not remove links if extra slack exists. **Note:** On smaller diameter pipe, links may need to be stretched.



4. Slide belt assembly into annular space. For larger size belts, start inserting Link-Seal modular seal assembly at the 6 O'Clock position and work both sides up toward the 12 O'Clock position in the annular space.



5. Start at 12'O Clock and tighten bolt until rubber begins to "bulge". Do not tighten any bolt more than 4 turns at a time. Continue in a clockwise manner until links have been uniformly compressed. (Approx. 2 or 3 rotations)



6. Make 2 or 3 more passes at 4 turns per bolt MAXIMUM, tightening all bolts clockwise until all sealing elements bulge around all pressure plates.



7. If the seal doesn't appear to be correct using the instructions provided, **Call PSI at 800-423-2410.**

Installation Notes: The Link-Seal® modular seal bolt heads are usually recessed below the wall opening or the edge of casing pipe and therefore a socket or offset wrench must be used. Hand Tools: Use 5/16" hex or #6 screwdriver for LS-200. 1/2" hex requires 3/8" drive socket wrench. 9/16" and 3/4" hex requires 1/2" drive socket wrench. (Tools not provided.)

**Always Wear Safety Equipment
When Installing Link-Seal® modular seals!**

Always Wear Safety Equipment When Using Link-Seal® Modular Seals!



Link-Seal® Modular Seal - Do's

1. Make sure pipe is centered.
2. Install the belt with the pressure plates evenly spaced.
3. Install the exact number of links indicated in sizing charts.
4. Check to make sure pipe is supported properly during backfill operations.
5. Make sure seal assembly and pipe surfaces are free from dirt.



Link-Seal® Modular Seal - Don'ts

1. Don't Install the belt with the pressure plates aimed in irregular directions. (Staggered)
2. Don't Install Link-Seal® modular seals with spiral weld pipe.
3. Don't torque each bolt completely before moving on to the next.
4. Don't use high speed power tools (450 rpm or less)
5. Do not use power tools with Link-Seal modular seal 316 stainless steel bolts.

If the seal doesn't appear to be correct using the instructions provided, **Call PSI at 713-747-6948 or 800-423-2410.**

Installation Techniques - Century-Line® Sleeves



Century-Line® Sleeves are thermoplastic wall or floor pipe penetration sleeves. One person working alone can usually install a Century-Line® Sleeve regardless of the size.



1. Measure the center line to position Century-Line® Sleeve end cap.



2. Nail one of the end caps at the marked center line.

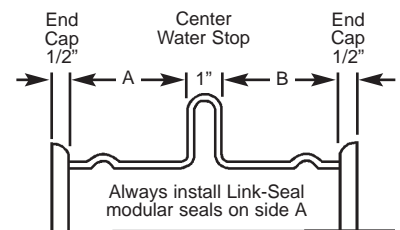


3. Place the Century-Line® Sleeve on the end cap. The sleeve should be cut 1/2" shorter than the width of the wall. Cut with a hand or power saw.

Note: To insure minimum water migration, center the water stop in wall by cutting equal lengths from each end of the sleeve, **except as noted below.**



4. Place second end cap on sleeve. Check to determine that the cap is properly inserted.



Always Wear Safety Equipment When Using Century-Line Sleeves & Link-Seal Modular Seals!

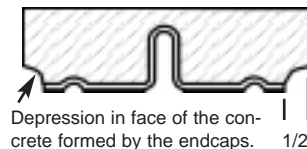


5. For additional stability, it's necessary to secure the sleeve with wire to the rebar. Inset the other end cap firmly and check that second end cap is positioned correctly and close the form.



6. After the concrete is poured and cured, remove end caps with screw driver or crow bar. End caps may be replaced to protect sleeve until pipe penetration is made.

Wall Thickness	Cut From Left End	Dimension A	Cut From Right End	Dimension B
16"	0.0"	7.0"	0.0"	7.0"
14"	1.0"	6.0"	1.0"	6.0"
12"	2.0"	5.0"	2.0"	5.0"
10"	2.5"	4.5"	3.5"	3.5"
8"	2.5"	4.5"	5.5"	1.5"



Notes:

- Example: To convert 16" to 12", cut 2" off each end.
- Endcaps leave 1/2" depression in face of concrete.
- On sleeves under 12" length, install Link-Seal® modular seal on the "long side" of the waterstop.
 - For Link-Seal® modular seals models LS-200, LS-275, LS-300, LS-315, LS-340 and LS-360 - install with pressure plates flush with outer edge of the sleeve.
 - For Link-Seal® modular seals models LS-325, LS-400, LS-410, LS-425 and LS-475 - install with pressure plates partially inserted into the sleeve. When tightened, the pressure plates will "pull" into the sleeve.
 - For Link-Seal® modular seals models LS-500, LS-525, LS-575 and LS-600 - the minimum sleeve length is 10". Follow the instructions in 3 above.

Alternative Technique Using Threaded Rod



After nailing end cap to form, drive (threaded rod*) through the end plate and form and (thread nut*) on other side.

Note: Remember to measure the (threaded rod*) to match the length of the sleeve.



Place the sleeve over the end cap nailed to the form.

* = Not Provided by PSI.



Place second cap on the sleeve and use a (block of wood*) and (wing nut*) to tighten unit in place. Make certain sleeve is plumb.



If you should have questions using the instructions provided, Call PSI at 713-747-6948 or 800-423-2410.

Installation Techniques - Cell-Cast® Disks



1. Locate center line where the hole is desired. This location will be used as a guide for the threaded centering assist rod.



2. A 2x4 wood nailer is included. Fasten it along with the threaded rod directly to the concrete form. This provides support and helps center the complete Cell-Cast® disk assembly.



3. Slide the first Cell-Cast® disk over the threaded rod.



4. Secure the edges of the cell to the form using the provided steel spikes.



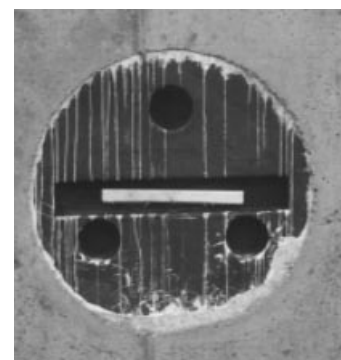
5. Additional disks are interlocked to accommodate finished wall thickness. Verify thickness is the same as wall.



6. Guide the 1" wood block over the threaded rod and secure the assembly with the wing nut provided.



7. Wrap each seam with one wrap of 2" wide tape to bridge any possible gaps. **Note:** Tape not included. Finish installing concrete forms and pour concrete.



8. After wall cures, wall forms are removed. The Cell-Cast® disk assembly is now ready for removal.



9. Chip excess concrete from the edge of the Cell-Cast® disk assembly and wall.



10. Remove disks by breaking out the entire assembly.



11. Inspect the installation. A smooth opening is important for a proper Link-Seal® modular seal installation. Repair voids and grind smooth any ridges.

If you should have questions using the instructions provided, Call PSI at 713-747-6948 or 800-423-2410.

Always Wear Safety Equipment When Using Cell-Cast® Disks!

Frequently Asked Questions



Q - Can Link-Seal® modular seals withstand pressures greater than 20 psi?

A - Yes, where pressure exceeds 20 psi, key factors to consider are: pipe surface, sleeve surface, Link-Seal® modular seal compression, and proper installation techniques. Contact Link-Seal® modular seal engineering services for recommendations.

Q - How much angular pipe movement will Link-Seal® modular seals allow and still maintain a seal?

A - Link-Seal® modular seals may allow angular pipe movement or misalignment of up to 10 degrees, depending upon the size of Link-Seal® modular seal used. Please call PSI for more information.

Q - When is the recommended time to install Link-Seal® modular seals?

A - Always install Link-Seal® modular seals prior to any final connections. This helps prevent off-center pipe alignment.

Q - Is it necessary to use WS or CS sleeves when installing Link-Seal® modular seals?

A - WS model steel and CS model plastic sleeves are specially designed for use with Link-Seal® modular seals. When installed with Link-Seal® modular seals these sleeves provide the best possible assurance of a quality wall penetration system.

Q - What tools are required to install Link-Seal® modular seals?

A - A socket or offset wrench with 5/16", 1/2", 3/8", 9/16", 3/4" & 1-3/16" sockets will handle all installations. A low speed (450 RPM or less) power tool is suggested for multiple installations to increase efficiency.

Q - Can I use power tools when installing Link-Seal modular seals with 316 stainless steel bolts?

A - No, please refer to recommended installation instructions.

Q - Sometimes when installing a Link-Seal® modular seal belt, it hangs loose on the pipe even though all my sizing calculations are correct. Why does it appear that I have too many links?

A - Link-Seal® modular seals are basically sized to fit the annular space, not the pipe. Use the assemblies recommended by the charts or calculation. It may not look right, but it will fit.

Q - Can Link-Seal® modular seals be used for penetrations where the pipe is off-center to the opening?

A - Centering is very important. Contact PSI engineering services for off-center installation.

Q - Is it necessary to use riser clamps, pipe saddles and hanger supports with Link-Seal® modular seals?

A - Link-Seal® modular seals are penetration type seals. It is not intended to be a structural support. Standard pipe hanger practice should always be applied.

Q - My wall is 24" thick. Do I need Link-Seal® modular seals on both sides of the wall?

A - In many cases, one single Link-Seal® modular seal assembly is appropriate. Double seals are typically found in critical applications such as fire walls or nuclear power stations. Double seals are also recommended for building foundation wall penetrations where the wall thickness is greater than 12".

Warranty and Conditions of Sale

The seller warrants that all goods furnished under this order will be free from defects in material and workmanship and will conform to Pipeline Seal & Insulator, Inc. published specifications.

The limit of Pipeline Seal & Insulator, Inc.'s liability for failure of any of our products to meet the foregoing warranty, or for breach of any other warranty, express, implied or statutory, shall be to supply an equivalent amount of product for any materials returned to us within 12 months of shipment and found to be defective by Pipeline Seal & Insulator, Inc.

Due to the widely varying conditions under which our products are used or installed, Pipeline Seal & Insulator, Inc. offers no warranty as to their merchantability, length of service or suitability for any particular purpose, express or implied, other than described above.

The Purchaser accepts full responsibility for installation of all goods furnished under this order and for any defects or damage suffered as a result of defective installation of such goods. No

instructions, advice, or aid relative to installation given by the Seller to the Purchaser shall be construed as a warranty as to the accuracy or utility of such instructions, advice, or aid, but only as an accommodation to the Purchaser and an opinion of the Seller.

The foregoing conditions of sale shall not be modified or affected in any way whatsoever by reason of Seller's receipt or acknowledgement of Buyer's purchase order or any other related instrument of paper containing additional or different conditions and, to the extent there may be any terms or provisions in such a purchase order, etc. which may be in conflict with or modification of the foregoing, such terms and provisions of such purchase order, etc. shall be deemed to have no force or effect.

Updated engineering catalogs, literature and installation techniques are available on-line at: www.linkseal.com



Pipeline Seal and Insulator, Inc.

6525 Goforth Street, Houston TX 77021 U.S.A.
Telephone: 713-747-6948 • Fax: 713-747-6029
Toll Free: 1-800-423-2410
www.linkseal.com • e-mail: info@psipsi.com



Certificate No: NACB7895



Certificate No:10125

***Copy This Page and Fax to PSI
at 1-713-747-6029***



Common Installation Concerns

(Check all that apply)

Challenge PSI with new applications and specialized situations. That's our strength. With over forty years of engineering experience in sealing technology, Link-Seal® modular seals are uniquely positioned to offer solutions that are unavailable from other manufacturers.

Date _____

Name _____

Title _____

Company _____

Address _____

City _____

State _____ Zip _____

Telephone _____

Facsimile _____

e-mail _____

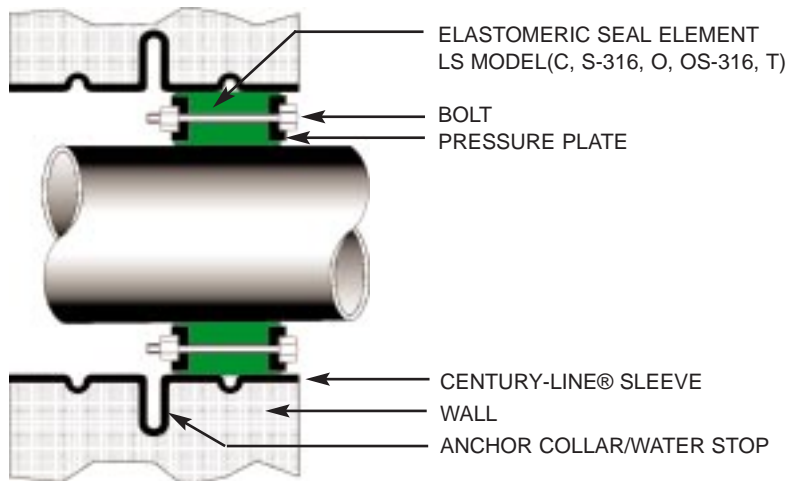
- Annular Space Too Narrow
- Sleeve Out of Round
- Unable To Use All Links
- Intermediate Sleeve Sizing
- Annular Space Too Wide
- Curved Wall Application
- Entering Wall on a Skew
- Buldging Links
- ISO 9002 Approval
- Off Center Alignment
- Narrow Wall Application
- Links Appear Crushed
- High Temperature Problems
- Factory Mutual Approval
- Pipe Out of Round
- Radial/Axial Problems
- Links Do Not Expand
- Material Compatibility
- Lightweight Pipe
- Corrosion Concerns
- Vibration Dampening
- Supporting Pipes
- Thrust Collars

Briefly Outline Your Ideas, Questions or Concerns:

[illegible]

Product Number Ordering Scheme

Link-Seal® Modular Seals with Century-Line Sleeves



LINK-SEAL® MODEL NO. EXAMPLE

10 - LS - 400 - C

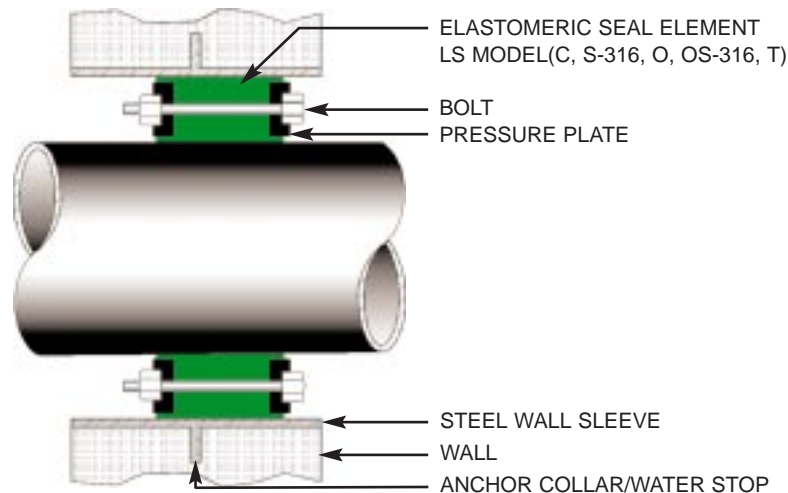
NO. OF LINKS _____
LINK-SEAL® _____
SIZE _____
MODEL _____

CENTURY-LINE® MODEL NO. EXAMPLE

1 - CS-10 - 16

NO. OF UNITS _____
CS SLEEVE MODEL NO. _____
SLEEVE LENGTH (INCHES) _____

Link-Seal® Modular Seals with Model WS Wall Sleeves



LINK-SEAL® MODEL NO. EXAMPLE

10 - LS - 400 - C

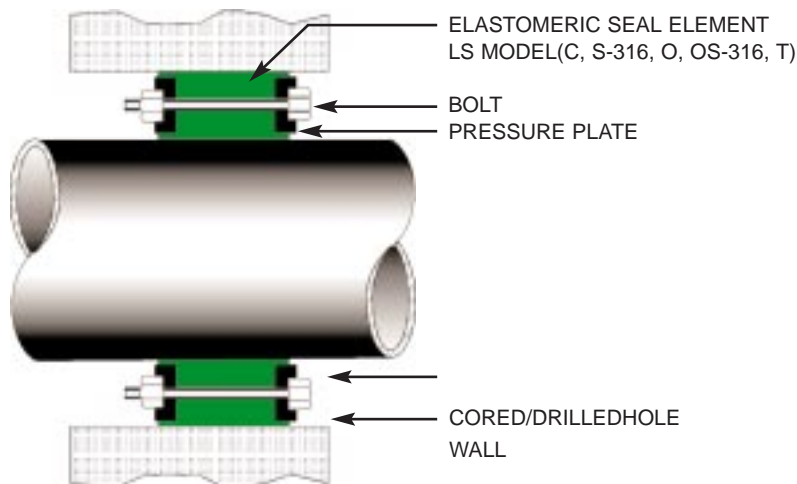
NO. OF LINKS _____
LINK-SEAL® _____
SIZE _____
MODEL _____

STEEL WS SLEEVE MODEL NO. EXAMPLE

WS - 14 - 25 - S - 12

WALL SLEEVE _____
SLEEVE NOMINAL _____
STEEL WALL THICKNESS _____
STEEL _____
LENGTH IN INCHES _____

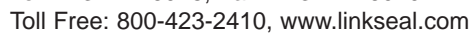
Link-Seal® Modular Seals with Cored or Drilled Wall Opening



LINK-SEAL® MODEL NO. EXAMPLE

10 - LS - 400 - C

NO. OF LINKS _____
LINK-SEAL® _____
SIZE _____
MODEL _____



APPROVED BY _____ DATE _____





Pipeline Seal and Insulator, Inc.

6525 Goforth Street, Houston, TX 77021 U.S.A.
Telephone: 713-747-6948, Facsimile: 713-747-6029
Toll Free: 800-423-2410
www.linkseal.com, www.pipeline seal.com
e-mail: info@psipsi.com

Link-Seal® is a registered trademark of PSI.
Century-Line® is a registered trademark of PSI.
Cell-Cast® is a registered trademark of PSI.

©2003, Pipeline Seal and Insulator, Inc.
LSEM/2-03-10

