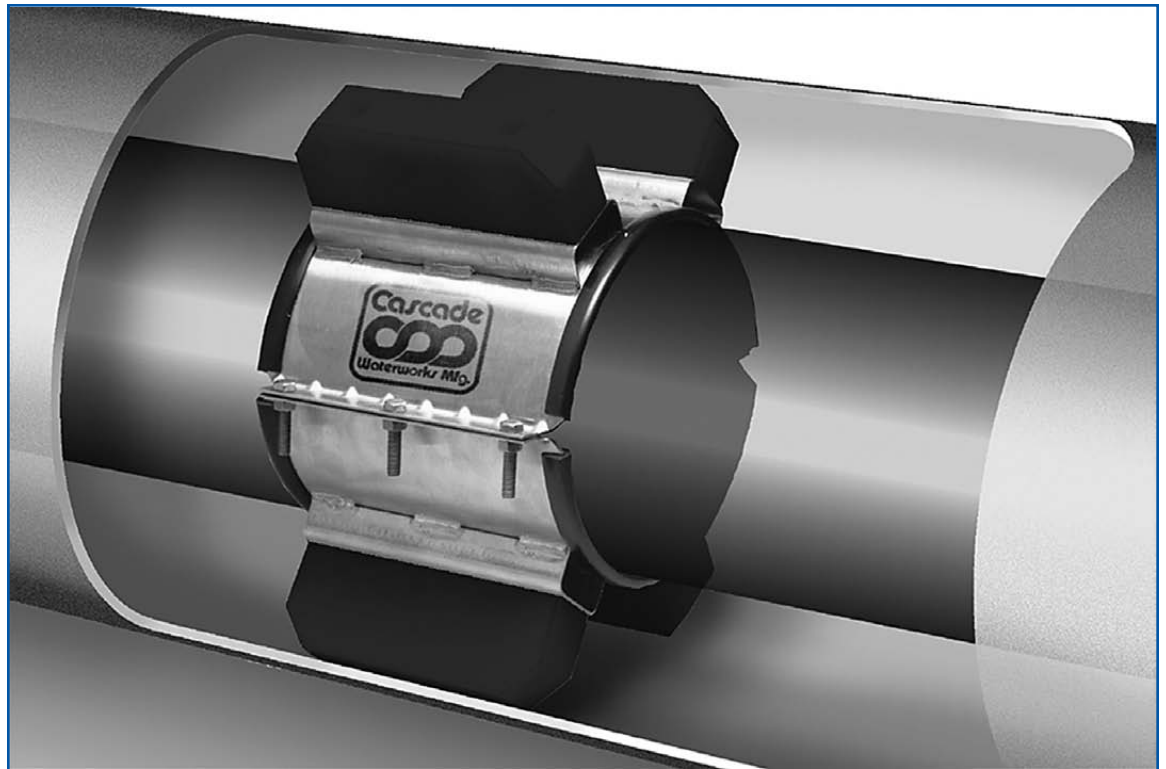




"The Standard
of Excellence in
the Industry"

ALL STAINLESS STEEL CASING SPACERS



**Position pipe within casing under
roadways, railroads, bridges,
and canals. Ideal for sliplining.**

1213 BADGER STREET • YORKVILLE, ILLINOIS 60560
(630) 553-0840 • (800) 426-4301 • FAX (630) 553-0181
www.cascademfg.com



LOW COEFFICIENT OF FRICTION

48" DIP into 60" Casing, 110' up 10% Grade

Owner: Cobb Marietta Water Authority,
Hwy 41 Transmission main

Engineer: Welker and Associates

Contractor: John D. Stephens

Contractor planned on a full day with a wench cable to pull, jacking equipment to push, plus a 7 man crew. With CASCADE'S spacers the entire 110' was installed in 1 hour 45 minutes using only a back hoe.



CORRECTING FOR GRADE

8" DIP into 24" casing, 380' gravity sewer.

Owner: City of Atlanta

Engineer: Dept. of Pollution Control

Contractor: Newell

Bore for casing turned up and lost 8" of grade over last 90'. CASCADE provided numbered spacers that when installed in sequence, brought the carrier back to grade. Spacers are also field adjustable.



CENTERING

54" steel into 72" and 64", CMP casing, 200'

Owner: City of Seattle — Tolt River Pipeline

Engineer: CH₂ M Hill

Contractor: Frank Coluccio

CASCADE spacers center the carrier within the casing to maintain alignment and restrain carrier against floatation or other movement.



PVC INSTALLATION-RESTRAINING

30" Vylon® PVC into 48" casing, 750' gravity sewer

Owner: Trinity River Authority

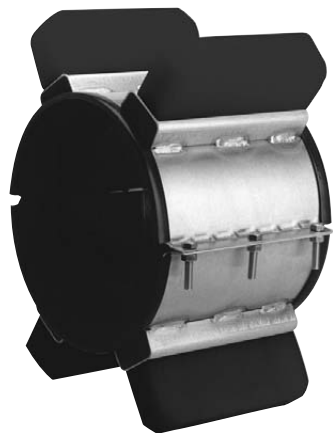
Engineer: McDonald and Associates

Contractor: Pate Bros.

Spacers placed on spigot end at limit line for Bell insertion. When assembled, spacer pushes Bell relieving stress and reducing chances of telescoping pipes. Spacers maintain proper flow line while restraining against floatation.

THE CASCADE SYSTEM

The CASCADE Casing Spacer system replaces the old method of banding wooden skids to the carrier pipe with steel straps. Compare CASCADE'S method with the obsolete one. In addition to the typical positioning design shown on this page, CASCADE has also developed designs for:



- Placing multiple carriers within one casing
- Positioning thermally insulated pipe without damage to insulation
- Centering small carriers within large casings
- Positioning gravity sewer to on grade requirements

CASCADE FEATURES

- Lowest coefficient of friction in the industry — easy to push
- High corrosion resistance — eliminate backfill
- Dielectric insulator — cathodic protection
- Design flexibility — position carrier positively
- Simple to use — trouble free insertion

CASCADE All stainless Steel Casing Spacers are the state of the art system for inserting pipes within pipes. The old method of strapping on and greasing wooden skids is obsolete. Compare CASCADE'S system with the antiquated wooden skids...

CASCADE ALL STAINLESS STEEL CASING SPACERS

- **Easily attached** by a single person.
- No special tools needed.
- Slide into casing with minimum pushing force. **Low coefficient of friction** lets runners glide over rough spots insuring trouble free insertion. **Lowest Coefficient of Friction in the Industry.**
- **High Corrosion Resistance** - 100% chemically passivated; Dielectrically insulates carrier and holds securely without any backfill.
- **No Backfill** - Lowers construction costs and allows for future access.

WOODEN SKIDS AND STRAPS

- Require at least two sets of hands to attach.
- Cumbersome, time consuming, greasy. Notching and banding tools needed.
- **Hard to push.** Catch on weld beads. Carrier rotates. Joints are destabilized. Binding can break straps or skids, making removal and reinsertion necessary.
- **Corrodes.** Requires backfill to insure long term stability. Allows bacteria to concentrate.
- Backfill of sand, gravel, or grout is expensive and makes future access difficult or impossible.

WHY CASCADE?

EXPERIENCE

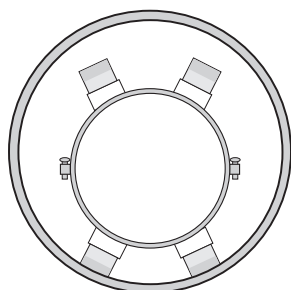
CASCADE IS THE LEADER in casing spacers for the water and sewer industry with literally thousands of successful installations across the nation. CASCADE has worked with every type of pipe used in water and sewer systems. New challenges are welcome, but chances are if it is a water or sewer application - we've already done it.

QUALITY

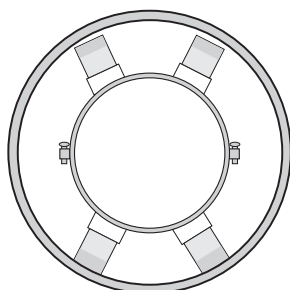
CASCADE is the leader in quality as well as experience from the liner to the runner - inside to out - there is no corner cutting. Each component material was carefully selected so that the product would be top notch - the best available. Imitators make cheaper products - not equal products.

THE CASCADE SYSTEM

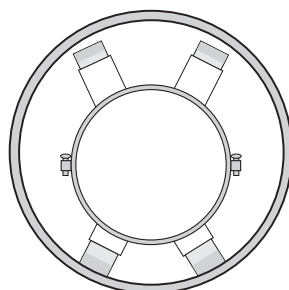
BASIC POSITIONS



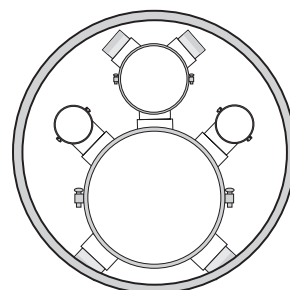
Standard: Assists installation and carries slip joint bells at least .75" off casing wall. Maintains dielectric insulation. No restraint against movement such as floatation or surge pressure bucking.



Centered & Restrained: Positions carrier in center of casing. Provides restraint against movement. Best for mechanically restrained pipe joints.

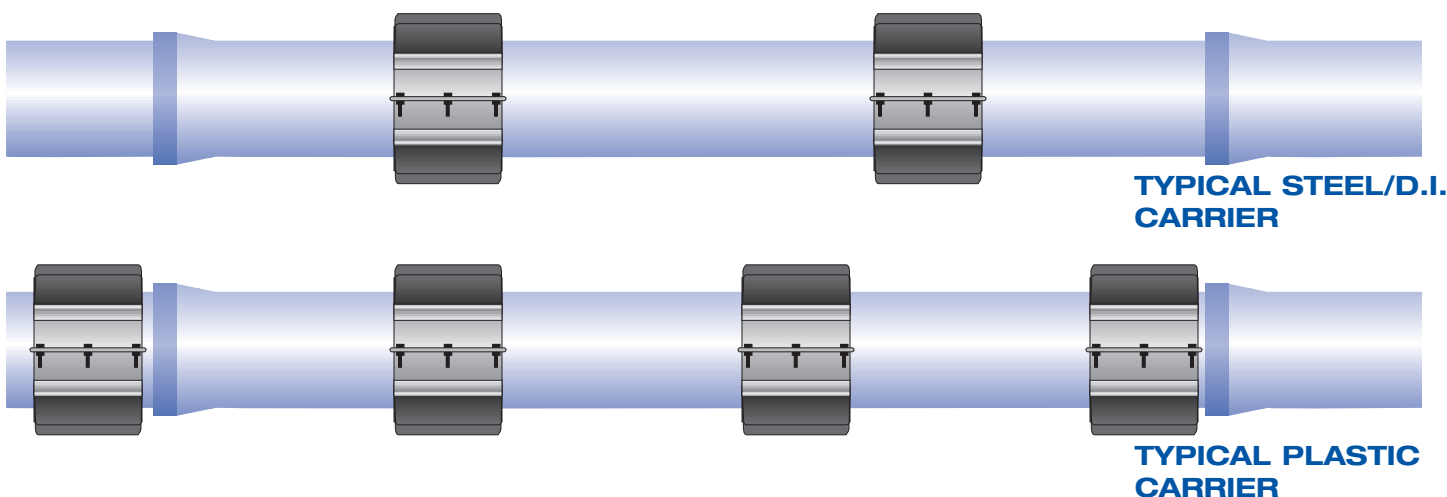


Restrained: Keeps carrier at bottom of casing while restraining against movement.



Multiple & Restrained: Reduces bores under highway.

CASING SPACER PLACEMENT DIAGRAM



SPECIFYING SPACER WIDTH & PLACEMENT INTERVALS

When deciding the width and placement intervals of CASCADE spacers, the main concerns are pipe stiffness, joint stability, height of separation between carrier and casing, and live load. *Generally*, stiffer pipe can be supported adequately at greater intervals than more flexible pipe. Casing pipes have deflections, ridges, or otherwise uneven surfaces. Care should be taken to maintain joint stability during, as well as after, installation.

Unless special circumstances exist, **CASCADE** recommends 8" wide spacers at 10' intervals on sizes up to 48" pipe. Pipes over 48" O.D. should be supported with 12" wide spacers.

For **ductile iron carrier pipes**, 10' intervals are the adequate through 60" O.D. For **steel carrier pipes**, 8' intervals are adequate through 60" O.D.

For 24" and larger pipe with the separation between carrier and casing greater than 5 inches, 6' intervals and/or 12" wide spacers should be considered.

All variations of PVC pipes (sewer, C-900 and thinner wall PVC) need support at closer intervals and should be supported every 6'.

Polyethylene pipes vary widely in the interval required and depends on the wall thickness and the maximum allowable deflection between supports. The pipe manufacturer should be consulted if intervals longer than 6' are desired.

Concrete and prestressed concrete cylinder pipe require shorter intervals. *Always* use Model CCS-ER Spacers.

In all instances, a spacer should be placed so as to support the carrier within 2' of the end of the casing pipe.

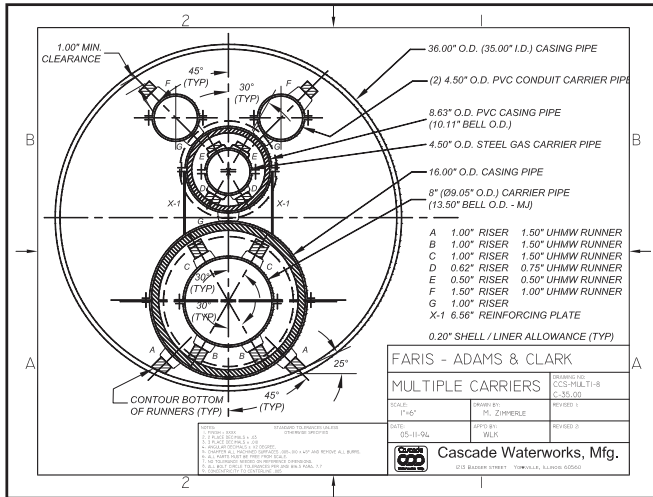
Please consult Cascade if there are any special conditions or if any questions arise.

For multiple pipe Casing Spacers, consult factory.

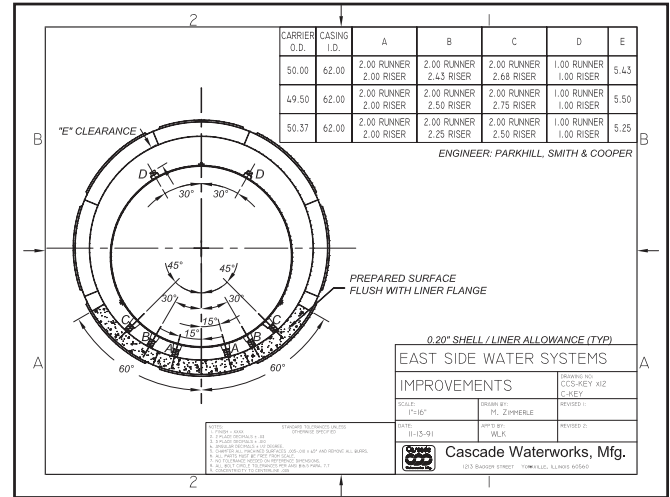
THE CASCADE SYSTEM

SAMPLE DRAWINGS

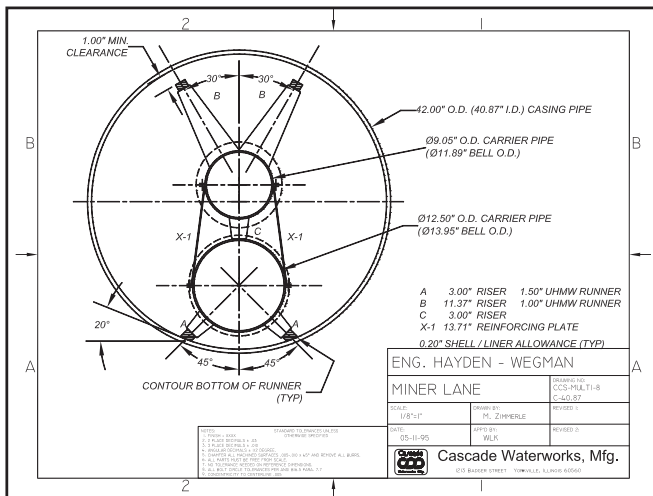
MULTIPLE CARRIERS



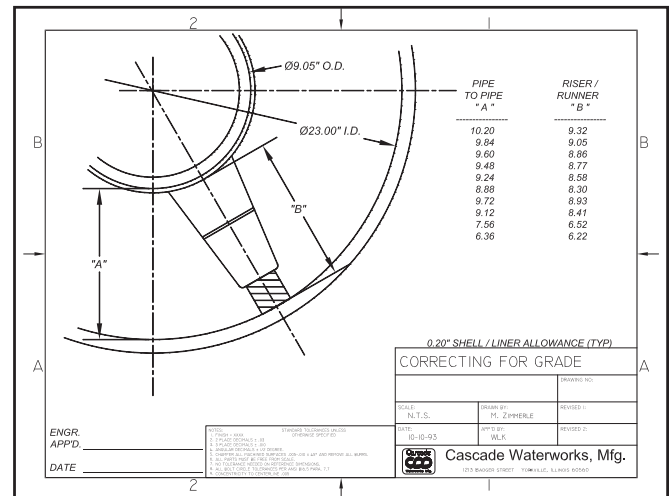
TUNNEL LINER



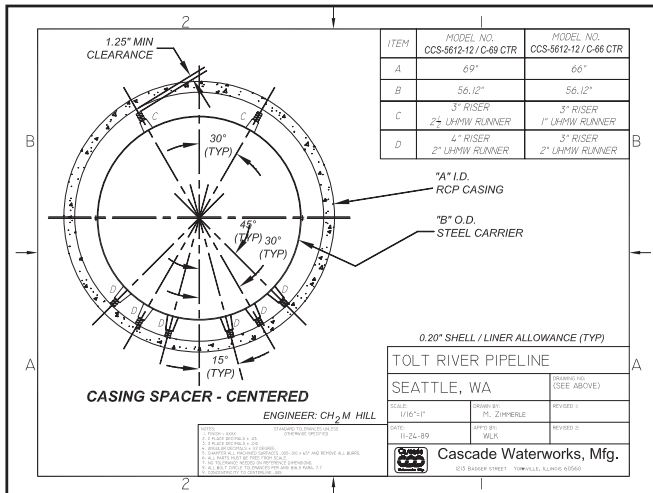
DUAL CARRIERS



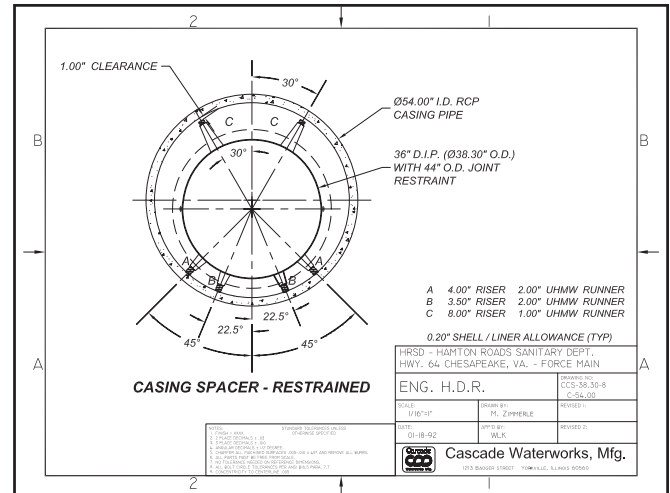
CORRECTING FOR GRADE



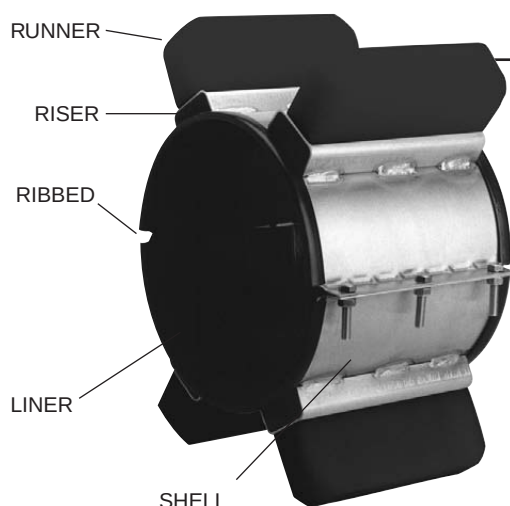
CENTERED CONFIGURATION



RESTRAINED CONFIGURATION



ORDERING INFORMATION



MATERIAL SPECIFICATIONS

SHELL -	Minimum 14 gauge T-304 stainless steel. All surfaces are fully chemically passivated. Flanges are ribbed for strength.
RISERS -	Max 10 ga. T-304 stainless steel, reinforced 6" and over height.
FASTENERS -	5/16-18 T-304 stainless steel
LINER -	PVC - .090 thick, 85-90 durometer (ASTM D1706-61T) - 80 Max constant operating temperature - 150°F (64°C) Electrical properties - (ASTM - D149-61) 1380 V/min. Resistance: Salt Spray (ASTM - B117) - Excellent Acids - Good
RUNNERS -	Ultra High Molecular Weight Polyethylene Low coefficient of friction High resistance to abrasion and sliding wear Toughness under impact Low deflection under compression Dielectric insulation

TYPICAL DATA - RUNNERS

PROPERTY	ASTM METHOD	UNITS	VALUE	ELECTRICAL PROPERTIES	ASTM METHOD	UNITS	VALUE
Specific Gravity	D-792	gm/cc	.934	Dielectric Constant	D-150	—	2.3
Tensile Strength (Break)	D-638	PSI	3500	Dissipation Factor			
Elongation (Break)	D-638	%	380	60 cycles to 10 6 cycles	D-150	—	<.05 x 10 ³
Izod Impact	D-256	ft.-lbs/in. of notch	NO BREAK	Volume Resistivity@23-c	D-257	ohm,cm	>10 ¹⁰
Hardness	D-2240	Shore D	67	Surface Resistivity	D-257	ohm	>10 ¹⁶
Coefficient of Friction	D-1894	—	.11-.13	Dielectric strength	D-148	KV/CM	900
Heat Distortion Temp. 66PSI	D-648	C	88	ABRASION CHARACTERISTICS			
Coefficient of Thermal Expansion	D-696	F ⁻¹	2 X 10 ⁻⁴	Taber Abrasion	D-1044	Mg/loss	Nil
				Sand Slurry*			7

* Sand Slurry condition - 7 hours in one part water at 1725 RPM.
Carbon Steel = 100. UHMW 1900 = 15. Lower value more resistant to abrasion.

EXAMPLES

- | | | |
|---|--|--|
| <p>1) Carrier - 12" DIP or C-900 PVC
Casing - 24" Steel .375 wall
Spacer Width - 8"
Configuration - Centered
CCS - 1320-8 / C23.25 CTR</p> | <p>2) Carrier - 48" Steel
Casing - 66" concrete
Spacer width - 12"
Configuration - Restrained
CCS - 4800-12 / C66 RES</p> | <p>3) Carrier - 6" SCH 40 PVC
Casing - 16" Steel .25" wall
Spacer width - 8"
Configuration - Standard
CCS - 663-8 / C15.5 STD</p> |
|---|--|--|

RISER/RUNNER HEIGHTS FOR STANDARD SPACERS

2" Height through 10" pipe size.
2 1/2" Height through 48" pipe size.
3" through 64" pipe

NUMBER OF RISER / RUNNERS REQUIRED FOR STANDARD SPACERS

4 Runners through 24" pipe size
6 Runners through 36" pipe size
8 Runners through 48" pipe size

CASCADE provides drawings for approval on all special applications.

IMPORTANT

WHEN ORDERING CASING SPACERS, PLEASE HAVE THE FOLLOWING INFORMATION AT HAND:

- Job Name/Engineer's Name
- Type and O.D. of carrier pipe
- Type of joint
- Type and I.D. of casing pipe
- Length of casing or quantity of spacers needed
- Configuration Requirement: Standard, Centered, or Restrained; any special installation requirements

CASCADE SPECIFICATIONS

STYLE CCS - CASING SPACERS

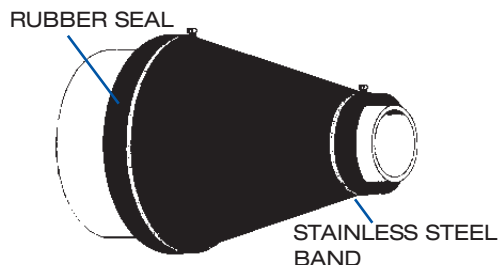
Casing spacer shall be a two-piece shell per carrier pipe and made from T-304 stainless steel of a minimum 14 gauge thickness. Each shell section shall be lined with a 0.090" thick, ribbed PVC extrusion with a retaining section that overlaps the edges of the shell and prevents slippage. Bearing surfaces (runners) shall be ultra high molecular weight polyethylene (UHMW) to provide abrasion resistance and a low coefficient of friction (0.12). The runners shall be attached to support structures (risers) at appropriate positions to properly support the carrier pipe within the casing pipe and to ease installation. The runners shall be mechanically bolted to the riser. The bolt heads are welded to the inside of the risers for strength. Risers shall be made of T-304 stainless steel of a maximum 10 gauge. All risers shall be MIG welded to the shell. Bottom risers 6" and over in height shall be reinforced. All reinforcing plates shall be 10 ga. T-304 stainless steel and shall be MIG welded to mating parts. **Standard positioning within the casing pipe** shall be sized such that the carrier rests near the bottom of the casing pipe and the height of the risers and runners are to provide a bottom clearance not less than one-half inch between the casing pipe and the extreme outside diameter of the joint (bell, seam weld, joint clamp, ...) of the carrier pipe.

Centered & Restrained positioning within the casing pipe shall be sized such that the height of the risers and runners are to center the carrier pipe in the casing pipe with a top clearance of three-fourths inch minimum.

Restrained positioning within the casing pipe shall be sized such that the carrier rests near the bottom of the casing pipe and the height of the risers and runners are to provide a bottom clearance not less than one-half inch between the casing pipe and the extreme outside diameter of the joint (bell, seam weld, joint clamp, ...) of the carrier pipe and a top clearance of three-fourths inch minimum.

Multiple Carrier pipes within the casing pipe shall be sized such that the carrier pipes are held at fixed distances relative to each other, with the height of the risers and runners to provide not less than three-fourths inch between the casing pipe and the outside diameter of the riser/runner combinations. Special reinforcing plates may be required to stabilize and support structure. All welds and metal surfaces shall be chemically passivated. Due to the numerous application possibilities, consult factory for spacing requirements. Casing spacers shall be Model CCS as manufactured by Cascade Waterworks Mfg. Co. of Yorkville, IL or approved equal.

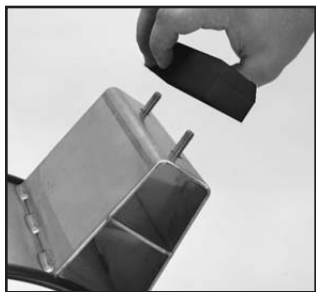
STYLE CCES CASING END SEALS



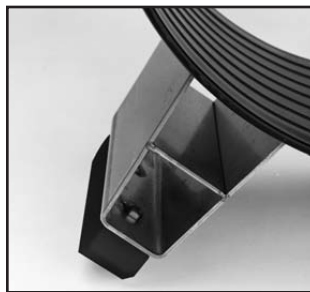
CASCADE Model CCES End Seals pull over the casing and carrier pipes after installation to provide a barrier to backfill debris and seepage.

MATERIAL SPECIFICATIONS:

SEAL - Neoprene - Other compounds available
BANDS - T-304 Stainless Steel



Cascade's Runners can be replaced in the field if bore is offgrade or installation is not to design.



REINFORCED RISER

SPECIFICATIONS

STYLE CCS-ER – CASING SPACERS (EXTENDED RANGE)

Pipe 36" Diameter and Up

Casing spacer shall be made from T-304 stainless steel of a minimum thickness of 14 gauge. Each shell section shall be a maximum of 12" wide, and shall be a two-piece design. Each shell section shall have a stud bar and receiver bar TIG welded to the shell. Studs shall be T-304 and threaded as 5/8-11x7" long. Each stud bar shall include up to three studs, and shall allow a maximum of 1" adjustment to circumference to compensate for the variations in large diameter (non-uniform) pipe. The shell shall be lined with a 0.090" thick, ribbed PVC extrusion with a retaining section that overlaps the edges of the shell and prevents slippage. Bearing surfaces (runners) shall be ultra high molecular weight polyethylene (UHMW) to provide high abrasion resistance and a low coefficient of friction (0.12). The runners shall be attached to support structures (risers) at appropriate positions to properly support the carrier within the casing and to ease installation. The runners shall be mechanically bolted to the riser. The bolt heads are welded to the inside of the risers for strength. Risers shall be made of T-304 stainless steel of a maximum 10 gauge. Bottom risers 6" and over in height shall be reinforced. All risers shall be MIG welded to the shell. **Standard positioning within the casing pipe** shall be sized such that the carrier rests near the bottom of the

casing pipe and the height of the risers and runners are to provide a bottom clearance not less than one-half inch between the casing pipe and the extreme outside diameter of the joint (bell, seam weld, joint clamp, ...) of the carrier pipe. **Centered & Restrained positioning within the casing pipe** shall be sized such that the height of the risers and runners are to center the carrier pipe in the casing pipe with a top clearance of three-fourths inch minimum. **Restrained positioning within the casing pipe** shall be sized such that the carrier rests near the bottom of the casing pipe and the height of the risers and runners are to provide a bottom clearance not less than one-half inch between the casing pipe and the extreme outside diameter of the joint (bell, seam weld, joint clamp, ...) of the carrier pipe and a top clearance of three-fourths inch minimum. All welds and metal surfaces shall be chemically passivated. Due to the numerous application possibilities, consult factory for spacing requirements. Casing spacers shall be Model CCS-ER as manufactured by Cascade Waterworks Mfg. Co. of Yorkville, IL or approved equal.



WARRANTY

Cascade Waterworks Mfg. Co. warrants its product(s) for one year from the date of shipment to be free of defects in material or workmanship. **Cascade** will repair or replace this product if it is found to be defective within the above stated one year warranty period provided that the buyer submits his claim in writing and delivers the original claimed defective product in its entirety, freight prepaid to **Cascade Waterworks Mfg. Co., 1213 Badger Street, Yorkville, IL, 60560** for inspection within 30 days. Written notice or products sent to Mfg. Reps or any other agents will not be honored as valid warranty claims. **Cascade** is not liable or responsible for any loss, damage or injury to any person(s) or property directly or indirectly arising from the use or inability to use this product. The user shall determine the suitability of the product for its intended use prior to any application and said user assumes all risks in connection with the use of this product. No claims for labor or damage will be allowed. Buyer must advise **Cascade** within 30 days of discovery of the alleged defect or the claim will be barred. This warranty is exclusive and in lieu of all others, whether written, oral or implied. Upon the product(s) purchase from **Cascade Waterworks Mfg. Co.**, or any of its **Agents**, the purchaser agrees to **all of the above terms of warranty**.

04/07