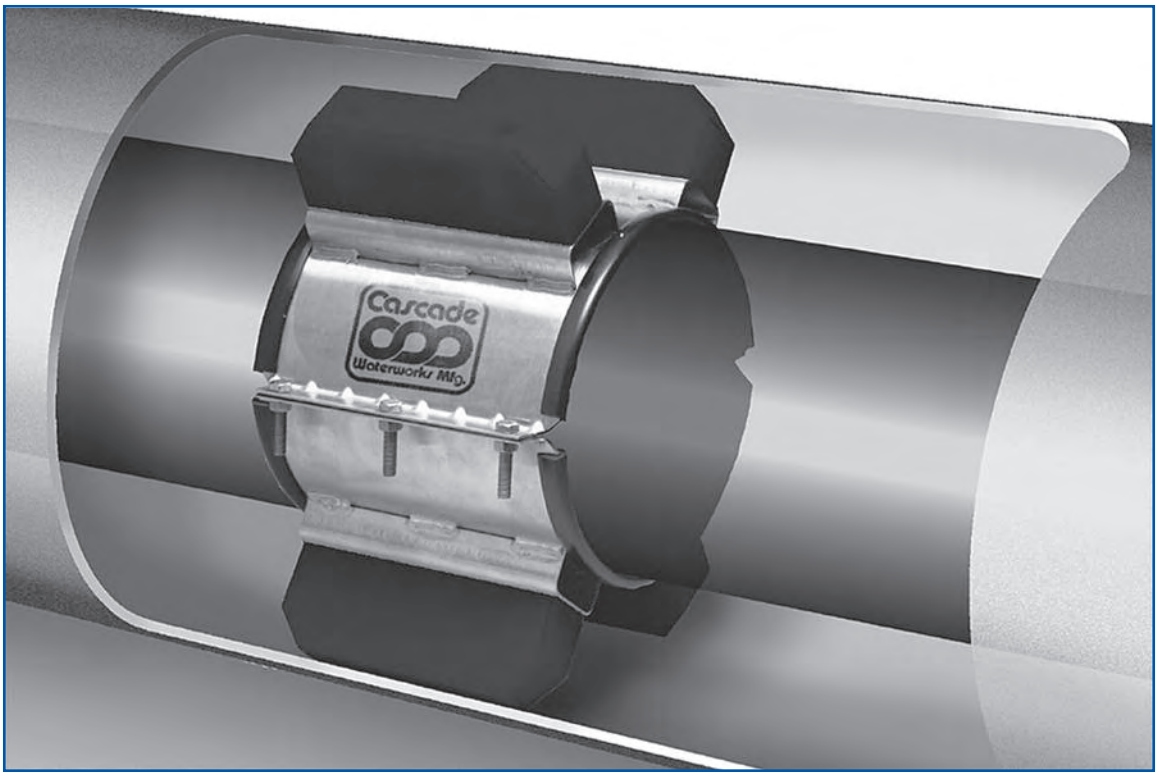
Cascade Waterworks Mfg.

"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
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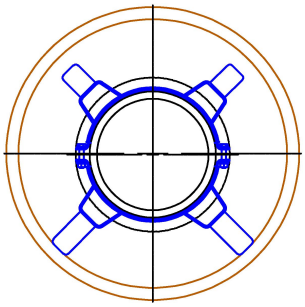
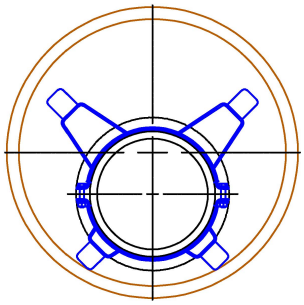
THE CASCADE SYSTEM

BASIC POSITIONS



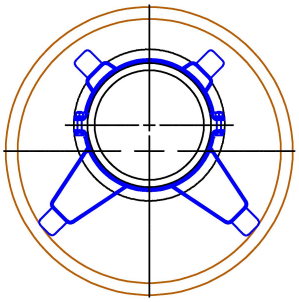
Center Restrained

Places carrier at center. Restrains against excessive flotation.



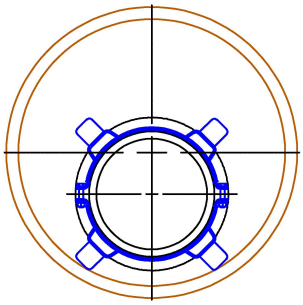
Bottom Restrained

Sets carrier near bottom. Restrains against excessive flotation.



Top Restrained

Sets carrier near top. Restrains against excessive flotation.



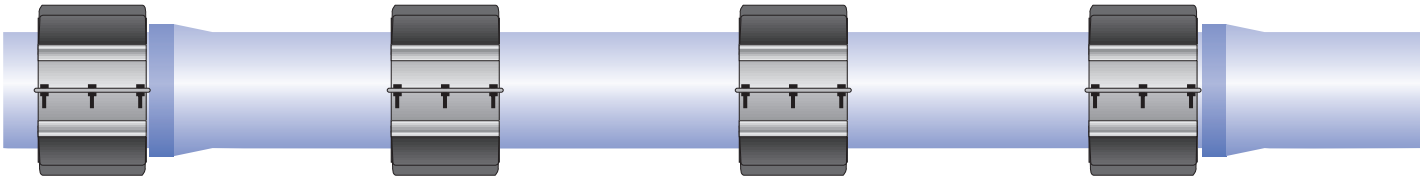
Clear Bell Only

Provides no flotation restraint, but protects carrier and its BELL from direct contact with casing.

CASING SPACER PLACEMENT DIAGRAM

Place a Spacer within 2 feet (max) of EACH end of the Casing pipe.

A Spacer at the Home Line provides Joint Stability & Over-Bell resistance.



Spacing Intervals should be determined by using the most stringent specification associated with the project. Some project owners/engineers may require a Spacer directly on each side of the Bell joint.

SPECIFYING SPACER WIDTH & PLACEMENT INTERVALS

When deciding the width of the Spacer bands and placement intervals, the main concerns are pipe stiffness, joint stability, height of separation between Carrier and Casing (annular space), and live load. ***Generally***, stiffer pipe can be supported adequately at somewhat 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. More variables exist than can be covered here.

Spacer Width

Barring special circumstances, Cascade recommends 8 inch wide Spacers through 48 inch Nominal Carrier size (other than concrete). For Carriers over 48 inch Nominal size, use of 12 inch wide Spacers should be considered. This is especially true for heavier pipe and/or large height of separation (annular space).

Spacing Intervals

In all instances, a Spacer should be placed within 2 feet of EACH end of the Casing pipe to provide support for the Carrier during back-fill operations.

All variations of plastic pipe (PVC & HDPE) need support at closer intervals and should generally be supported every 6 feet, maximum.

Concrete and Pre-stressed Concrete Cylinder Pipe (PCCP) require shorter intervals (5 feet or less). Consideration should also be given to the use of Model CCS-ER Spacers, and/or 12 inch wide bands.

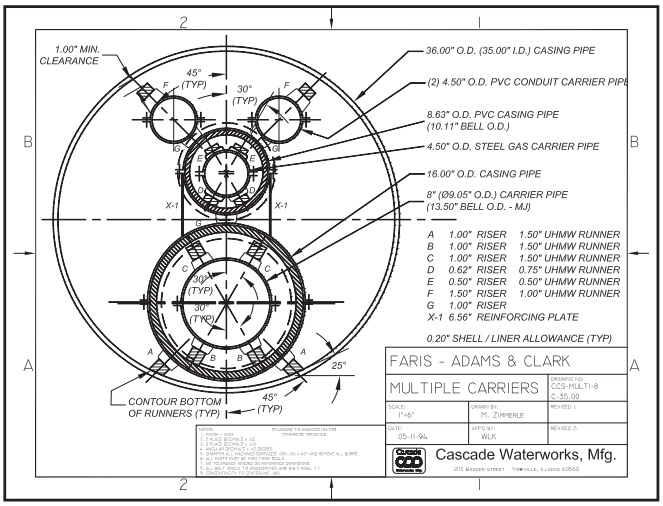
For Ductile Iron Carrier pipe, 10 foot spacing may be adequate through 60 inch Carrier, if annular space is less than 6 inches. For Steel Carrier pipe, 8 foot spacing may be used similarly. Variables such as height of separation (annular space) and length of Casing run should always be considered. Annular space greater than 6 inches on Carrier pipe larger than 24 inch Nominal size may require shorter intervals and/or 12 inch wide bands.

Please consult with factory for multiple Carriers (MULTI Spacers) or any other special conditions.

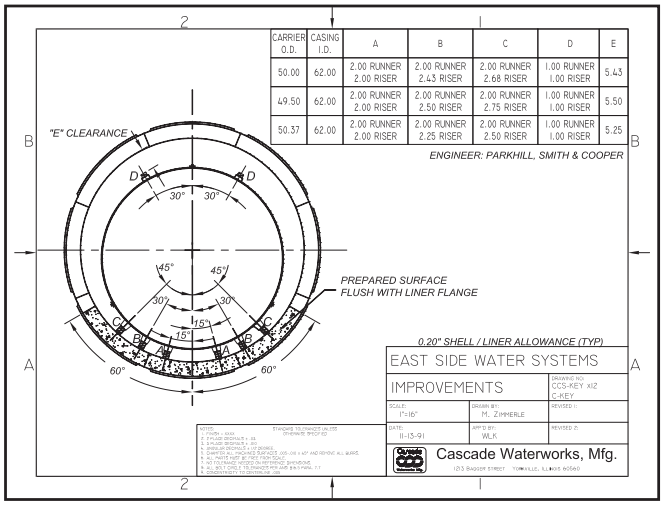
In all instances, the most stringent specification associated with the project should be followed.

SAMPLE DRAWINGS

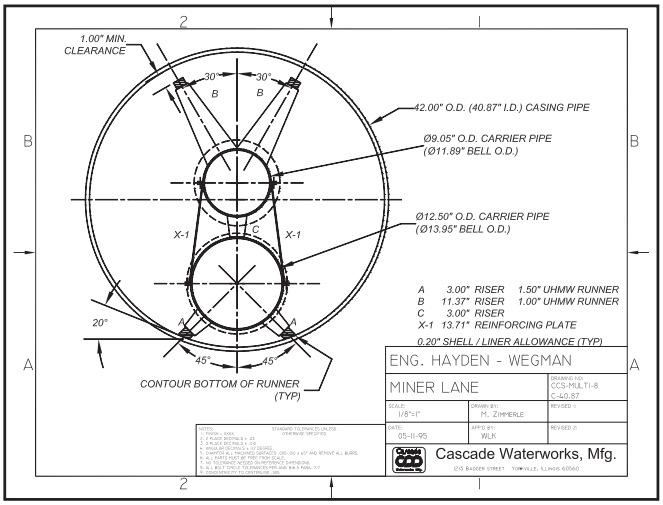
MULTIPLE CARRIERS



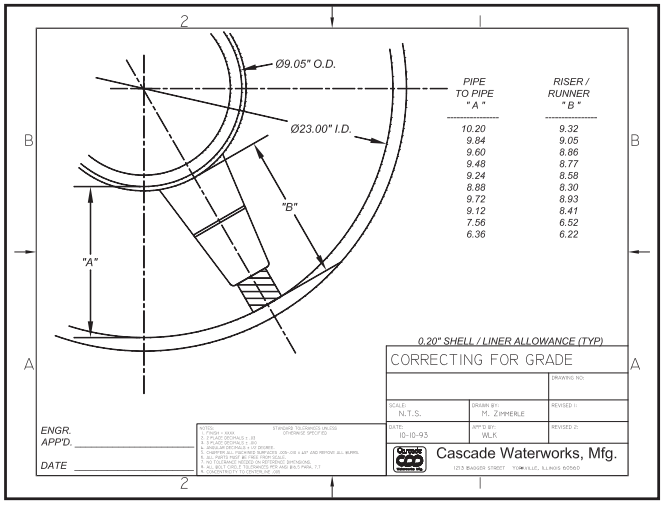
TUNNEL LINER



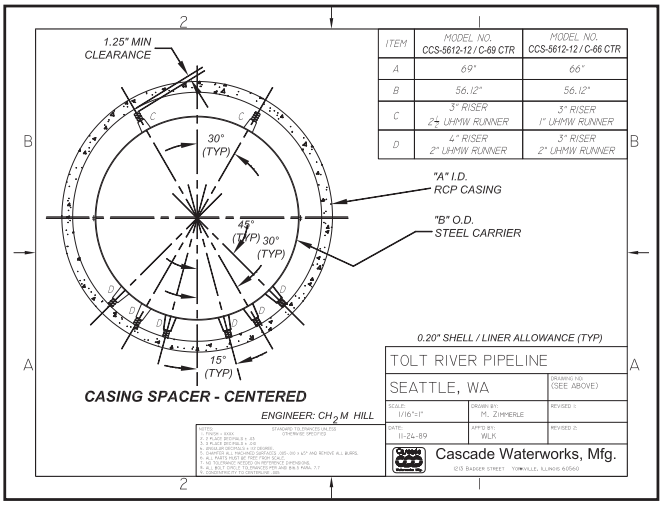
DUAL CARRIERS



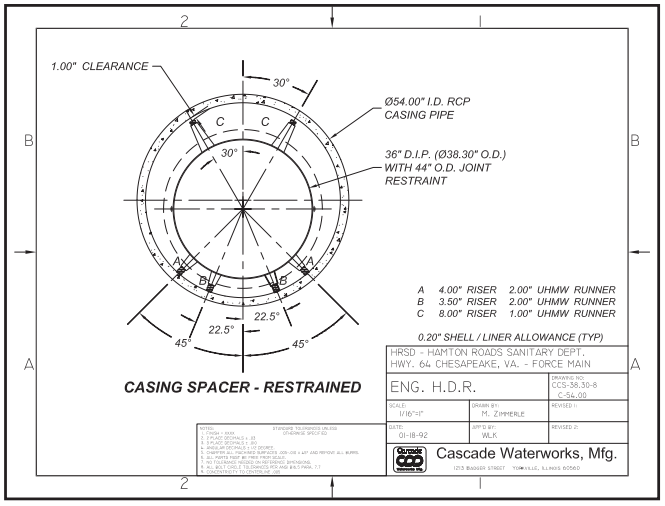
SLOPE (GRADE) CORRECTING



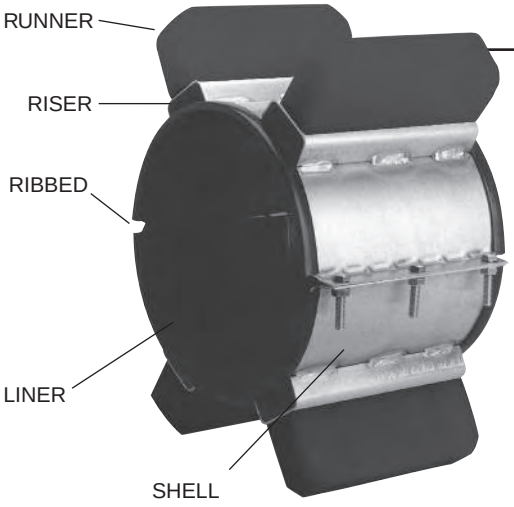
CENTERED POSITION



RESTRAINED POSITION (Bottom)



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. (when applicable)

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

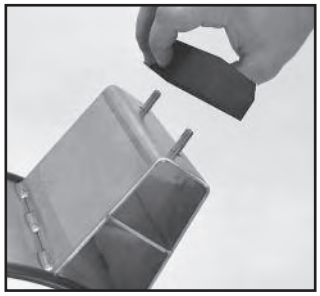
TYPICAL DATA – RUNNERS

PROPERTY	ASTM METHOD	UNITS	VALUE
Specific Gravity	D-792	gm/cc	.934
Tensile Strength (Break)	D-638	PSI	3500
Elongation (Break)	D-638	%	380
Izod Impact	D-256	ft.-lbs/in. of notch	NO BREAK
Hardness	D-2240	Shore D	67
Coefficient of Friction	D-1894	—	.11-.13
Heat Distortion Temp. 66PSI	D-648	C	88
Coefficient of Thermal Expansion	D-696	F^{-1}	2 X 10^{-4}

ELECTRICAL PROPERTIES	ASTM METHOD	UNITS	VALUE
Dielectric Constant	D-150	—	2.3
Dissipation Factor 60 cycles to 10 6 cycles	D-150	—	<.05 x 10^{3}
Volume Resistivity@23-c	D-257	ohm,cm	>10^{10}
Surface Resistivity	D-257	ohm	>10^{16}
Dielectric strength	D-148	KV/CM	900
ABRASION CHARACTERISTICS			
Taber Abrasion	D-1044	Mg/loss	Nil
Sand Slurry*			7

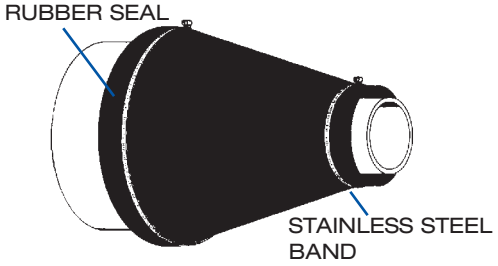
** Sand Slurry condition - 7 hours in one part water at 1725 RPM. Carbon Steel = 100. UHMW 1900 = 15. Lower value more resistant to abrasion.*

**UHMW Runners for lowest coefficient of friction, and highest impact and wear resistance. The correct material for this application.



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

For a more seamless installation on misaligned applications, contact the factory to order GRADED SPACERS. Custom Spacers will be fabricated to specific dimensions, including projects with vertical undulations.



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

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.

SLOPE (GRADE) CORRECTING

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

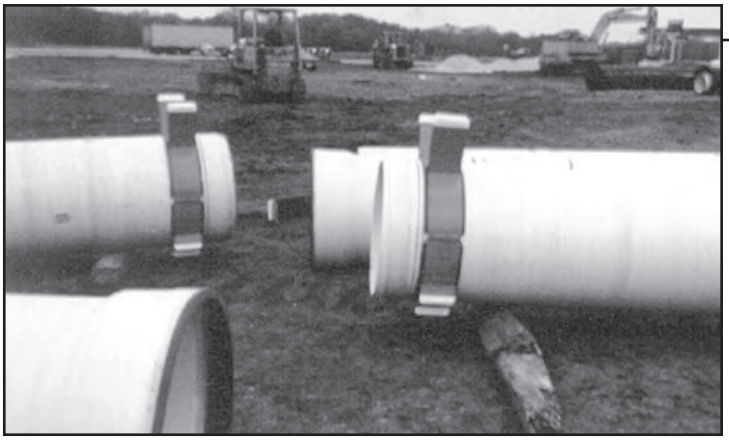
54" steel into 72" and 64", CMP casing, 200'

Owner: City of Seattle — Tolt River Pipeline

Engineer: CH_2 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.

STYLE CCS – CASING SPACERS

Casing spacer shall be a two-piece design per carrier pipe and made from T304 stainless steel of a minimum 14 gauge thickness, with 8 inch wide bands (CCS08) or 12 inch wide bands (CCS12), depending on application specifics. Each set will be lined with a 0.090" thick, ribbed PVC extrusion with a retaining section that overlaps the edges of the shell and prevents slippage. Liner shall have a hardness of 85-90 durometer. Bearing surfaces (runners) shall be ultra-high molecular weight polyethylene (UHMW) to provide the highest abrasion resistance and the lowest coefficient of friction (0.12) available with a variety of heights to meet desired position and a width of one and one half inches. The runners shall be mechanically bolted to the spacer. Risers shall be MIG welded to the shell, where applicable, and shall be made of T304 stainless steel of a maximum 10 gauge with bolt heads welded to the inside of the risers for strength and retention. Bottom risers 6" and over in height shall be reinforced. All reinforcing plates shall be 10 gauge T304 stainless steel and shall be MIG welded to mating parts. Fasteners shall be 5/16"-18, Type 304 (18-8) Stainless Steel throughout. Unless otherwise requested, casing spacers shall be configured in the Centered position (industry standard). (*Many other configurations are available on request). Spacers 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 with slightly more space allowed in larger applications. Top clearance shall be designed to allow for safe insertion into the Casing while providing restraint against excessive flotation. All weldments shall be fully chemically passivated in accordance with ASTM A380. Due to the numerous application possibilities, please consult factory for spacing requirement questions as well as other positioning options. Casing spacers shall be Model CCS as manufactured by Cascade Waterworks Mfg. Co. of Yorkville, IL.

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.**