File 5.1.2

Contractor:	Renaud Bros. Inc.
Job Name:	Wardsboro BRF 013-1(15)
Location:	Wardsboro, Vt.
Job # 063-16	Date: 3/18/2016
Drawn By:	JBH

CAMP Precast Concrete Products, Inc.
78 Precast Road, Milton, VT 05468
Phone (802) 893-2401 Fax (802) 893-1542

Product I.D. DI 120+50 **Diameter:** 48"

Invert: No Ladders: No Coating: No Access Size: 24" x 24"

Cast Iron / Hatch: Neenah Foundry R-3588 Frame & Type D Checkerboard Grate, (4-flange)

Rim:	1422.23	Cone:		Riser#1:	Riser#4:
Inv. Out:	1415.33	Cover:	18"	Riser#2:	Riser#5:
Diff:	6.90	Base:	5'	Riser#3:	Riser#6:
Sump:	0.50				

Gross V.F.:	7.40	Angle	0						
C.I. Height:	0.67	Boot:	8022						
Net V.F.:	6.73	Dist. Up:	15" to CTR						
Brick Space:	0.23	Pipe Type:	HDPE						
Actual V.F.	6.50	Pipe Size:	18"						

Quality Control

Prepour

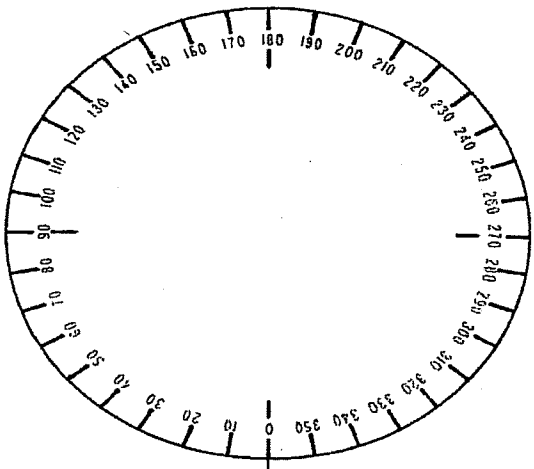
Form Cleaning: Form Release:
Rein. Steel: Std. Spec. Form Closure:
Block Out: Rein. Size:
Comments: Q.C. by/date:

Postpour

Finish: Bricking:
Invert: Ladders:
Coating: Boots:
Comments: Q.C. by/date:

Special Info / Comments:				**VT AOT Specs. Including 8" Thick Bases**
Mix #:		Wt.:		
Mold #:		YDS³		

BASE



18" HDPE Up 15" to ctr.
elev. 1415.33

File 5.1.2

Contractor:	Renaud Bros. Inc.		
Job Name:	Wardsboro BRF 013-1(15)		
Location:	Wardsboro, Vt.		
Job #	063-16	Date:	3/18/2016
Drawn By:	JBH		

CAMP Precast Concrete Products, Inc.
78 Precast Road, Milton, VT 05468
Phone (802) 893-2401 Fax (802) 893-1542

Product I.D. **DI 121+75** **Diameter:** **48"**

Invert: **No** Ladders: **No** Coating: **No** Access Size: **24" x 24"**

Cast Iron / Hatch: **Neenah Foundry R-3588 Frame & Type D Checkerboard Grate, (4-flange)**

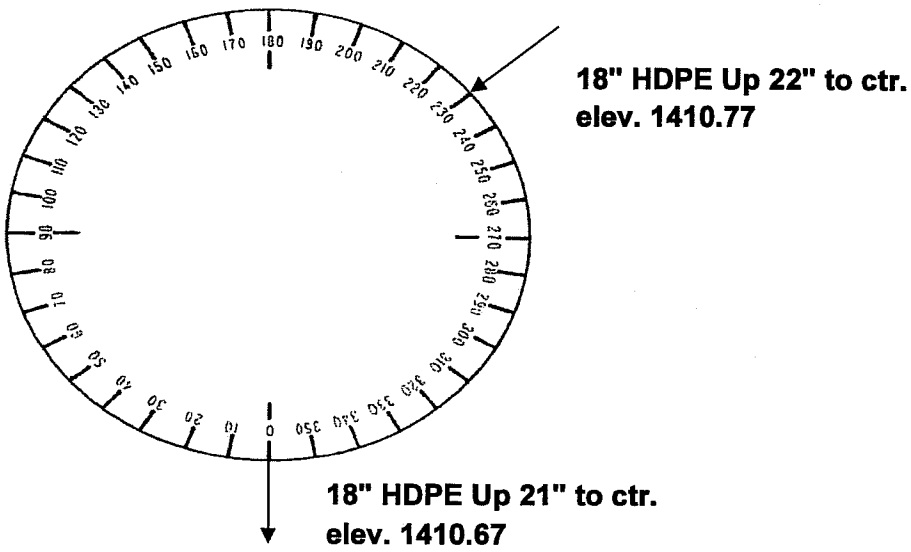
Rim:	1417.17	Cone:		Riser#1:		Riser#4:
Inv. Out:	1410.67	Cover:	18"	Riser#2:		Riser#5:
Diff:	6.50	Base:	5'	Riser#3:		Riser#6:
Sump:	1.00					

Gross V.F.:	7.50	Angle	0	230				
C.I. Height:	0.67	Boot:	8022	8022				
Net V.F.:	6.83	Dist. Up:	21" to CTR	22" to CTR				
Brick Space:	0.33	Pipe Type:	HDPE	HDPE				
Actual V.F.	6.50	Pipe Size:	18"	18"				

Quality Control			
Prepour	Form Cleaning:	Form Release:	
	Rein. Steel: Std. Spec.	Form Closure:	
	Block Out:	Rein. Size:	
	Comments:	Q.C. by/date:	
Postpour	Finish:	Bricking:	
	Invert:	Ladders:	
	Coating:	Boots:	
	Comments:	Q.C. by/date:	

Special Info / Comments:				**VT AOT Specs. Including 8" Thick Bases**
Mix #:		Wt.:		
Mold #:		YDS³		

BASE



File 5.1.2

Contractor:	Renaud Bros. Inc.		
Job Name:	Wardsboro BRF 013-1(15)		
Location:	Wardsboro, Vt.		
Job #	063-16	Date:	3/18/2016
Drawn By:	JBH		

CAMP Precast Concrete Products, Inc.
78 Precast Road, Milton, VT 05468
Phone (802) 893-2401 Fax (802) 893-1542

Product I.D. **DI 123+63** **Diameter:** **48"**

Invert: **No** Ladders: **No** Coating: **No** Access Size: **24" x 24"**

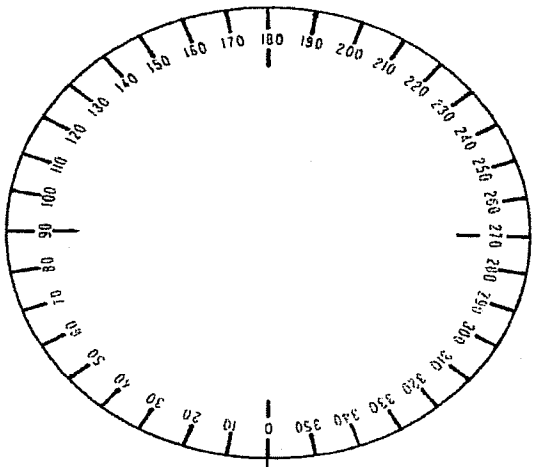
Cast Iron / Hatch: **Neenah Foundry R-3588 Frame & Type D Checkerboard Grate, (4-flange)**

Rim:	1417.17	Cone:		Riser#1:		Riser#4:		
Inv. Out:	1410.92	Cover:	18"	Riser#2:		Riser#5:		
Diff:	6.25	Base:	5'	Riser#3:		Riser#6:		
Sump:	1.20							
Gross V.F.:	7.45	Angle	0					
C.I. Height:	0.67	Boot:	8022					
Net V.F.:	6.78	Dist. Up:	24" to CTR					
Brick Space:	0.28	Pipe Type:	HDPE					
Actual V.F.	6.50	Pipe Size:	18"					

Quality Control			
Prepour	Form Cleaning:	Form Release:	
	Rein. Steel: Std. Spec.	Form Closure:	
	Block Out:	Rein. Size:	
	Comments:	Q.C. by/date:	
Postpour	Finish:	Bricking:	
	Invert:	Ladders:	
	Coating:	Boots:	
	Comments:	Q.C. by/date:	

Special Info / Comments:				**VT AOT Specs. Including 8" Thick Bases**
Mix #:		Wt.:		
Mold #:		YDS³		

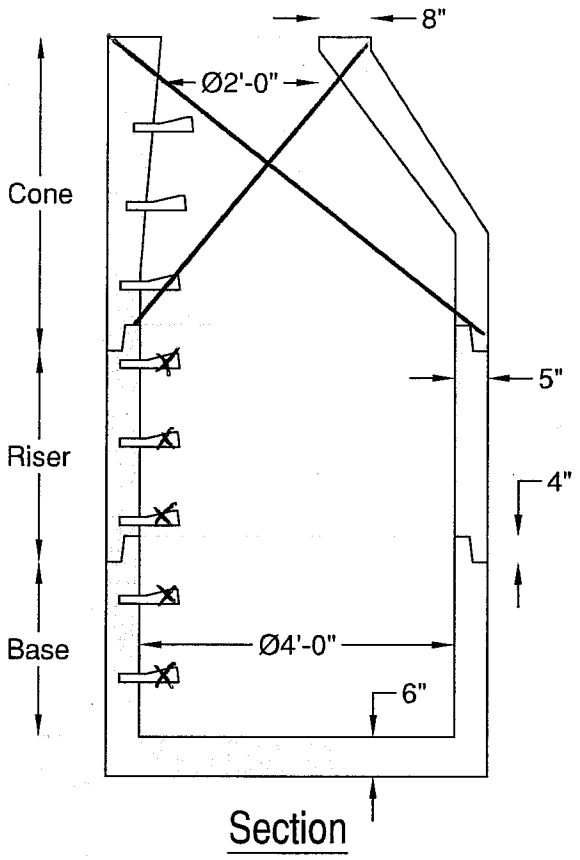
BASE

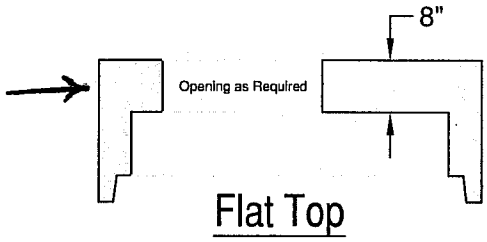


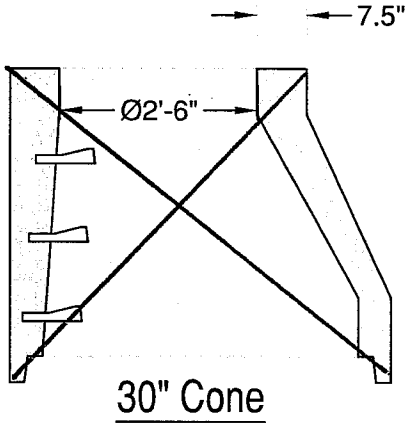
18" HDPE Up 24" to ctr.
elev. 1410.92

48" Diameter Manhole

94 Gal. / Vertical ft.







FLAT TOP SECTION

Height	Item #	Weight
1'-0"	MH48-12FT	1,650 lbs
1'-6"	MH48-18FT	2,080 lbs

Standard Heights Shown - Other Heights Available

RISER SECTION

Height	Item #	Weight
1'-0"	MH48-12R	860 lbs
2'-0"	MH48-24R	1,710 lbs
3'-0"	MH48-36R	2,570 lbs
4'-0"	MH48-48R	3,420 lbs

Standard Heights Shown - Other Heights Available

BASE SECTION

Height	Item #	Weight
2'-0"	MH48-24B	3,070 lbs
3'-0"	MH48-36B	3,880 lbs
4'-0"	MH48-48B	4,720 lbs
5'-0"	MH48-60B	5,560 lbs
6'-0"	MH48-72B	6,400 lbs

Standard Heights Shown - Other Heights Available

24" Cone

Height	Item #	Weight
3'-0"	MH48-24C36	2,680 lbs
3'-6"	MH48-24C42	3,120 lbs
4'-0"	MH48-24C48	3,560 lbs
4'-6"	MH48-24C54	4,000 lbs
5'-0"	MH48-24C60	4,440 lbs

30" Cone

Height	Item #	Weight
3'-0"	MH48-30C36	2,660 lbs
3'-6"	MH48-30C42	3,100 lbs
4'-0"	MH48-30C48	3,540 lbs
5'-0"	MH48-30C60	4,420 lbs

SPECIFICATIONS:

- Concrete Minimum Strength 5000psi @ 28 days
- Joints sealed with Butyl sealant
- Monolithic Construction
- Meets ASTM C478
- H-20 Loading
- Weights Subject to Variation

PRECAST CONCRETE PRODUCTS
78 PRECAST ROAD MILTON, VT 05468 • 802.893.2401
TOLL FREE 1.888.299.2401 FAX 802.893.1542

The Company With Connections®

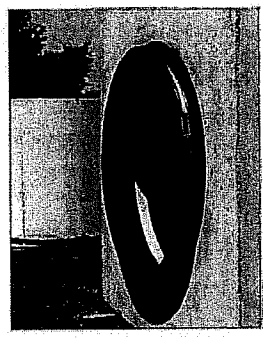
A BOOT STYLE CONNECTOR FOR CORRUGATED OR SMOOTH WALL PIPE

Z•LOK STM

Z•LOK STM

The **Z•LOK STM CONNECTOR** was designed by A-LOK Products, Inc. to address the need for a boot style connector for large diameter pipe. This makes it ideally suited for stormwater application. Available for 6"-102" pipes.

The **Z•LOK STM Pipe to Manhole Connector** is a flexible connector specifically engineered to produce a positive watertight seal for pipes entering precast concrete structures and the structure itself.



Z•LOK STM Connector cast into storm structure.

MATERIAL

The **Z•LOK STM CONNECTOR** is molded from an EPDM compound engineered to conform with the requirements of section 4.1.1 of ASTM C-923. Alternative compounds are available for unusual applications upon special order.

All stainless steel hardware is in compliance with section 4.2, *"Mechanical Devices"* of ASTM C-923.

KEY ADVANTAGES

The **Z•LOK STM CONNECTOR** assures a positive watertight connection and provides up to 15° of omnidirectional deflection and 1.50" of vertical or horizontal movement without loss of seal, providing greater flexibility in the design and installation of pipelines and structures. These design features of the **Z•LOK STM CONNECTOR** prevent infiltration due to shear caused by settlement or ground movement.

Once fastened, immediate backfilling is possible enhancing project safety and overcomes the normal problems encountered with water, running sand and other unstable trench conditions.

When casting the **Z•LOK STM CONNECTOR** into the structure, making it an integral part of the wall, 50% of the opportunity for infiltration is eliminated.

PRODUCT REFERENCES

A.) ASTM C-923
Resilient Connector Between Reinforced Concrete Manholes Structures, Pipe and Laterals.

B.) ASTM C-1478
Resilient Connectors Between Reinforced Concrete Storm Sewers Structures, Pipes and Laterals.

C.) ASTM C-1244
Standard Test Method For Concrete Sewer Manholes by the Negative Air Pressure (Vacuum) Test.

PERFORMANCE STANDARD

The **Z•LOK STM Connector** meets or exceeds all material and test requirements of ASTM C-923-00: *"Resilient Connectors Between Reinforced Concrete Manhole Structures, Pipes and Laterals"*.

See following chart:

RESILIENT TEST REQUIREMENTS OF A.S.T.M. C-923

TEST	RESULTS	ASTM METHOD
Chemical resistance 1 N Sulfuric acid 1 N Hydrochloric Acid	 no weight loss no weight loss	at 22°C for 48h
Tensile strength	1200 psi or 8.5 MPa, min	D 412
Elongation at break	350% min.	
Hardness	±5 from mfg's. specified hardness	D 2240 (Shore A durometer)
Accelerated oven-aging	decr. of 15%, max. of original tensile strength, decr. of 20% max. of elongation	D 573, 70±1°C for 7 days
Compression set	decr. of 25%, max. of original deflection	D 395, Method B, at 70°C for 22h
Water absorption	increase of 10%, max. of original by weight	D 471, immerse 0.75 by 2-in. or 19 by 25-mm Specimen in distilled water at 70°C for 48h
Ozone resistance	rating 0	D 1171
Low-temp brittle point	no fracture at -40°C	D 746
Tear resistance	200 lbf/in. or 34 kn/m	D 624, Method B

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PRODUCT SPECIFICATIONS

A flexible pipe to manhole connector shall be used whenever a pipe penetrates into a precast concrete manhole or structure.

The connector shall be the **Z•LOK STM CONNECTOR** as manufactured by **A•LOK PRODUCTS, INC.**, Tullytown, PA, or approved equal.

The design of the connector shall provide a flexible, watertight seal between the pipe and concrete structure. The connector shall assure that a seal is made between:

(1) The connector and the structure wall by casting the connector integrally with the structure wall during the manufacturing process in a manner that it will not pull out during pipe coupling.

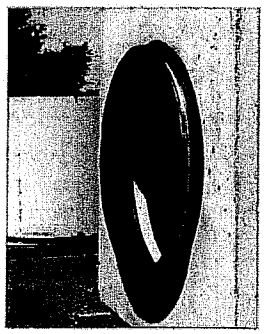
(2) The seal between the connector and the pipe shall be made by compressing the connector against the outside circumference of the smooth wall pipe or against the inside walls of the valley of the corrugated pipe by means of a stainless steel take-down clamp.

The connector shall be made from materials that conform to the physical and chemical requirements outlined in Section 4, *"Materials and Manufacture"* of ASTM C-923 *"Standard Specification for Resilient Connectors Between Reinforced Concrete Manhole Structures, Pipes, and Laterals"*, and the overall design will meet or exceed Section 7, *"Test Methods and Requirements"* of ASTM C-923 and ASTM C-1478.

The connector shall be sized specifically for the type of pipe being used and shall be installed in accordance with the recommendations of the manufacturer.

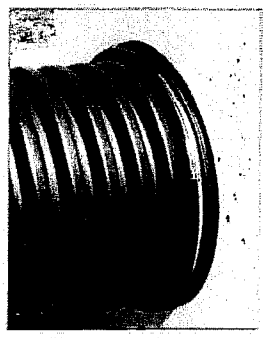
FIELD INSTALLATION INSTRUCTIONS

CORRUGATED PIPE



FIELD INSTALLATION

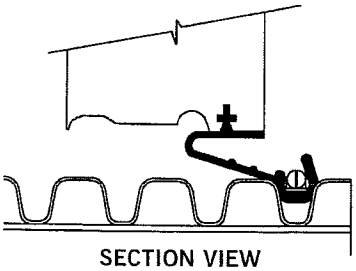
STEP 1:
Z•LOK STM Connector cast into storm structure.



STEP 2:
Pipe is centered through the connector. The Stainless Steel Clamp is centered above the valley of pipe making sure the fastening points are positioned in the two cutout areas of the rubber connector.

STEP 3:
Stainless Steel Clamp is **tightened equally** about the take-up point to 60 in./lbs. This action compresses the rubber against the side walls of the pipe valley and a watertight connection is formed.

IMPORTANT: After groove of pipe is centered in gasket tighten stainless steel clamp equally to 60 in. lbs. with an A•LOK Torque Wrench.

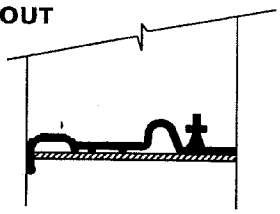


SECTION VIEW
WITH PIPE INSTALLED

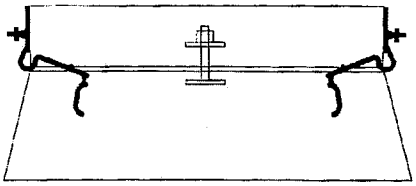
FIELD INSTALLATION INSTRUCTIONS

ONE-PIECE WEDGE KNOCKOUT
For 6" Flatwall

Pull connector over one-piece Wedge Knockout Hole Former as shown.

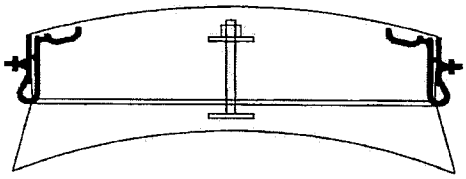


TWO-PIECE MANDREL
For 8" Flatwall and above



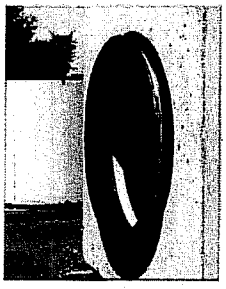
1. **Stretch gasket over outside mandrel half, with cut-outs positioned at 3 and 9 o'clock.**
2. **Force gasket down inside mandrel before installing in form.**
3. **Use coil nut to tighten gasket and mandrels together.**

TWO-PIECE MANDREL
For Round Manholes



FIELD INSTALLATION INSTRUCTIONS

SMOOTH WALL PIPE



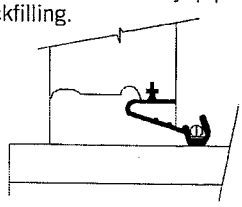
FIELD INSTALLATION

STEP 1:
Z•LOK STM Connector cast into storm structure.

STEP 2:
Pipe is inserted and centered within the connector to obtain proper mechanical seal.

STEP 3:
Stainless Steel Clamp is tightened equally about the take-up point to 60 in./lbs, insuring a watertight connection. This should be done prior to any pipe deflection or backfilling.

SECTION VIEW
WITH PIPE
INSTALLED



Z-LOK STM CONNECTORS
CORRUGATED PIPE DATA

FLATWALL CONNECTORS ARE MARKED (C-F) ROUNDWALL CONNECTORS ARE MARKED (C-R)
CORRUGATED Z-LOK STM CONNECTORS HAVE NOTCHES LOCATED AT 3 & 9 FOR TAKE-DOWN CLAMP ADJUSTMENT.

Z-LOK STM PART #	PIPE SIZE	MAX. O.D.	Z-LOK STM MANDREL PART#	Z-LOK STM CLAMP SIZE
ZS-8016-C-F ZS-8016-C-R	12" CPP	15.00"	SM-8016-F SM-8016-R	CL-EV12L
ZS-8019-C-F ZS-8019-C-R	15" CPP	17.75"	SM-8019-F SM-8019-R	CL-EV15-18L
ZS-8022-C-F ZS-8022-C-R	18" CPP	21.47"	SM-8022-F SM-8022-R	CL-EV15-18L
ZS-8029-C-F ZS-8029-C-R	24" CPP	27.80"	SM-8029-F SM-8029-R	CL-EV24L
ZS-8031-C-F ZS-8031-C-R	24" HANCOR ONLY	28.40"	SM-8031-F SM-8031-R	CL-EV24H
ZS-8039-C-F ZS-8039SCR	30" CPP	35.50"	SM-8039-F SM-8039-R	CL-EV30H
ZS-8045-C-F ZS-8045-C-R	36" CPP	41.75"	SM-8045-F SM-8045-R	CL-EV36H

CORRUGATED POLYETHYLENE PIPE (CPP) NEEDS THE EV CLAMP DESIGN.

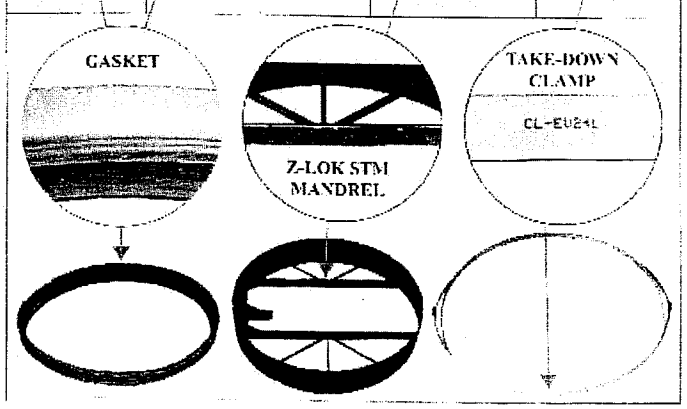
NOTE: NEED TO INDICATE WHEN ORDERING IF GASKETS ARE FOR ROUND OR FLATWALL

EXAMPLE: ZS-XXXX-C-F = CORRUGATED FOR FLATWALL STRUCTURES
ZS-XXXX-C-R = CORRUGATED FOR ROUND STRUCTURES

NOTE: ZS-8031 WOULD BE FOR 24" HANCOR PIPE BECAUSE OF THE LARGER VALLEY ON THE PIPE.

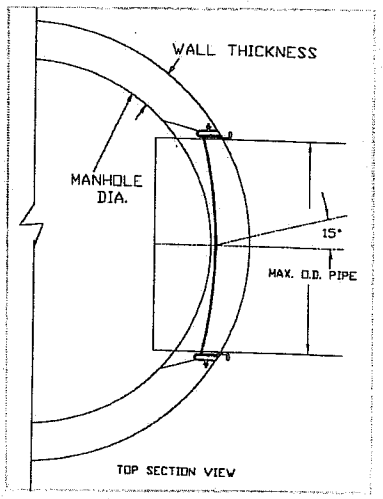
COMPONENT IDENTIFICATION FOR Z-LOK STM CONNECTORS

Z-LOK STM PART#	PIPE SIZE	MAX. O.D.	Z-LOK STM MANDREL PART #	Z-LOK STM CLAMP SIZE
ZS-8029-C-F	24" CPP		SM-8029-F	CL-EV24L



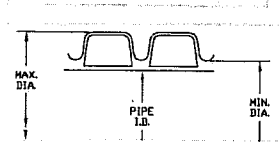
Smooth Wall Pipe

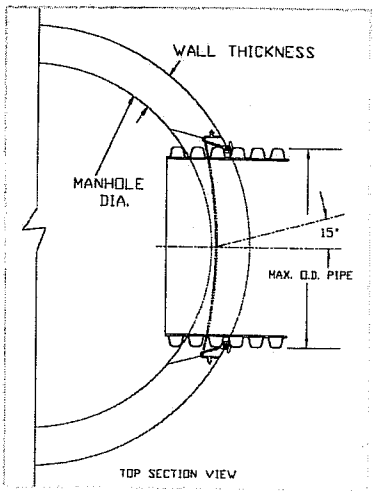
MANHOLE DIA.	MAX. O.D. PIPE
48" DIA. 5" WALL	28 IN.
60" DIA. 6" WALL	30 IN.
72" DIA. 7" WALL	37 IN.
84" DIA. 8" WALL	44 IN.
96" DIA. 9" WALL	51 IN.

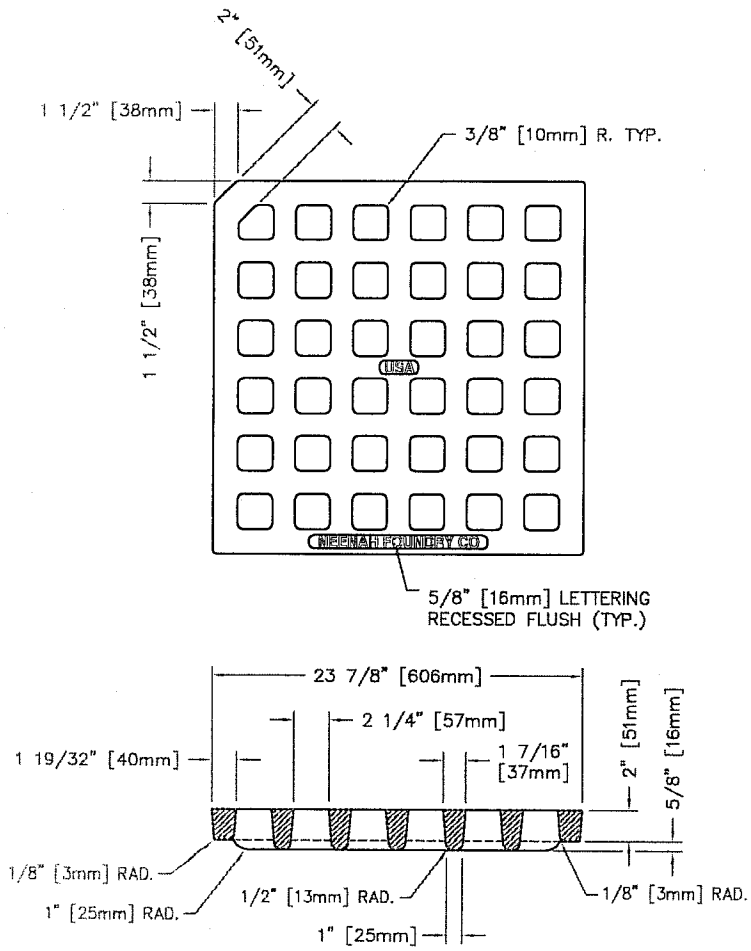


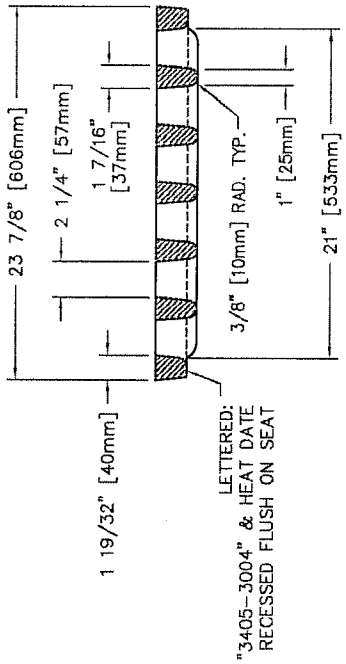
Corrugated Pipe

MANHOLE DIA.	MAX. O.D. PIPE
48" DIA. 5" WALL	28 IN.
60" DIA. 6" WALL	30 IN.
72" DIA. 7" WALL	37 IN.
84" DIA. 8" WALL	44 IN.
96" DIA. 9" WALL	51 IN.









NOTE: ALL DIMENSIONS SHOWN ARE IN ENGLISH AND [METRIC].

MATERIAL: CAST GRAY IRON ASTM A-48, CLASS 35B

FREE OPEN AREA: 1.2 SQ. FT.

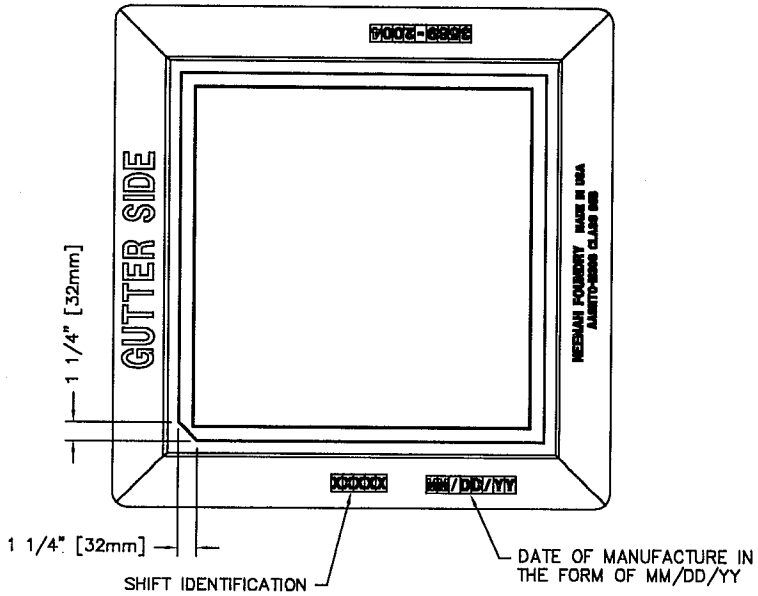
FINISH: NO PAINT

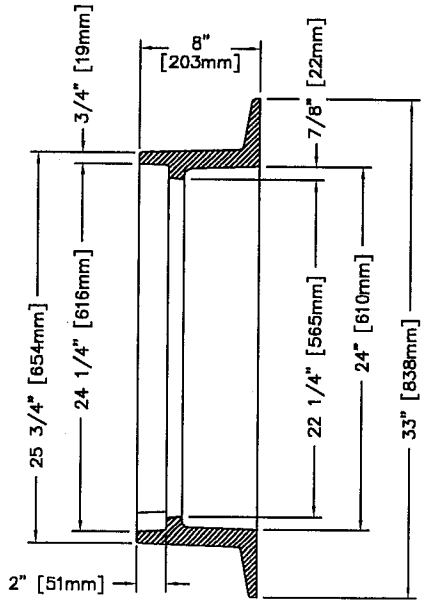
WEIGHT: APPROX. 201#

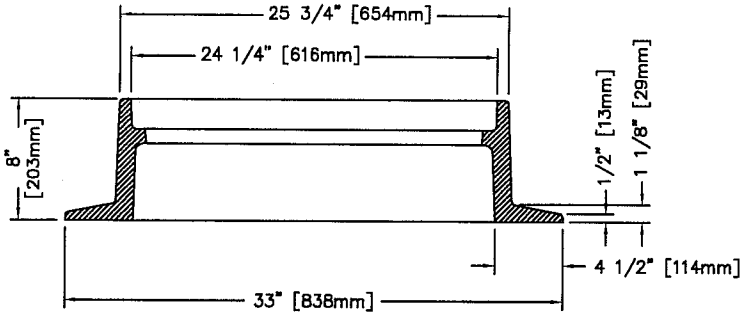
12-10-99	ADDED LETTERING	KMH	
DATE	REVISION	INT	

DR.	E. REMME	SCALE 1/8"=1"	TITLE: R-3405-A TYPE "A" GRATE
CH.			
APP.		DIM CHK.	NEENAH FOUNDRY COMPANY NEENAH WISCONSIN 54956
DATE	11-29-99		NF-34053004 B

CAD DWG. REF: 34053004.DWG- 2







NOTE: ALL DIMENSIONS ARE SHOWN IN ENGLISH AND [METRIC].
MATERIAL: CAST GRAY IRON ASTM A-48, CLASS 35B
FINISH: NOT PAINTED
WEIGHT: 274#

DR. LMA	SCALE 1/8"=1"	TITLE: R-3588 FRAME			
CH.					
APP.	DIM CHK.	NEENAH FOUNDRY COMPANY NEENAH WISCONSIN 54956	NF-35882004	B	
DATE 06-20-2007					

DATE	REVISION	INT
08/02/2011	UPDATED LETTERING PER CASTING CHECK	ELN

CAD DWG. REF: 35882004.DWG- 2

PRODUCT SPECIFICATIONS

ConSeal™ CS102

Concrete Sealants INC.

Butyl Rubber Sealant For All Precast Structures; Meets Specs.

APPLICATIONS

For self-sealing joints in: Manholes, Concrete Vaults, Septic Tanks, Concrete Pipe, Box Culverts, Utility Vaults, Burial Vaults, and Vertical Panel Structures.

SEALING PROPERTIES

- Provides permanently flexible watertight joints.
- Low to high temperature workability: 30°F to 120°F (-1°C to 48°C)
- Rugged service temperature: -30°F to +200°F (-34°C to +93°C)
- Excellent chemical and mechanical adhesion to clean, dry surfaces.
- Sealed Joints will not shrink, harden or oxide upon aging.
- No priming normally necessary. When confronted with difficult installation conditions, such as wet concrete or temperatures below 40°F (4°C), priming the concrete will improve the bonding action. Consult Concrete Sealants for the proper primer to meet your application.

HYDROSTATIC STRENGTH

ConSeal CS-102 meets the hydrostatic performance requirement as set forth In ASTM C-990 section 10.1 (Performance requirement: 10psi for 10 minutes in straight alignment – in plant, quality control test for joint materials.)

SPECIFICATIONS

ConSeal CS-102 meets or exceeds the requirements of Federal Specification SS-S-210 (210-A), AASHTO M-198B, and ASTM C-990-91.

P.O. Box 176, New Carlisle OH, 45344 • 937.845.8776 or 800.332.7325
FAX 937-845-3587 • www.conseal.com

CONSEAL™ CS102

Concrete Sealants INC.

Butyl Rubber Sealant For All Precast Structures; Meets Specs.

PHYSICAL PROPERTIES

	Spec	Required*	CS 102
Hydrocarbon blend content % by weight	ASTM D4 (mod.)	50% min.	51%
Inert mineral filler % by weight	AASHTO T111	30% min.	35%
Volatile Matter % by weight	ASTM D6	2% max.	1.2
Specific Gravity, 77°F	ASTM D71	1.15-1.50	1.25
Ductility, 77°F	ASTM D113	5.0 min.	10
Penetration, cone 77°F, 150 gm. 5 sec.	ASTM D217	50-100	55-60
Penetration, cone 32°F, 150 gm. 5 sec.	ASTM D217	40 mm	40-65
Flash Point, C.O.C., °F	ASTM D92	350°F min.	450°F
Fire point, C.O.C., °F	ASTM D92	375°F min.	475°F

IMMERSION TESTING

- 30-Day Immersion Testing: No visible deterioration when tested in 5% Caustic Potash, 5% Hydrochloric Acid, 5% Sulfuric Acid, and 5% saturated Hydrogen Sulfide. *

- One Year Immersion Testing: No visible deterioration when tested in 5% Formaldehyde, 5% Formic Acid, 5% Sulfuric Acid, 5% Hydrochloric Acid, 5% Sodium Hydroxide, 5% Hydrogen Sulfide and 5% Potassium Hydroxide.

- Requirements of ASTM C-990 Standard Specification for Joints for Concrete Pipe, Manholes, and Precast Box Sections Using Preformed Flexible Joint Sealants.

LIMITED WARRANTY
This information is presented in good faith, but we cannot anticipate all conditions under which this information and our products, or the products of other manufacturers in combination with our products, may be used. We accept no responsibility for results obtained by the application of this information or the safety and suitability of our products, either alone or in combination with other products. Users are advised to make their own tests to determine the safety and suitability of each such product or product combinations for their own purposes. It is the user's responsibility to satisfy himself as to the suitability and completeness of such information for this own particular use. We sell this product without warranty, and buyers and users assume all responsibility and liability for loss or damage arising from the handling and use of this product, whether used alone or in combination with other products.

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