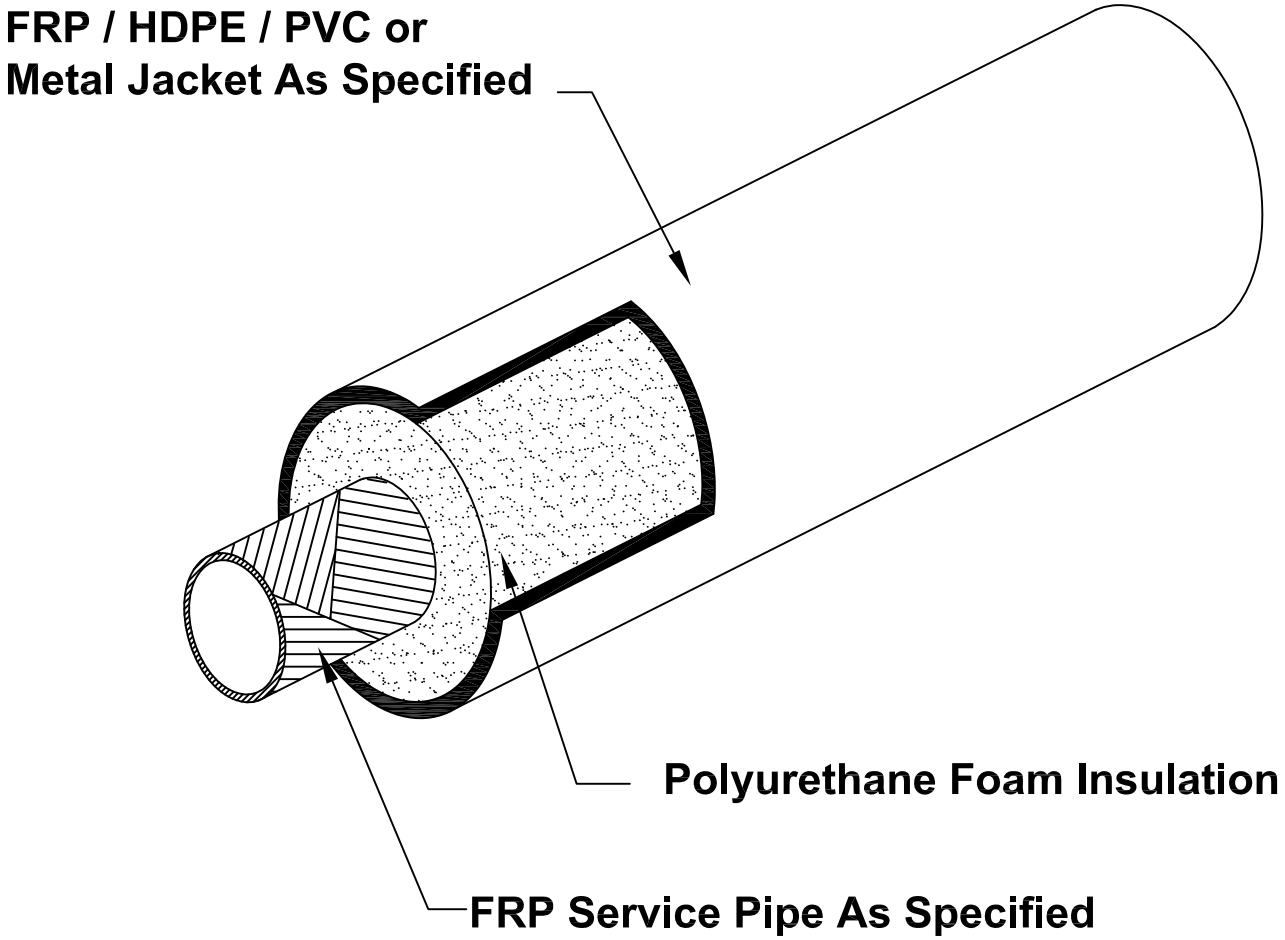
FRP PIPE SYSTEM

For Applications Up To 200° F* Below And Above Ground

- ☐ Chilled Water
- ☐ Condensate
- ☐ Domestic Water
- ☐ Heating Hot Water
- ☐ Petroleum Products
- ☐ Potable Water
- ☐ Waste Water



TRICON FORCE
PIPING SOLUTIONS
tfpiping.com

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2 Technology Blvd
Canastota, NY 13032
Phone: 904-687-2874

Texas
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TABLE 1

Pipe Size	Minimum Insulation Thickness	PVC Jacket O.D.	PVC Jacket Wall
2”	1.81”	6.14”	.070”
3”	1.25”	6.14”	.070”
4”	1.75”	8.16”	.080”
6”	1.69”	10.20”	.100”
8”	1.69”	12.24”	.120”
10”	1.63”	14.32”	.140”
12”	1.47”	16.00”	.160”

TABLE 2

Pipe Size	Minimum Insulation Thickness	HDPE Jacket O.D.	HDPE Jacket Wall
2”	2.00”	6.63”	.150”
3”	1.43”	6.63”	.150”
4”	1.58”	8.00”	.150”
6”	1.51”	10.00”	.175”
8”	1.73”	12.43”	.175”
10”	1.48”	14.06”	.175”
12”	1.39”	15.87”	.175”

Service Pipe:
The service pipe can be filament wound fiberglass-reinforced epoxy, bell and spigot, designed to withstand up to 200°F. Pipe sizes 2” through 8” may be supplied in 20 Ft. random lengths. Pipe sizes 10” through 16” to be supplied in 40 Ft. lengths. Straight lengths of piping will be supplied with 6” of piping exposed at each end for field joint fabrication.

Insulation:
The insulation shall be a foamed in place closed cell polyurethane which completely fills the annular space between the carrier pipe and the exterior casing. The insulation shall have the following physical properties:

Minimum Density (lb./cu. ft.) 2.0	ASTM D-1622
“K” Factor BTU/Hr. sq. ft. °F/in. .16	ASTM C-177
90-95 % Closed Cell	ASTM D-2856

Exterior Casing:*
The exterior casing shall be
(1) Seamless, extruded white **PVC** Type 1, Grade 1 and Class 12454-B per ASTM D-1784 or
(2) High Density Polyethylene **(H.D.P.E.)** ASTM D-1248 with the following physical properties:
ASTM D-3350…….Resin Type III, Grade P34
ASTM D-638……...Tensile Yield Strength 3300 psi
ASTM D-638……Ultimate Elongation 850%
ASTM D-790…Tangent Flexural Modules 175,000 psi

No polyethylene tape casings will be allowed.

Sub-Assemblies:
Any requirement for thrust blocking is the responsibility of the design engineer. Fittings that do not require restraint blocks should be field insulated. Fittings that require restraint blocks must have blocks designed by the design engineer. FRP pipe should be joined to steel systems with flanges. All steel systems should be anchored within five feet of connection point to eliminate any thrust, stress, or torque from being transferred to the FRP from the steel.

Field Joints:
After joining and hydrostatic testing, PVC jacketed straight field joints shall be insulated with polyurethane foam to the thickness specified, PVC sleeve and pressure sensitive tape. HDPE jackets will use polyurethane foam and a heat shrinkable sleeve.

Installation:
No Piping shall be installed in standing water. Trenches shall be maintained dry until final field closure is complete. The installing contractor shall handle the piping system in accordance with the directions furnished by the manufacturer and as approved by the architect and engineer. The carrier piping shall be hydrostatically tested as specified in the contract documents.
EXERCISE DUE CARE WHEN INSTALLING AND TESTING THE PIPING SYSTEM.
DO NOT TEST WITH AIR OR GAS.

Backfill:
A 4-inch layer of sand or fine gravel, less than ½” in diameter, shall be placed and tamped in the trench to provide uniform bedding for the **TRICON FRP** system. Once the system is in place, the trenches shall be carefully backfilled with similar material and hand tamped in 6” layers until a minimum of 12” above the top of the preinsulated pipe has been achieved. The remainder of the backfill shall be void of rocks, frozen earth and foreign material. The trench shall be compacted to comply with H-20 Highway loading.

Accessories:
- Heat Tracing

System Options:
- Contact your Tricon representative for available sizes and system options.

* Optional metallic casings for above ground applications include, Spiral Lockseam in Galvanized, Aluminum or Stainless Steel.
* Optional non-metallic casings for below grade offered include, Filament Wound FRP.

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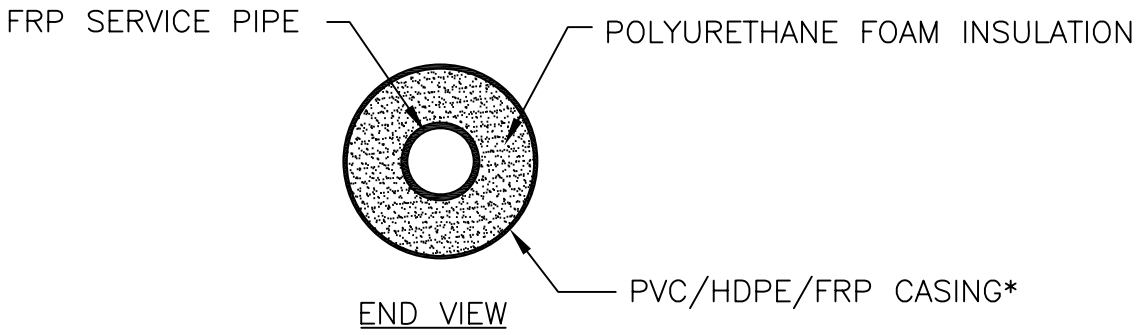
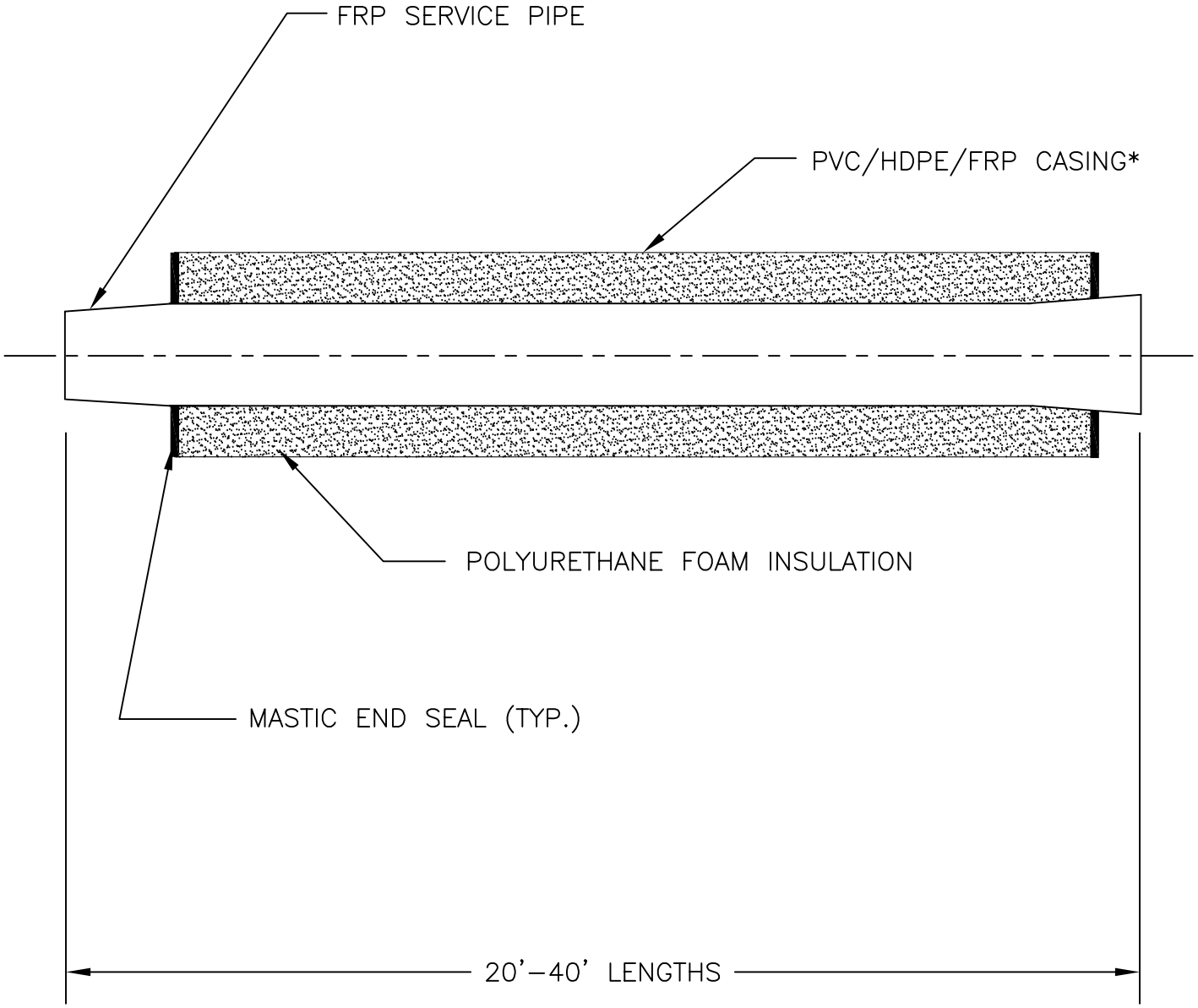
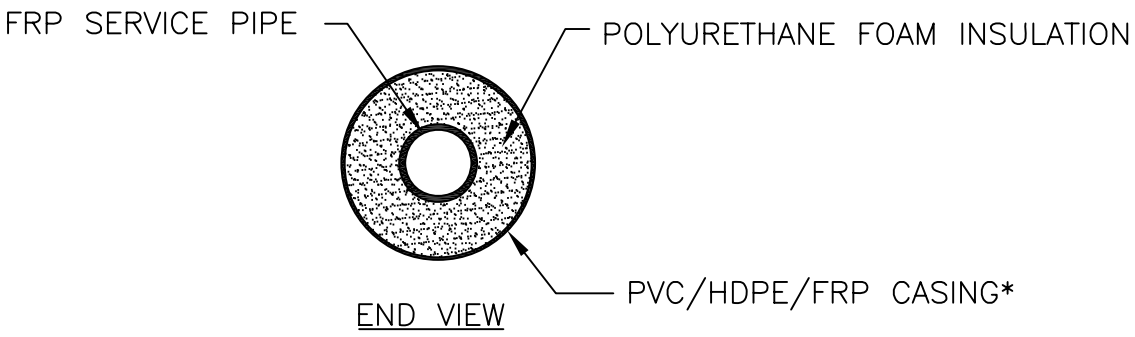


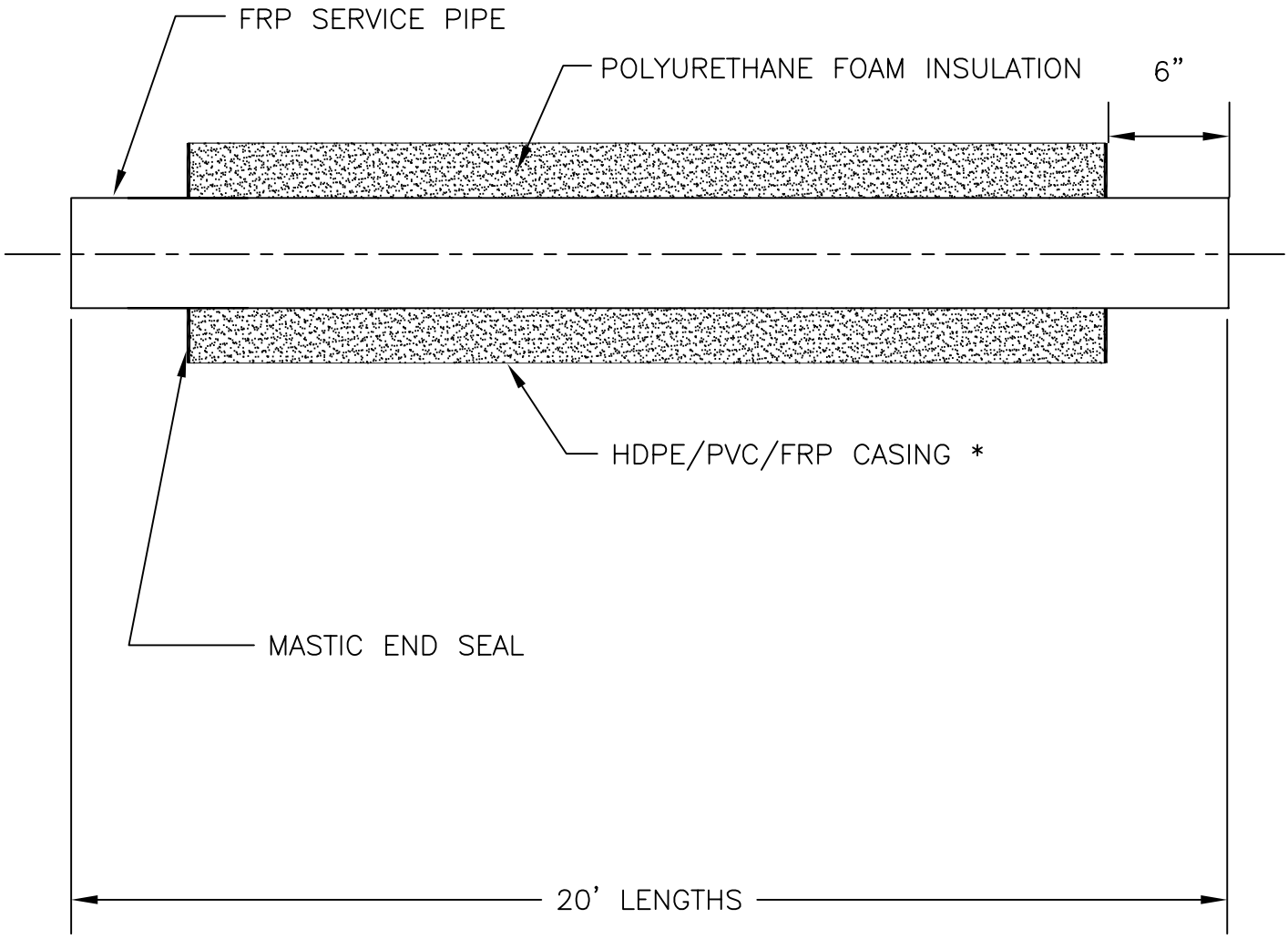
END VIEW



* OPTIONAL METAL JACKET AVAILABLE FOR ABOVE GRADE APPLICATION.

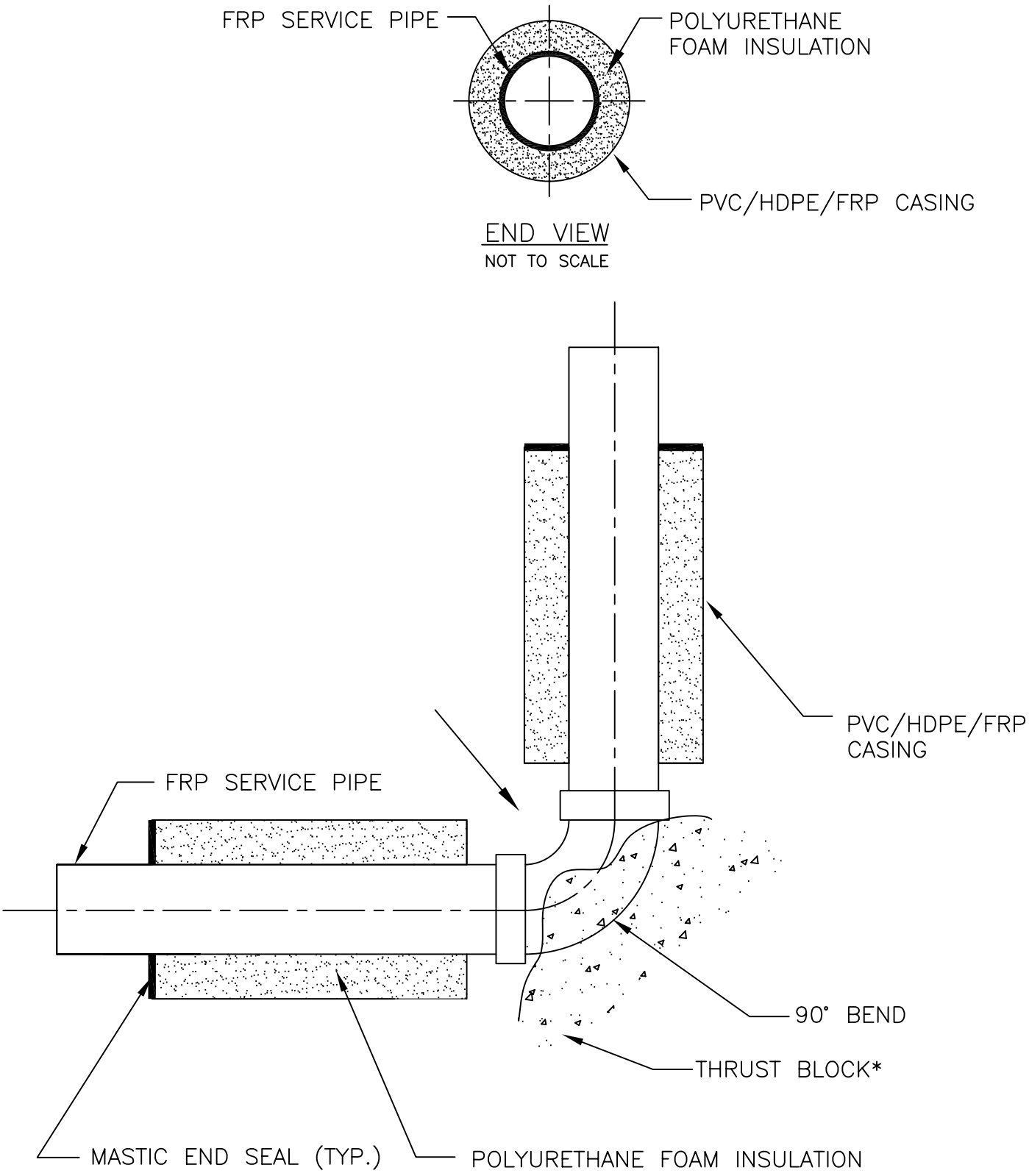
FRP STRAIGHT LENGTH DETAIL – BELL x PLAIN END			TRICON FORCE PIPING SOLUTIONS tfpiping.com
FRP	Date: 03/09/06	Dwg. No. FRP–1A	
	Rev.:		





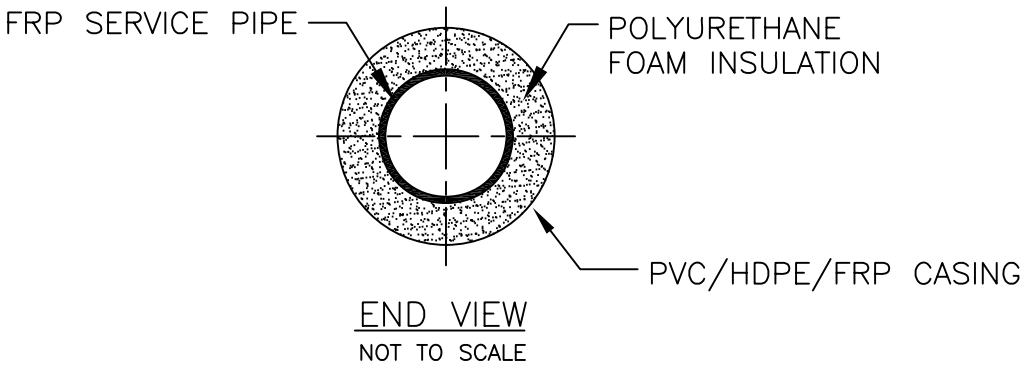
* OPTIONAL METAL JACKET AVAILABLE FOR ABOVE GRADE APPLICATION.

FRP STRAIGHT LENGTH DETAIL – PLAIN END x PLAIN END			TRICON FORCE PIPING SOLUTIONS tfpiping.com
FRP	Date: 03/09/06	Dwg. No. FRP–1B	
	Rev.:		

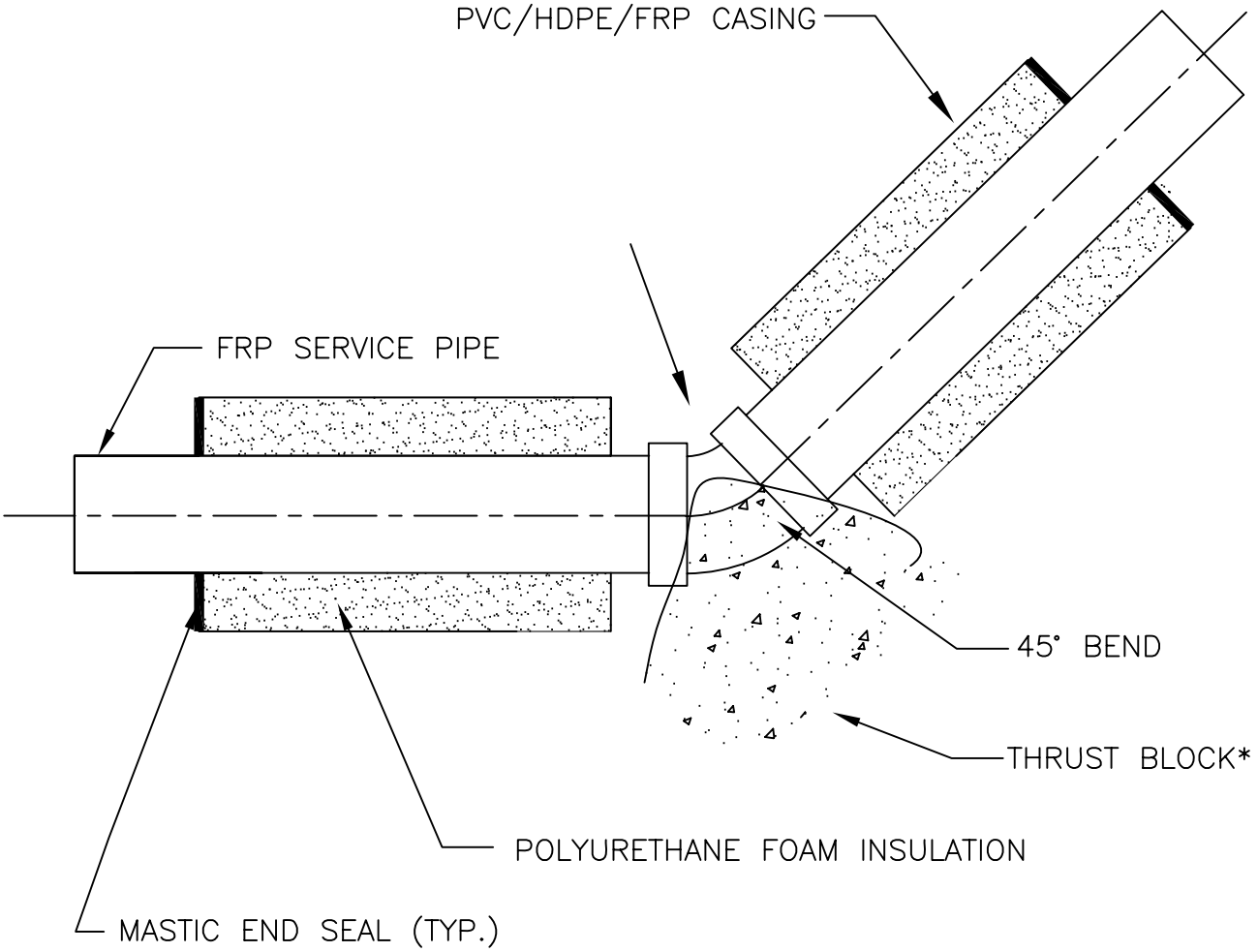


* THRUST BLOCKING MAY BE REQUIRED FOR HOT WATER SYSTEMS CONTACT DESIGN ENGINEER FOR THRUST BLOCK DESIGN, SIZING, AND SOIL CONDITIONS.

FRP 90° BEND DETAIL			TRICON FORCE PIPING SOLUTIONS tfpiping.com
FRP	Date: 03/09/06	Dwg. No.: FRP–2	
	Rev.:		

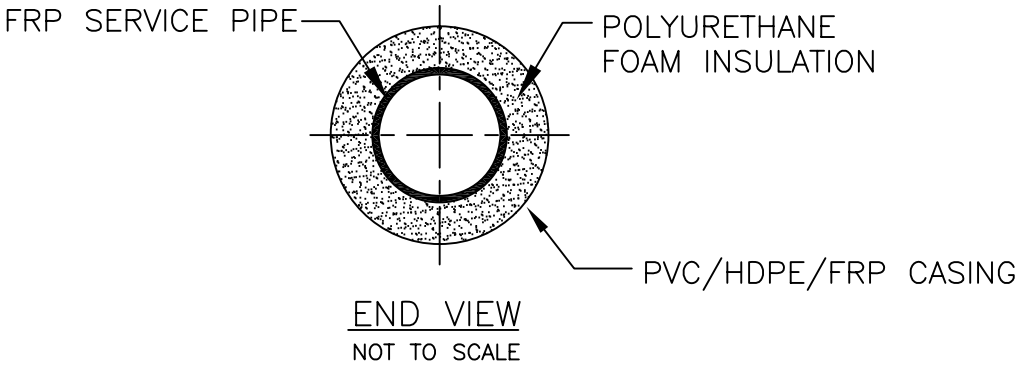


END VIEW
NOT TO SCALE



* THRUST BLOCKING MAY BE REQUIRED FOR HOT WATER SYSTEMS CONTACT DESIGN ENGINEER FOR THRUST BLOCK DESIGN, SIZING, AND SOIL CONDITIONS.

FRP 45° BEND DETAIL			TRICON FORCE PIPING SOLUTIONS tfpiping.com
FRP	Date: 03/09/06	Dwg. No.: FRP–3	
	Rev.:		



END VIEW
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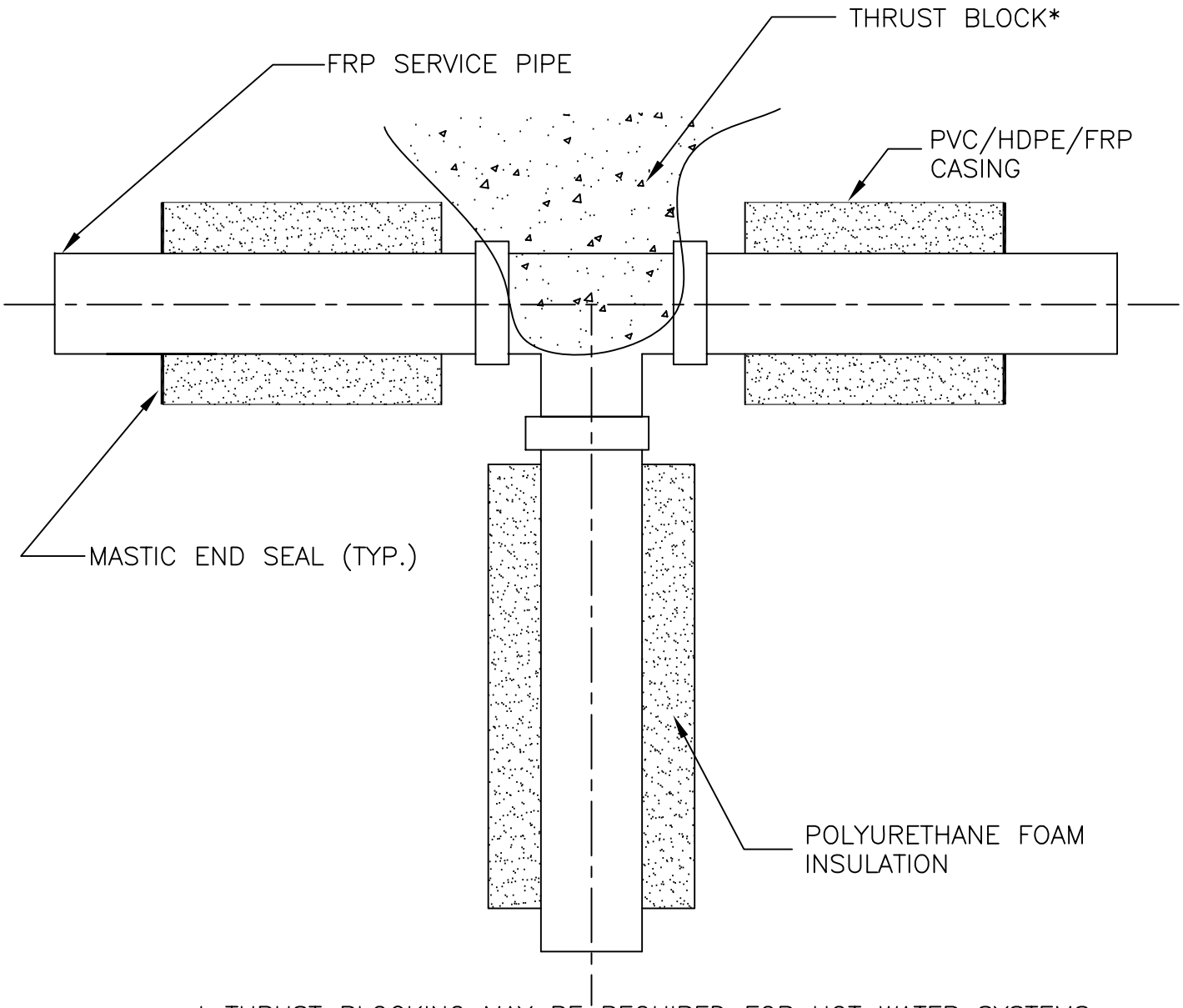
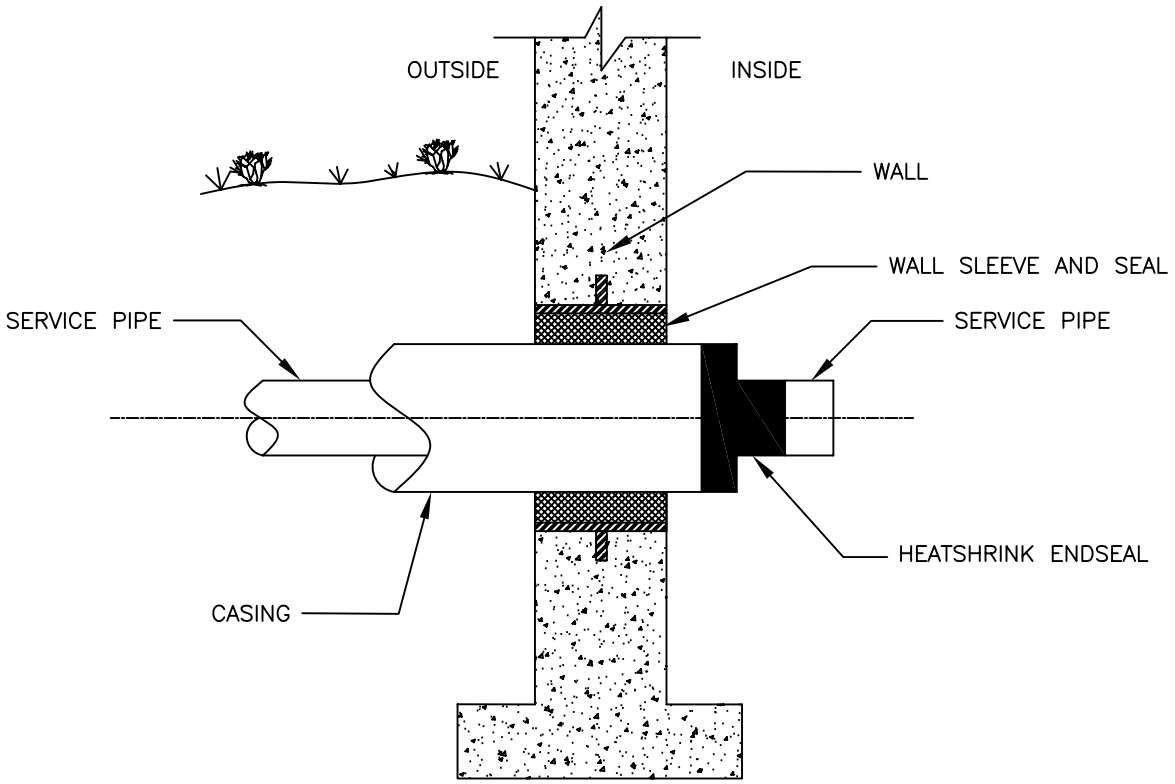
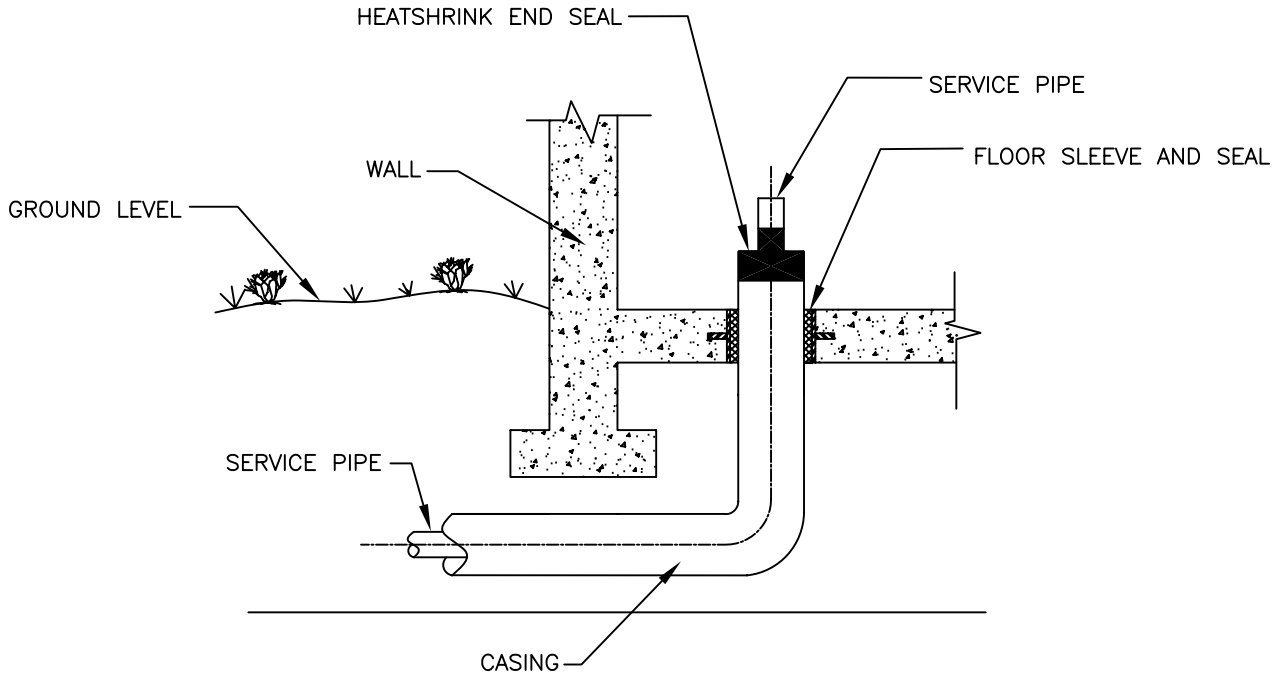


* THRUST BLOCKING MAY BE REQUIRED FOR HOT WATER SYSTEMS CONTACT DESIGN ENGINEER FOR THRUST BLOCK DESIGN, SIZING, AND SOIL CONDITIONS.

FRP TEE DETAIL		TRICON FORCE PIPING SOLUTIONS tfpiping.com
FRP	Date: 03/09/06	Dwg. No.: FRP-4
	Rev.:	



WALL PENETRATION DETAIL



BUILDING RISER DETAIL

HEATSHRINK END SEAL DETAIL		
FRP	Date: 03/09/06	Dwg. No.: FRP–5
	Rev.:	

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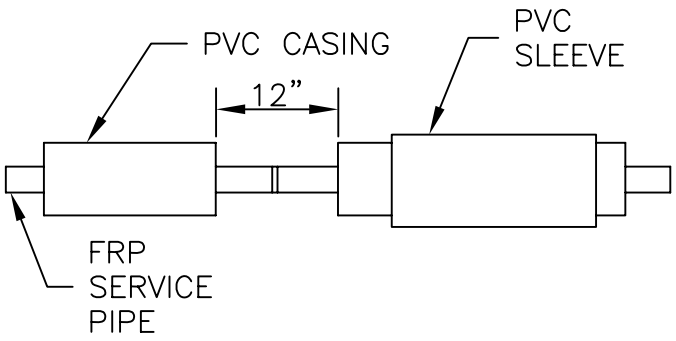
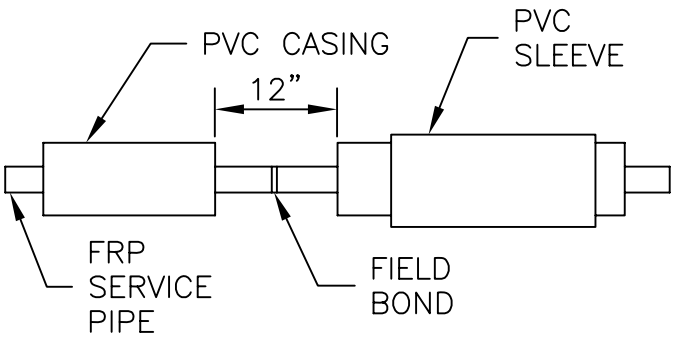
PHASE 1



PRIOR TO BONDING FRP SERVICE PIPE, SLIDE PVC SLEEVE OVER PVC CASING.

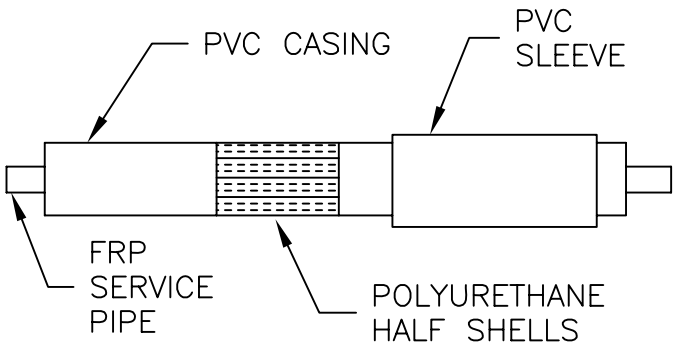
PHASE 2



HYDRO TEST ALL JOINTS AS REQUIRED.

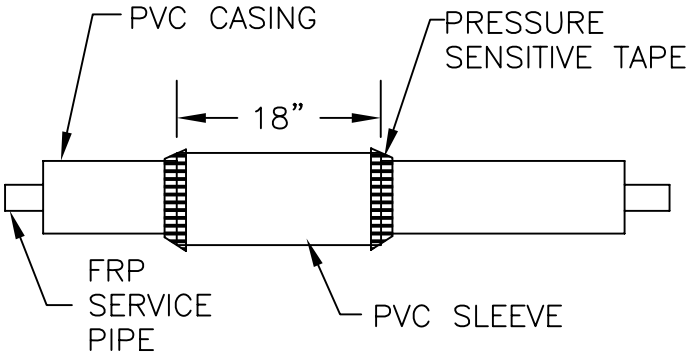
DO NOT TEST WITH AIR OR GAS

PHASE 3



FIT POLYURETHANE FOAM HALF SHELLS OVER SERVICE PIPE AND SECURE IN PLACE. SLIDE PVC SLEEVE ONTO CENTER OF JOINT OVER INSULATION.

PHASE 4



APPLY A WRAP OF PRESSURE SENSITIVE TAPE AROUND THE AREA WHERE THE CASING AND SLEEVE MEET. ALLOW A 2” OVERLAP OF TAPE ONTO BOTH SURFACES.

IN COLDER WEATHER, TAPE MUST BE KEPT WARM UNTIL TIME OF USE.

TRICON FRP FIELD JOINT KIT DETAIL WITH RIGID POLYURETHANE FOAM & PVC CASING

FRP	Date: 03/09/06	Dwg. No. FRP–6A
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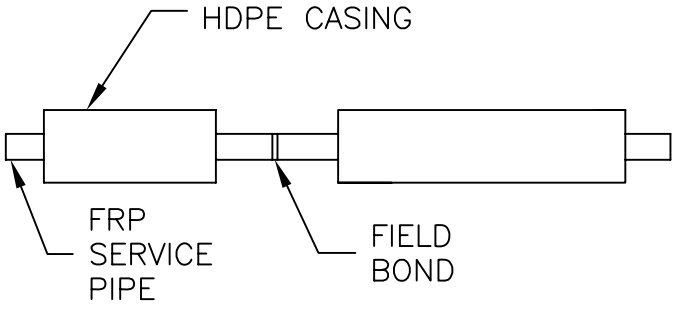
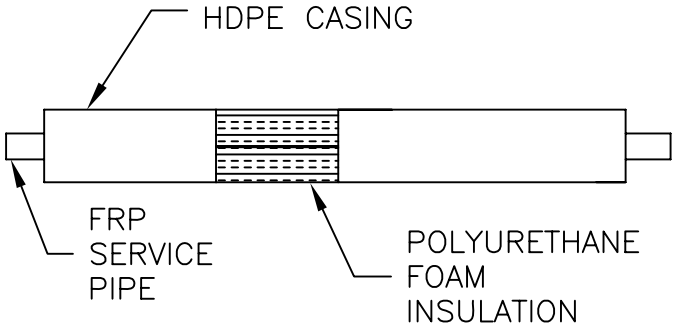
PHASE 1



AFTER BONDING SERVICE PIPE, HYDRO TEST PER RECOMMENDATIONS.

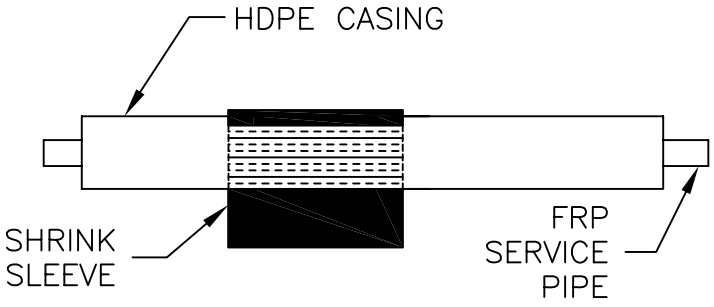
DO NOT TEST WITH AIR OR GAS

PHASE 2



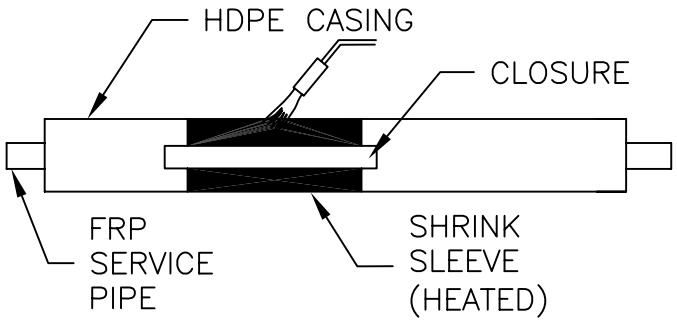
INSTALL RIGID URETHANE INSULATION IN PLACE TO PIPE AND SECURE.

PHASE 3



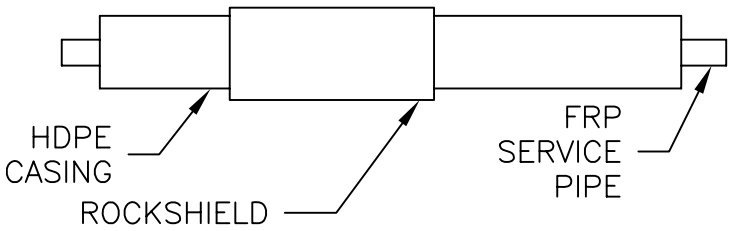
REMOVE RELEASE LINER AND PLACE SHRINK SLEEVE AROUND JOINT AND PIPE INSUALTION. OVERLAP SLEEVE AT THE 10 TO 12 O'CLOCK POSITION. GENTLY HEAT BACKING OF SLEEVE AND CLOSURE. PRESS THE CLOSURE FIRMLY INTO PLACE. GENTLY HEAT CLOSURE AND PAT DOWN WITH HAND

PHASE 4



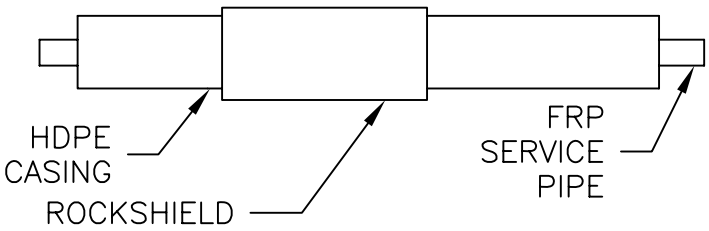
WITH LOW YELLOW FLAME, HEAT THE SHRINK SLEEVE FROM THE MIDDLE TOWARD EACH SIDE OF THE SLEEVE UNTIL RECOVERY IS COMPLETE. SHRINKING HAS BEEN COMPLETED WHEN ADHESIVE OOZES FROM SIDES. AVOID EXCESSIVE HEAT TO OVERLAP AREA.

PHASE 5



SLIDE HDPE ROCKSHIELD OVER JOINT SO THAT SHRINK SLEEVE IS COMPLETELY COVERED.

PHASE 6



SECURE HDPE ROCKSHIELD IN PLACE. FIELD JOINT IS NOW COMPLETE.

TRICON FRP FIELD JOINT KIT DETAIL WITH RIGID POLYURETHANE FOAM & HDPE CASING

FRP	Date: 03/09/06	Dwg. No. :FRP–6B
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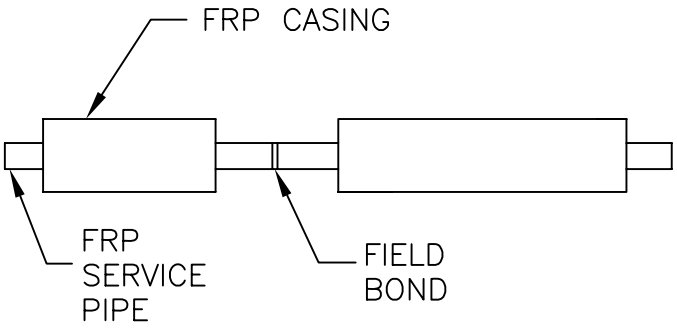
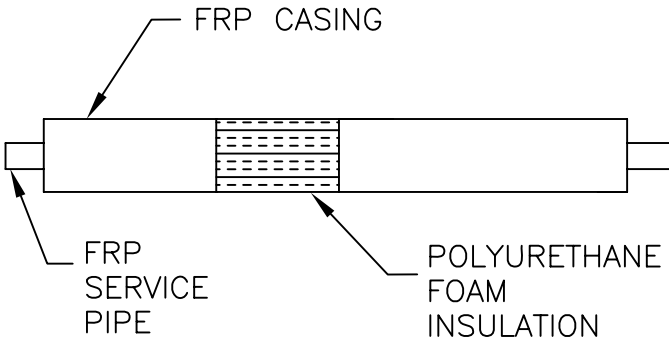
PHASE 1



AFTER BONDING SERVICE PIPE, HYDRO TEST PER RECOMMENDATIONS.

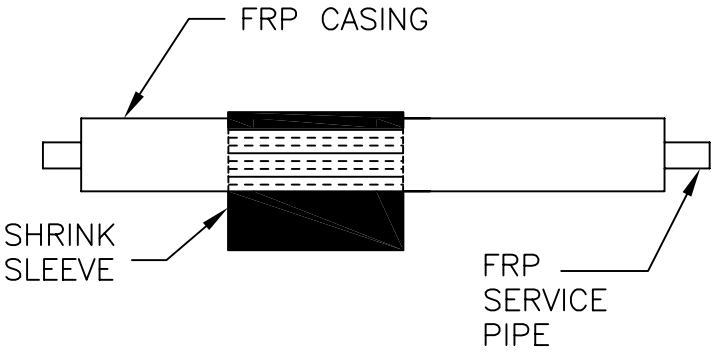
DO NOT TEST WITH AIR OR GAS

PHASE 2



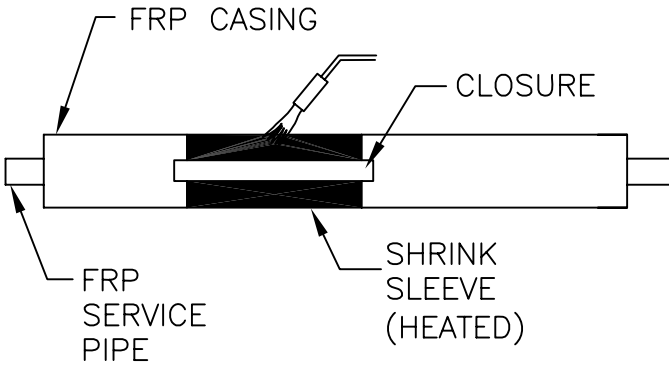
INSTALL RIGID URETHANE INSULATION IN PLACE TO PIPE AND SECURE.

PHASE 3



REMOVE RELEASE LINER AND PLACE SHRINK SLEEVE AROUND JOINT AND PIPE INSULATION. OVERLAP SLEEVE AT THE 10 TO 12 O'CLOCK POSITION. GENTLY HEAT BACKING OF SLEEVE AND CLOSURE. PRESS THE CLOSURE FIRMLY INTO PLACE. GENTLY HEAT CLOSURE AND PAT DOWN WITH HAND

PHASE 4



WITH LOW YELLOW FLAME, HEAT SHRINK SLEEVE USING CIRCUMFERENTIAL STROKES. SHRINKING HAS BEEN COMPLETED WHEN ADHESIVE OOZES FROM SIDES. AVOID EXCESSIVE HEAT TO OVERLAP AREA. DO NOT BACKFIL UNTIL SHRINKSLEEVE IS COOL TO THE TOUCH.

TRICON FRP FIELD JOINT KIT DETAIL WITH RIGID POLYURETHANE FOAM & FRP CASING

FRP

Date: 03/09/06	Dwg. No.:FRP–6C
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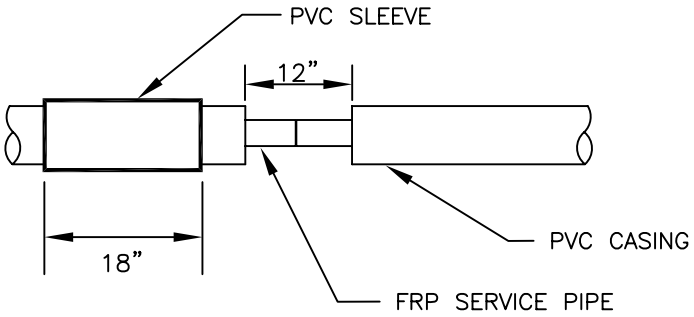
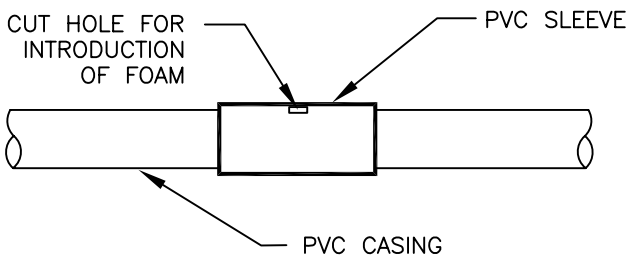
STEP 1



SLIDE PVC SLEEVE OVER END OF PIPE CASING.
HYDRO–TEST ALL BONDED JOINTS AS REQUIRED.

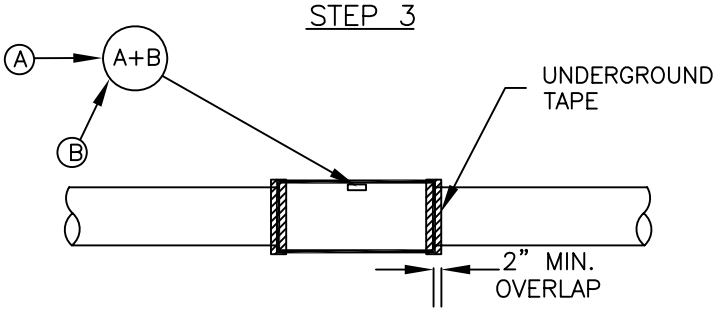
DO NOT TEST WITH AIR OR GAS

STEP 2



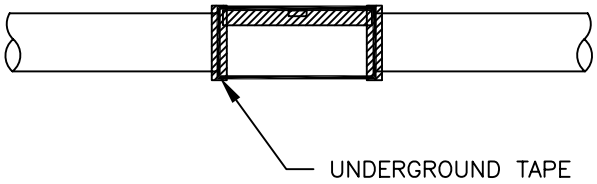
CENTER PVC SLEEVE OVER JOINT AND SECURE IN PLACE. CUT HOLE IN TOP OF PVC SLEEVE FOR INTRODUCTION OF POLYURETHANE FOAM MIXTURE.

STEP 3



APPLY UNDERGROUND TAPE WHERE PVC SLEEVE AND CASING MEET. PROVIDE FOR A MINIMUM OVERLAP OF 2". REFER TO CHART BELOW FOR FOAM AMOUNT BASED ON JACKET SIZE. POUR FOAM INTO OPENING.
WHEN FOAM REACTS, TEMPORARILY SEAL THE OPENING WITH DUCT TAPE TO MAXIMIZE INSULATION IN CAVITY.

STEP 4



TRIM OFF EXCESS MATERIAL AFTER CURING IS COMPLETE. APPLY ADDITIONAL UNDERGROUND TAPE TO HOLE IN PVC SLEEVE.

POLYURETHANE FOAM MIXTURE CHART

JACKET SIZE	FIELD JOINT
3	3
4	4
5	5
6	6
8	8
10	10
12	12
14	14
16	16

CHART INDICATES THE PROPORTIONS OF EACH COMPONENT (NAMELY "A" & "B") TO BE MIXED PRIOR TO INTRODUCTION INTO PIPE CAVITY. A NOMINAL INSULATION THICKNESS OF 1–1/2" IS ASSUMED FOR THE PURPOSES OF THIS CHART. FOR THICKNESS OTHER THAN 1–1/2", CONTACT TRICON FOR QUANTITIES. EXAMPLE: FOR AN 8 INCH JACKET, 8 OUNCES OF "A" AND 8 OUNCES OF "B" ARE REQUIRED. REQUIRED PROPORTIONS MAY VARY AS A RESULT OF CHANGES IN WEATHER CONDITIONS. NOTE THAT CHEMICAL REACTION WILL TAKE LONGER IN COLDER WEATHER. CONTACT TRICON FOR ADVICE DURING INCLEMENT WEATHER.

IN COLDER WEATHER, TAPE MUST BE KEPT WARM UNTIL TIME OF USE.

FRP FIELD JOINT DETAIL – POUR IN PLACE INSULATION

FRP

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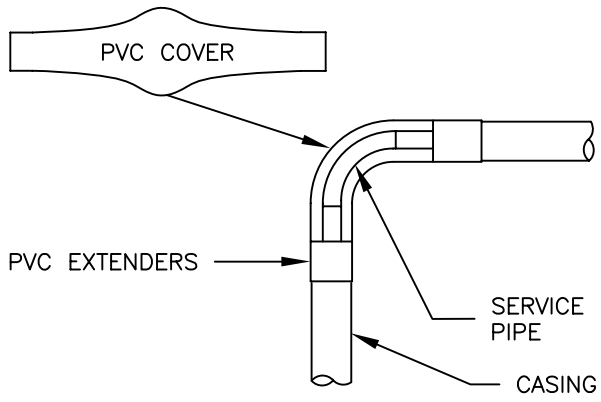
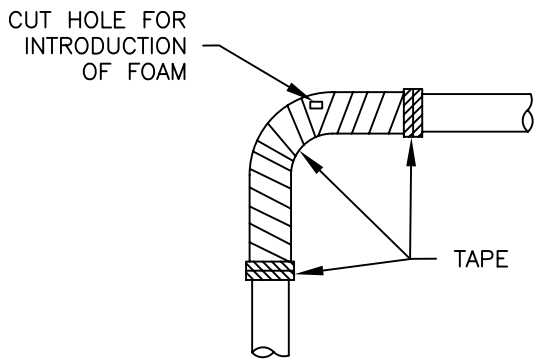
STEP 1



IF REQUIRED, SLIDE PVC EXTENDERS OVER END OF PIPE PRIOR TO ELBOW BEING BONDED INTO POSITION. TEST JOINT AS REQUIRED.

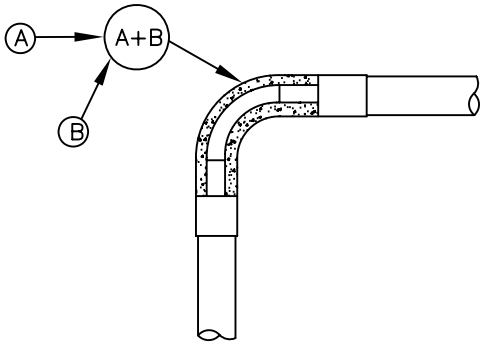
DO NOT TEST WITH AIR OR GAS

STEP 2



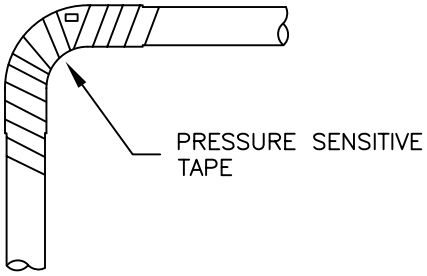
POSITION AND SECURE PVC ELBOW COVER.
CUT SMALL OPENING IN COVER FOR INTRODUCTION OF FOAM.

STEP 3



REFER TO CHART BELOW FOR FOAM AMOUNT BASED ON JACKET SIZE. POUR FOAM INTO OPENING.
WHEN FOAM REACTS, TEMPORARILY SEAL THE OPENING WITH DUCT TAPE TO MAXIMIZE INSULATION IN CAVITY

STEP 4



TRIM OFF EXCESS MATERIAL AFTER CURING IS COMPLETE. WRAP FITTING WITH PRESSURE SENSITIVE TAPE AS SHOWN.

IN COLDER WEATHER, TAPE MUST BE KEPT WARM UNTIL TIME OF USE.

POLYURETHANE FOAM MIXTURE CHART

JACKET SIZE	ELBOW
3	7
4	7
5	9
6	6
8	6
10	20
12	30
14	40
16	50

CHART INDICATES THE PROPORTIONS OF EACH COMPONENT (NAMELY "A" & "B") TO BE MIXED PRIOR TO INTRODUCTION INTO PIPE CAVITY. EXAMPLE: FOR AN 8 INCH JACKET. 6 OUNCES OF "A" AND 6 OUNCES OF "B" ARE REQUIRED. REQUIRED PROPORTIONS MAY VARY AS A RESULT OF CHANGES IN WEATHER CONDITIONS. NOTE THAT CHEMICAL REACTION WILL TAKE LONGER IN COLDER WEATHER. CONTACT TRICON FOR ADVICE DURING INCLEMENT WEATHER.

TRICON LOW TEMP FIELD INSULATED ELBOW FITTING KIT DETAIL WITH PVC JACKET

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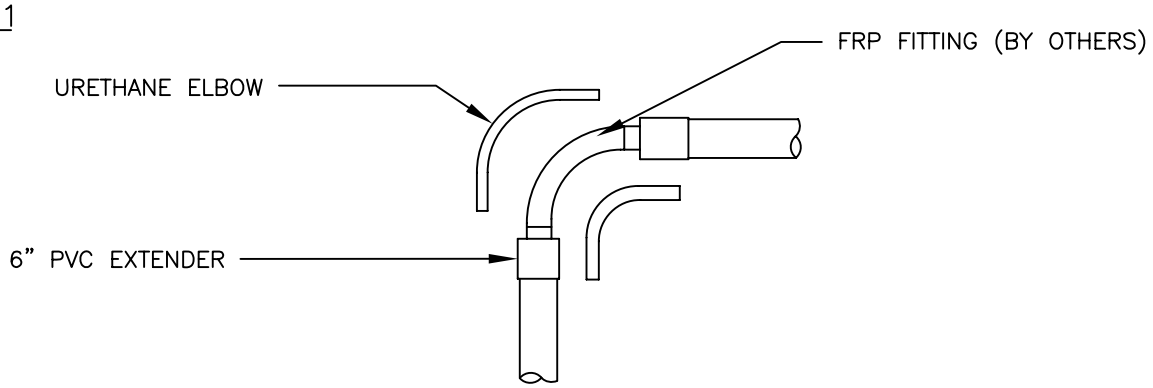
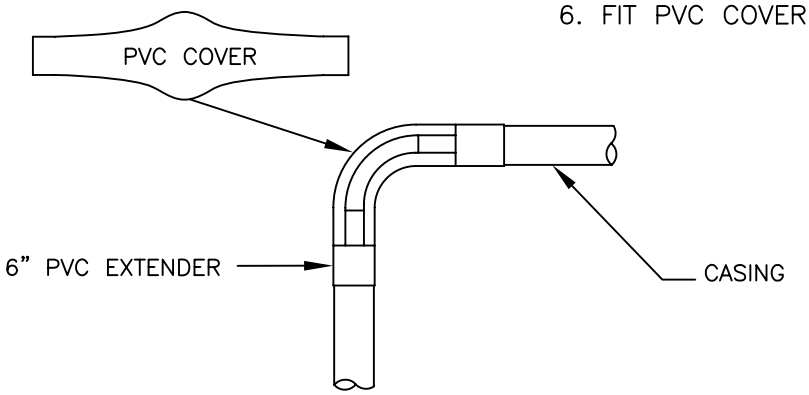
STEP 1



1. SLIDE 6" PVC SLEEVE EXTENDERS ONTO END OF PIPE CASING BEFORE ELBOW IS BONDED.
2. TEST ALL BONDED JOINTS AS REQUIRED. **DO NOT TEST WITH AIR OR GAS**
3. FIT POLYURETHANE FOAM INSULATION OVER FITTING AND SECURE IN PLACE.
4. CUT AND FIT STRAIGHT PIPE COVERING INTO PLACE THAT URETHANE ELBOW DOES NOT COVER.
5. SLIDE EXTENDERS IN PLACE AND SECURE WITH POLYKEN TAPE.

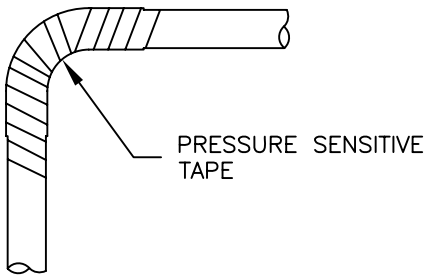
STEP 2

6. FIT PVC COVER OVER FITTING.



STEP 3

IN COLDER WEATHER, TAPE MUST BE KEPT WARM UNTIL TIME OF USE.



7. WRAP FITTING WITH PRESSURE SENSITIVE TAPE AS SHOWN.

TRICON FRP FIELD INSULATED ELBOW FITTING KIT DETAIL WITH RIGID INSULATION.			TRICON FORCE PIPING SOLUTIONS tfpiping.com
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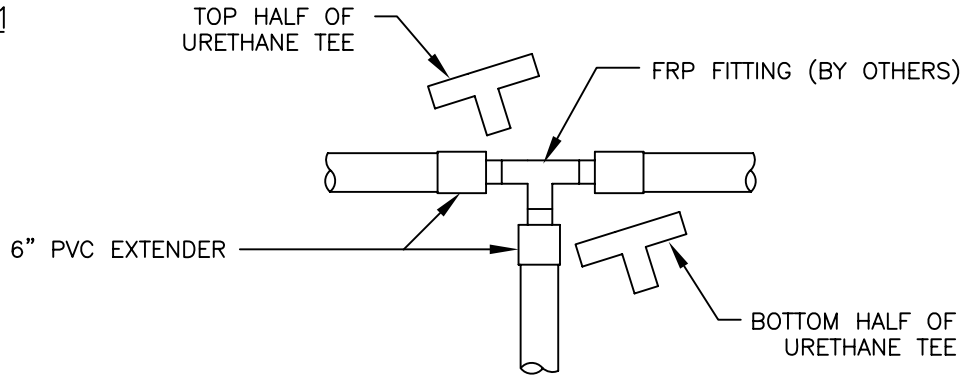
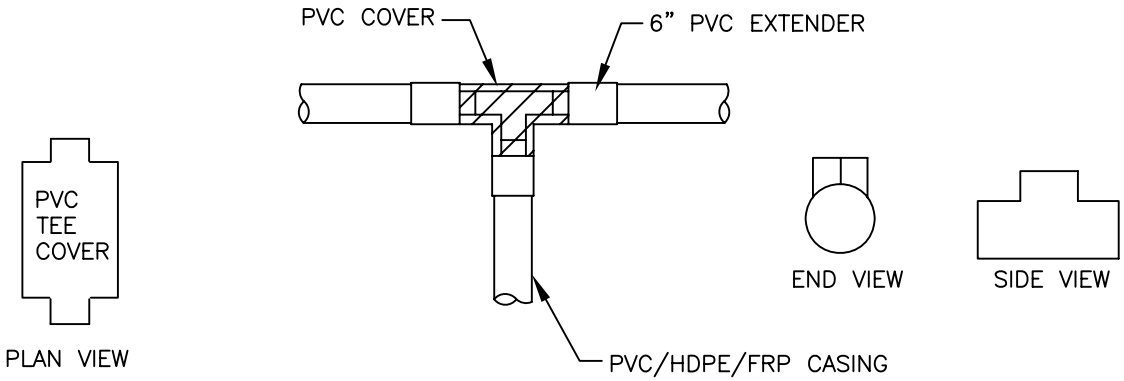
STEP 1



1. SLIDE 6" PVC EXTENDERS ONTO END OF PIPE CASING BEFORE TEE IS BONDED.
2. HYDRO–TEST ALL BONDED JOINTS AS REQUIRED. **DO NOT TEST WITH AIR OR GAS**
3. FIT POLYURETHANE FOAM INSULATION OVER FITTING AND SECURE IN PLACE.
4. CUT AND FIT STRAIGHT PIPE COVERING INTO PLACE THAT URETHANE TEE DOES NOT COVER.
5. SLIDE EXTENDERS IN PLACE AND SECURE WITH POLYKEN TAPE.

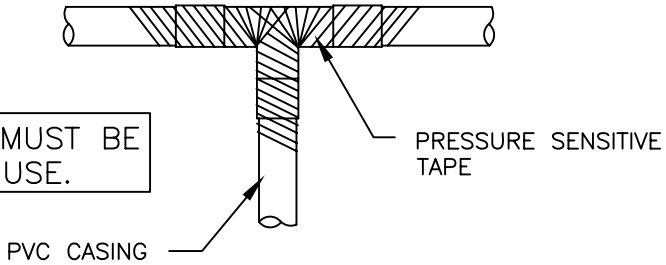
STEP 2



6. FIT PVC COVER OVER FITTING.

STEP 3

IN COLDER WEATHER, TAPE MUST BE KEPT WARM UNTIL TIME OF USE.



7. SPIRALLY WRAP FITTING WITH PRESSURE SENSITIVE TAPE AS SHOWN.

FRP FIELD INSULATED TEE
FITTING KIT DETAIL WITH RIGID INSULATION

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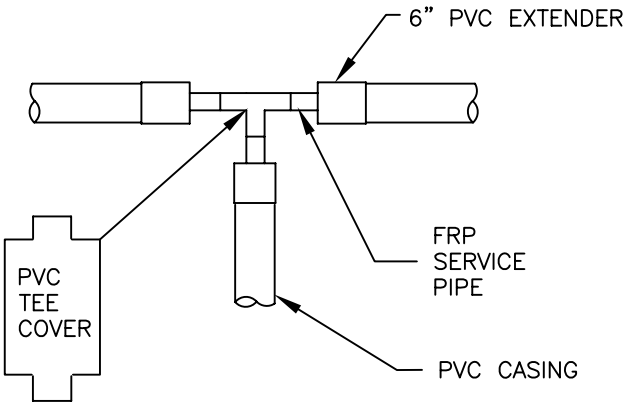
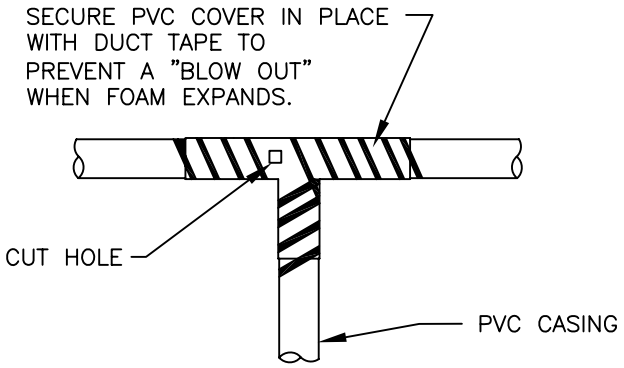
STEP 1



IF REQUIRED, SLIDE PVC EXTENDERS OVER END OF PIPE PRIOR TO ELBOW BEING BONDED INTO POSITION.

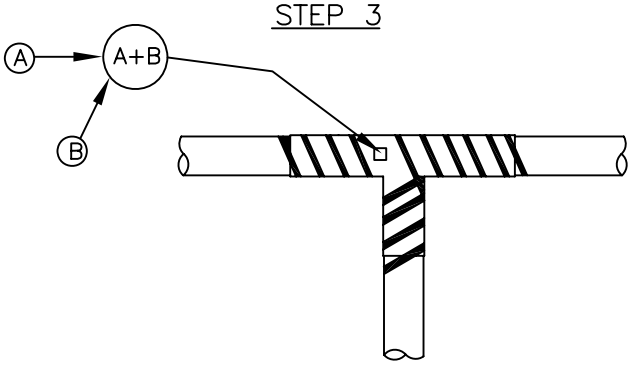
STEP 2



HYDRO–TEST ALL JOINTS AS REQUIRED. POSITION AND SECURE PVC TEE COVER. CUT SMALL OPENING IN COVER FOR INTRODUCTION OF FOAM.

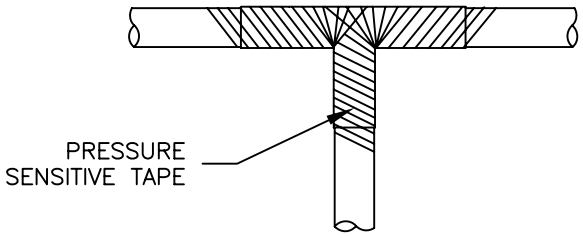
DO NOT TEST WITH AIR OR GAS

STEP 3



REFER TO CHART BELOW FOR FOAM AMOUNT BASED ON JACKET SIZE. POUR FOAM INTO OPENING. WHEN FOAM REACTS, TEMPORARILY SEAL THE OPENING WITH DUCT TAPE TO MAXIMIZE INSULATION IN CAVITY.

STEP 4



TRIM OFF EXCESS MATERIAL AFTER CURING IS COMPLETE. WRAP FITTING WITH PRESSURE SENSITIVE TAPE AS SHOWN

IN COLDER WEATHER, TAPE MUST BE KEPT WARM UNTIL TIME OF USE.

POLYURETHANE FOAM MIXTURE CHART

JACKET SIZE	TEE
4	4
5	6
6	8
8	14
10	20
12	32
14	41
16	55

CHART INDICATES THE PROPORTIONS OF EACH COMPONENT (NAMELY "A" & "B") TO BE MIXED PRIOR TO INTRODUCTION INTO PIPE CAVITY. EXAMPLE: FOR AN 8 INCH JACKET, 14 OUNCES OF "A" AND 14 OUNCES OF "B" ARE REQUIRED. REQUIRED. PROPORTIONS MAY VARY AS A RESULT OF CHANGES IN WEATHER CONDITIONS. NOTE THAT CHEMICAL REACTION WILL TAKE LONGER IN COLDER WEATHER.
CONTACT TRICON FOR ADVICE DURING INCLEMENT WEATHER

TRICON FRP FIELD INSULATED TEE DETAIL

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