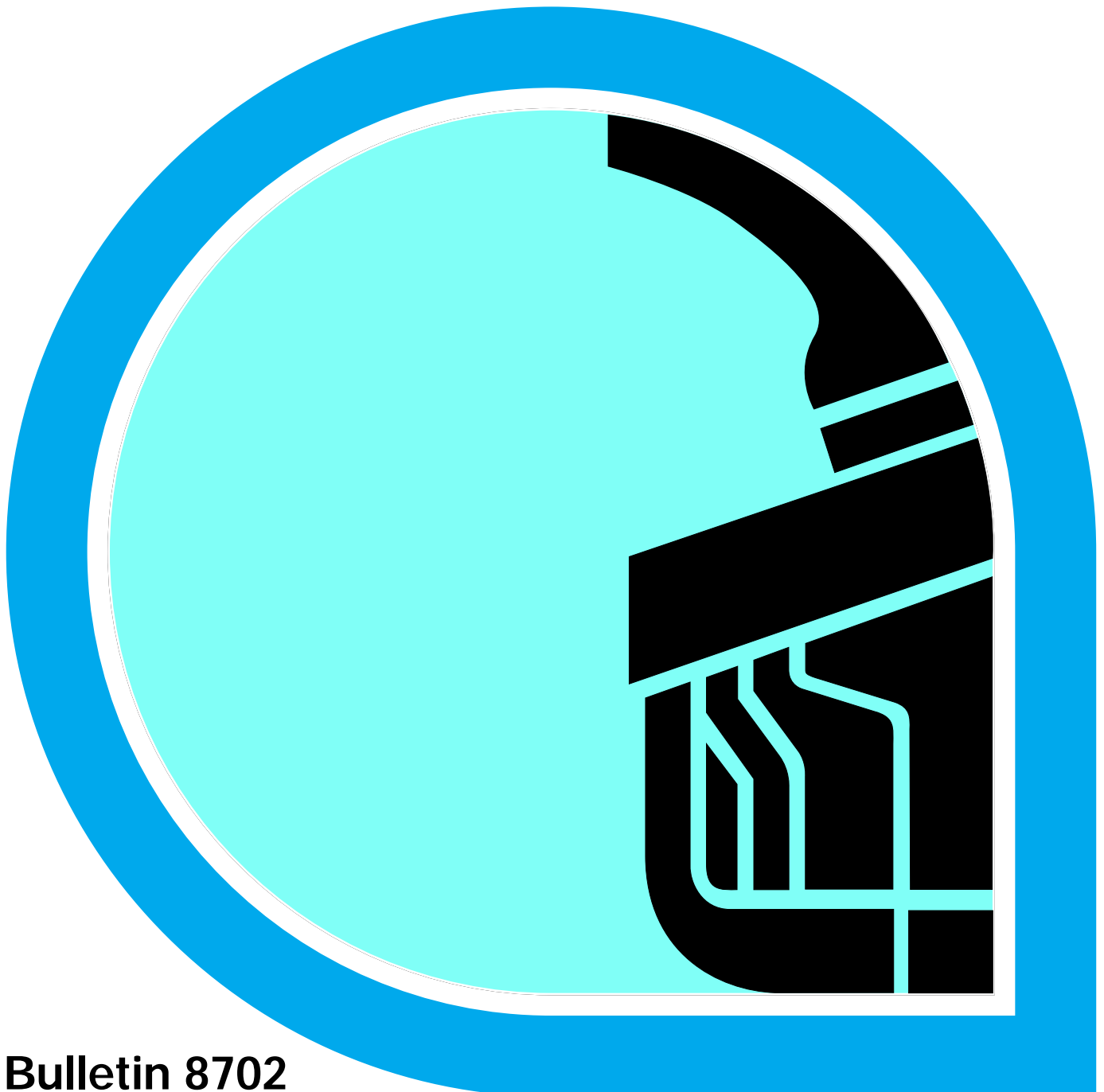


Installation Practices

for secondary containment
piping systems



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1 Introduction

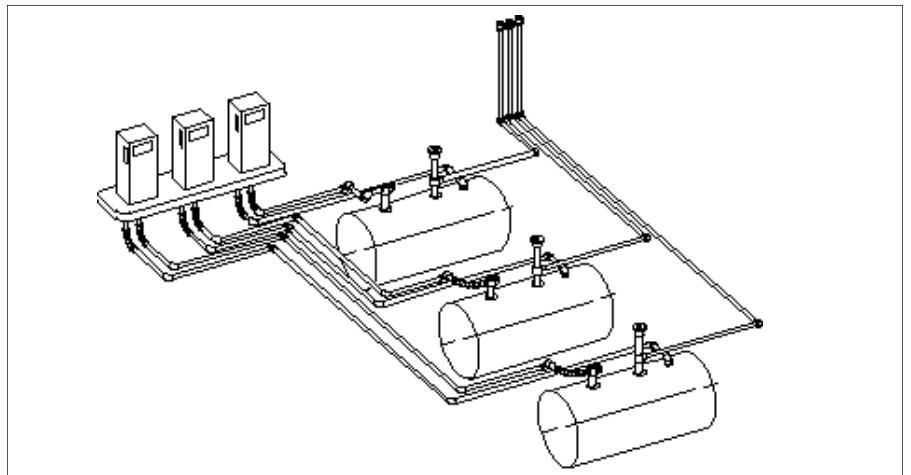
Dualoy 3000/L contained piping systems

Dualoy 3000/L secondary containment systems are designed to enclose UL and ULC-listed Ameron primary piping used in product lines, vent lines and vapor recovery lines from the pump discharge at the product storage tank to the shear valve at the dispenser. Containment systems employ pipe one size larger than the primary and specially designed fittings that provide complete enclosure of primary piping. Dualoy containment systems are designed for close make-up and ease of installation. Contact Ameron Fiberglass Pipe Division for assistance in designing containment systems.

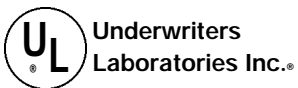
Dualoy 3000/L non-contained piping systems

Detailed installation instructions for Dualoy 3000/L single-wall piping systems may be found in Ameron publication Bulletin 7501 (FP104) available from Ameron Fiberglass Pipe Division or your Ameron distributor.

Fig. 1-1. A typical three-product service station layout employing Dualoy 3000/L fiberglass pipe for product piping and Stage I and Stage II vapor recovery lines. Dualoy 3000/L piping is also available for the complete line of secondary containment systems.



2 Listings and approvals



Dualoy 3000/L is listed in the U. S. with Underwriters Laboratories for nonmetallic underground piping for petroleum products, gasoline-alcohol blends, alcohols and oxygenated fuels for both primary (File MH9162) and containment (File MH15596) piping systems. Dualoy 3000/L pipe and fittings are also listed with Underwriters Laboratories of Canada for petroleum products and alcohols (File CMH 715), in Sweden with AB Statens Anläggningsprovning (Certifikat SA 1-1-9846), and in The Netherlands with KIWA (Ref. ATA no. 2062/1-E). Dualoy 3000/L piping systems conform to the requirements of Arrêté 261 bis (French Ministry of the Environment). In Great Britain the Dualoy 3000/L system has been tested and accepted by the London Fire and Civil Defence Authority.

3 On-site inspection and storage

Inspection

Primary piping inspection is especially critical on double-wall installations. Shipping or handling damage is not visible once the primary has been contained. Damaged pipe can be identified by localized discoloration, crazing and deep scratches or gouges. Refer to Ameron Bulletin 7501 for guidelines on inspection, handling and storage. Inspect containment piping and fittings for damage.

Storage

Dualoy 3000/L pipe incorporates a 5-mil thick, resin-rich reinforced outer coating which provides outstanding UV resistance. Pipe stored out of doors for extended periods may assume a chalky appearance. This change in appearance is superficial and does not affect the pipe's performance. Protect stored pipe from impact damage by stacking on padded racks. Have ample supplies of nuts, bolts and washers or rivets and adhesive on hand before starting installation.

4 Materials

Pipe

Manufacturer tallies pipe on the basis of overall length. Allow for cutting losses and wastage when ordering.

Fittings

Containment fittings (90° and 45° elbows, tees, couplings and reducer couplings) are shipped 5 sets to the box. Older containment fittings in 6-inch size are provided in matched sets that should not be mixed. Sump penetration fittings are shipped individually.

Adhesives

Two adhesives are used in Dualoy 3000/L secondary containment systems:

- **Ameron B20** for 3, 4 and 6-inch containment systems
- **Ameron RP34C** for older 6-inch containment systems

Ameron B20 and RP34C epoxy-resin adhesives are formulated for permanently bonding containment pipe and fittings. They are supplied as two-part systems consisting of a resin and a hardener.

Each adhesive kit contains

- Resin
- Hardener
- Mixing stick
- Spatula and/or brush
- Detailed usage instructions
- Emery paper
- Gloves
- Paper towels

Refer to the layout drawings to estimate the number of adhesive kits required. Include bonds for all couplings, elbows, tees, reducers and sump penetrations plus a waste factor. Short pot life at higher temperatures may not allow as many bonds to be made as indicated in the tables: allow a greater waste factor at higher temperatures. For further information refer to the product data sheets for the individual adhesives.

Containment fitting bonds per 5-oz adhesive kit

Nominal Pipe Size (in) (mm)	Ameron Adhesive	90° Elbows	45° Elbows	Tees	Concentric Reducers	Saddles	Couplings
3 80	B20	3	3	2	4	3	3
4 100	B20	3	3	2	4	2	2
6 150	B20	1	1	1	1	1	1
6 150	RP34C ¹	1	1	1	1	1	1

1) Use with older style fittings

Tools

The following tools are suggested to install Dualoy 3000/L piping:

- 3/8-inch electric drill or equivalent air-driven motor
- 1 1/4-inch hole saw for installing saddles
- 4-inch hole saw for installing sump penetration fittings
- 1 1/2-inch diameter by 1-inch wide coarse-grit flapper sander wheel for abrading secondary pipe ends
- 1 1/2-inch disc grinder wheel for abrading sump wall at penetration
- Heavy-duty heat guns, hot air blowers, heating blankets or Chem Cure Paks for cool or cold-weather installation.

When using pneumatic tools, the air supply must be dry and oil-free as moisture or oil on bonding surfaces will interfere with the adhesive.

5 Trenching, bedding and backfilling

Recommended practices

Although fiberglass pipe has excellent strength, it must be protected against impact which may occur from improper handling or during backfilling.

- Provide a trench width equal to the pipe diameter plus six inches on each side. Separate multiple lines by at least 4 inches. Refer to Fig. 5-1.
- Provide a minimum of 18 inches of select backfill between the top of the pipe and unpaved ground surfaces.
- Provide a minimum of 4 inches of select backfill between the top of the pipe and reinforced concrete pavement (4 inches minimum thickness).
- Provide a minimum of 8 inches of select backfill between the top of the pipe and asphalt pavement (2 inches minimum thickness).
- Slope the trench bottom evenly from the dispensers back to sumps or tanks at a minimum $\frac{1}{8}$ in/ft.
- Maintain the trench bottom free of hard or sharp objects.
- Grade the trench bottom with at least 6 inches of select backfill to provide firm, even support for the pipe. Compact the subgrade well to prevent differential settling.
- Protect the pipe from impact during backfilling and abrasion during operation by surrounding it with four to six inches of select backfill such as washed sand, pea gravel ($\frac{3}{4}$ -inch maximum) or crushed stone ($\frac{1}{2}$ -inch maximum).
- Wrap pipe lying near concrete with rubber or foam padding to avoid direct contact with the concrete.

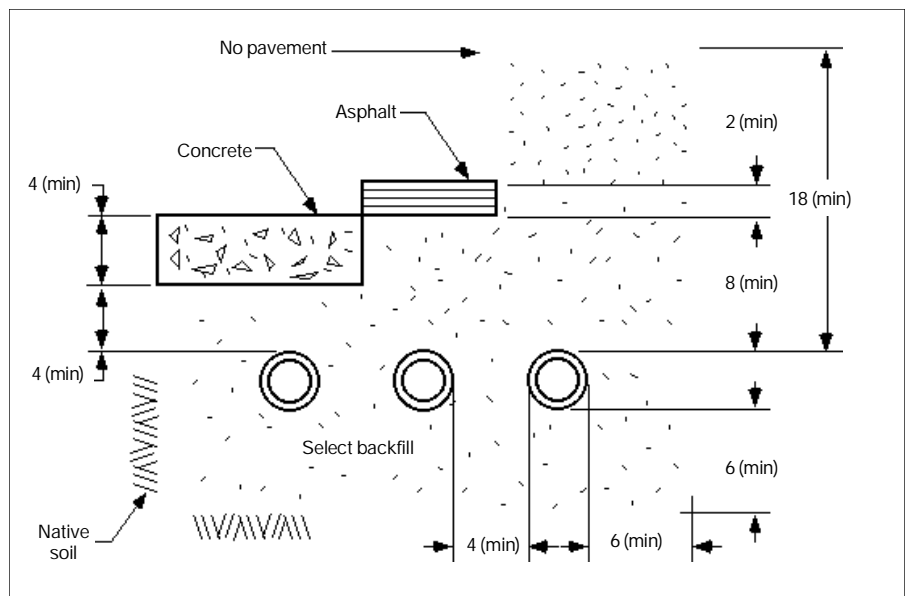


Fig. 5-1. Use only select materials for bedding and backfilling Dualoy 3000/L fuel handling systems. Native materials are rarely suitable and should not be used.

6 Dry fitting contained primary piping

Recommended practices

- Have island forms, boxes, and shear valves in place before dry fitting.
- Lay out and dry fit primary and containment piping at the same time.
- Allow sufficient clearance when dry fitting the primary to accommodate the containment fittings.

Dimensions of containment fittings may be found at the end of this document.

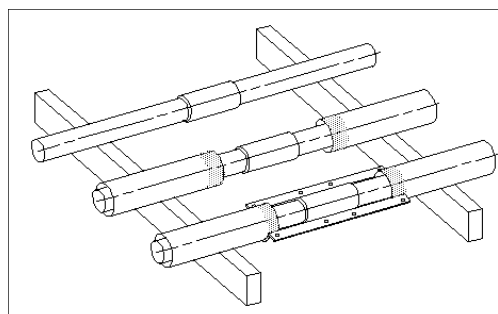


Fig. 6-1. During layout, bonding and inspection, support the piping on 2x4 blocks to keep the joints clean and to keep bedding out of the pipe. Remove supports before burial.

Do not bond primary system together before the secondary containment system has been dry fit.

7 Dry fitting secondary containment systems

Cutting containment piping

Ameron containment piping employs a straight joint. Use of tapered pipe ends in straight containment fittings will result in a gap in the joint. When employing pipe that has been delivered with a factory taper as containment piping, remove the taper as shown in Fig. 7-1.

After cutting containment pipe to length, use a flapper sander, coarse sandpaper or emery cloth to remove the surface gloss for 1 to 1½ inches from the square-cut end of the pipe. Surface gloss is most conveniently removed before the containment pipe has been placed over the primary.

Place containment fittings under the dry-fit primary fittings when measuring the length of containment pipe to be cut. Cut the containment pipe to allow 1 to 1½ inches for insertion into each fitting as shown in Fig. 7-2.

Fig. 7-1. Some containment pipe may be received with tapered ends. Cut off the tapers and remove the surface gloss for 1 to 1½ inches from the end of the pipe.

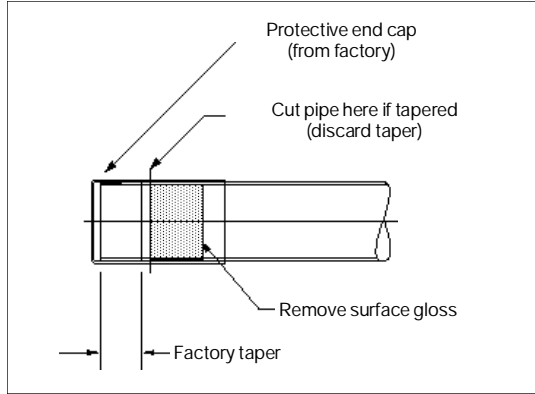


Fig. 7-2. Always include a coupling in the secondary wherever a primary coupling is located.

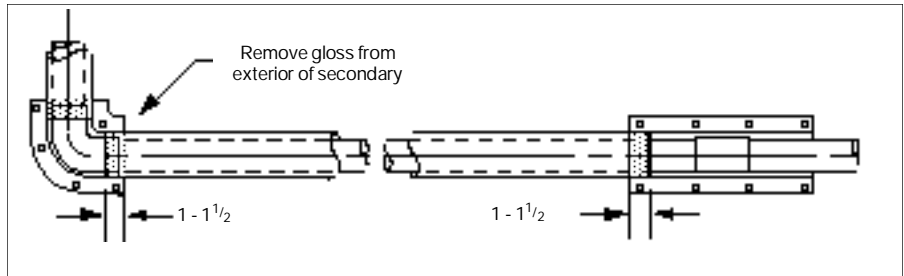
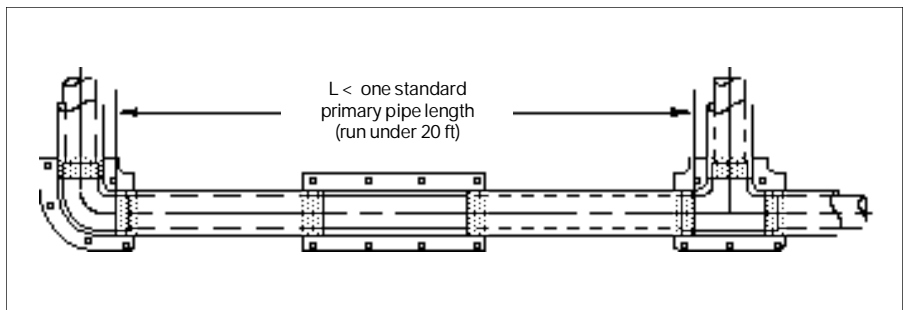


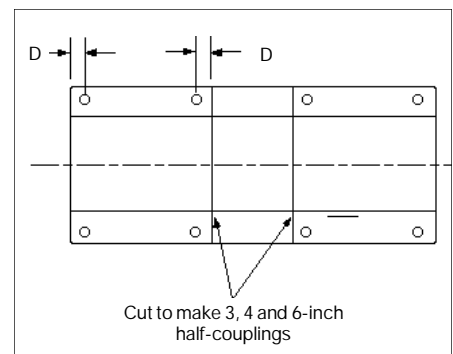
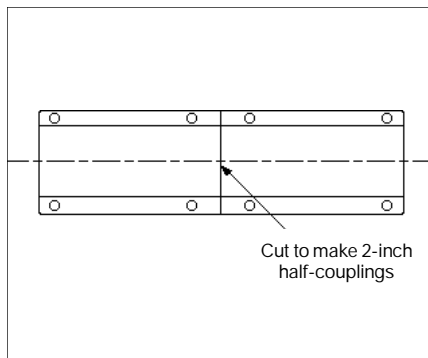
Fig. 7-3. In runs less than the standard 20-foot primary pipe length, include a containment coupling to provide access to the primary during bonding, testing and inspection. In short primary runs where lack of space prevents the use of a full-length containment coupling, use a half-coupling instead.



Cutting containment couplings

The center holes on 2-inch couplings have been located near the middle of the coupling. Cut exactly between these two holes. The resulting half-couplings will be 7 inches long. Two cuts are necessary when making 3 and 4-inch half-couplings. The resulting half-couplings are 5½ inches long.

Fig. 7-4. Cut full-length couplings so that all bolt holes on half-couplings are equidistant from the ends.



7 Dry fitting secondary containment systems (cont.)

Access to primary fittings

Ameron secondary containment piping provides convenient access to primary fittings during bonding, testing and inspection by using lengths of 3½-inch containment pipe and appropriate reducing couplings. In most layouts the primary runs can be contained by three pieces of containment pipe, as shown in Fig. 7-5. The containment pipe at the ends of the run are standard diameters one size larger than the primary line; the middle piece is 3½-inch containment pipe. In a '3 over 2' system, the 3½-inch containment section slips over the 3-inch containment pipe as shown in Fig. 7-7; in a '4 over 3' system, the 3½-inch containment section slips inside. By manipulating the pipe sections, ready access to the primary fittings can be achieved.

Fig. 7-5. Most primary runs can be contained by three pieces of containment pipe.

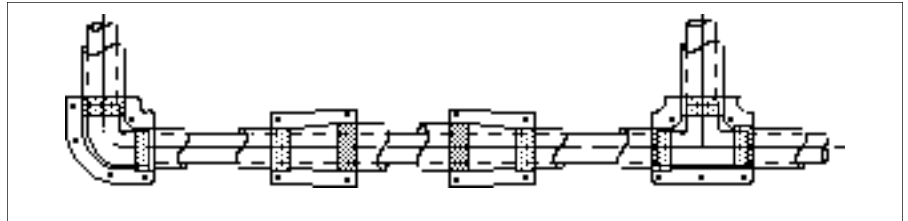
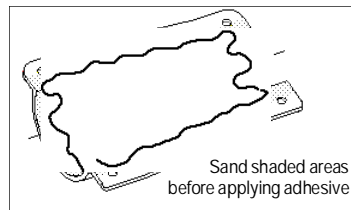


Fig. 7-6. Containment reducers are furnished with a pipe stop to prevent over-insertion of the pipe on the large end.



Runs of containment piping are closed using 3½ x 3-inch reducing closure pieces in '3 over 2' systems and 4 x 3½-inch reducing closure pieces in '4 over 3' systems.

A typical containment installation is seen in Figs. 7-7 and 7-8. Easy access to the primary joint at one end of the run is achieved by placing the end section of the containment inside the center section. Similarly, access to the joint at the other end of the primary line is achieved by placing the other end length of secondary inside the larger center section. The final configuration is shown in Fig. 7-5.

Fig. 7-7. Easy access to the primary joints at the ends of a run may be achieved by sliding the end containment sections inside the center sections as seen here and in Fig. 7-8.

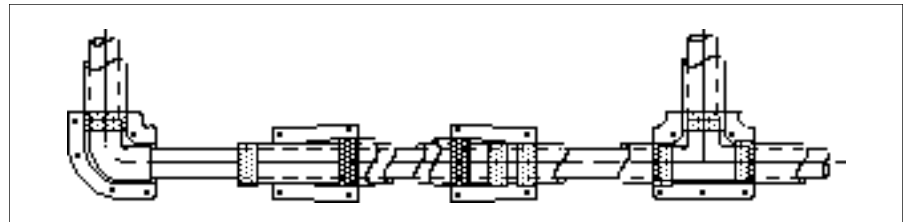


Fig. 7-8. Access to the joint at the other end of the line is achieved by placing the length of secondary inside the larger center section. The final configuration is shown in Fig. 7-5.

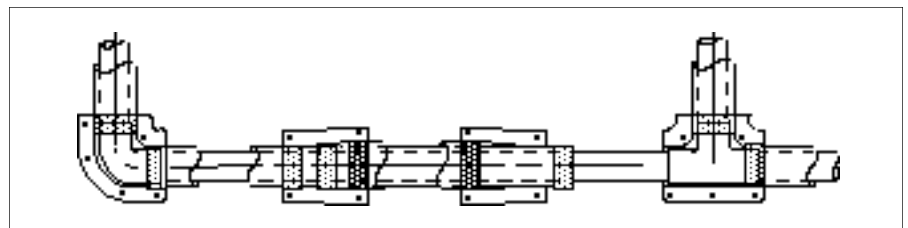
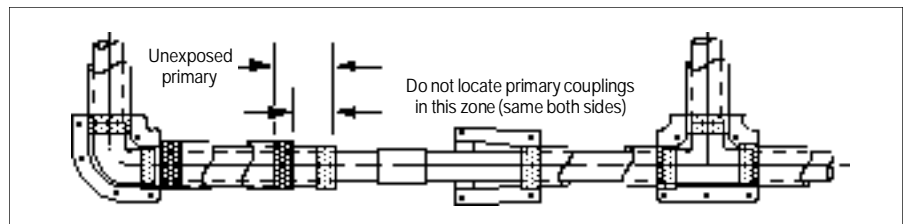


Fig. 7-9. When primary runs exceed 20 feet in length, thus requiring two or more lengths of pipe, the primary coupling is located in the center of the run for easy access.



7 Dry fitting secondary containment systems (cont.)

Containing short runs

For primary runs under four feet in length, a standard 14-inch containment coupling and short pipe nipples can be substituted for 3½-inch containment piping.

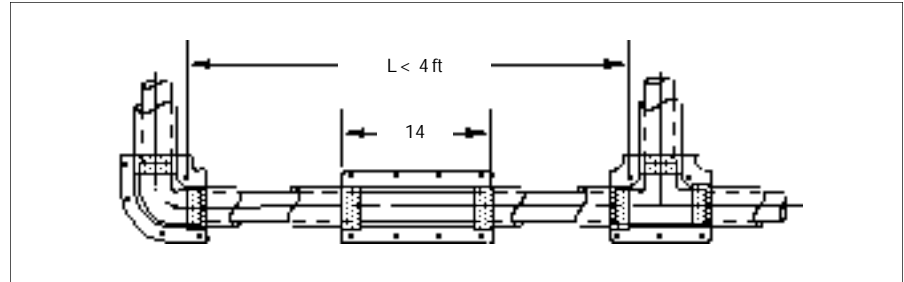


Fig. 7-10. Contain short runs with a standard containment coupling and short containment pipe nipples.

Containing crossovers and very short runs

Make crossovers by using 45° elbows and tees in both primary and containment. In this way a minimum 4-inch vertical clearance can be provided between the lines. Limit

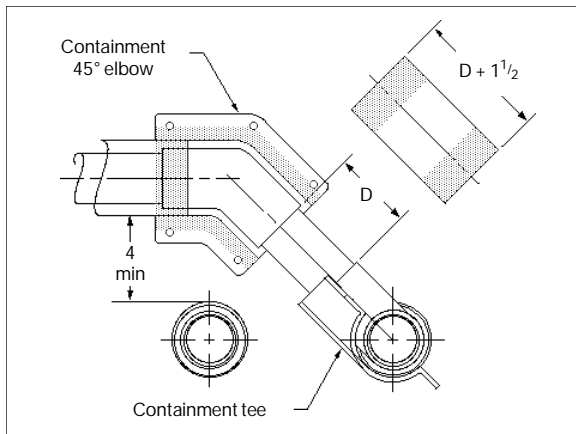


Fig. 7-11. At crossovers and very short runs where even a containment half-coupling cannot be included, cut the containment pipe so that a minimum ¾-inch insertion depth in the containment fittings is maintained.

the length of containment nipples at crossovers and other very short runs to the face-to-face distance between the secondary fittings plus 1½ inches in order to allow sufficient space to move the containment nipple while working on the primary. This length will provide an insertion depth of ¾ inch of pipe in the containment fittings.

Centralizers

Centralizers are not required in Dualoy 3000/L containment systems unless in-pipe detection lines have been specified by the owner. In such cases, contact Ameron for availability.

Take care not to allow stones and backfill to enter the annular space between primary and containment as this may result in leaks.

7 Dry fitting secondary containment systems (cont.)

Recommended lengths for containment sections

Primary Run Length (ft/in)	Containment Pipe Length		Unexposed Primary Length ² (ft/in)	Primary Run Length (ft/in)	Containment Pipe Length		Unexposed Primary Length ² (ft/in)
	Center ¹ (ft/in)	Ends (ft/in)			Center ¹ (ft/in)	Ends (ft/in)	
4' 0"	1' 1"	1' 5"	0' 4"	28' 0"	7' 7"	10' 2"	2' 7"
6"	1' 3"	1' 8"	0' 5"	6"	7' 9"	10' 4"	2' 7"
5' 0"	1' 4"	1' 10"	0' 6"	29' 0"	7' 11"	10' 7"	2' 8"
6"	1' 6"	2' 0"	0' 6"	6"	8' 0"	10' 9"	2' 9"
6' 0"	1' 8"	2' 2"	0' 7"	30' 0"	8' 2"	10' 11"	2' 9"
6"	1' 9"	2' 4"	0' 7"	6"	8' 4"	11' 1"	2' 10"
7' 0"	1' 11"	2' 7"	0' 8"	31' 0"	8' 5"	11' 3"	2' 10"
6"	2' 0"	2' 9"	0' 8"	6"	8' 7"	11' 6"	2' 11"
8' 0"	2' 2"	2' 11"	0' 9"	32' 0"	8' 8"	11' 8"	2' 11"
6"	2' 4"	3' 1"	0' 9"	6"	8' 10"	11' 10"	3' 0"
9' 0"	2' 5"	3' 3"	0' 10"	33' 0"	9' 0"	12' 0"	3' 0"
6"	2' 7"	3' 5"	0' 10"	6"	9' 1"	12' 2"	3' 1"
10' 0"	2' 9"	3' 8"	0' 11"	34' 0"	9' 3"	12' 5"	3' 2"
6"	2' 10"	3' 10"	1' 0"	6"	9' 5"	12' 7"	3' 2"
11' 0"	3' 0"	4' 0"	1' 0"	35' 0"	9' 6"	12' 9"	3' 3"
6"	3' 2"	4' 2"	1' 1"	6"	9' 8"	12' 11"	3' 3"
12' 0"	3' 3"	4' 4"	1' 1"	36' 0"	9' 10"	13' 1"	3' 4"
6"	3' 5"	4' 7"	1' 2"	6"	9' 11"	13' 3"	3' 4"
13' 0"	3' 6"	4' 9"	1' 2"	37' 0"	10' 1"	13' 6"	3' 5"
6"	3' 8"	4' 11"	1' 3"	6"	10' 2"	13' 8"	3' 5"
14' 0"	3' 10"	5' 1"	1' 3"	38' 0"	10' 4"	13' 10"	3' 6"
6"	3' 11"	5' 3"	1' 4"	6"	10' 6"	14' 0"	3' 7"
15' 0"	4' 1"	5' 6"	1' 5"	39' 0"	10' 7"	14' 2"	3' 7"
6"	4' 3"	5' 8"	1' 5"	6"	10' 9"	14' 5"	3' 8"
16' 0"	4' 4"	5' 10"	1' 6"	40' 0"	10' 11"	14' 7"	3' 8"
6"	4' 6"	6' 0"	1' 6"	6"	11' 0"	14' 9"	3' 9"
17' 0"	4' 7"	6' 2"	1' 7"	41' 0"	11' 2"	14' 11"	3' 9"
6"	4' 9"	6' 4"	1' 7"	6"	11' 3"	15' 1"	3' 10"
18' 0"	4' 11"	6' 7"	1' 8"	42' 0"	11' 5"	15' 3"	3' 10"
6"	5' 0"	6' 9"	1' 8"	6"	11' 7"	15' 6"	3' 11"
19' 0"	5' 2"	6' 11"	1' 9"	43' 0"	11' 8"	15' 8"	3' 11"
6"	5' 4"	7' 1"	1' 10"	6"	11' 10"	15' 10"	4' 0"
20' 0"	5' 5"	7' 3"	1' 10"	44' 0"	11' 0"	16' 0"	4' 1"
6"	5' 7"	7' 6"	1' 11"	6"	12' 1"	16' 2"	4' 1"
21' 0"	5' 9"	7' 8"	1' 11"	45' 0"	12' 3"	16' 5"	4' 2"
6"	5' 10"	7' 10"	2' 0"	6"	12' 5"	16' 7"	4' 2"
22' 0"	6' 0"	8' 0"	2' 0"	46' 0"	12' 6"	16' 9"	4' 3"
6"	6' 1"	8' 2"	2' 1"	6"	12' 8"	16' 11"	4' 3"
23' 0"	6' 3"	8' 4"	2' 1"	47' 0"	12' 9"	17' 1"	4' 4"
6"	6' 5"	8' 7"	2' 2"	6"	12' 11"	17' 3"	4' 4"
24' 0"	6' 6"	8' 9"	2' 2"	48' 0"	13' 1"	17' 6"	4' 5"
6"	6' 8"	8' 11"	2' 3"	6"	13' 2"	17' 8"	4' 6"
25' 0"	6' 10"	9' 1"	2' 4"	49' 0"	13' 4"	17' 10"	4' 6"
6"	6' 11"	9' 3"	2' 4"	6"	13' 6"	18' 0"	4' 7"
26' 0"	7' 1"	9' 6"	2' 5"	50' 0"	13' 7"	18' 2"	4' 7"
6"	7' 2"	9' 8"	2' 5"	6"	13' 9"	18' 5"	4' 8"
27' 0"	7' 4"	9' 10"	2' 6"	51' 0"	13' 10"	18' 7"	4' 8"
6"	7' 6"	10' 0"	2' 6"	6"	14' 0"	18' 9"	4' 9"

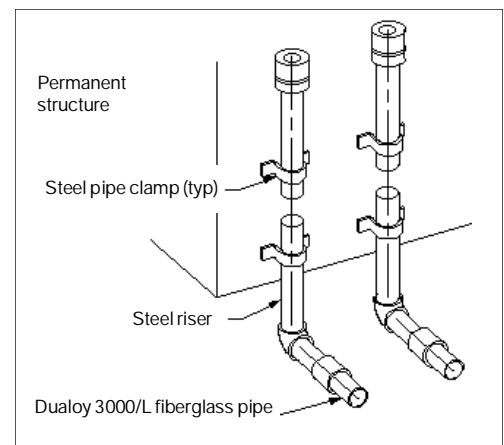
- 1) The maximum length of a center section is calculated by measuring the face-to-face distance between primary fittings at the ends of a run and multiplying the result by a factor of 0.27. End section lengths are then determined by dividing the remaining length equally. This procedure will yield a center section approximately equal to 75% of an end section.
- 2) Tabulated value is rounded-off difference between an end and a center containment section and amounts to 1/2 the unexposed length in a primary run.

7 Dry fitting secondary containment systems (cont.)

Fig. 7-12. Support risers by attaching them directly to structure walls.

Vent piping

Do not use fiberglass pipe to support the weight of heavy items in a line such as valves, strainers and steel riser pipes. When containing vent piping, do not use fiberglass vent or containment piping to support the steel riser pipes: the weight of the steel risers may prevent good bonds in the fiberglass lines and result in leaks. Support the risers by attaching them directly to structure walls.



8 Bonding containment piping

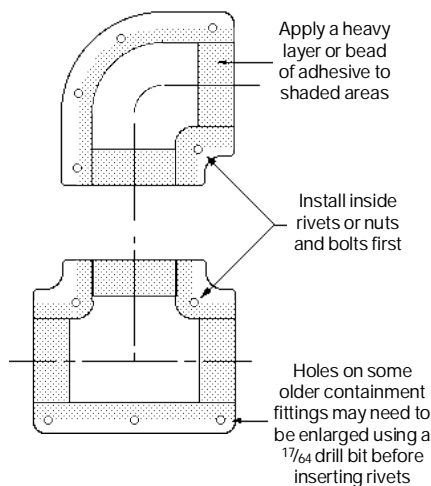


Fig. 8-1. Containment fittings seal effectively only if the shaded areas between the holes in the flanges and the inside are well covered with adhesive. Adhesive applied to the outer half of containment fitting flanges will serve no purpose unless the holes themselves are sealed. For this reason, and to conserve adhesive, it suffices to apply adhesive only to the inner half of the flanges.

Adhesives for containment piping

Two different amine-cured epoxy-resin adhesives are used to install Ameron containment piping. Ameron B20 adhesive is used for 3, 3½, 4 and 6-inch containment pipe and fittings. RP34C is used for 6-inch systems using older fittings.

Bonding and testing contained primary piping

- Bond the primary only after the containment pipe has been placed over it and all adjustments have been made for clearance and interference.
- Follow standard adhesive procedures. Do not disturb the primary lines before the adhesive cures.
- Primary system bonds must be visually inspected or soap tested before installing containment fittings.

Sealing containment piping

- Bond containment only after primary lines have been tested and inspected.
- All bonding surfaces must be free from water, soap, oil, grease, dirt and the like and should be lightly sanded before applying adhesive.
- Take care that each leg of the containment pipe goes into the fitting straight and is not disturbed until the adhesive has cured.

Assembly of 3, 3½, 4 and 6-inch containment

- Apply a **uniform, heavy coating or heavy bead** of adhesive to the **inner half** of containment fittings flanges (Fig. 8-1), to the sanded radius of the fitting where the pipe will fit, and to the outside of the containment pipe. **Apply adhesive to both half-shells.**
- Put the containment fitting around the containment pipe carefully. Make sure the pipe is not cocked or misaligned in the fitting.
- The recommended method of joining 3, 3½ and 4-inch Dualoy containment fittings is by means of rivets. Rivetted closure is cleaner, more effective and much faster than closure with nuts and bolts. The compressed air-driven Ameron Rivetool and appropriately sized rivets are available from Ameron or from your Ameron distributor. **Use wing nuts or conventional bolts to close 6-inch containment fittings.**
- Insert a rivet into each of the holes in the fitting.
- Keep the upper stem of the rivet clean to avoid the accumulation of adhesive in the end of the Rivetool.
- After inserting the rivets, hold the two fitting halves together firmly with three or four C-clamps. It is always best to insert the rivets before applying the clamps as the rivets serve to line up the holes.
- **Attempting to rivet containment fittings without using C-clamps can result in substandard joints.**

The sole purpose of rivets and bolts is to hold containment fitting halves together while the adhesive cures. The performance of joined and cured Ameron fiberglass pipe systems depends in no way on rivets, bolts or any other metallic closure devices. Moreover, the UL/ULC listing for Dualoy3000/L secondary containment piping is the result of tests conducted after the adhesive has cured and all rivets and bolts have been removed.

Follow all instructions and safety precautions provided with the Rivetool.

8 Bonding containment piping

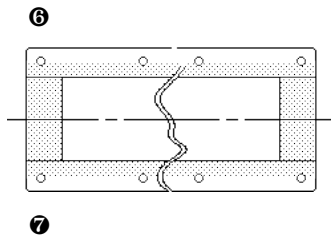


Fig. 8-2. When installing containment couplings with an Ameron Rivetool, always alternate from side to side as indicated above to assure uniform tension on both sides of the fitting.

Do not move or step on the containment piping before the adhesive is cured as this may disturb the joints enough to cause leaks.

B20 and RP34C Pot Life and Cure Times (5-oz)

Ambient Temperature ¹		Pot Life		Minimum Cure Time ^{1,2}	
		B20	RP34C	B20	RP34C
(°F)	(°C)	(minutes)	(minutes)	(hours)	(hours)
40	5	70	—	12	—
65	18	40	30	5	10
75	24	30	25	4	4
95	35	20	12	3	3

- 1) An external heat source must be used to cure B20 adhesive at temperatures below 40°F (5°C) and RP34C adhesive at temperatures below 60°F (16°C). The adhesive and the bonding surfaces should be warmed to 50°F (10°C) before mixing and applying the adhesive. Adhesive may be cured using an Ameron Chem Cure Pak® (US Pat. No. 3,475,239) or an Ameron-approved electric heating blanket.
- 2) The minimum joint cure time must elapse prior to pressure testing.

- Place the end of the Rivetool over the rivet stem and squeeze the trigger. The detached stem will fall of its own accord out of the Rivetool.
- Whether using the Rivetool or nuts and bolts to join containment couplings, always make up rivets or bolts by alternating from one side to the other as shown in Fig. 8-2 to assure uniform tension on both sides of the fitting. Similarly, always make up the inside rivets or bolts on tees and elbows before closing those on the outside; make up the large end of concentric reducers before the small end.
- C-clamps may be removed as soon as the rivets or bolts have been made up; it is not necessary to wait for the adhesive to cure.
- Always use genuine Ameron rivets: they are designed to provide optimal closing tension based on the dimensions of the containment fittings. Use of substitute rivets may yield unpredictable results.
- When using bolts, always tighten them stepwise to provide uniform make-up between the fitting halves.

Assembly of 6-inch containment using older fittings

- Apply a uniform layer of Ameron RP34C adhesive at least 1/8 inch thick to all flat, sanded sealing surfaces, the sanded end of the containment pipe and to the sanded radius of the fitting where the containment pipe will fit.
- **Use wing nuts or conventional bolts to close 6-inch containment fittings.**

9 Containing flexible connectors

Flex connectors connecting the piping system to the shear valves at dispensers may be contained using either hard piping or a containment boot.

- In the hard piping configuration, the connector is contained using standard containment fittings and short nipples. The containment piping terminates at a 1½ inch galvanized nipple threaded into the shear valve as shown in Fig. 9-1.
- Ameron containment boots are designed to continue the containment from the containment piping directly to the shear valve. The flexible boot is joined to the piping and the shear valve with stainless steel clamps provided with the containment boot.

Containing flex connectors with hard piping

- 1) Screw a short 1½-inch galvanized nipple and a galvanized coupling into the shear valve, making sure that the nipple is long enough to accommodate the small end of a 3 x 1½-inch containment reducer coupling.
- 2) Terminate the product line with a 2-inch fiberglass sleeve coupling. Dualoy 3000/L 2-inch couplings are 6¼ inches long. If using the older 8-inch long sleeve coupling, cut 1½ inches off one end. Bond a 2 x 1½-inch threaded fiberglass bushing into the fiberglass coupling. If using the older style coupling, bond the bushing into the cut end.
- 3) Bond the coupling to the fiberglass pipe. Allow the adhesive to cure before screwing the flex connector into the fiberglass bushing. Use non-hardening thread sealant.

9 Containing flexible connectors

Fig. 9-1. Dualoy containment fittings and nipples may be used to contain flex connectors at the dispensers in a 'hard' containment configuration.

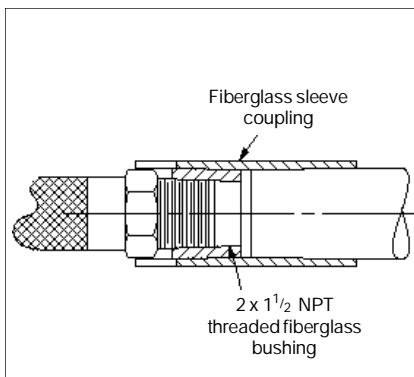
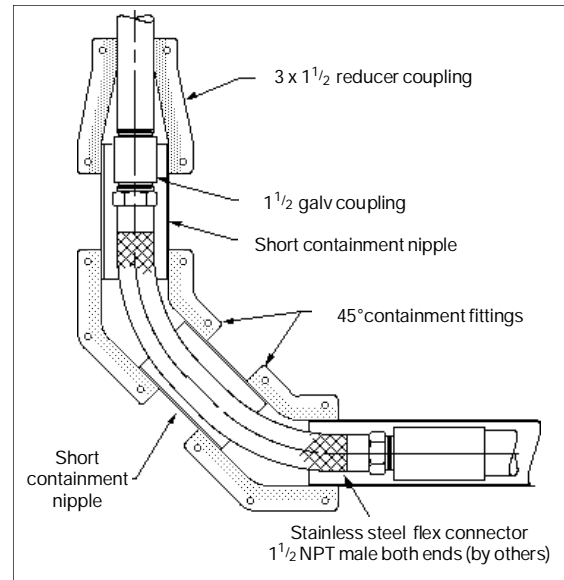


Fig. 9-2. Bond the threaded fiberglass bushing into the sleeve coupling. When the adhesive has cured, screw the flex connector into the bushing. This joining sequence avoids possible deformation of the bushing when joining to the flex connector.

The Dualoy containment boot is designed for use with a shear valve having 1 1/2-inch NPT female threads and (1) 3.11-inch machined outer surface or (2) 2-inch NPT male threads on the outer surface. These instructions assume the use of a flex connector with 1 1/2-inch NPT male ends. Make sure that the flats on the flex connector can fit inside the boot. Provide sufficient clearance between the shear valve and its supporting bracket to install the boot.

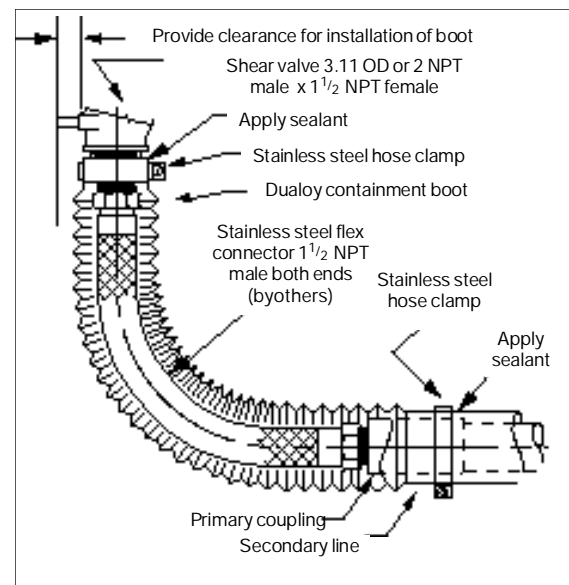
Fig. 9-3. The Dualoy containment boot used to contain flex connectors between 3-inch Dualoy 3000/L containment lines and shear valves in contained piping systems.

- 4) Screw the other end of the connector into the galvanized coupling. Use thread sealant.
- 5) Fabricate containment for the flex connector using 45° containment fittings and short nipples as shown in Fig. 9-1.
- 6) If the flex connector is particularly supple, a single 90° containment elbow may be used in lieu of two 45° elbows.
- 7) Join the reducer coupling to the galvanized nipple using pipe adhesive.



Containing flex connectors with containment boot

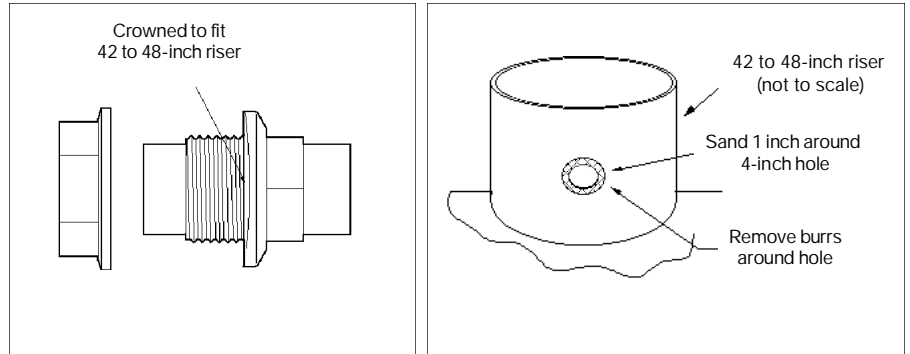
- 1) Cut the small cuff off the boot, leaving both ridges intact.
- 2) Terminate the product line with a sleeve coupling into which a 1 1/2-inch NPT female x 2-inch male tapered fiberglass bushing has been bonded. See step in 2 in the previous section and Fig. 9-2.
- 3) Slide the cut end of the boot over the containment line as shown in Fig. 9-3. Position boot and containment pipe to allow access to the end of the primary. Access may be improved by including one or more 14-inch containment couplings in the line so that the boot and the final containment nipple can be moved as one piece.
- 4) When using a shear valve with threaded outer surface, mount the 2-inch NPT female x 3.11-inch male plastic adapter on the shear valve. Use nonhardening thread sealant. Tighten the adapter with the pronged wrench provided by Ameron. The adapter is not required when using a shear valve with 3.11-inch machined outer surface.
- 5) Join the flex connector to the shear valve. Use thread sealant.
- 6) Test and inspect the product piping before moving the boot into place.
- 7) Apply thread sealant to the containment pipe where the end of the boot will be positioned and to the adapter or machined surface of the shear valve.
- 8) Slide the boot over the flex connector and push into place. When mounting over the adapter, an audible snap will indicate when the boot is seated.
- 9) Install stainless steel clamps.
- 10) Suggested test pressure for the boot is 5 to 15 psig. Maintain pressure in the primary at least equal to the boot test pressure to avoid collapse of the flex connector.



10 Sump penetrations

The Dualoy sump penetration fitting (Fig. 10-1) provides a simple means of penetrating 42 to 48-inch diameter fiberglass tank risers or sumps in contained piping systems. The fitting is typically mounted through a sump wall. Ported reducing closures (Fig. 10-3) may be used inside the sump to isolate the annular space between the primary and the containment pipe and to provide a monitoring port. Alternatively, the sump fitting is available with a factory-installed monitoring port (Fig. 10-6). The standard sump fitting can be used in square sumps by reversing its direction.

Figs. 10-1,2. The Dualoy sump fitting (left) provides a simple means of penetrating 42 to 48-inch diameter fiberglass tank risers (right) or sumps in contained piping systems.



Before installing the primary

- Use a hole saw to cut a 4-inch hole in the sump wall as low as possible to provide maximum slope into the sump.
- Remove any burrs from the edge of the hole.
- Check hole size by dry fitting the fitting from the inside. Make sure the thickest part of the saddle-shaped flange faces upward.
- Using a disc grinder, abrade about 1 inch around the hole to provide a rough bonding surface .
- Mix Ameron B20 adhesive following the instructions included in the kit. Apply an even layer of adhesive to
 - The edge of the hole and around the hole,
 - The bonding surface of the fitting flange, and
 - The threads to lock the nut permanently in place.
- Install the fitting in the proper orientation.
- Make up the nut from the outside and check around the edge of the flange on the inside to verify the presence of an adhesive bead. If a bead is not visible all the way around the fitting, remove and apply more adhesive. Tighten with a wrench.
- Do not move the fitting until the adhesive has cured. Follow the cure time recommendations on the adhesive instruction sheet.

After installing the primary

Most specifications will call for isolating the annular containment space from the sump. This may be accomplished using 3 x 2 inch containment closure pieces as shown in Fig. 10-3 or by using a sump fitting that has been provided at the factory with a bushing

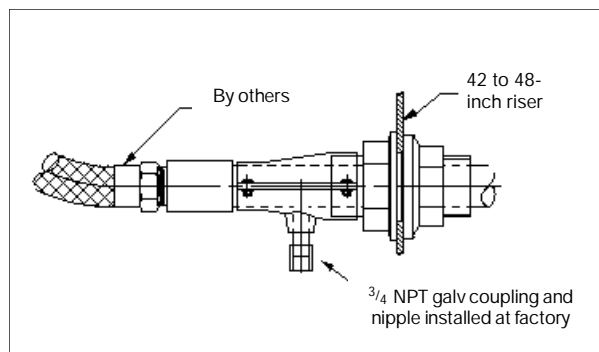


Fig. 10-3. A ported reducing closure isolates the annular space between the primary and the containment pipe and provides a monitoring port inside the sump.

in the annulus between the sump fitting itself and a primary pipe sleeve coupling as shown in Fig. 10-5.

When using 3 x 2-inch reducing closures to isolate the annular space between the primary and the secondary, provide

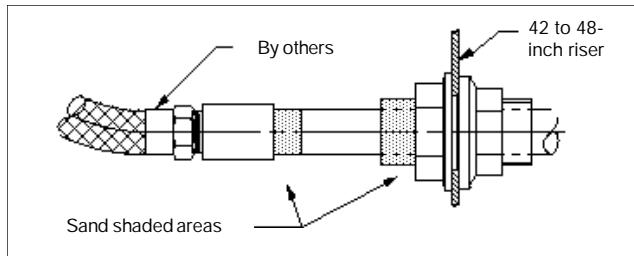
10 Sump penetrations (cont.)

sufficient length of primary pipe to accommodate both the closure pieces and the fiberglass bell x female threaded adapter which terminates the primary.

To install 3 x 2 reducing closures, sand the sump fitting, the exterior of the primary pipe for about 1½ inches where the small end of the closure pieces will fit (Fig. 10-4), and the bonding surfaces of the closure pieces (Fig. 7-6). Apply liberal amounts of adhesive to the sanded areas and bolt the closure halves together.

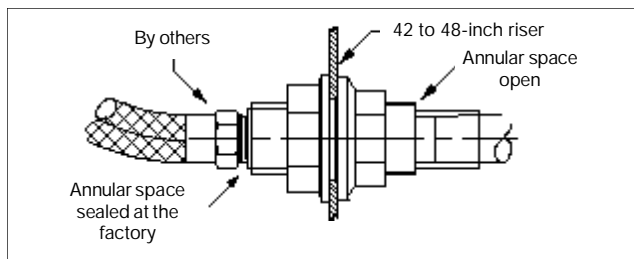
The containment system annular space can also be sealed off and isolated from the sump by means of special sump penetration fittings that permit direct connection of

Fig. 10-4. Sand the bonding surfaces of the sump penetration fitting, the primary pipe, and the reducing closure pieces before applying B20 adhesive.



1½ or 2-inch flex connectors to the penetration fittings themselves on the inside of the sump. This configuration provides more space in the sump. These fittings also incorporate tapered female bell ends on the other end, thus permitting direct bonding of 2-inch primary pipe to the penetration fittings on the outside of the sump.

Fig. 10-5. Sump penetration fittings are available from the factory with 1½ - and 2-inch NPT female threads on the inside and 2-inch female tapered bell ends on the outside that permit direct connection of flex connectors and product lines.



On the outside of the sump, join the containment pipe to the penetration fitting with the following:

- 1) Full-length 3-inch containment couplings; or
- 2) Half-length 3-inch containment couplings as shown in Fig. 10-7; or
- 3) 3½ x 3-inch reducing couplings, when 3½-inch containment pipe is used directly adjacent to the sump.

Fig. 10-6. The sump penetration fittings shown in Fig. 10-5 are also available with factory-installed monitoring ports that can be used in place of the ported reducing closure shown in Fig. 10-3.

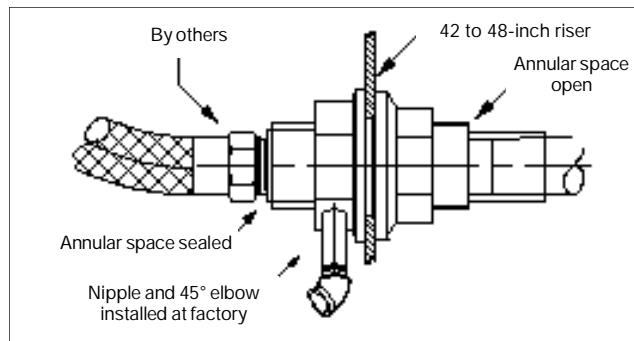
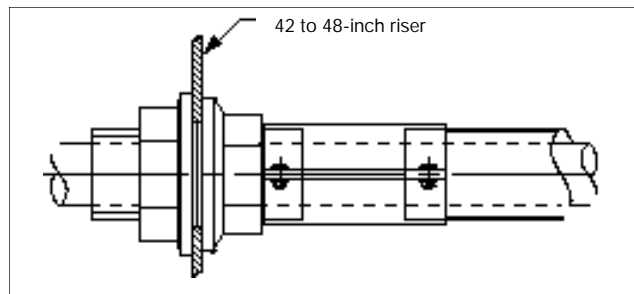


Fig. 10-7. Join containment piping to sump penetration fittings by means of containment couplings or 3½ x 3-inch containment reducing couplings if 3½-inch containment pipe is used directly adjacent to the sump.



11 Containment system testing

Pneumatic testing

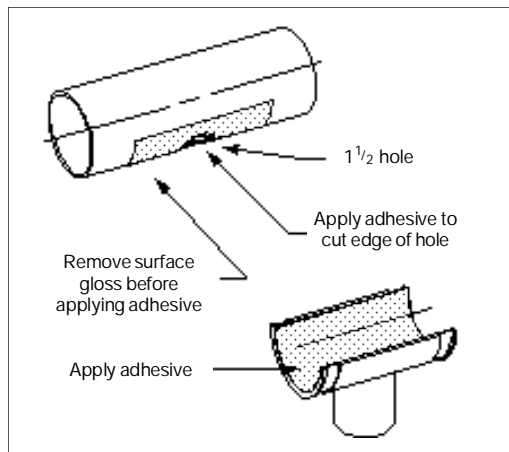
Plan tests carefully and carry them out with all due precaution.

Pressurizing equipment should be suited to the size of the system and the pressure required and should be operated by qualified and experienced personnel only. Pressure sources should be capable of approaching test pressure gradually.

Use gauges with a full-scale reading of no more than twice the test pressure: Do not use a 100 psi gauge for a 10 psi test. Use reliable gauges calibrated against a dead weight tester and zeroed for atmospheric pressure.

Pneumatic testing at approximately 10 psi is recommended and is the preferred method of testing containment piping. Higher pressures are dangerous as a sudden release could cause the piping to whip out of the trench. A 10-psi test will attest to the integrity of the system. If higher test pressures are mandated, please consult Ameron Fiberglass Pipe Systems.

Fig. 11-1. Access to the annular space between primary and containment is obtained by means of saddles with 2-inch outlets.



The recommendations offered herein are intended only as a guide. Ameron assumes no responsibility or liability for the consequences of any testing practices.

Provisions for testing and monitoring

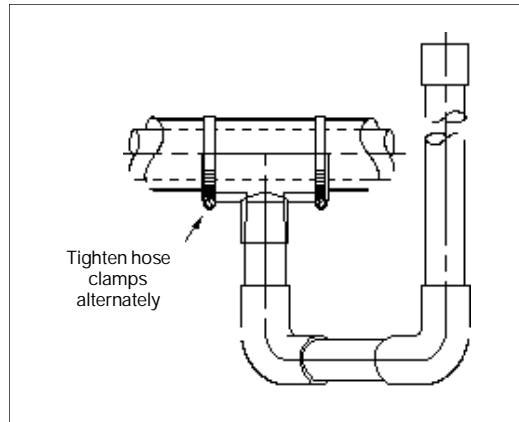
Pressure test equipment or leak detection devices located outside the sump may be connected to the containment pipe by means of U-traps with threaded adapters at the end. Two alternative configurations are shown in Figs. 11-3 and 11-4. U-traps are typically located adjacent to manholes, at branches or at low points in the system.

Observe the following saddle installation procedures when fabricating U-traps.

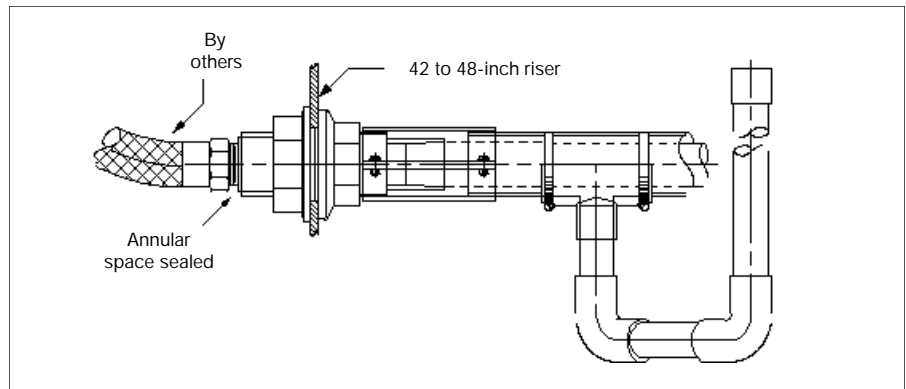
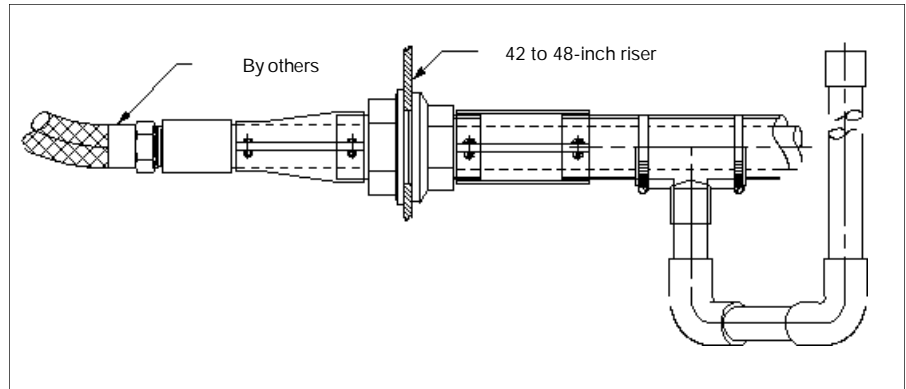
- 1) Cut a 1 1/2-inch hole in the containment pipe using a circular hole saw with a pilot drill. Do not force the hole saw as this may fray the edges of the hole.
- 2) Remove surface gloss from the pipe wall where the saddle is to be bonded; clean burrs from the edge of the hole.
- 3) Insure that the bonding surfaces are clean and dry before applying adhesive.
- 4) Mix Ameron B20 adhesive according to directions. Observe pot life restrictions.
- 5) Apply adhesive to the pipe wall, to the edges of the hole and the interior of the saddle as illustrated in Fig. 11-1.
- 6) Align the saddle over the hole and hold in place with two hose clamps.
- 7) Tighten the clamps alternately until secure and an adhesive bead surrounds the saddle.
- 8) Below 40°F (5°C), cure the adhesive with a Chem Cure Pak or heating blanket.
- 9) Do not pressurize the containment line until the adhesive has fully cured.

11 Containment system testing (cont.)

Fig. 11-2. U-traps for monitoring the annular space between primary and secondary lines are fabricated using saddles with 2-inch outlets and Dualoy 3000/L primary pipe and fittings.



Figs. 11-3, 4. Alternative configurations for installing U-traps. Above: The annular space is isolated from the sump by means of plain reducers. Below: Additional space inside the sump is obtained by using a factory-modified sump penetration fitting as shown in Fig. 10-5.



12 Repair procedures

Repairing non-contained primary piping

Refer to Ameron Bulletin 7501 for detailed instructions concerning the repair of primary piping in non-contained systems

Repairing contained primary piping

The 2-inch Dualoy repair coupling is sized so that it can be contained with 4-inch Dualoy 3000/L pipe. Thus, when repairing primary pipe contained within 3-inch standard containment pipe or 3½-inch containment pipe, replace the containment pipe with a 4-inch containment nipple. Join the 4-inch replacement nipple to the existing containment pipe with the appropriate reducing couplings.

When using wing-nuts to close the primary repair coupling, align the wings exactly parallel with the line to maintain the clearance necessary to permit the 4-inch containment pipe to slip over the 2-inch repair coupling. Make this alignment before the adhesive cures.

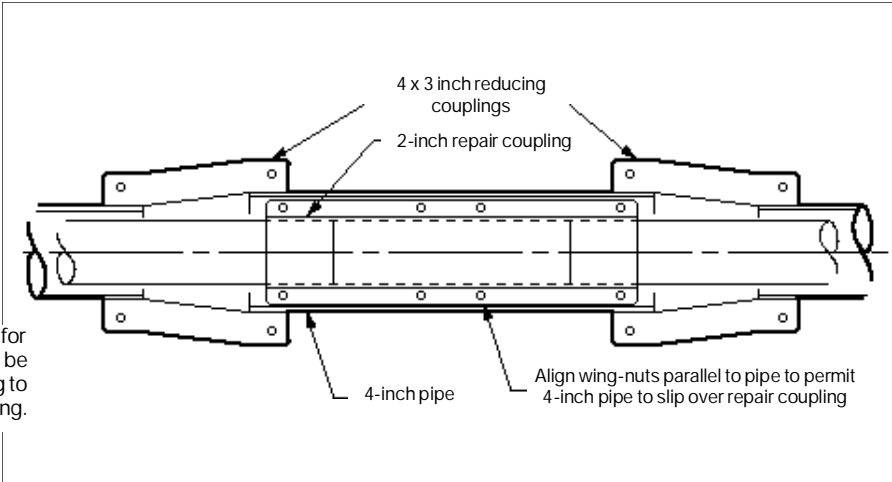


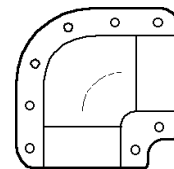
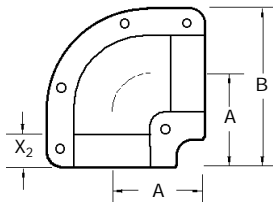
Fig. 12-1. Refer to Bulletin 7501 for detailed procedures which must be followed for repaired primary piping to maintain its UL listing.

When repairing lines that have been in service and that may contain flammable fumes, do not use electric drills or other tools which may constitute a spark hazard near the pipe. Use only air-driven or manual tools for cutting and sanding.

13 Containment fittings dimensions

90° elbows

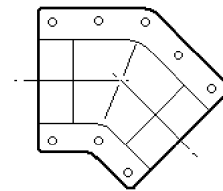
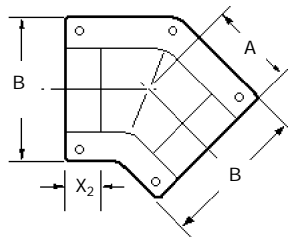
Nominal Pipe Size	A	B	C	X ₂	No. of Bolt Holes	Wt. (lb)	
							(in)
3	80	4.28	7.28	-	1.50	5	1.1
4	100	4.77	8.25	-	1.50	5	1.3
6	150	5.62	10.53	-	2.00	8	1.5



6-inch elbow

45° elbows

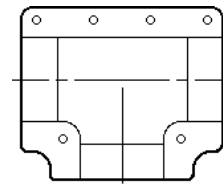
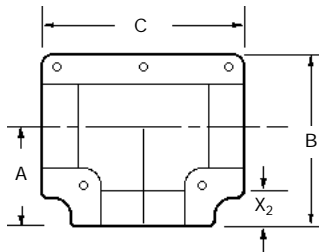
3	80	3.50	6.00	-	1.50	5	0.8
4	100	3.75	7.00	-	1.50	5	1.2
6	150	6.32	9.75	-	2.00	8	1.5



6-inch elbow

Tees

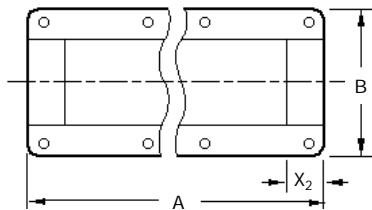
3	80	4.28	7.24	8.56	1.50	5	1.2
4	100	4.78	8.25	9.58	1.50	5	1.6
6	150	5.72	10.67	11.65	2.00	6	1.7



6-inch tee

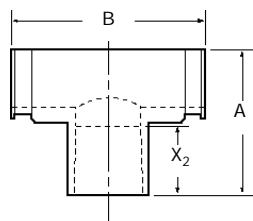
Couplings

2	50	14.00	4.00	-	1.50	8	1.3
3	80	14.00	6.00	-	1.50	8	1.7
4	100	14.00	7.00	-	1.50	8	2.0
6	150	14.19	9.75	-	4.00	10	2.0



Saddles

3 x 2	80 x 50	4.00	6.00	-	2.15	-	1.3
4 x 2	100 x 50	4.50	6.00	-	2.15	-	1.7
6 x 2	150 x 50	5.56	7.75	-	2.15	-	2.1

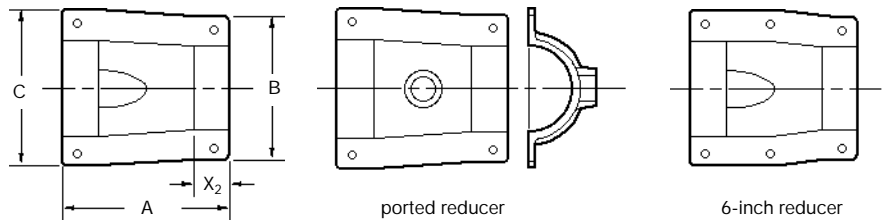


13 Containment fittings dimensions

Reducers, plain and with 3/4-inch NPT outlet

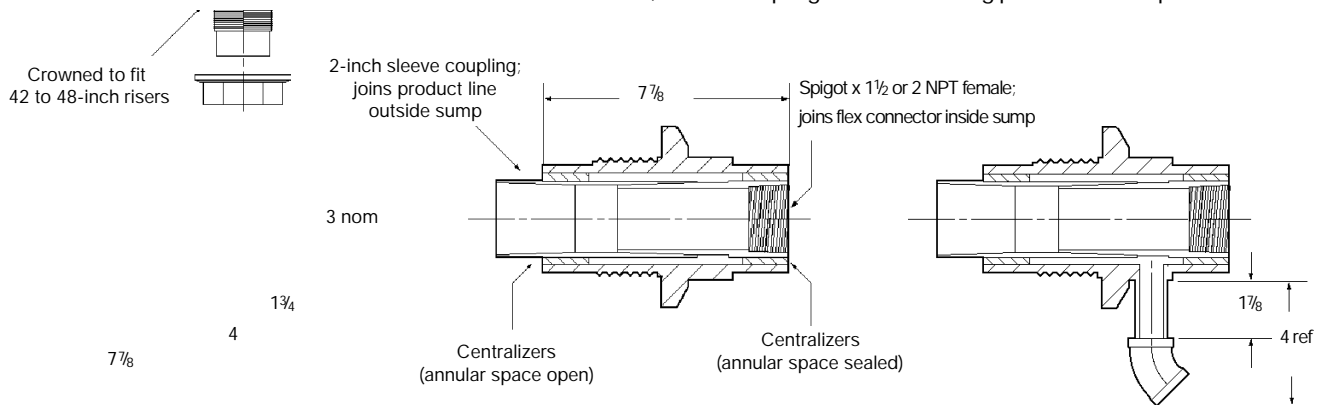
Nominal Pipe Size		A	B	C	X ₂	No. of Bolt Holes	Wt.
(in)	(mm)	(in)	(in)	(in)	(in)		(lb)
3 x 1 1/2	80 x 40	6.25	4.48	6.10	1.50	4	0.6
3 x 1 1/2	80 x 40	6.25	4.47	6.10	1.50	4	1.1 ¹
3 x 2	80 x 50	6.25	4.90	6.10	1.00	4	0.7
3 x 2	80 x 50	6.25	4.90	6.10	1.00	4	1.1 ¹
3 1/2 x 3	90 x 80	6.25	6.00	6.37	1.50	4	0.8
4 x 3	100 x 80	7.00	6.00	7.00	1.50	4	0.9
4 x 3	100 x 80	7.00	6.00	7.00	1.50	4	2.0 ¹
4 x 3 1/2	100 x 90	6.25	6.36	6.98	1.50	4	1.0
6 x 4	150 x 100	7.17	7.62	9.74	2.00	6	1.0

1) Ported reducer.



Sump penetration fittings

Plain sump penetration fittings are stock items. Sump penetration fittings with factory-installed centralizers, sleeve couplings and monitoring ports must be special ordered.



14 Health and safety information

FOR CHEMICAL EMERGENCY
SPILL, LEAK, FIRE,
EXPOSURE OR ACCIDENT
CALL CHEMTREC
DAY OR NIGHT
1-800-424-9300
Toll-free in the
continental U.S.
483-7616 in
District of Columbia
For calls originating outside the
continental U.S.
202-483-7616
Washington D.C. collect
ALL CALLS ARE RECORDED

Toxicity of adhesives

Hardeners: Irritating to the skin, eyes and respiratory tract: orally toxic; may cause sensitization.

Resins: May be mildly irritating to skin and eyes; may cause sensitization.

Handling precautions for adhesives

Hardeners: Do not get in eyes, on skin or clothing. Avoid breathing vapor. Wash thoroughly after handling. When handling in the field, wear gloves and eye protection. When handling in bulk quantities, wear rubber gloves, rubber apron and NIOSH-approved respirator.

Resins: Avoid contact with eyes, skin or clothing. When handling in the field, wear gloves and eye protection. Wash thoroughly after handling.

First aid for adhesive users

In case of contact

Eyes: Immediately flush with plenty of water for at least 15 minutes. Call a physician.

Skin: Wash with water, and soap if available.

Clothing: Remove contaminated clothing and wash before reuse.

Inhalation: Remove to fresh air. Give oxygen or artificial respiration if necessary.

Ingestion: If hardener is swallowed and patient is conscious, give plenty of water or milk to drink. Do not induce vomiting. Call a physician. If resin is swallowed, give 100 grams (about 1/4 lb) activated charcoal slurry in water. Do not induce vomiting. Call a physician.

Important notice

This literature and the information and recommendations it contains are based on data reasonably believed to be reliable. However, such factors as variations in environment, application or installation, changes in operating procedures, or extrapolation of data may cause different results. Ameron makes no representation or warranty, express or implied, including warranties of merchantability or fitness for purpose, as to the accuracy, adequacy or completeness of the recommendations or information contained herein. Ameron assumes no liability whatsoever in connection with this literature or the information or recommendations it contains.

A March, 1992, decision of the United States District Court for the Western District of Wisconsin held that Smith Fiberglass Products, Inc. holds a valid patent that is infringed when adjacent sections of containment pipe can be telescoped together to enable 100% inspection of the primary pipe. Ameron's Inspection Containment system was found by a jury to infringe on this patent. You may continue to use Dualoy 3000/L containment piping provided the center sections in a typical run of containment piping are no longer than 75% of the length of the shortest end section. Although preventing 100% inspectability, this restriction will still allow for convenient access to and inspection of the primary system joints. Every length of Dualoy 3000/L primary and secondary containment pipe is individually inspected at the factory before a UL sticker can be affixed to it. If you have followed the recommendations for on-site inspection and storage outlined in section 3 of this document, you may have every assurance that parts of the pipe barrel which you cannot view directly are sound and will provide decades of uninterrupted service.



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Manufacturing plants: Burkburnett, Texas; Spartanburg, South Carolina; Geldermalsen, The Netherlands and Singapore. Bondstrand pipe is also manufactured in Japan and Saudi Arabia.