

DUROMAXX[®] RAINWATER HARVESTING INSTALLATION GUIDE





Preface

This installation guide is for your crews. Distribute it to help them unload, handle and install steel reinforced polyethylene (SRPE) tank safely. SRPE tanks can be installed per the requirements of ASTM D2321, "Standard Recommended Practice for Underground Installation of Flexible Thermoplastic Sewer Pipe."

Don't assume that experienced workers know all the answers. Review these instructions with your supervisors and crews. It can mean a safer and better job for you and your customer.

SRPE tanks are made from DuroMaxx® pipe and as such many pipe installation procedures are referenced in this manual.

If you have any questions about these instructions, call your Contech Dealer or your Contech Sales Engineer, or carefully review the installation guide and ASTM D2321.

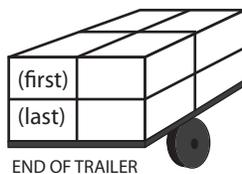
Contents	Page
Safety instructions for unloading & handling	3
Handling weights.....	4
Flotation prevention	5
Assembly and installation references.....	6
Standard backfill details	8
Heavy construction loads.....	10
Cutting instructions.....	11

 This safety alert symbol indicates important safety messages. When you see this symbol, it will alert you to hazards or unsafe practices that CAN result in severe personal injury (including death) or property damage. Be sure you understand the message that follows.

Safety Instructions

 Failure to follow these instructions can result in serious injury or death and/or damage to pipe.

1. Only trained and authorized equipment operators are to be permitted to unload the trailer.
2. Wear approved safety hat, shoes, gloves and eye protection.
3. Park the truck and trailer on level ground before you start unloading.
4. Keep all unauthorized persons clear of the area when the driver releases the binders from the trailer and during unloading.
5. Do not release strapping around the wood frame until the pallets or bundles have been placed on level ground and will not be moved again as a unit.
6. On nested loads, cut the internal strapping prior to unloading.
7. Know the capabilities and rated load capacities of your lifting equipment. Never exceed them.
8. Do not stand or ride on the load of pipe while it is being unloaded.
9. If unloading at multiple points, secure pallets between drop off points. Always unload the top pallets first. (See illustration at right)
10. Never attach chains or cable to the pipe. They could damage the pipe.
11. Do not push pallets off the trailer or permit pipe to drop to the ground.
12. Do not stack DuroMaxx pipe over two pallets high. Stacks of three or more pallets can damage bottom pipes and can become unstable.
13. Only use authorized unloading poles to lift pipe. Unauthorized unloading pole can lead to unsafe practices and damaged pipe.



WARNING

14. Falling or rolling pipe can cause severe personal injury or death. Notwithstanding the instructions contained in this booklet, it is the responsibility of the consignee or consignee's agent to devise safe unloading and handling procedures.



WARNING

14. Do not lift from the steel strapping.
15. Do not stand beneath or near the pipe while it is being unloaded.
16. Always follow all project, local, state and OSHA rules and safety requirements including but not limited to confined space, trenching, shoring and excavation procedures.

Handling Weights

These are estimated average weights and are not for specification use.

TABLE 1. DIMENSIONS & HANDLING WEIGHTS							
Nom. Volume (gal)	Nom. Diameter (in)	Length (ft)	Pick Weight (lb)	Total Volume (gal)	Total Volume (cf)	Actual Volume (gal)	Actual Volume (cf)
2000	60	16	1250	2280	305	2122	284
3000		24	1750	3420	457	3183	425
4500		32	2000	4560	610	4243	567
6500		48	2750	6840	914	6365	851
3000	72	16	1750	3281	439	3107	415
4500		24	2250	4922	658	4660	623
6500		32	2750	6563	877	6214	831
9500		48	4000	9844	1316	9320	1246
4000	84	16	2250	4465	597	4005	535
6500		24	2750	6697	895	6007	809
8500		32	3250	8929	1194	8010	1071
13000		48	4500	13394	1791	12016	1606
5500	96	16	2500	5830	779	5335	713
8500		24	3250	8744	1169	8003	1070
11500		32	4000	11659	1559	10680	1426
17000		48	5250	17489	2338	16006	2140
14000	108	30	4250	14277	1909	13280	1775
19000		40	5250	19036	2545	17707	2367
16500	120	29	4750	16503	2206	15492	2071
20000		36	5500	20486	2739	19231	2571
22500		40	6000	22762	3043	21368	2856

Unloading and Handling

Read and follow all safety instructions before unloading pipe.

1. Before unloading, observe the pipe for damage while it is still on the truck. Note any pipe damage on the bill-of-lading and have the truck driver initial the notes. Also, report any shipping damage to your local Contech representative.
2. **Do not** overtighten strapping as it may cause dimpling. If dimpling occurs, unstrap pipe to allow for rebound to occur at the dimpling of the pipe.
3. Use a forklift with full-length forks or fork extensions (typically 8 feet), front-end loader or backhoe with fork adapters at full length to engage entire pallet width. Make sure back of forklift is free of protrusions or spikes that could damage the pipe.
4. Use Nylon lifting slings of sufficient strength, length and specifically intended to safely handle entire pallet or individual pipe, whichever is being lifted.
5. Use two (2) sling points for lifting sizes greater than 30" diameter. Sling spacing equal to 1/3rd of the pipe length is generally sufficient.
6. For tank lengths longer than 32 ft, the use of a spreader bar is recommended. The spreader bar should be 1/3rd the length of the tank and appropriately sized for the weight being lifted.
7. **Do not** use steel cables, chains and/or hooks to unload or handle pipe.
8. **Do not** stand or ride on the pipe load during unloading or handling.
9. **Do not** scoop the pipe or strike with forks.
10. **Do not** drag or drop the pipe.



Trench Dimensions

Trenching practices shall be in accordance with OSHA.

1. The trench needs to be wide enough for a person to work safely.
2. Where trench walls are unstable, the contractor may elect to use tight sheeting, bracing, or a trench box for stabilization during pipe laying. If the conditions are severe, sheeting may be left in place.
3. Refer to ASTM D2321, Paragraph 6.4.2, for proper placement and movement of trench boxes. Improper use of trench boxes can affect pipe performance.



Groundwater

1. Excessive groundwater may necessitate dewatering. Dewatering techniques must meet all OSHA and local requirements and codes.
2. In areas of saturated trench conditions or in dewatered trenches, refer to "Foundation and Bedding," and ASTM D2321 for proper selection of bedding and backfill materials.
3. Flotation of the pipe and erosion or wash-out of previously placed soil support must be prevented to ensure that the structure maintains its load carrying capacity.
4. Contact the Engineer of Record, hereinafter referred to as "engineer," for proper cover to prevent flotation.

TABLE 2. MINIMUM COVER NEEDED TO PREVENT FLOTATION	
Pipe Dia. (in)	Cover Required
30	1'-4"
36	1'-7"
42	1'-10"
48	2'-2"
54	2'-5"
60	2'-8"
72	3'-2"
84	3'-9"
96	4'-3"
108	5'
120	5'-5"

Foundation and Bedding

1. An unstable trench bottom must be stabilized at the engineer's direction. In such cases, install special foundation and bedding materials in 6 inch layers and compact.
2. Excavation below the final loosely placed bedding material shall be compacted using standard bedding practices or compacted at a minimum of 90% Standard Proctor Density.



3. The final bedding material provides uniform support to hold the pipe on line and grade. A relatively loose 4" to 6" thick bedding layer is usually adequate. Before installing the pipe, bring bedding material to grade along the entire length of the pipe. Bedding materials can be Class I, II or III per ASTM D2321.
4. When excavating in Class IV materials (silts, silty clays and clays), provide a uniform, undisturbed foundation.
5. Class IA materials if used for bedding, must be used as haunching material to the spring line in a dry trench. To minimize the potential for migration, Class IA materials should be used to the top of the pipe in wet trenches or in trenches that will fall below the water table.

Haunching

1. Proper haunching provides a major portion of the pipe's load-carrying capability. Poor workmanship will lead to excessive pipe deflection and grade and alignment problems. Haunching materials can be Class I, II, or III per ASTM D2321.
2. Work enough material under the haunch of the pipe by hand to provide proper compaction and side support. Material shall meet the minimum compaction requirements of ASTM D2321.
3. When trench walls are unstable, sloughing must be prevented so that haunching material can be placed and compacted adequately. The proper use of a trench box or over-excavation can assist in these cases.
4. Don't let the pipe move when placing material under the haunch of the pipe.
5. Take care not to damage the pipe with shovels, or other construction/tamping equipment.
6. Haunch material extends from the bedding/foundation material to the springline elevation.

Backfill and Compaction

1. Initial backfill materials extend from the springline to above the pipe (see page 9 -Standard Backfill Detail) to provide the remainder of the pipe support and protect the pipe from stones or cobbles in the final backfill. Backfill materials that generally follow the requirements of ASTM D2321, such as Class I, II, or III (or approved equal) may be used.
2. Native materials meeting the acceptable materials on page 7 can be used as backfill, but should be approved by the Engineer.
3. Materials must be free from large stones, frozen lumps or other debris.
4. Typical trench/backfill details can be found on pages 8 and 9; and acceptable backfill materials and compaction requirements on page 7 in this document.
5. Select fill should be placed and compacted to the minimum thickness referenced in the applicable installation detail before transitioning to native or non-select fill material over the pipe or to pavement.
6. Fill above the select fill should be fully compacted.
7. As backfill is placed around the pipe, care should be taken to avoid damage to the pipe.
8. Backfill height differential from one side of pipe to the other shall not exceed 12". Only "hand compaction" equipment is allowed over and around the pipe until minimum construction heights are achieved.

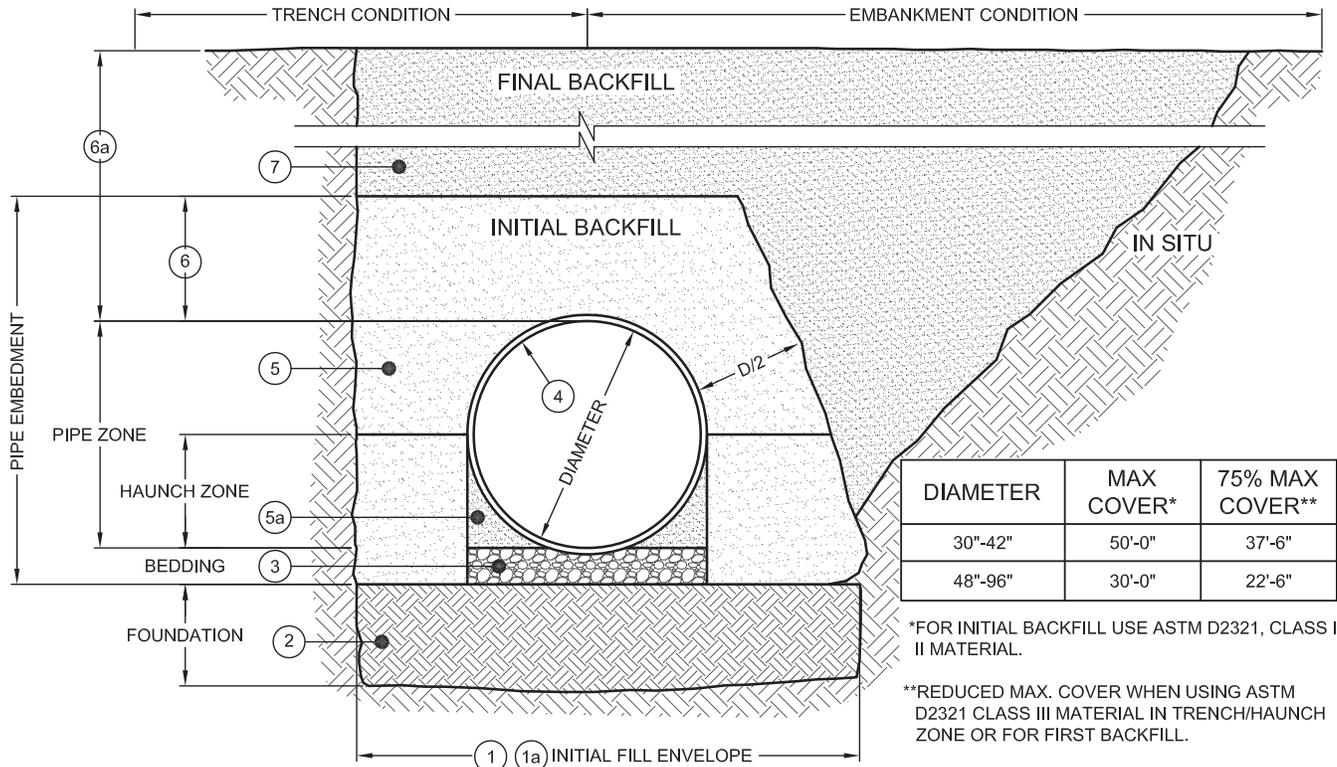


TABLE 3. ACCEPTABLE BACKFILL MATERIALS AND COMPACTION REQUIREMENTS

DESCRIPTION	SOIL CLASSIFICATIONS				MINIMUM STANDARD PROCTOR DENSITY %
	ASTM D2321	ASTM D2487	AASHTO M43	AASHTO M145	
Graded or crushed, crushed stone, gravel	Class I	-	5 56	A-1-a	85%
Well-graded sand, gravels and gravel/sand mixtures; poorly graded sand, gravels and gravel/sand mixtures; little or no fines	Class II	GW GP SW SP	57 6	A-1-b A-3	85%
Silty or clayey gravels, gravel/sand/silt or gravel and clay mixtures; silty or clayey sands, sand/clay or sand/silt mixtures	Class III	GM GC SM SC	Gravel and sand (<10% fines)	A-2-4 A-2-5	90%

Use of cementitious or flowable backfills is compatible with DuroMaxx. Proper precautions should be taken to preclude flotation of the pipe. Contact your Contech representative for further guidance.

Backfill Detail for 36" to 96" diameter



*FOR INITIAL BACKFILL USE ASTM D2321, CLASS I, II MATERIAL.
 **REDUCED MAX. COVER WHEN USING ASTM D2321 CLASS III MATERIAL IN TRENCH/HAUNCH ZONE OR FOR FIRST BACKFILL.

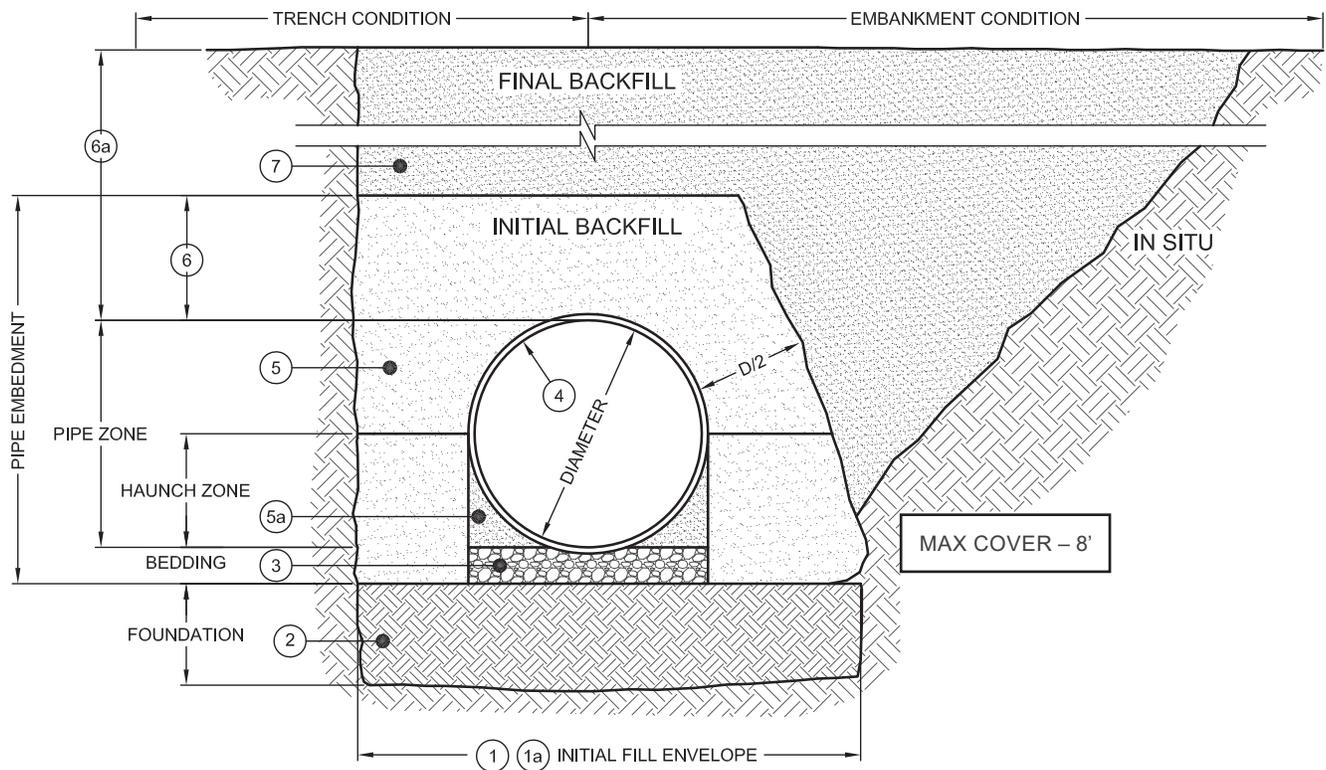
- ① MINIMUM TRENCH WIDTH MUST ALLOW ROOM FOR PROPER COMPACTION OF HAUNCH MATERIALS UNDER PIPE. MIN. WIDTH = (1.25 x DIAMETER) + 12" (FOLLOW ASTM D2321)
- ①a MINIMUM EMBANKMENT WIDTH IS 3 PIPE DIAMETERS BUT NO LESS THAN 2' OUTSIDE OF SPRINGLINE.
- ② FOUNDATION SHALL BE WELL CONSOLIDATED & STABLE.
- ③ BEDDING MATERIAL SHALL BE A RELATIVELY LOOSE MATERIAL THAT IS ROUGHLY SHAPED TO FIT THE BOTTOM OF THE PIPE, 4" TO 6" IN DEPTH.
- ④ DUROMAXX STEEL REINFORCED (SRPE) PIPE.
- ⑤ INITIAL BACKFILL FOR PIPE EMBEDMENT MATERIAL TO MEET ASTM D2321 CLASS I, II, III OR APPROVED EQUAL, COMPACTED TO 90% STANDARD PROCTOR (NATIVE MATERIAL CAN BE UTILIZED THAT MEETS ASTM D2321 OR APPROVED EQUAL).
 - ALL LIFTS PLACED IN CONTROLLED MANNER. TO PREVENT UNEVEN LOADING, IT IS RECOMMENDED THAT LIFTS NOT EXCEED 8" UNCOMPACTED LIFT HEIGHTS.
- ⑤a HAUNCH ZONE MATERIAL SHALL BE HAND SHOVELED OR SHOVEL SLICED INTO PLACE TO ALLOW FOR PROPER COMPACTION.
- ⑥ INITIAL BACKFILL ABOVE PIPE MAY INCLUDE ROAD BASE MATERIAL AND RIGID PAVEMENT (IF APPLICABLE), MINIMUM COVER STILL APPLIES, OTHERWISE:
12" MINIMUM FOR PIPE DIAMETERS 66" - 96"
- ⑥a HEIGHT OF COMPACTED COVER PER DIAMETER FOR CONVENTIONAL HIGHWAY LOADS (DISTANCE MEASURED FROM TOP OF PIPE TO BOTTOM OF FLEXIBLE PAVEMENT OR TOP OF RIGID PAVEMENT):
24" MINIMUM FOR PIPE DIAMETERS 84" - 96"
- ⑦ FINAL BACKFILL MATERIAL SELECTION AND COMPACTION REQUIREMENTS PER THE PROJECT PLANS, SPECIFICATIONS. ENGINEER OF RECORD.

NOTES:

- GEOTEXTILE SHALL BE USED AS REQUIRED TO PREVENT SOIL MIGRATION.
- FOR MULTIPLE BARREL INSTALLATION THE RECOMMENDED STANDARD SPACING BETWEEN PARALLEL PIPE RUNS SHALL BE = PIPE DIA./2 OR 3' FOR PIPE DIAMETERS 72" AND LARGER. CONTACT YOUR CONTECH REPRESENTATIVE FOR NONSTANDARD SPACING.
- BACKFILL REQUIREMENTS SHALL FOLLOW ASTM D2321. IN THE EVENT OF DISCREPANCIES, ASTM D2321 SHALL SUPERCEDE THIS DETAIL.

① BACKFILL DETAIL
 ② SCALE: N.T.S.

Backfill Detail for 108" and 120" diameter



- ① MINIMUM TRENCH WIDTH MUST ALLOW ROOM FOR PROPER COMPACTION OF HAUNCH MATERIALS UNDER PIPE. MIN. WIDTH = $(1.25 \times \text{DIAMETER}) + 12"$ (FOLLOW ASTM D2321)
- ①a MINIMUM EMBANKMENT WIDTH IS 3 PIPE DIAMETERS.
- ② FOUNDATION SHALL BE WELL CONSOLIDATED & STABLE.
- ③ BEDDING MATERIAL SHALL BE A RELATIVELY LOOSE MATERIAL THAT IS ROUGHLY SHAPED TO FIT THE BOTTOM OF THE PIPE, 4" TO 6" IN DEPTH.
- ④ DUROMAXX STEEL REINFORCED (SRPE) PIPE.
- ⑤ INITIAL BACKFILL FOR PIPE EMBEDMENT MATERIAL TO MEET ASTM D2321 CLASS I OR APPROVED EQUAL, COMPACTED TO 90% STANDARD PROCTOR (NATIVE MATERIAL CAN BE UTILIZED THAT MEETS ASTM D2321 OR APPROVED EQUAL).
 - ALL LIFTS PLACED IN CONTROLLED MANNER. TO PREVENT UNEVEN LOADING, IT IS RECOMMENDED THAT LIFTS NOT EXCEED 8" UNCOMPACTED LIFT HEIGHTS.
- ⑤a HAUNCH ZONE MATERIAL SHALL BE HAND SHOVELED OR SHOVEL SLICED INTO PLACE TO ALLOW FOR PROPER COMPACTION.
- ⑥ INITIAL BACKFILL ABOVE PIPE MAY INCLUDE ROAD BASE MATERIAL AND RIGID PAVEMENT, MINIMUM COVER STILL APPLIES, OTHERWISE: 18" MINIMUM FOR PIPE DIAMETERS 108" - 120"
- ⑥a HEIGHT OF COMPACTED COVER PER DIAMETER FOR CONVENTIONAL HIGHWAY LOADS (DISTANCE MEASURED FROM TOP OF PIPE TO BOTTOM OF FLEXIBLE PAVEMENT OR TOP OF RIGID PAVEMENT): 36" MINIMUM FOR PIPE DIAMETERS 120"
- ⑦ FINAL BACKFILL MATERIAL SELECTION AND COMPACTION REQUIREMENTS PER THE PROJECT PLANS, SPECIFICATIONS. ENGINEER OF RECORD.

NOTES:

- GEOTEXTILE SHALL BE USED AS REQUIRED TO PREVENT SOIL MIGRATION.
- FOR MULTIPLE BARREL INSTALLATION THE RECOMMENDED STANDARD SPACING BETWEEN PARALLEL PIPE RUNS SHALL BE = PIPE DIA./2 OR 3' FOR PIPE DIAMETERS 72" AND LARGER. CONTACT YOUR CONTECH REPRESENTATIVE FOR NONSTANDARD SPACING.
- BACKFILL REQUIREMENTS SHALL FOLLOW ASTM D2321. IN THE EVENT OF DISCREPANCIES, ASTM D2321 SHALL SUPERCEDE THIS DETAIL.

1 **BACKFILL DETAIL**
2 **SCALE: N.T.S.**

Flowable Fill

These materials are suitable for use with DuroMaxx at the direction of the Engineer. The contractor must take precautions to preclude the dislocation or flotation of the pipe during placement of the flowable fill. Should these materials be utilized by the contractor, Contech will assist with recommendations for restraint to ensure line and grade can be maintained.

Embankment Conditions

1. DuroMaxx is a superior product that is normally installed in a trench condition. Embankment installations are an acceptable installation application.
2. In general, the backfill type and placement of the backfill immediately around the pipe can be the same as that shown on page 8.
3. The width of the select fill zone around the pipe and the type of material placed outside the zone – adjacent to the select fill zone – are critical and dependent upon the pipe diameter and ultimate amount of fill and loads to be placed over the pipe.
4. In the event of an embankment installation, a backfill design should be prepared for the specific site conditions by the Engineer.
5. Larger diameters may not be allowed or may require additional care in backfilling. Only small walk-behind compaction equipment should be used directly around the pipe.

Cover Limits

Once the backfilling process is completed, the contractor should take care to maintain the minimum allowable cover height over the pipe and should notify all other contractors and subcontractors to avoid removal of fill cover or rutting.

Pipe Dia. (in)	Min. Cover (ft)	Max. Cover (ft)
30-42	1	8
48-60	1	8
66-72	1.5	8
84-96	2	8
108	2.5	8
120	3	8

NOTES

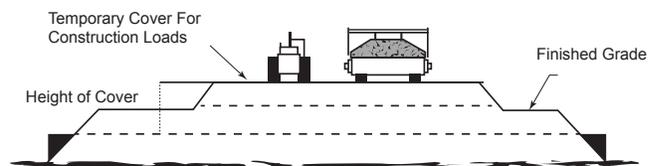
1. Allowable minimum cover is measured from the top of the pipe to the bottom of a flexible pavement or the top of the pipe to the top of a rigid pavement. Minimum cover in unpaved areas will be greater than for paved areas shown in Table 2 and must be maintained. Contact your local Contech Sales Engineer for more information.
2. All heights of cover are based on trench conditions. If embankment conditions exist, additional care in the placement of fill outside the pipe backfill zone is required. Your Contech representative can provide further guidance for a project in embankment conditions.

Construction Loads

For temporary construction vehicle loads, an extra amount of compacted cover may be required over the top of the pipe. The height of cover shall meet the minimum requirements shown in Table 5 below. The use of heavy construction equipment necessitates greater protection for the pipe than finished grade cover minimums for normal highway traffic.

Minimum cover may vary depending on local conditions. The contractor must provide the additional cover required to avoid damage to the pipe. Minimum cover is measure from the opt of the pipe to the top of the maintained construction roadway surface.

Minimum Height of Cover Requirements for Construction Loads. The Minimum Cover should be a COMPACTED Height of Cover Requirement.				
Diameter/Span (in)	Axle Load (Kips)			
	>32≤50	50≤75	75≤100	110≤150
30-42	2.0 ft	2.5 ft	3.0 ft	3.0 ft
48-72	3.0 ft	3.0 ft	3.5 ft	4.0 ft
84-96	3.0 ft	3.5 ft	4.0 ft	4.5 ft
102-120	3.5 ft	4.0 ft	4.5 ft	5.0 ft



Temperature Effects

1. DuroMaxx is a superior product and the pipe's stiffness is not affected by solar absorption or elevated ambient temperatures.
2. If large swings in temperature occur from the location the pipe is stored and the bottom of the trench, then the pipe may require conditioning to avoid contraction of the pipe's length.
3. Operating temperatures are not recommended beyond 120° F (49° C).

Repairs

1. The recommended cutting tool for DuroMaxx pipe is a chop saw and abrasive saw blade. Refer to the Operating Instructions from the saw manufacturer for additional information.
2. Blade thickness should be no less than 1/8" thick and is recommended to be made of 2 ply material that is used to cut ductile iron pipe.
3. Use the leading edge of the blade to cut into the ribs of the pipe.
4. Bury the blade as much as possible into the pipe as you proceed.
5. The alternative cutting tool for DuroMaxx is a handheld reciprocating saw. This process will take about 2 minutes to cut the steel ribs. There are 9 ribs for 24" around the pipe circumference.
6. For large diameters, square cuts can be achieved from the inside. Repairs
4. Should damage to the pipe occur at any point during installation, the Engineer should be contacted immediately.
5. For larger damaged sections, cut out damaged areas and cut a length of replacement pipe to fit.
6. Similar to other flexible pipe products, DuroMaxx can be coupled using various industry standard methods and materials (e.g. concrete collars, Fernco® Inc., Mar Mac® or equal).
7. For smaller abrasions or exposed steel, an approved rubberized undercoating spray can be used to cover the steel.

Taps

1. DuroMaxx pipe can be supplied with standard prefabricated taps fittings or components per job plans once pre-fabrication drawings are reviewed by Contech Engineering and approved by the Engineer.
2. DuroMaxx can be field tapped using Inserta-Tees® for drainage projects. Please contact your Contech Representative for more information. Recommendations



Always use safety glasses when cutting DuroMaxx pipe and use protective gloves in case sharp edges are exposed.

Recommended Draining Procedure

The tank can be drained for inspection and maintenance through the manhole access. Tank draining can be accomplished by operating the rainwater harvesting pump to evacuate the water from the tank. A vac truck can be used to evacuate any remaining water. If it is not feasible to operate the rainwater harvesting pump, a vac truck in conjunction with a portable submersible pump placed in the tank can be used.

Tank Corrosion and Chemical Leaching Potential

SRPE tanks are not suitable for potable water storage applications.

Please refer to the "DuroMaxx Technical Bulletin TB1- Durability Considerations for DuroMaxx Sewer Pipe" for tank corrosion and chemical leaching potential.

Acceptable pH Range for RWH Applications

Please refer to the "DuroMaxx Technical Bulletin TB1- Durability Considerations for DuroMaxx Sewer Pipe" for pH range considerations.



Support

Your Primary Contech Contact: _____

Phone: _____

Your Customer Solutions Coordinator (CSC) is: _____

Phone: _____

Project Site Address: _____

NOTES: _____

- Drawings and specifications are available at www.ContechES.com.
- Site-specific design support is available from our engineers.

Contech Engineered Solutions provides site solutions for the civil engineering industry. Contech's portfolio includes bridges, drainage, sanitary sewer, stormwater and earth stabilization products. For information on other Contech division offerings, visit www.ContechES.com or call 800-338-1122.

NOTHING IN THIS CATALOG SHOULD BE CONSTRUED AS A WARRANTY. APPLICATIONS SUGGESTED HEREIN ARE DESCRIBED ONLY TO HELP READERS MAKE THEIR OWN EVALUATIONS AND DECISIONS, AND ARE NEITHER GUARANTEES NOR WARRANTIES OF SUITABILITY FOR ANY APPLICATION. CONTECH MAKES NO WARRANTY WHATSOEVER, EXPRESS OR IMPLIED, RELATED TO THE APPLICATIONS, MATERIALS, COATINGS, OR PRODUCTS DISCUSSED HEREIN. ALL IMPLIED WARRANTIES OF MERCHANTABILITY AND ALL IMPLIED WARRANTIES OF FITNESS FOR ANY PARTICULAR PURPOSE ARE DISCLAIMED BY CONTECH. SEE CONTECH'S CONDITIONS OF SALE (AVAILABLE AT WWW.CONTECHES.COM/COS) FOR MORE INFORMATION.

For more complete information on installing DuroMaxx, refer to ASTM D2321.

DuroMaxx® is a registered trademark of Contech Engineered Solutions LLC. Mar Mac® is a registered trademark of Mar Mac Construction Products, Inc. Fernco® is a registered trademarks of Fernco, Inc. Inserta Tee® is a registered trademark of Inserta Fittings Co.