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## **BULLETIN No. 516** PROFILE WALL HDPE PIPE AND FITTINGS FOR SEWER AND DRAIN

The user may choose to adopt part or all of this Model Specification; however, the user should ensure that all parts used are appropriate for the user's purpose. See notice below.

#### 1 GENERAL TERMS AND CONDITIONS:

- 1.1 <u>Scope:</u> This specification covers requirements for profile wall high-density polyethylene (HDPE) pipe and fittings for sewer and drain.
- 1.2 <u>Engineered and Approved Plans:</u> The installation and construction of sewer and drain pipe and fittings shall be performed in accordance with engineered construction plans for the work prepared under the direction of a Professional Engineer.
- 1.3 <u>Referenced Standards:</u> Where all of part of a Federal, ASTM, ANSI, AWWA, etc., standard specification is incorporated by reference in these Specifications, the reference standard shall be the latest edition and revision.
- 1.4 <u>Licenses and Permits</u>: A licensed and bonded General Contractor shall perform all sewer and drain piping construction work. The Contractor shall secure all necessary permits before commencing construction.
- 1.5 <u>Inspections:</u> All work shall be inspected by an Authorized Representative of the Owner who shall have the authority to halt construction if, in his opinion, these specifications or standard construction practices are not being followed. Whenever any portion of these specifications is violated, the Project Engineer or his Authorized Representative, shall, by written notice, order further construction to cease until all deficiencies are corrected. A copy of the order shall be filed with the Contractor's license application for future review. If the deficiencies are not corrected, performance shall be required of the Contractor's surety.

#### 2 HIGH DENSITY POLYETHYLENE PIPE AND FITTINGS:

- 2.1 <u>Qualification of manufacturers:</u> The manufacturer shall have manufacturing and quality control facilities that are capable of producing and assuring the quality of the sewer and drain piping and fittings required by these specifications. The manufacturer's production facilities shall be open for inspection by the owner or his Authorized Representative.
- 2.1.1 Profile wall high density polyethylene pipe and fittings shall be furnished by a manufacturer with a minimum of 10 years' experience in the United States in the manufacture of profile wall polyethylene pipe meeting ASTM F 894 and HDPE fittings fabricated from pipe meeting ASTM F 894.
- 2.2 <u>Approved Manufacturer's:</u> Manufacturers that are qualified and approved by the Project engineer are listed below. Products from unapproved manufacturers are prohibited. Spirolite by Plasson USA.
- 2.3 <u>Polyethylene Materials:</u> Materials used for the manufacture of polyethylene pipe and fittings shall be highdensity polyethylene in accordance with ASTM F 894 requirements with a cell classification of 445574C per ASTM D-3350. Upon request, a manufacturer's physical property data sheet shall be supplied.
- 2.3.1 Black material shall contain a minimum of 2% carbon black for long-term protection against UV degradation. The base resin used in the manufacture of the product shall contain a high quality anti- oxidant package.



- 2.4 <u>Elastomeric Gaskets:</u> Elastomeric gaskets shall comply with the non-pressure requirements of ASTM F477.
- 2.5 <u>Lubricant:</u> The joint assembly lubricant shall have no detrimental effect on the gasket or on the pipe.
- 2.6 Polyethylene Pipe and Fittings:
- 2.6.1 Polyethylene pipe shall be manufactured in accordance with ASTM F 894 and shall have integral bell and spigot joints meeting ASTM D 3212 or shall be plain ended for field joining.
- 2.6.2 Polyethylene fittings shall be fabricated from sections of pipe meeting ASTM F 894 using extrusion welding. Fittings shall be constructed with integral bell and spigot joints that are compatible with the pipe or shall be plain ended for field joining.
- 2.6.3 Threaded outlets and caps for pressure and temperature measurement shall be provided as specified in approved shop drawings.
- 2.6.4 Custom fabricated pipe and fittings shall be manufactured in accordance with shop drawings that are approved by the Engineer prior to fabrication.
- 2.6.5 To ensure joint quality and compatibility, the same manufacturer shall produce pipe and fittings.

#### 3 JOINING:

- 3.1 Field joining shall be by bell and spigot joints meeting ASTM D 3212 that are sealed using an elastomeric profile gasket that fits in a machined circumferential groove in the spigot, or by gasketed flanges or by field fusion.
- 3.2 Joints shall be aligned and assembled in accordance with the manufacturer's instructions.
- 3.3 Flanged connections: Option A, HDPE Plate Flange to be drilled in field to match mating hole pattern: Option B, Wound Flange with back-up ring meeting an ANSI B16.1, 125-lb. Drilling pattern. Flange gaskets shall be full faced, 3/8-in thick rubber or elastomer of 60-durometer hardness.

#### 4 HANDLING, CONSTRUCTION AND INSTALLATION:

- 4.1 Unloading and transport shall be performed in accordance with instructions provided by the delivery driver. Pipe and fittings shall be handled with lifting and equipment that is of proper capacity and in safe operating condition. Pipe and fittings shall not be pushed, pulled, rolled or dropped off the truck. All pipe and fittings shall be examined before installation and no piece that is found to be defective or damaged shall be installed. Damage occurring after installation shall be corrected at the installer's expense in accordance with the Engineer's instructions and the manufacturer's recommendations.
- 4.2 <u>Underground Installation:</u> Underground installations using open cut and burial techniques shall be performed in accordance with ASTM D2321 and ASTM D1668 or as specified by the project engineer. The contractor shall observe all appropriate safety requirements in accordance with local, state and federal codes and regulations.
- 4.3 All pipe and fittings shall be clean and undamaged before installation. When pipe laying is not in progress the open ends of the pipeline shall be closed by watertight plugs or other approved means. Good alignment shall be preserved in laying. The deflection at joints shall not exceed the deflection limits recommended by manufacturer. Where crossing utilities are encountered when opening the trench, pipe and fittings as necessary to reroute system piping or crossing utility piping shall be provided.

- 4.4 Pipe trenches shall be kept free from water during pipe laying and joining, and until sufficient backfill has been placed to prevent floatation of the pipe. Provide ample means and devices to promptly remove and dispose of all water entering the trench.
- 4.4.1 Where the Engineer determines that the maximum ground water level will be at or below the pipe springline for the service life of the pipeline, the pipe shall be backfilled according to Figure 4.4.1, Dry Installation Bedding Requirements.
- 4.4.2 Where the Engineer determines that the ground water level may be above the pipe springline during the service life of the line, the pipeline shall be backfilled in accordance with Figure 4.4.2 Wet Installation Bedding Requirements.



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- 4.5 Backfilling of trenches shall commence immediately after pipe is placed in the trench.
- 4.6 Shoring, sheeting, or trench shields shall be utilized in such a manner as to minimize disturbance of the backfill material beneath the pipe crown. Where moveable trench shields are used, steps shall be taken not to disturb the pipe embedment.
- 4.6.1 Pipe embedment shall be placed in lifts. Backfill material placed under the pipe haunches shall be thoroughly shovel sliced along the length of the pipe.
- 4.6.2 Where compaction of backfill materials is required, compact by mechanical means such has vibratory sleds, gasoline driven impact tampers, and air driven impact tampers, or other approved means. Compact to a minimum of 90% Standard Proctor or as required by the Engineer.
- 4.7 After completing backfill in the pipe zone, the trench shall be backfilled to grade with native soil. Where pipe is located beneath roads, compact backfill to a minimum of 95% Standard Proctor density. HDPE profile pipe shall not be subject to roller or wheel loads until a minimum of one diameter or 36" (whichever is larger) of backfill has been placed over the top of the pipe.

#### 5 INSPECTIONS AND TESTS:

- 5.1.1 The Contractor shall conduct leakage tests on the completed pipeline in accordance with either 5.1.2, Infiltration Leakage Inspection or 5.1.3, Exfiltration Leakage Testing. The allowable leakage shall not exceed 10 gallons per pipe diameter inch per mile per day. The Contractor shall furnish all supplies, materials, water (if required), labor, etc., needed to conduct leakage tests. Any leakage, including active seepage, shall be corrected where such leakage exists until the pipeline meets the requirements of this specification.
- 5.1.2 Infiltration Leakage Inspection: The pipeline shall be inspected for infiltration. Inspection may be made following a heavy rain or by flooding the area above the pipe so that water level is eighteen inches or more above the crown of the pipe or as instructed by the Engineer.
- 5.1.3 <u>Exfiltration Leakage Testing</u>: Pipelines shall be tested with low-pressure air in accordance with ASTM F1417. The time in minutes that is required for the internal air pressure to drop from 3.5 psig to 2.5 psig shall be measured and the results compared with the values calculated in accordance with ASTM F1417, Appendix XI.
- 5.1.4 If any section fails the leakage test, the Contractor shall correct the deficiency and retest that section without additional cost to the Owner.
- 5.2 After completion of any section of the pipe, the grades, joints, and alignment shall be true to line and grade. There shall be no visual leakage and the control system shall be completely free from any cracks and from protruding joint materials, sand deposits, mortar, or other materials on the inside to the satisfaction of the Engineer.
- 5.3 Vertical pipe deflection after at least thirty days shall not exceed five percent of the base ID of the pipe per ASTM F894. Deflection shall be checked in accordance with the manufacturer's recommendations by pulling a mandrel through the line, or by measuring vertical inside diameter.

#### 6 CLEANING:

6.1 At the conclusion of the work, the pipeline shall be cleaned to remove all dirt, stones, pieces of wood, and other material that may have entered during the construction period. All debris and obstructions shall be removed.



## BULLETIN No. 519 BURIED MANHOLES AND STRUCTURES

The user may choose to adopt part or all of this Model Specification; however, the user should ensure that all parts used are appropriate for the user's purpose. See notice below.

#### 1.1 DESCRIPTION:

This specification covers the requirements of high density polyethylene (HDPE) buried manholes and lift stations in nominal sizes of 18-through 120-inch with integral bell joints, per ASTM F-894.

#### 1.2 REFERENCED STANDARDS:

- A. ASTM D 2837: Standard Test Method for Obtaining Hydrostatic Design Basis for Thermoplastic Pipe Materials
- B. ASTM D 3212: Standard Specification for Joints for Drain and Sewer Plastic Pipes Using Elastomeric Seals
- C. ASTM D3350: Standard Specification for Polyethylene Plastics Pipe and Fittings Material
- D. ASTM F894: Standard Specification for Polyethylene (PE) Large Diameter Profile Wall Sewer and Drain Pipes
- E. ASTM F1759: Standard Practice for Design of High-Density Polyethylene (HDPE) Manholes for Subsurface Applications

#### 1.3 QUALIFICATION:

The manhole manufacturer must have at least 10 years of experience manufacturing PE manholes for the U.S. market for projects of a similar size and scope as well as an available reference list of projects.

#### 1.4 MATERIALS:

- A. Polyethylene Materials used to manufacture the pipe and fittings shall be high density, extra high molecular weight polyethylene material having a minimum cell classification of 445574C according to ASTM D 3350 and a Hydrostatic Design Basis (HDB) of 1600 psi (at 73°F) according to ASTM D 2837. Pipe Manufacturer shall only use resins listed in the Plastic Pipe Institute's TR 4. Clean rework material, generated by the manufacturers own production may be used as long as the pipe produced meets the applicable requirements of this specification.
- B. Rubber gaskets shall comply in all respects with the physical requirements specified in the non-pressure requirements of ASTM Specification F-477. They shall be molded or produced from an extruded shape approved by the manufacturer and spliced into circular form
- C. Lubricant: The lubricant used for assembly of bell & spigot joints shall have no detrimental effect on the gasket or on the pipe.

#### 2.1 HIGH DENSITY POLYETHELENE MANHOLE FABRICATION:

A. The manhole shall be fabricated to meet the design requirements of ASTM F-1759, based on soil and installation information supplied by the Purchaser or the Engineer.



- B. The riser shaft shall be manufactured in accordance with ASTM F-894, shall be of solid wall construction only, and shall be specified by the Standard Inside-Diameter Dimension Ratio (SIDR) or the Inside- Dimension Ratio (IDR). The riser SIDR or IDR shall be of a sufficient wall thickness that the manhole meets the requirements of Section 2.1A.
- C. Where required, the manhole riser shall be manufactured with an integrally wound bell and spigot joint, an extrusion welded joint, or a fused joint. Joining shall be accomplished in accordance with the manufacturer's recommendations.

#### 2.2 SHOP DRAWINGS:

Upon request complete shop drawings of the manholes shall be submitted to the Engineer for approval.

2.3 Workmanship:

The riser and stubout pipes shall be homogeneous throughout and free from visible cracks, holes, foreign inclusions or other injurious defects connecting to HDPE fittings and structures shall have a smooth surface suitable for gasket sealing.

2.4 Pipe Size:

PE Pipe and manholes shall be produced by the same manufacturer.

Acceptable manhole manufacturers are:

a. Spirolite by Plasson USA

#### 2.3 INSPECTION REQUIREMENTS:

- A. Notification: If inspection is specified by the purchaser, the manufacturer shall notify the purchaser in advance of the date, time and place of testing of the pipe in order that the purchaser may be represented at the test.
- B. Access: The inspector shall have free access to the inspection area of the manufacturer's plant. The manufacturer shall make available to the inspector, without charge, all reasonable facilities for determining whether the pipe meets the requirements of this specification
- C. Certification: As the basis of the acceptance of the material, the manufacturer will furnish a certificate of conformance to these specifications upon request. When prior agreement is being made in writing between the purchaser and the manufacturer, the manufacturer will furnish other conformance certification in the form of affidavit of conformances, test results, or copies of test reports.

#### 3.1 INSTALLATION:

- A. Unloading: Manholes can be unloaded from the truck by using a boom and sling arrangement. Manholes shall be handled per the Manufacturer's written recommendations. The Manufacturer will provide lifting lugs to assist with handling unless otherwise agreed to by the Manufacturer and Purchaser
- B. Installation: Achieve stable and permanent support under and around the manhole. Install the manhole in a dry trench. Place sufficient crushed stone or other Class I material to provide a stable foundation. The thickness of the foundation layer shall be a minimum of 8 inches. Compact the foundation material to 95% Standard Proctor density. Alternatively, the manhole can be set on a properly designed reinforced concrete slab on a stable foundation.



- C. Backfilling: The embedment surrounding the manhole shall extend to at least 3.5 feet or to the trench wall, whichever is the greater distance, for manholes placed in stable insitu soils. In unstable soil, the embedment shall extend to a distance equal to at least one manhole diameter (but not less than 3.5 feet) or to the trench wall, whichever is the greater distance. Embedment shall be placed from the invert to the top of the manhole. The embedment shall consist of Class I or II material compacted to at least 90% Standard Proctor density in 12" lifts. Place backfill evenly around the manhole to prevent moving the manhole out of alignment.
- D. Concrete Anchors: Where required to prevent flotation, concrete anchors shall be constructed as shown in the Engineer's design drawings.
- E. Concrete Tops: When vehicular loads are present, a concrete top shall be constructed as shown in the Engineer's design drawings.
- F. Manhole Entry: Manholes present confined space and fall hazards. All entrants shall follow applicable OSHA confined space entry procedures and use a fall protection device for all entries.

#### 3.2 DELIVERY:

Manholes and fittings shall, unless otherwise specified, be prepared for standard commercial shipment

### BULLETIN No. 523 PROFILE WALL HDPE PIPE AND FITTINGS FOR ODOR CONTROL

The user may choose to adopt part or all of this Model Specification; however, the user should ensure that all parts used are appropriate for the user's purpose. See notice below.

#### 1 GENERAL TERMS AND CONDITIONS:

- 1.1 <u>Scope:</u> This specification covers requirements for profile wall high-density polyethylene (HDPE) pipe and fittings for the control of odorous exhaust air (odor control) systems.
- 1.2 <u>Engineered and Approved Plans</u>: The installation and construction of odor control pipe and fittings shall be performed in accordance with engineered construction plans for the work prepared under the direction of a Professional Engineer.
- 1.3 <u>Referenced Standards</u>: Where all of part of a Federal, ASTM, ANSI, AWWA, etc., standard specification is incorporated by reference in these Specifications, the reference standard shall be the latest edition and revision.
- 1.4 <u>Licenses and Permits</u>: A licensed and bonded General Contractor shall perform all odor control piping construction work. The Contractor shall secure all necessary permits before commencing construction.
- 1.5 <u>Inspections:</u> All work shall be inspected by an Authorized Representative of the Owner who shall have the authority to halt construction if, in his opinion, these specifications or standard construction practices are not being followed. Whenever any portion of these specifications is violated, the Project Engineer or his Authorized Representative, shall, by written notice, order further construction to cease until all deficiencies are corrected. A copy of the order shall be filed with the Contractor's license application for future review. If the deficiencies are not corrected, performance shall be required of the Contractor's surety.

#### 2 HIGH DENSITY POLYETHYLENE PIPE AND FITTINGS:

- 2.1 <u>Qualification of manufacturers:</u> The manufacturer shall have manufacturing and quality control facilities that are capable of producing and assuring the quality of the odor control piping and fittings required by these specifications. The manufacturer's production facilities shall be open for inspection by the owner or his Authorized Representative.
- 2.1.1 Profile wall high density polyethylene pipe and fittings shall be furnished by a manufacturer with a minimum of 10 years' experience in the United States in the manufacture of profile wall polyethylene pipe meeting ASTM F 894 and HDPE fittings fabricated from pipe meeting ASTM F 894.
- 2.2 <u>Approved Manufacturers:</u> Manufacturers that are qualified and approved by the Project engineer are listed below. Products from unapproved manufacturers are prohibited. Spirolite by Plasson USA.
- 2.3 <u>Polyethylene Materials:</u> Materials used for the manufacture of polyethylene pipe and fittings shall be highdensity polyethylene in accordance with ASTM F 894 requirements with a cell classification of 445574C per ASTM D-3350. Upon request, a manufacturer's physical property data sheet shall be supplied.
- 2.3.1 Black material shall contain a minimum of 2% carbon black for long-term protection against UV degradation. The base resin used in the manufacture of the product shall contain a high quality anti- oxidant package.



- 2.4 <u>Elastomeric Gaskets:</u> Elastomeric gaskets shall comply with the non-pressure requirements of ASTM F477.
- 2.5 <u>Lubricant:</u> The joint assembly lubricant shall have no detrimental effect on the gasket or on the pipe.
- 2.6 <u>Polyethylene Pipe and Fittings:</u>
- 2.6.1 Polyethylene pipe shall be manufactured in accordance with ASTM F 894 and shall have integral bell and spigot joints meeting ASTM D 3212 or shall be plain ended for field joining.
- 2.6.2 Polyethylene fittings shall be fabricated from sections of pipe meeting ASTM F 894 using extrusion welding. Fittings shall be constructed with integral bell and spigot joints that are compatible with the pipe or shall be plain ended for field joining.
- 2.6.3 Threaded outlets and caps for pressure and temperature measurement shall be provided as specified in approved shop drawings.
- 2.6.4 Custom fabricated pipe and fittings shall be manufactured in accordance with shop drawings that are approved by the Engineer prior to fabrication.
- 2.6.5 To ensure joint quality and compatibility, the same manufacturer shall produce pipe and fittings.

#### 3 JOINING

- 3.1 Field joining shall be by bell and spigot joints meeting ASTM D 3212 that are sealed using an elastomeric profile gasket that fits in a machined circumferential groove in the spigot, or by gasketed flanges or by field fusion.
- 3.2 Joints shall be aligned and assembled in accordance with the manufacturer's instructions.
- 3.3 Flanged connections: Option A, HDPE Plate Flange to be drilled in field to match mating hole pattern: Option B, Wound Flange with back-up ring meeting an ANSI B16.1, 125-Ib. Drilling pattern. Flange gaskets shall be full faced, 3/8-in thick rubber or elastomer of 60-durometer hardness.

#### 4 HANDLING, CONSTRUCTION AND INSTALLATION

- 4.1 Unloading and transport shall be performed in accordance with instructions provided by the delivery driver. Pipe and fittings shall be handled with lifting and equipment that is of proper capacity and in safe operating condition. Pipe and fittings shall not be pushed, pulled, rolled or dropped off the truck. All pipe and fittings shall be examined before installation and no piece that is found to be defective or damaged shall be installed. Damage occurring after installation shall be corrected at the installer's expense in accordance with the Engineer's instructions and the manufacturer's recommendations.
- 4.2 <u>Underground Installation:</u> Underground installations using open cut and burial techniques shall be performed in accordance with ASTM D2321 and ASTM D1668 or as specified by the project engineer. The contractor shall observe all appropriate safety requirements in accordance with local, state and federal codes and regulations.
- 4.3 All pipe and fittings shall be clean and undamaged before installation. When pipe laying is not in progress the open ends of the pipeline shall be closed by watertight plugs or other approved means. Good alignment shall be preserved in laying. The deflection at joints shall not exceed the deflection limits recommended by manufacturer. Where crossing utilities are encountered when opening the trench, pipe and fittings as necessary to reroute odor control system piping or crossing utility piping shall be provided.

- 4.4 Pipe trenches shall be kept free from water during pipe laying and joining, and until sufficient backfill has been placed to prevent flotation of the pipe. Provide ample means and devices to promptly remove and dispose of all water entering the trench.
- 4.4.1 Where the Engineer determines that the maximum ground water level will be at or below the pipe springline for the service life of the pipeline, the pipe shall be backfilled according to Figure 4.4.1, Dry Installation Bedding Requirements.



4.4.2 Where the Engineer determines that the ground water level may be above the pipe springline during the service life of the line, the pipeline shall be backfilled in accordance with Figure 4.4.2 Wet Installation Bedding Requirements.



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- 4.5 Backfilling of trenches shall commence immediately after pipe is placed in the trench.
- 4.6 Shoring, sheeting, or trench shields shall be utilized in such a manner as to minimize disturbance of the backfill material beneath the pipe crown. Where movable trench shields are used, steps shall be taken not to disturb the pipe embedment.
- 4.6.1 Pipe embedment shall be placed in lifts. Backfill material placed under the pipe haunches shall be thoroughly shovel sliced along the length of the pipe.
- 4.6.2 Where compaction of backfill materials is required, compact by mechanical means such has vibratory sleds, gasoline driven impact tampers, and air driven impact tampers, or other approved means. Compact to a minimum of 90% Standard Proctor or as required by the Engineer.
- 4.7 After completing backfill in the pipe zone, the trench shall be backfilled to grade with native soil. Where pipe is located beneath roads, compact backfill to a minimum of 95% Standard Proctor density. HDPE profile pipe shall not be subject to roller or wheel loads until a minimum of one diameter or 36" (whichever is larger) of backfill has been placed over the top of the pipe.

#### 5 INSPECTIONS AND TESTS

- 5.1.1 The Contractor shall conduct leakage tests on the completed pipeline in accordance with either 5.1.2, Infiltration Leakage Inspection or 5.1.3, Exfiltration Leakage Testing. The allowable leakage shall not exceed 10 gallons per pipe diameter inch per mile per day. The Contractor shall furnish all supplies, materials, water (if required), labor, etc., needed to conduct leakage tests. Any leakage, including active seepage, shall be corrected where such leakage exists until the pipeline meets the requirements of this specification.
- 5.1.2 <u>Infiltration Leakage Inspection</u>: The pipeline shall be inspected for infiltration. Inspection may be made following a heavy rain or by flooding the area above the pipe so that water level is eighteen inches or more above the crown of the pipe or as instructed by the Engineer.
- 5.1.3 <u>Exfiltration Leakage Testing</u>: Pipelines shall be tested with low-pressure air in accordance with ASTM F 1417. The time in minutes that is required for the internal air pressure to drop from 3.5 psig to 2.5 psig shall be measured and the results compared with the values calculated in accordance with ASTM F1417, Appendix XI.
- 5.1.4 If any section fails the leakage test, the Contractor shall correct the deficiency and retest that section without additional cost to the Owner.
- 5.2 After completion of any section of the pipe, the grades, joints, and alignment shall be true to line and grade. There shall be no visual leakage and the odor control system shall be completely free from any cracks and from protruding joint materials, sand deposits, mortar, or other materials on the inside to the satisfaction of the Engineer.
- 5.3 Vertical pipe deflection after at least thirty days shall not exceed five percent of the base ID of the pipe per ASTM F894. Deflection shall be checked in accordance with the manufacturer's recommendations by pulling a mandrel through the line, or by measuring vertical inside diameter.

#### 6 CLEANING

6.1 At the conclusion of the work, the pipeline shall be cleaned to remove all dirt, stones, pieces of wood, and other material that may have entered during the construction period. All debris and obstructions shall be removed.





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