The Atkore Guide to
HDPE PIPE & CONDUIT

Atkore™

Navigating the technical requirements and standards of HDPE can be complex, especially with considerations like ASTM compliance, color codes, and selecting materials that meet specific project demands.

As infrastructure growth accelerates across the U.S., HDPE pipe and conduit have proven to be a reliable choice. In this guide, you'll find the insights needed to make confident, informed decisions, supporting the success of your projects—from start to finish.

Atkore™

HDPE PIPE & CONDUIT TECHNOLOGY

Understanding key terms is essential to selecting and working with HDPE pipe and conduit. This glossary provides clear definitions of the most commonly used HDPE terminology, with terms sourced from industry authorities like the Plastics Pipe Institute (PPI).

HDPE: High density polyethylene (HDPE) refers to the thermoplastic polymer produced from the monomer ethylene. HDPE piping has a high strength-to-density ratio and is highly bendable, allowing for pipe to be coiled. HDPE is lightweight, flexible, inexpensive and corrosion resistant. In addition to piping, HDPE is used in the production of plastic bottles, geomembranes, grocery bags, toys, containers and plastic lumber.

IPS and DIPS: Iron Pipe Size or IPS represents the nominal diameter of the pipe. A 6-in. IPS pipe has an inside diameter of six inches. Ductile Iron Pipe Size or DIPS is used to specify the size of ductile iron pipe. Typically, IPS refers to black iron or carbon steel pipe while DIPS refers to cast/ductile iron pipe. IPS and DIPS are used in the HDPE market to replicate the familiar dimensions of these other IPS pipes, and are available in size ranging from ¾-in. to 65-in. diameters while DIPS is available from 4- in. to 36-in. diameters.

Bend Radius: Bend radius, measured to the inside curvature, is the minimum radius one can bend a pipe, tube, sheet, cable or hose without kinking it, damaging it or shortening its life. The smaller the bend radius, the greater the material flexibility. HDPE piping is more flexible than other competitive piping options, offering a smaller bend radius. However, exceeding minimum bend radiuses may result in mechanical failure and decreased longevity. It can also be problematic for HDPE-encased fiber-optic cabling, as exceeding minimum bend radius can cause light attenuation resulting in performance loss.

Dimension Ratio (DR): The Dimension Ratio (DR) is the ratio of the pipe outside diameter to the pipe minimum wall thickness. As diameters change, the pressure rating remains the same for the same material, dimension ratio and application.

Standard Dimension Ratio (SDR): Certain Dimension Rations (DRs) that meet an ASTM International specified number series (32.5, 26, 21, 17, 13.5) are referred to as Standard Dimension Ratios (SDRs). There is an approximately 25% difference in minimum wall thickness between each SDR.

SDR: SDR is defined as the ratio of the nominal outside diameter to the nominal wall thickness. To calculate SDR, use this formula:

$$SDR = dn/en$$

Where dn is the nominal outside diameter of pipe and en is the nominal (minimum) wall thickness of the pipe.

Carbon Black (CB): Carbon Black products are additives used to improve the strength and performance of HDPE pipe. CBs are typically used to improve UV resistance and to reduce or lower moisture absorption in pipe.

Coefficient of friction: Coefficient of friction measures the amount of friction existing between two surfaces. As this measurement relates to piping, a lower coefficient of friction typically means less friction damage in piping (example: outer layer wear). Use this formula to find the coefficient of friction (fr):

$$Fr/N = fr$$

Where Fr is the resistive friction force and N is the normal force pushing on objects.

Temperature derating: Materials rated for operating pressures or tensions at a standard temperature must be 'derated' when temperatures increase. Derating is usually expressed graphically or in terms of derating factors. HDPE piping loses its strength to pressure and tension as temperature is increased.

FM approved: FM Approvals is a third-party testing and certification service. FM Approved-HDPE pipe and fittings are subjected to more severe performance testing. The five-step certification process includes product review, testing, and manufacturing facility audits.

UL Rating: Underwriters Laboratories (UL) is a global safety science company and third-party certification company founded in 1894. The company tests products and technologies for safety. Beginning in 1965, UL published a series of standards for polymer raceway products, including rigid PVC conduit as well as HDPE conduit.

Seismic loading: Seismic loading is one of the basic concepts of earthquake engineering which includes application of a seismic oscillation to a structure. It happens at contact surfaces of a structure, either with the ground or with adjacent structures. According to an Electric Power Research Institute report titled "Nondestructive Evaluation: Seismic Design Criteria for Polyethylene Pipe Replacement Code Case," there are two potential sources for seismic loads on piping: loads from wave propagation in the soil and from seismic anchor motion of the buildings that form the boundary for the buried pipe.

COMMON ASTM STANDARDS FOR HDPE

ASTM International develops technical standards across multiple industries, including manufacturing, chemicals, consumer products, energy, and construction. HDPE pipe and conduit are made to meet these rigorous standards, delivering dependable quality and performance.

When selecting plastic pipe, confirming that the supplier meets all necessary standards is important. Below is a list of 16 common ASTM standards for HDPE pipe and conduit, along with their definitions:

D3035

Standard Specification for PE Plastic Pipe Based on Controlled Outside Diameter

ASTM standard D3035 covers OD controlled PE pipes. These pipes are pressure rated for water and used for sewage, potable water and industrial applications.

D3350

Standard Specification for PE Plastics Pipe and Fittings Material

ASTM standard D3350 covers the identification of PE pipe and fitting materials in accordance with a cell classification system. Cell classification is based on tests of primary properties including density, melt index, flexural modulus and more.

D2513

Standard Specification for PE Gas Pressure Pipe, Tubings and Fittings

ASTM standard D2513 covers requirements and test methods for PE pipe, tubing and fittings used in natural gas distribution. Tests include material dimensions and tolerances, hydrostatic burst strength, chemical resistance and rapid crack resistance.

D792

Standard Test Methods for Density and Specific Gravity of Plastics by Displacement

ASTM standard D792 covers density test methods for solid plastics. The standard includes test methods for testing solid plastics in water and in liquids other than water.

F2619

Standard Specification for HDPE Line Pipe

ASTM standard F2619 covers requirements and test methods for HDPE materials, pipe and fittings for pressure or non-pressure oil and gas applications.

D1238

Standard Test Method for Melt Flow Rates of Thermoplastics by Extrusion Plastometer

ASTM standard D1238 covers the test method for melt flow rates of molten thermoplastic resin using an extrusion plastometer. The standard describes four procedures.

D790

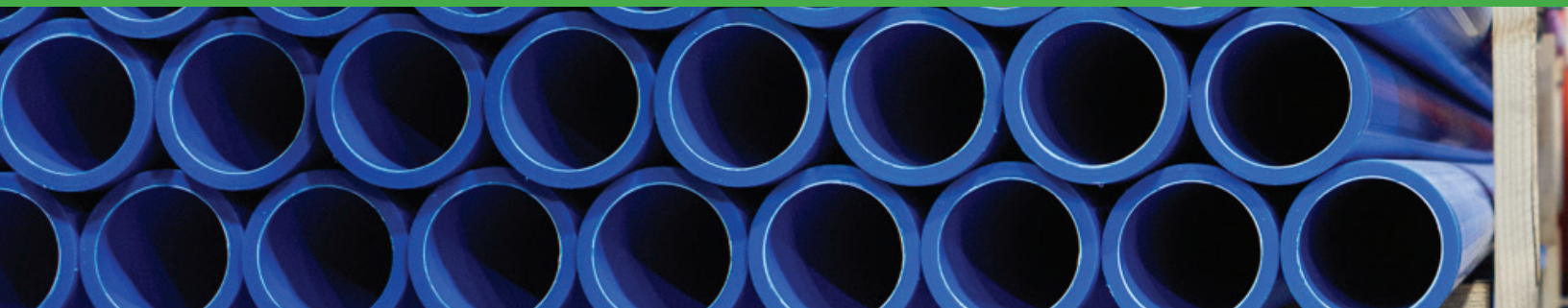
Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials

ASTM standard D790 covers the test methods used to determine the flexural properties of unreinforced and einforced plastics. The test methods are applicable to both rigid and semi-rigid materials.

D638

Standard Test Method for Tensile Properties of Plastics

ASTM standard D638 covers the test method for tensile properties of plastics. The test method is also useful for qualitative characterization and research and development.



D696

Standard Test Method for Coefficient of Linear Thermal Expansion of Plastics Between -30°C and 30°C with a Vitreous Silica Dilatometer

ASTM standard D696 covers the thermal expansion test method. The temperature range is the range at which most plastics are commonly used.

D2837

Standard Test Method for Obtaining Hydrostatic Design Basis for Thermoplastic Pipe Materials or Pressure Design Basis for Thermoplastic Pipe Products

ASTM standard D2837 covers the test methods for hydrostatic design basis (HDB) and pressure design basis (PDB). HDB is the long-term hydrostatic strength category based on stress and PDB is the long-term hydrostatic strength category based on pressure. This test method is applicable to all known thermoplastic pipe materials.

F2160

Standard Specification for Solid Wall HDPE Conduit Based on Controlled Outside Diameter (OD)

ASTM standard F2160 covers the standard specs for HDPE conduit. HDPE conduit that meets this standard shall be made as OD controlled solid wall and sized in IPS. Specifications include material, dimensional, workmanship and performance requirements for PE conduit, duct and innerduct used in non-pressure applications.

F714

Standard Specification for PE Plastic Pipe (SDR-PR) Based on Outside Diameter

ASTM standard F714 covers PE pipe made in dimensions based on outside diameters of 90 mm and larger. This pipe is used for new construction and insertion renewal of old pipes used to transport water, sewage and industrial process liquids, effluents and slurries.

D2239

Standard Specification for PE Plastic Pipe (SIDR-PR) Based on Controlled Inside Diameter

ASTM standard D2239 covers the standard specs for HDPE pipe made in standard inside dimension ratios (SIDR) and pressure rated for water. Specifications include requirements for PE compounds and material, dimensional, workmanship and performance requirements.

F1473

Standard Test Method for Notch Tensile Test to Measure the Resistance to Slow Crack Growth of PE Pipes and Resins

ASTM standard F1473 covers the slow crack growth test known as PENT (Pennsylvania Notch Test). This test method determines the resistance of PE materials to slow crack growth under specific conditions.

D746

Standard Test Method for Brittleness Temperature of Plastics and Elastomers by Impact

ASTM standard D746 covers the test method to determine the temperature at which plastics will exhibit brittle failure under specified impact conditions. The standard also provides two routine inspection and acceptance procedures.

F1041

Standard Guide for Squeeze-Off of Polyolefin Gas Pressure Pipe and Tubing

ASTM standard F1041 covers the general procedures for squeeze-off of polyolefin gas pressure pipe and tubing.

UNDERSTANDING HDPE COLOR CODES

Color coding is an important part of HDPE manufacturing and installation, helping workers quickly identify pipe contents and avoid costly or dangerous mistakes.

When construction crews, excavators, or utility companies encounter a pipe underground, the American Public Works Association (APWA) Uniform Color Code provides a reliable reference to identify what each pipe carries.

The APWA Uniform Color Code serves as the standard guide for solid and striped colors used on underground HDPE pipe and conduit. These bright colors make underground pipes easy to spot, reducing the risk of accidental cuts or damage to lines carrying gas, water, or wastewater.

In addition to promoting safety, color variations also help distinguish different raceway owners. This is particularly valuable in telecommunications, where multiple owners may have pipes in the same trench.

HDPE COLOR CODE GUIDE

- **Solid red or red stripes:** electric power lines, cable, conduit and lighting cables
- **Solid orange or orange stripes:** telecommunications, alarm or signal lines, cables or conduit
- **Solid yellow or yellow stripes:** methane or propane fuel gas, petroleum, steam or gaseous materials
- **Solid green or green stripes:** sewers or drain lines
- **Solid blue or blue stripes:** potable water
- **Solid purple/lavender or purple/lavender stripes:** reclaimed water, irrigation and slurry lines
- **Solid black:** any application where the pipe is exposed to sunlight for a long period of time

The Plastic Pipe Institute also follows the APWA color code. Additionally, PPI strongly recommends that yellow only be used for gas distribution piping.

Atkore™ | BUILDING BETTER TOGETHER

COLOR OR STRIPE COLOR	SOLID WALL PIPING APPLICATION
Red	Electric power lines, cable, conduit and lighting cables
Orange	Telecommunication, alarm or signal lines, cables or conduit
Yellow	Fuel gas (methane or propane), oil, petroleum, steam or gaseous materials
Green	Sewers and drain lines
Blue	Potable water
Violet (Purple)	Reclaimed water, irrigation and slurry lines

Stripes are longitudinal, with three or four stripes at equally spaced intervals along the pipe. This allows the stripes to be seen from any angle. Stripes are often used to differentiate individual ducts within a bundle of pipe.

HDPE Pipe & Conduit Color Additives

HDPE resin is shipped from the manufacturer in the form of small, colorless pellets. Color is added to the resin during the manufacturing stage. Carbon black additives are used to provide UV protection, as colored pipe will fade when exposed to sunlight. ASTM F2160 specifies the stabilizers in colored conduit should protect it in outside storage for one year. Colored pipes will eventually fade over time, even with UV stabilizers, which is why black is recommended for pipes that will be exposed to sunlight.

Customize Your Pipe with Atkore - United Poly Systems

Atkore offers fully customizable high-density polyethylene pipes. We manufacture pipe in 12 colors with additional striping options. Custom colors are available upon request.

ABOUT ATKORE HDPE PIPE & CONDUIT

Atkore produces quality HDPE pipe and conduit in diameters from ¾-in. to 26-in. IPS, 4-in. to 24-in. DIPS, and ¾-in. to 2-in. CTS for use in many industries, including telecommunications, power utility, electrical, and oil and gas.

We offer fully customizable HDPE conduit options. Our off-the-shelf HDPE conduit/pipe is available in a variety of sizes, colors, dimensions, and lengths, with or without stripes. In addition, piping can be customized with a ribbed interior (to maximize the distance cable may be pulled or jetted), pull tape, or a lubricated interior (for easier installation).

Atkore is a global manufacturer of HDPE conduit and industrial products, with over 5,600 employees and 49 manufacturing and distribution plants located across the U.S. Our coast-to-coast coverage allows us to quickly deliver to most of the country at reduced freight costs, and to shorten lead times for critical orders. With over a decade of experience in the HDPE market, Atkore remains a leading provider of electrical, safety, and infrastructure solutions. We manufacture HDPE pipe and conduit under United Poly Systems, Heritage Plastics, and Allied Tube & Conduit brands.

Atkore
16100 South Lathrop Avenue
Harvey, IL 60426

atkore.com

ATKR-WP-7230-2501