HDPE Drainage Products





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Advanced Drainage Systems: the world's largest manufacturer of polyethylene drainage products



The science of materials engineering has totally changed the complexion of many U.S. industries. Nowhere is this more evident than in the construction market, where plastics are outperforming and outlasting traditional metal and mineral materials in a wide range of applications.

Without doubt, the workhorse of construction plastics is High Density Polyethylene (HDPE). And the company that has led the development of HDPE for drainage products is Advanced Drainage Systems, with a record of painstaking research and breakthrough applications dating back to the 1960s.

Today, more than six billion feet of ADS pipe are in service around the world. You can see ADS products everywhere on major construction sites with drainage requirements. The distinctive Green Stripe on the pipe is your assurance of the best in quality and service from the world leader in polyethylene drainage products.

Markets we serve

ADS HDPE drainage products are used in a wide variety of end-use applications:

- · Storm and sanitary sewers
- Highway drainage
- Agriculture
- Recreation
- Mining
- · Septic systems and leach fields
- · Landfills and waste management
- Retention/detention systems
- Residential drainage

Customer service

ADS operates 21 manufacturing facilities throughout the U.S. Custom design and special fabrication work is handled through production centers established at many of these plants.

Local requirements are promptly serviced through a nationwide network of more than 30 stocking Customer Service Centers. ADS



representatives are on hand to provide factory-direct product and installation information. An experienced group of regional engineers serves government agencies, private consultants, and contractors with specification guidance, project design assistance, and overall technical support.

The following pages highlight the complete line of ADS drainage products, and explain the considerable advantages of HDPE for drainage applications.

High Density Polyethylene: <u>The preferred pipe material</u>



Pipe is generally divided into two categories: rigid and flexible. A pipe is rigid when it will not accept any deflection without structural distress. Examples are concrete, clay, and cast iron. Flexible pipe will accept at least 2 percent deflection without structural distress. Steel, aluminum, and thermoplastics fall into this category. We can further divide flexible pipe into elastic materials, which are the metal pipes, and viscoelastic, represented by thermoplastic materials.

While rigid pipe can be traced back to the Roman Empire, high density polyethylene drainage pipe has only been in use since the 1950s. In this relatively brief period, HDPE has been the subject of exhaustive laboratory tests and field experiments. In real-world installations, the product has built an impressively successful record of trouble-free performance. Today, we see an accelerating trend among construction engineers to replace steel and concrete piping with polyethylene because of its superior mechanical and chemical properties and cost-effective handling characteristics.

- 1. Structural strength. HDPE's toughness and flexibility enable it to withstand fill heights of 100 feet or more. Tests at Utah State University show that heavy soil loads will fracture the wall of rigid pipe, but under identical conditions, will produce only moderate deflection in flexible polyethylene pipe. HDPE will not crack or break during proper installation, and maintains its impact strength at sub-zero temperatures.
- 2. Abrasion resistance. The following chart indicates that the



material loss rate of HDPE is only 15% to 25% that of reinforced concrete under controlled experi-



ments. And decades of in-situ testing and real-world installations have demonstrated polyethylene's interior toughness. It is used successfully with harsh mining and dredging slurries, and is virtually immune to damage from even the most aggressive sewer cleaning tools.

- 3. Light weight. Polyethylene weighs 50 to 75% less than comparable steel pipe, and is about one-tenth the weight of concrete. This translates into easier handling, smaller work crews, reduced heavy equipment requirements, and improved safety.
- Chemically inert. HDPE is highly resistant to corrosion, and is immune to galvanic and electro-



mechanical reaction. As seen in the diagram, polyethylene can safely be used with soils or effluents with a pH range of 1 to 14.

Additional information available from ADS:

- 1. ASTM D 3350, "Standard Specification for Polyethylene Plastics Pipe and Fittings Materials"
- 2. ADS Tech Note 2.108, "Chemical Resistance Properties of Corrugated Polyethylene Pipe, Fittings, and Manholes"
- 3. ADS Tech Note 2.116, "Abrasion Resistance of Piping Systems"
- 4. "Practical Approach to the Study of Polyolefin Weatherability", R.J. Martinovich and G.R. Hill

HDPE pipe's durability is dramatically demonstrated by this highway cross drain installed in 1981 near an abandoned strip mine. The metal pipe used prior to this time had to be replaced every few years due to the highly acidic (an average pH of 2.1) and abrasive run-off from the mine. Today, after more than 17 years, the polyethylene cross drain shows no sign of needing replacement.





N-12[®] Smooth Interior Pipe



N-12 has built an impressive service record in storm water and other drainage applications where hydraulics are important and durability is critical. The pipe is offered in diameters from 4" through 60", in nominal 20 ft. lengths.

Corrugated exterior adds strength

The natural toughness of HDPE is enhanced by the corrugated exterior which increases the structural strength of N-12 pipe. It is designed for use under both H20 and E80 live loads, or with fill heights of 50 feet or more. In fact, field research shows the pipe performing well at depths exceeding 100 feet. Even under harsh backfill conditions and shifting soils, N-12 has continued to give outstanding performance.

Smooth interior provides superior flow

In order to meet the most demanding hydraulic requirements, N-12 is manufactured with a smooth inner wall. This design insures maximum flow capacity, and PE's resistance to abrasion and corrosion will sustain this capacity for years into the future. With a recommended 0.012 rating, the pipe is ideal for applications requiring low Mannings "n" values.

Unparalled joint integrity

All N-12 pipe features quick and easy ProLink bell-and-spigot joints with rubber O-ring gaskets conforming to ASTM F 477. The **N-12 ProLink WT**[®] series is a water-tight 4" through 48" system that meets ASTM D 3212 @ 10.8 psi, even when deflected and misaligned.

N-12 ProLink Ultra® pipe

The industry's best soil-tight system is offered by N-12 ProLink Ultra pipe in 12" through 42" diameters. Its built-in gasketed bell joint is the same O.D. as the pipe, so there is no need to dig bell holes to hold grade in the trench. ProLink Ultra is manufactured in 6m (19' 8") laying lengths.

Convenience on the jobsite

N-12's light weight leads to a number of job site economies: more pipe per delivery truck, easier handling, smaller crews, less heavy equipment, less pipe damage, and better safety. The pipe cuts easily and requires no beveling for joining.

- 1. AASHTO Specification M 252
- 2. AASHTO Specification M 294
- 3. ASTM D 2412
- 4. ASTM D 3212
- 5. ASTM F 477
- 6. ADS Tech Note 2.115, "Comparative Pipe Stiffness"
- 7. ADS Form # L 1096, "ADS N-12 & N-12 HC Pipe"
- 8. ADS Tech Note 4.103, "Plastic Pipe Design" by James B. Goddard
- 9. ADS Tech Note 2.120, "Stormwater Retention/Detention Systems" by Ed Kampbell. P.E.
- 10. PennDOT Deep Burial Study



N-12°HC High Capacity Large Diameter Pipe



Eight years of intensive design and production testing have led to the introduction of N-12[®]HC 42", 48" and 60" HDPE pipe. It features a smooth inner wall for efficient high-volume flow, and a smooth exterior for structural integrity.

Innovative wall design

The wall section resembles a honeycomb, braced circumferentially with closely spaced circular ribs. This design increases both pipe stiffness to handle installation stresses, and structural strength for heavy loads, without excessive increases in pipe weight. In tests at Utah State University, a 20-foot section withstood soil pressures equivalent to 180 feet of cover. These results and others indicate that N-12 HC may have the most stable large diameter wall profile ever manufactured.

Integral, water-tight joints speed installation

Factory-installed bell-and-spigot joints with ASTM F 477 rubber O-ring

gaskets provide water-tight connections meeting ASTM D 3212 @ 10.8 psi.

Long 20-foot lengths are easily transported (one truck can deliver 120 feet of 48" pipe), and require far fewer joints than concrete pipe in the same diameters. Its lightweight (only 640 lbs. per 20-foot section of 48" pipe) reduces the need for manpower and heavy equipment. Total installation time can be reduced by as much as 30% over equivalentlysized concrete pipe.

Additional information available from ADS:

- 1. AASHTO M294
- 2. AASHTO Specifications MP7
- 3. ASTM D 2412
- 4. ASTM D 3212
- 5. ASTM F 477
- 6. ADS Tech Note 2.115, "Comparative Pipe Stiffness"
- 7. ADS Form# L 1096, "ADS N-12 & N-12 HC Pipe"
- 8. ADS Tech Note 4.103, "Plastic Pipe Design" by James B. Goddard

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Standard Corrugated Pipe



ADS single-wall corrugated HDPE pipe is ideal for drainage projects where flexibility, light weight, and low cost are important. It is available in 3" to 24" diameters, and sold in coils through 8" and 20-foot lengths in larger sizes.

Multiple drainage applications

ADS pipe has been used for decades on farms, golf courses, parks and playing fields to keep surfaces dry by channeling away excess underground moisture. Homeowners find it to be an economical, easy-toinstall solution to all kinds of residential drainage problems: downspout run-offs, foundation and window well drains, driveway culverts, and wet spots on the lawn. ADS single-wall pipe is also used for highway edge drains and other construction applications where economy and durability are important.

Perforated and non-perforated

For subsurface water collection or leaching action, ADS pipe is offered with uniform slots and drilled holes. Non-perforated pipe is available when water must be moved by gravity flow from one point to another.

- 1. AASHTO Specification M 252
- 2. AASHTO Specification M 294
- 3. ASTM D 2412
- 4. ASTM D 405
- 5. ASTM D 667
- 6. ADS Tech Note 2.115, "Comparative Pipe Stiffness"
- 7. ADS Tech Note 4.103, "Plastic Pipe Design" by James B. Goddard



On-Site Septic Systems



SB2[®] Gravel-less Leach Bed Pipe

In many areas, the SB2 system can be a cost-effective alternative to conventional leach beds. The product consists of 8" or 10" single wall corrugated polyethylene pipe with specially located perforations, wrapped with either ADS Drain Guard[®] nonwoven geotextile or knitted ADS Sock.

The outside diameters of the pipe provide an equivalent of 2 to 3 square feet of soil absorption area per lineal foot. The location of the drain holes (60 degrees off the bottom center line) provides added sludge storage capacity, which increases retention time. The Drain Guard protective wrap is sonically welded to the tubing, and allows free passage of effluent to the soil while limiting soil particle infiltration.

ADS TripleWall™

Using state-of-the-art extrusion technology, this three-layer HDPE pipe has unprecedented beam strength, far exceeding the stiffness requirements of ASTM F 810. A co-extruded smooth inner wall and corrugated center section is covered by an extrusion-laminated white outer wall. A deep bell coupling is spun-welded to the pipe and is designed to fit all standard 4" sewer and drain fittings.



TripleWall pipe's exceptional stiffness permits assembly on work stands, and its light weight allows for one-man installation. It is produced in 4" diameters in 10 ft. lengths, either solid or with standard 5/8" perforations set 120° apart.

Standard Pipe and Gravel

ADS perforated single wall corrugated pipe is the economical choice for wastewater disposal in conventional gravel leach beds. Polyethylene's toughness and chemical resistance assure many years of trouble-free service.

Leaching Chambers



Sturdy, lightweight plastic units provide optimum unmasked leaching surface. Effluent flows freely to uncompacted backfill through open bottoms and innovative sidewalls with louvers that prevent migration into the chamber. Units measure 76" long x 34" wide with a choice of standard 14" height or an 11" low profile model. Installation requires no stone or gravel, and requires one person with only a backhoe, level, and a rake.

AdvanEDGE®

ADS AdvanEDGE geocomposite pipe (see page 12) is commonly specified for perimeter drainage for leaching fields and landfills.

- 1. ASTM F 405
- 2. ASTM F 449
- 3. ASTM F 667
- 4. ASTM F 810
- 5. ADS Form# L 4000R, "SB2"
- 6. ADS Tech Note 2.115, "Comparative Pipe Stiffness"

Couplings and Fittings



ADS offers the industry's most complete selection of joining systems for gravity-flow pipe. The Standard, Pro Link, and Series 35 lines provide varying degrees of soil and water tightness, so cost constraints can be more easily balanced with project requirements.

Standard Drainage **Couplers and Fittings**

For many less critical drainage applications, ADS standard split couplers and fabricated fittings will provide excellent performance at the lowest installed cost. Split couplers are often used for field repairs, and for slope drains where extra pull-out resistance is needed.



Standard and Fabricated Drainage Fittings

ProLink[®] Couplers

Molded high density polyethylene gasketed couplers provide soil, silt or water tight joints for storm sewer and culvert pipe. Bell/bell styles are available in 12" through 24" sizes, and single bell integral couplers are offered for 30" through 60" pipe. *The N-12 ProLink WT® series provides a water-tight 12" through 48" system that meets ASTM D 3212 @ 10.8 psi.* Split couplers and ProLink ST® couplers are designed for soiltight and silt-tight applications.

Series 35 Sanitary Fittings

Watertight service is assured with a full selection of thermo-molded PVC couplings, tees, elbows, wyes, caps, and adaptors. Each is fitted with an O-ring seal, and is designed to connect not only corrugated poly-ethylene pipe but also PVC, concrete and other materials.

- 1. AASHTO Specification M 252
- 2. AASHTO Specification M 294
- 3. AASHTO Specification MP7
- 4. ASTM D 2321
- 5. ASTM D 2412
- 6. ASTM D 3034
- 7. ASTM D 3212
- 8. ASTM F 477
- 9. ASTM F 1417
- 10. "ADS Couplings" brochure
- 11. ADS Tech Note 2.115, "Comparative Pipe Stiffness"
- 12. ADS Form# L 1096, "ADS N-12 and N-12 HC Pipe"





AdvanEDGE is a panel shape pipe offered in 12" and 18" heights, and in coils up to 400 ft. The primary benefit of its panel design is quick drainage response after introduction of water, making it ideal for timecritical applications such as hightraffic road and track beds. Other popular uses include building foundation drainage, golf courses, athletic fields, airport runways, railroad track ballast, and perimeter "curtain" drainage for landfills and leaching fields.

Designed with a difference

Competitive panel shape products depend on the tensile modulus of a geotextile wrap to maintain an open flow channel. When this low-modulus fabric collapses, the waterway is obstructed, reducing its hydraulic efficiency.

AdvanEDGE pipe does not rely on the geotextile for structural support. Its strength is derived from a corrugated cylinder maintained by pillars located strategically throughout the core. The result is a series of ovalshaped sections with all-direction strength. This completely enclosed waterway with fewer projections allows AdvanEDGE to function as a pipe, discharging more water to the outlet.

Stronger material

HDPE has an unbeatable combination of mechanical and chemical properties for drainage pipe applications. Many competitive geocomposite cores are made from less desirable materials such as low density PE or styrene.

Superior flow

The chart below shows Advan-EDGE's hydraulic capacity vs. slope. AdvanEDGE has more than twice the hydraulic flow of competitive pipe.



Economical installation

The slim-line profile of AdvanEDGE pipe allows for installation in a narrow trench, easily dug with highspeed trenching equipment. It requires no gravel or select backfill, and can be installed directly against a wall or structural member. Advan-EDGE can also be installed horizontally directly on the subgrade beneath playing turf and golf greens. This orientation accelerates water removal and cuts labor costs because no trenches are required.

- 1. ADS Form# L 2020/98, "ADS AdvanEDGE Pipe"
- 2. ADS Form# L 2006/98, "ADS 6" AdvanEDGE Pipe"
- 3. "Geocomposite Edgedrain System Design" by James B. Goddard
- 4. Kentucky Transportation Center Report KTC-97-5, "Performance and Cost Effectiveness of Pavement Edge Drains"



Geosynthetic Products



ADS offers a complete selection of construction fabrics and other geosynthetic products for soil stabilization and reinforcement, filtration, separation, erosion control, and subsurface drainage.

Geotextiles

ADS woven and non-woven Geotextiles offer a range of styles to fit a variety of subsurface construction applications. Durably constructed of polypropylene, ADS Geotextiles provide permanent, cost-efficient solutions that are completely environmentally compatible. These fabrics are resistant to naturally encountered chemicals, alkalies, acids, and biological degradation, and will meet or exceed AASHTO M 288 specifications.

Geogrids

These products feature large openings and are available in a variety of shapes and thicknesses. Geogrids provide strong soil support, with particular effectiveness in embankment reinforcement, erosion control, and shoreline protection under rip-rap.

Silt Fence

Used to contain sediment runoff from construction borders and newly graded slopes, ADS silt fence is available in 100-foot rolls with preassembled hardwood stakes and a choice of fabrics and other options.

Erosion Control Mats

Uniquely designed three-layer netting mats provide effective surface protection for slopes with existing vegetation or newly seeded soil.

Filter Fabric Wraps

Extra-strong synthetic materials are used with perforated drainage pipe to prevent infiltration of fine soil particles while allowing water to flow freely.

- 1. Drain Guard[®]. Designed for normal handling conditions, Drain Guard is a spunbound nylon wrap with a unique bonding process that provides ultraporous filtration while restraining and stabilizing sandy/silty soils.
- 2. ADS Sock. This is a machineknitted polyester drain envelope that stretches to fit snugly over the pipe. It has extra toughness and flexibility to withstand unusually rough installation and handling conditions.

- 1. AASHTO M 288-90, "Standard Specification for Geotextiles"
- 2. ADS Form# L 3001, "ADS Geosythetic Products"
- 3. ADS Form# L 3002, "ADS Geogrids"
- 4. ADS Product Note 3.102, "ADS Drain Guard and Sock"



Surface Drainage Products



Heavy duty inline drains and drain basins from ADS are widely used in commercial landscaping, parks, and recreational fields. They are available in 8" through 30" sizes, and are delivered with factory-installed watertight gasketed adaptors for corrugated polyethylene and other pipe materials.

Built for durability

All units feature cast iron surface grates and heavy molded PVC bodies, and can stand up to loads imposed by mowers, small tractors, and other lawn equipment. The 8" and 10" drains are economical, yet have been shown to have up to 10 times the service life of other plastic products. The 12", 15", 18", 24", and 30" units with a concrete collar are H-20 DOT rated, which permits use in driveways, parking lots, and similar roadway applications.

Delivered ready to install

Products are sized and assembled to meet individual job specifications. Pipe adaptors are installed at elevations conforming to project requirements. The larger drain basins are custom fabricated, and can be produced to a maximum height of 10 ft.

All units are engineered to applicable ASTM standards and environmental regulations.

Additional information available from ADS:

ADS Form# L 1074/94, "ADS Surface Drainage Products"



Drain Basins

For changes in pipe direction or elevation, multiple inlets, and transition to other pipe sizes or materials.



- 8": adaptors for 4" and 6" pipe
- 12", 18", 15", 24" and 30" • Variable adaptor elevations • 12": 4" - 12" outlets available • 15": 4" - 15" outlets available • 18": 4" - 18" outlets available • 24": 4" - 24" outlets available • 30": 4" - 30" outlets available

Market/Technical Support



ADS is more than a products manufacturer. Over the past three decades, the company has committed substantial resources to expanding the market for HDPE drainage production applications historically dominated by concrete and metal pipe.

Technical assistance

ADS has a team of 20 regional engineers working to obtain state & regional specification acceptance.

Along with national representatives with AASHTO and ASTM, ADS engineers are in daily contact with customers, offering professional guidance on new applications and unique installation situations. These often involve the design and construction of custom fittings, which are fabricated in special departments located at many of the company's 21 manufacturing plants.

ADS has also taken the lead in designing totally new applications for polyethylene drainage products. A recent example is the Storm Water Retention/Detention Design Tool, produced on CD-ROM. This comprehensive presentation includes a complete review of preferred engineering practice in determining flow rates, capacity requirements, and system sizing. The CD contains valuable data on watershed definition, drainage pattern layout, rainfall frequency, duration, and intensity, runoff coefficients, calculation of peak flow rates and system storage requirements, and detailed examples of actual installed systems. Users can design their own site plans using a complete selection of pipe and component drawings on insertable AutoCad



Release 13 drawing blocks. Due to the positive feedback on the CD-ROM, ADS will continue to update users with the latest news and data.

Field support

In addition to the regional engineers, ADS customers receive support from 165 field sales representatives, and product specialists based at our three zone offices. These people provide on-site assistance to contractors, engineers and distributors on matters ranging from installation questions to emergency product needs. Deliveries are handled by the largest company-owned fleet in the industry: 180 tractors, over 400 dropside, flatbed and covered van trailers, and local delivery trucks located at each of our 30 Distribution Centers.



Tomorrow's drainage system today



This has been an overview of the polyethylene products developed by ADS for gravity-flow drainage applications.

At ADS, we have seen the enormous cost of rebuilding yesterday's infrastructure, as metals and concrete complete their often limited service life. Today, the *engineered plastic system* is a reality, providing better hydraulic performance, extended service life, and reductions in installation and maintenance costs. Tomorrow, you will continue to see new products and applications from ADS, the world leader in HDPE drainage systems.

We invite your call to help solve problems or answer questions. To serve you better, ADS has a nationwide network of sales and manufacturing facilities, so wherever you are, we're nearby.

ADS Sales and Service Locations



ADS corrugated pipe is your assurance of the best in quality and service from the world leader in polyethylene drainage products.

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