

# ***N-12<sup>®</sup> LOW HEAD IRRIGATION PIPE***



THE MOST **ADVANCED** NAME IN WATER MANAGEMENT SOLUTIONS™



# N-12 LOW HEAD IRRIGATION PIPE

## The Thirsty West

Water resources and water rights have become one of the biggest challenges facing the western United States. Explosive population growth, in a region where water is already scarce, combined with frequent rainfall shortages, have highlighted the need for improvement to an aging and inadequate water conveyance infrastructure.

For generations, the distribution of water to arid regions of the western U.S. has been accomplished through irrigation canals and open-earth ditches. As demand for water has increased, the inefficiency of these open-water conveyances has become apparent. In parts of the southwest, water loss from evaporation is estimated at 100 inches per year. When the loss through infiltration is added, the problem becomes even more significant.

Enclosing these canals with pipe is one way of conserving and stretching water supplies. Up to this point, the installation of pipe for irrigation water has been difficult and cost prohibitive due to inadequate, inappropriate, or over-designed pipe.

## The engineered solution

Advanced Drainage Systems, Inc. offers an innovative, cost-effective pipe designed expressly to meet this growing need. ADS N-12 Low Head pipe provides the structural strength, joint integrity, flow capacity, flexibility and economy to serve the needs of this increasingly important market.

Over the last 50 years, Advanced Drainage Systems corrugated high-density polyethylene (HDPE) pipe has built a reputation for economy, durability, and superior performance in gravity-flow, drainage applications. ADS single wall pipe became the preferred product for agricultural, highway, mining, turf-recreation, and residential drainage markets in the early years of the company. ADS improved upon single wall pipe with the introduction of N-12 pipe, the first HDPE drainage pipe combining an annular corrugated exterior for strength with a smooth interior wall for maximum flow capacity.

## N-12 Low Head Pipe

Building on the success of N-12 pipe, the next generation of performance in HDPE pipe has been achieved with N-12 Low Head pipe.

Longer bells and spigots provide for increased joint misalignment allowing for easy field adjustments in curvilinear (radial) installations, while maintaining watertight performance. Multiple polymer composite bands are used on the longer bell to provide additional sealing area and ease of field joint assembly. The extended spigot has two gaskets to provide redundant sealing of the joint. These modifications provide a watertight, yet flexible joint tailored for the low head irrigation market.

In addition to joint improvements, ADS engineers designed a pipe capable of handling the pressure associated with low head irrigation. N-12 Low Head pipe is extruded with a pressure-rated



resin (PE 3408/PE3608) in the liner portion of the pipe. This resin is the same as that used in high pressure gas transmission lines throughout the United States. Although not required in traditional gravity-flow, non-pressure drainage applications, the addition of a pressure-rated resin allows continuous pressure (up to 5 psi) to be applied without detrimental long-term effects.

### Applications

ADS Low Head pipe can be specified for ditch enclosures for irrigation, irrigation pipe replacement, and water conveyance. The pipe is available in 24" (600 mm) through 60" (1500 mm) diameters, and exceeds the requirements of AASHTO M294 and ASTM F2306 due to its HDB (pressure rated) resin and advanced connection design.

### Structural Strength

As a flexible conduit, HDPE pipe withstands vertical pressure by transferring most of the overburden load to the surrounding soil. ADS Low Head pipe will support AASHTO HL-93 and H-25 live loads with a minimum of 12" (300 mm) of cover for 24"-48" (600 - 1200 mm) and 24" (600 mm) of cover for 60" (1500 mm) pipe, which is an important consideration in low head pressure applications under highways and haul roads.

### Hydraulic efficiency

The smooth interior of ADS Low Head pipe provides the superior flow characteristics that are essential for efficient transmission of water. Results confirmed from lab testing indicate a Manning's value of 0.012 is appropriate for design (it should be noted that "n" values tend to increase with slower velocities and larger pipe sizes).

### Durability

High-density polyethylene is an extremely tough material that can easily withstand the normal impacts typical of shipping and installation. It is highly resistant to chemical attack, and is unaffected by soils or effluents with pH ranges of 1.5 to 14. HDPE's ductility and molecular structure result in excellent resistance to abrasion. Polyethylene pipe shows less than 20% of the material loss of concrete pipe in abrasive



environments, and is often specified for harsh mine slurries and as a liner for deteriorated culverts.

#### **Light weight**

HDPE pipe is up to 30 times lighter than traditional piping products, making it far easier to transport and handle. On-site labor and equipment requirements are reduced, with a corresponding reduction in the risk of potential injury.

#### **Fast installation**

Long 20' (6 m) lengths mean fewer joints. Joints are typically the weakest link in any low head irrigation system and should be minimized. ADS Low Head pipe joints push together quickly and easily with the integral gasketed bell and spigot design.

#### **Lowest installed cost of any low head irrigation pipe**

The material cost of HDPE pipe is extremely competitive with other low head transmission pipe materials. When installation costs are factored in, the savings begin to multiply:

- Polyethylene's light weight cuts shipping charges
- Fewer people are needed for on-site unloading and handling
- Heavy equipment requirements are reduced
- Long lengths are easy to handle and require fewer joints
- Bell and spigot joint design reduces labor time for assembly

#### **Installation recommendations**

Proper installation is crucial for the long-term performance of any pipe structure. The basic procedures and precautions for ADS Low Head pipe are very similar to the requirements of most other pipe products.

ADS Low Head irrigation pipe is a flexible conduit which transfers live and dead loads to the surrounding soil. Class I or II soils may be used for backfill, and should be compacted to at least 90% standard Proctor density. Contact an ADS representative for any specific installation considerations.



# N-12 LOW HEAD PIPE SPECIFICATION

## SCOPE

This specification describes 24- through 60-inch (600 to 1500 mm) ADS N-12 Low Head pipe for use in low head/low pressure applications.

## PIPE REQUIREMENTS

N-12 Low Head shall have a smooth interior and annular exterior corrugations.

- 24- through 60-inch (600 to 1500 mm) pipe shall meet AASHTO M294, Type S or ASTM F2306 with the modifications listed herein
- Manning's "n" value for use in design shall be 0.012
- Where low head applications sustain continuous pressure, the sustained pressure shall not exceed 5 psi and the surge pressure shall not exceed 10 psi

## JOINT PERFORMANCE

Pipe shall be joined using a bell and spigot joint meeting the requirements of AASHTO M294 or ASTM F2306. The joint shall be watertight according to the requirements of ASTM D3212. Gaskets shall meet the requirements of ASTM F477. Gaskets shall be installed by the pipe manufacturer and covered with a removable, protective wrap to ensure the gaskets are free from debris. A joint lubricant available from the manufacturer shall be used on the gasket and bell during assembly.

12- through 60-inch (300 to 1500 mm) diameters shall have a reinforced bell with a polymer composite band installed by the manufacturer.

## FITTINGS

Fittings shall conform to AASHTO M294 or ASTM F2306. Bell and spigot connections shall utilize a welded or integral bell and inline, valley, or saddle gasket meeting the watertight joint performance requirements of ASTM D3212.

## FIELD PIPE AND JOINT PERFORMANCE

To assure watertightness, field performance verification may be accomplished by testing in accordance with ASTM F1417 or ASTM F2487. Appropriate safety precautions must be used when field-testing any pipe material. Contact the manufacturer for recommended leakage rates.

## MATERIAL PROPERTIES

Virgin material for pipe and fitting production shall be high-density polyethylene conforming with the minimum requirements of cell classification 435400C for the corrugated exterior profile, and 445464C, for the interior liner as defined and described in the latest version of ASTM D3350, except that carbon black content should not exceed 4%. The 24- through 60-inch (600 to 1500 mm) virgin pipe material shall comply with the notched constant ligament-stress (NCLS) test as specified in Sections 9.4 and 5.1 of AASHTO M294 and ASTM F2306, respectively. The interior liner resin shall have a material designation code of PE2408/PE3608 by the Plastic Pipe Institute and a Hydrostatic Design Basis of 1600 psi.

## INSTALLATION

Installation shall be in accordance with ASTM D2321 and ADS recommended installation guidelines, with the exceptions that minimum cover in traffic areas for 24- through 48-inch (600 to 1200 mm) diameters shall be one foot (0.3 m) and for 60-inch (1500 mm) diameter the minimum cover shall be 2-feet (0.6 m) in single run applications. Backfill for minimum cover situations shall consist of Class 1 (compacted) or Class 2 (minimum 90% SPD) material. Maximum fill heights depend on embedment material and compaction level; please refer to Technical Note 2.01. Contact your local ADS representative or visit our website at [www.ads-pipe.com](http://www.ads-pipe.com) for a copy of the latest installation guidelines.

## PIPE DIMENSIONS

Nominal Diameter in. (mm)	24 (600)	30 (750)	36 (900)	42 (1050)	48 (1200)	60 (1500)
Pipe O.D.* in. (mm)	27.8 (719)	36.0 (914)	42.0 (1067)	48.0 (1219)	54.0 (1372)	67.0 (1702)

\*Pipe O.D. values are provided for reference purposes only, values stated for 24- through 60-inch are ±1 inch. Contact a sales representative for exact values.



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