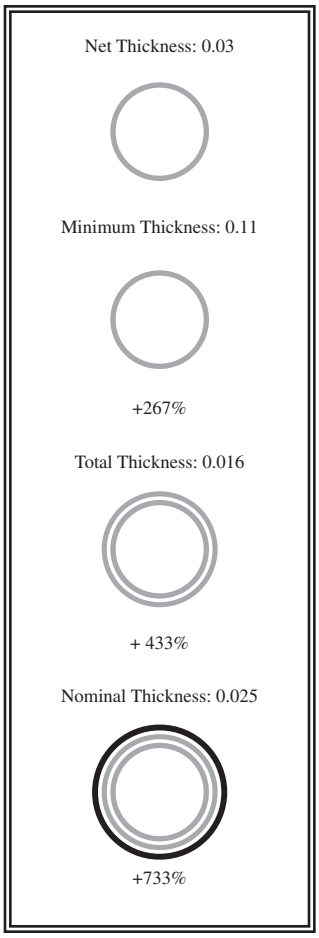
Pipe A-11

Ductile Iron Pipe Research Association

WHY MINIMUM PRESSURE CLASS?

In the 1991 revision of the ANSI/AWWA C 150/421.50 designs standard for Ductile iron pipe, **Pressure Class** designations were incorporated. This raised questions from some utilities and engineers that traditionally specified Ductile iron pipe based on a Thickness Class designation. **Pressure Class** designations refer to the pipe's ability to hold pressure, whereas Thickness Class refers only to wall thickness. And, as shown below, the same conservative design approach for determining Ductile iron pipe wall thickness continues without compromise.



Example Design Criteria:

- Nominal diameter: 6 inches
- Laying condition: Type 5
- Depth of cover: 7 feet
- Working pressure: 100 psi.
- Surge allowance: 100 psi.

Net Thickness:

Designing in accordance with AWWA CI50, using the following conservative design criteria, a "net thickness" of 0.03 inches results:

- Factor of Safety: 2 for internal pressure, including surge
2 for ring bending
2 for ring deflection
- Soil Density: 120 pcf

Minimum Manufacturing Thickness:

In accordance with AWWA C150, a **service allowance** of 0.08-inches is added to the pipe wall "net thickness." This results in a "minimum thickness" of 0.11-inches which has **267%** more wall thickness than required for design conditions.

Total Thickness:

To assure "minimum thickness," a diameter-dependant allowance for the **casting tolerance** is added to the "minimum thickness." In this example an allowance of 0.05-inches is added to the "minimum thickness." We now have a "total thickness" of 0.16-inches which has **433%** more wall thickness than required for design conditions.

Nominal Thickness:

The "total thickness" is often much less than the minimum pressure class "nominal thickness." For our example the minimum pressure class "nominal thickness" of 0.25-inches exceeds the "total thickness" by an additional 0.09-inches. Thus, for this example, the minimum pressure class nominal thickness is **733%** greater than required for design conditions.

This conservative design approach is unmatched in the pressure pipe industry. Using this approach, Thickness Class 52 Ductile Iron pipe would translate into a **Pressure Class 1,000** with **933%** more wall thickness than needed for the above design conditions.

Many utilities site corrosion concern as a reason for adding wall thickness. However, in our example, while the extra 0.06- inches found between Thickness Class 52 and **Pressure Class 350** provides a tremendous increase in pressure capacity, in a corrosive environment it would only extend the life of the pipe marginally. The most economical design calls for minimum **Pressure Class** selection based on loading requirements and polyethylene encasement (ANSI/AWWA Cl05/A21.5) to combat corrosion.