

# Information File Note

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TOPIC: Ductile Iron

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## Comment

- 1) Ductile Iron has been used in Europe for municipal castings for over 30 years. It is the material of choice due to the inherent properties available with this material
- 2) The introduction of DI municipal occurred shortly after the change was made from Grey iron to ductile in water/sewer pipes. Since then all 'performance' products have moved to ductile inc. pipes, valves, fittings, hydrants etc. There are very few products left in the water/sewer industry that are manufactured from grey iron.
- 3) The change to DI is due to the superior mechanical performance of ductile iron compared to the traditional materials. DI has a significantly higher strength to weight ratio therefore products can be made lighter and stronger. In addition due to the ability to withstand impact the product is highly suitable for situations such as pumping loads (water pressure) and dynamic traffic impact since the risk of catastrophic failure is minimised. DI has a significantly higher Tensile Strength (circa 68,000psi) compared to the general Grey Iron specified (circa max 35,000psi).
- 4) There are a number of key reasons why municipal castings are designed in DI:
  - **Designability.** DI is an engineered material with a predictable mechanical performance (GI has a wide parameter of failure and cannot easily be predicted). This allows complex shapes, thin sections and tight tolerances to be manufactured. In turn this allows performance designs to be made giving the end user the benefit of advanced features.
  - **Strength.** DI has a significantly higher strength to weight ratio. This allows a reduction of weight without any sacrifice in strength. Products are highly durable due to the fact that they are impact resistant and therefore more suitable within a dynamic loading application i.e. road traffic.
  - **Weight.** In general the weight of DI products are 50% lighter than the GI counterparts. Whilst this is important in terms of lifting the principle issue is one of posture which cannot be addressed through weight alone.
- 5) The growth of DI in Europe is widespread. In Western Europe the markets are principally DI only (particularly France, UK, Spain, Italy). This change occurred within about a 10/15 year period. For example the UK completed the switch in 1998/99.
- 6) Most developed markets utilise DI. The driver is often the host manufacturers who redevelop both process and product to protect their businesses from attack from low cost economies with poor products e.g. India. Product and process development has not taken place within the USA and most designs are 50 years old with no user features and benefits.
- 7) There are no markets which have moved from Grey Iron to DI. All Grey Iron markets are changing to DI due to the superior mechanical properties of the material and the

advantages that can be gained by both designer and end user.

- 8) There are always some queries regarding the performance of our products due to the lightweight and 'thinner' appearance of the covers. In application our covers are three to four times stronger (note: static load strength) therefore are very effective in terms of withstanding traffic stresses. The concern of durability is negated due to the fact that covers are designed for a more rigorous market (Europe) and have stood the test of time.
- 9) The corrosion of DI (see separate note) is not an issue. GI and DI corrode at the same rates. Despite the concerns of many users about Hydrogen Sulphide gas this is not an issue. You will not see DI covers that have failed due to the effects of corrosion.
- 10) In recent months US manufacturers have recognised the threat of the new products and are finally looking at development. Many stakeholders inc. OSHA, now recognise the issues that old designs create such as back strain and compensations costs. The requirements within the **OSH act** also necessitate the move toward new designs to protect the workforce particularly now that solutions are available and engineers and municipalities are aware of the dangers (also published by Liberty Mutual Insurance).