



Willman Industries Technical Fact Sheet – Solution Strengthened Ductile Iron Grades

For 50 plus years the foundry industry has produced ductile iron to the same, almost unchanged, specifications which are defined by their tensile strength, yield strength and elongation as designated in the table below:

Grade	UTS (Tensile) Strength (min)	Yield Strength (min)	% Elongation (min)
60-40-18	60,000	40,000	18%
80-55-06	80,000	55,000	6%
100-70-03	100,000	70,000	3%

These are the specifications broadly covered by ASTM A536

There have been some technical advances in the meantime, specifically austempered ductile iron, which provides higher strengths with elongations up to 11%. Although very good products they have the disadvantage of requiring a special and not inexpensive heat treatment.

A new generation of ductile irons has been developed by Willman Industries. These new grades produce higher strengths with even greater elongation. These grades can be produced as cast with greater uniformity of casting properties than the original ductile iron grades shown above.

Willman Industries has developed three new tentative specifications which are as follows:

Grade	UTS (Tensile) Strength (min)	Yield Strength (min)	% Elongation (min)
DI-75	75,000	55,000	21%
DI-80	80,000	60,000	18%
DI-90	90,000	65,000	15%

These new grades do not exhibit the section sensitivity of the original ductile iron grades. Also, the hardness and mechanical properties are extraordinarily uniform throughout all the casting sections.

To simplify the comparison, the middle grade (80-60-18) meets the elongation requirement (18%) of the standard 60-40-18, but possesses higher tensile and yield strength. However for those solely interested in elongation there is a new grade, 70-55-21, which has higher elongation as well as higher yield and tensile strength. It should also be noted that the yield to tensile strength ratio of these new grades is typically 75% whereas the first generation has a ratio of about 65%. This gives engineers more leeway in design, since the limit of proportionality is higher for any given tensile. Similarly the fatigue strengths are higher at any given elongation.

If you wish to know more or discuss applications please call our general phone number at 920-668-8526 and request technical support from one of our staff engineers.