Why Use S355 Steels?

Discover why S355 is the go-to structural steel for welding. Explore its superior mechanical properties compared to S275 steels. All from (CLIENT) - Your steel expert!

Structural steels are an attractive option for construction purposes as they exhibit high strength, toughness, and fatigue resistance under load. Because of their advanced properties compared to plain steels, they find extensive use in construction services.

Simple to manufacture and entirely recyclable at the end of their useful life, and while often seen as being a more expensive option, the advanced properties of structural steels often outweigh commercial issues. When resistance to mechanical conditions is required, the high ductility of structural steels is a distinct advantage.

However, many designers are unimaginative when it comes to selecting steels for structural applications and often choose from a small range of these resilient steels. Typically, engineers will opt for a steel such as an S275, since this class offers good weldability and machining properties. If a greater resistance to applied forces is required, architects will often look no further than the JR version of the S275 alloy, which offers elevated mechanical properties.

S355: The Practical Alternative to S275.

However, structural engineers and architects often overlook some of the credible alternatives to **S275** class, and most notably **S355**. This medium alloy carbon-manganese steel exhibits good yield and tensile strength, but with a good level of ductility. S355 has good weldability by everyday welding processes and is able to exhibit good impact resistance even in sub-zero temperatures. Those properties alone make S355 a more attractive option than steels such as S275.

Low carbon steel S355 is characterised by the addition of 1.6% manganese, and 0.5% phosphorus, silicon, and sulphur respectively. Carbon is no higher than 0.22%. This chemistry makes for a weldable steel with excellent workability.

S355 offers an excellent strength to weight ratio, and conforms to **BS EN10025**. On paper S355 might not seem too dissimilar to S275, but it is the small differences that make it the material of choice in a growing number of structural applications.

Superior Structural Properties.

Chief amongst these is its ability to maintain a good degree of strength at temperatures down to -20°C, which outperforms S275 significantly. Properties of this kind are becoming increasingly important to structural engineers as weather conditions on the planet become unpredictable, and structural strength has to be guaranteed under all environmental conditions.

But one of the most desirable factors is its enhanced mechanical properties weight for weight when compared to other structural steels. This means that an equitable strength can be obtained from smaller sections of material. The designer can rely on the same structural

strength from reduced cross-sectional areas and that in itself becomes an important factor since this then reduces the overall burden of welded sections.

Making Welding Easier.

Welding in structural steels is always an area of concern for structural engineers, and being able to keep welds to a minimum is essential. The non-uniform heating and cooling in both the weld and localised base metal produce a thermally-impacted area known as the **heat-affected zone** (HAZ). This area is typified by **cold crack susceptibility**, and residual stress in the welds. Furthermore, the HAZ has been identified as being an area for hydrogen embrittlement in carbon manganese steels such as S275 and S355. This becomes and increasing problem as the ambient temperature reduces.

Since it is not possible to remove all of the effects of the HAZ by post conditioning, reducing the number and size of welds becomes the main goal of the structural engineer. S355 grade structural steel is ideal for this since it can be used in smaller sections, but the problem can be further alleviated by the use of welding electrodes to suppress hydrogen ingress during the welding process.

Low alloy steels such as S355 are perfect for use with general low-hydrogen manual metallic arc (MMA) electrodes such as **E7018**, which give a good finish while reducing the diffusible hydron that can enter the weld. The combination of reduced weld area and diffusible hydrogen make S355 a steel of choice for structural applications.

Structural engineers and designers are becoming increasingly responsive to the use of S355 in place of more usual steels like S275. Its mix of strength in smaller sections and ability to be used at lower temperatures are highly sought after properties. The fact that welding HAZ and **hydrogen embrittlement** can be further controlled are an added bonus.

Steels such as S355 are now commonly regarded as both economically and technically viable alternatives to everyday constructional materials like S275. Low carbon steels with specialist chemistry and advanced properties are now seen as the industry standard in a number of everyday commercial and building solutions. (CLIENT) can help you understand the best steel products for your application from our extensive range. Our ability to meet the needs of industrial sectors is unmatched, so call us now and let our expert team assist you.