

ESSENTIAL STEEL PERFORMANCE AT FORGING

- **Guardrail Steel Composition Alloyed with Other Metals**
 - **Additional Chemical Additives to raise Performance**
 - **Compare Low Performance Steel without Additions**
 - **Tensile Strength and Elongation Properties**
 - **Ductility essential to the Bending and Curving capabilities at severe impacts.**
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Steelmaking is the process of producing steel from iron ore and/or scrap metal. In steelmaking, impurities such as nitrogen, silicon, phosphorus, sulfur and excess carbon (important impurity) are removed from the sourced iron, and alloying elements such as manganese, nickel, chromium, carbon and vanadium are added to produce different grades of steel. Limiting dissolved gases such as nitrogen and oxygen and entrained impurities (termed "inclusions") in the steel is also important to ensure the quality of the products cast from the liquid steel.

Steelmaking has existed for millennia. Today there are two major commercial processes for making steel, namely basic oxygen steelmaking, which has liquid pig-iron from the blast furnace and scrap steel as the main feed materials, electric arc furnace (EAF) steelmaking, which uses scrap steel or direct reduced iron (DRI) as the main feed materials.

Steel grade:

Each steel grade has a number of explicit attributes associated with the particular standard that it complies with, whereas a general term description such as MILD STEEL can cover more than one grade or standard and also no standard.. When steel is purchased to meet a specific standard level, the purchaser can be assured that it will meet certain chemistry and/or additional metal components at forging so as to meet mechanical performance requirements.

Steel suppliers:

Some countries have steel merchants who fraudulently supply steel products that are simply not forged to specific performance levels as stated in a purchase order.

Guardrail is pressed world wide by these steel suppliers from mild steel plate and then galvanized but it has very low performance attributes.

This appears and looks the same physically as the steel forged and tested for higher tensile and higher ductile capabilities.

This steel described as (mild steel) is much less expensive and regulators in the purchasing country look sometimes at cost as the governing factor on a project over the human safety factor.

Suppliers themselves issue certificates for this steel without any tests being performed.

All Project Engineers need to have random access to independent testing authorities that by receiving samples of the steel can verify by microscopic and physical testing the steel's performance capabilities.

Most countries receiving foreign manufactured steel guardrail have the product tested usually by their own testing authority.

The cost of this test is very low.

Road construction is an industrial necessity that calls for extreme technical processes in order to protect the millions of road vehicles carrying the population of the country being many millions of people.

Decisions on safety

Civil Engineers understand where a cost saving may be introduced in a project. A project such Road Construction and the fitment of Road Safety Furniture (Safety Barrier Appurtenances) call conjunctively for the highest investment in barrier performance to save lives and horrific injuries.

Impact by errant out of control high-speed vehicles into any low performance steel guardrail will fail to prevent penetration, will not redirect the vehicle back onto the road and likely create serious injuries or death to vehicle occupants.

Guardrail, because this Road Barrier System is deployed worldwide more than any other road barrier, needs to be constructed from the safest material and installed by trained teams of competent specialists.

Benefits to all countries

Guardrail is copied worldwide in many forms. Not many systems however generate safety outcomes at vehicle impacts.

Competent Regulators in every country have available at no cost the results of extensive Crash Tested Road Barrier Systems

Europe (EN Standard), the US (MASH Standard) as well as Australasia, Canada, Malaysia, South American countries adopt these test standards to qualify their road appurtenances in order to provide safer roads for their people.

The cost of crash testing runs into many millions of \$\$\$\$\$\$, but the results are available to all world countries.

The emphasis in this paper is the product that is tested is the one you can rely on therefore its always important to purchase the right steel. If the price is very low and the steel certificates appear to be not genuine then it is likely that the steel is not to crash tested specification.