

# DUPLEX STAINLESS STEEL AND ALLOYING OF STEEL BY NITROGEN

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## ABSTRACT

Duplex stainless steel is most advanced steel for among the stainless group. It consists of high amount of chromium and slight amount of nickel that's why it is called duplex. They have two phase microstructure consisting of grain of ferrite and austenite. Duplex stainless steel are also magnetic, a property that can be used to easily differentiate them from common austenitic grades of stainless. Duplex stainless steel is having high strength. It has better toughness and ductility and ferritic grades. It has very high corrosion resistance especially by allowing of nitrogen the corrosion resistance increased. It has very good stress corrosion cracking resistance (SCC). Processing of duplex stainless steel can be improved by

- Progress in metallurgy, melting methods allowing chemical analysis optimization, hot workability, and weldability improvements.
- Improved availability in all shapes of products (plates, seamless and welded pipes, bars, coils)
- Chemical analysis optimization allowing use down to  $-100^{\circ}\text{C}$  and lightening of welding parameters requirements.

Nitrogen in steel effect in improving the mechanical and corrosion properties of steel if it remains in solid solution when we make precipitate. Addition of nitrogen improve fatigue life, strength. It fights localized corrosion (pitting, crevice, and intergranular corrosion). Due to this feature and behaviour of nitrogen in steel is good class engineering material. Nitrogen is strong austenitic former, it takes the interstitial position between the steel. It diffuses fast and alloying require less time. There is rapid oxide formation during welding and AM. Nitrogen also helps to increase pitting resistance. Various effect of Nitrogen, we have to give desired % of nitrogen to prevent the resultant material from inconsistent/ irregular mechanical properties. Embrittlement of heat affected zone of welded steel also tends to the poor formability of material. Nitrogen result in strain ageing and reduce ductility. Hardness of steel linearly Increases with %N. More effective when added during steel making.

**Keyword:** ageing, duplex steel, heat affected zone, stress corrosion cracking.

