

# ... for applications and markets with high safety equipments



### • REFINING & PETROCHEMICAL

High performance steels for the most severe applications of tomorrow's refineries and petrochemical plants:

- High Pressure, H<sub>2</sub>, high temperature: CrMo(V) series (HDC, HDT...)
- H<sub>2</sub>S environment: HIC CMn series
- Clad plates: coke-drums, distillation towers, separators

Stainless steels

## COAL

- Special steels for coal processing and usage:
- Power Generation : Heat resistant boilers: steel A299, MnMo Coal Chemicals including gasification / liquefaction: 3.5 Ni
- steels, A203, A387qr11, CromElso®11, clad plates





### GAS TREATMENT

H<sub>2</sub>S resistant steels specially designed to the highest quality level for separators, amine absorbers...

- SOHIC
- Clad plates are also available
- Austenitic & Duplex Grades

### NUCLEAR

A real commitment allied to a strong experience to meet the challenge of the world nuclear renaissance:

- Reactor Pressure Vessels
- Steam generators
- Pressurizers, Boron Injection Tank

A complete range of nuclear grades: A533B, A508, 16MND5, A387gr91, stainless steels...



# Industeel has references all around the world...



... and all markets needing high safety pressure vessel equipments

\* limited selection of references, this list is not exhaustive

\*\* Industeel, referenced supplier for generation 2, PWR, (A)BWR, EPR, AP1000, PBMR reactor types.

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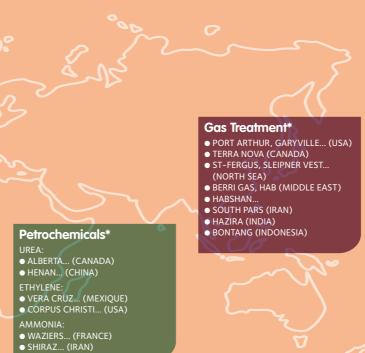
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# transforming tomorrow





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# Industeel





# Steel solutions for pressure vessels

# Steel solutions for pressure vessels

## From design to commissioning...

Pressure vessels are critical pieces of equipment for a wide range of industries ranging from Oil & Gas to Petrochemical and to Power Generation.

In all cases, the design and construction of these equipments must comply with strict design codes such as the European Pressure Equipment Directive (PED) and the American ASME code. They may be supplemented by API, NACE requirements for pressure vessels in oil and gas or refinery service, further defining the exact conditions for safe fabrication and operation of such equipments.

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Finally, there may be additional specifications accounting for severe operating conditions ranging from cryogenic temperatures up to high temperatures in the creep range, or for the presence of corrosive environments where in-service degradation must be considered.

# ... a global experience

Industeel worldwide experience is a great asset to its customers through a global approach of the projects. Industeel can help customers to reduce overall costs and optimize their offer:

• Supply chain adapted to customers needs

- Tailor made optimization for a better workability of the product
- Support for material choice to improve in-service properties and performance • Participation to joint scientific projects and international technical committees
- to improve standards and industrial practices
- Technical support based on strong R&D expertise



These constraints dictate that the steel used in pressure vessel fabrication be particularly adapted for the given service conditions. This is why Industeel has developed a range of tailor-made pressure vessel steels to account not only for improved vessel reliability and increased lifetime and to reduce global life-cycle costs, but also for easier fabrication and assembly. Whatever the nature of the difficulty, be it ease of repair by welding, low temperature impact toughness requirements, resistance to high temperature hydrogen rich environments or resistance to corrosive compounds such as H2S, Industeel can propose a range of carbon, low alloy or solid and clad stainless steels to meet the challenge.















# All components for pressure vessels...

- PLATES and forged plates for shells in different thicknesses
- Plates from 5 mm (3/16") up to over 300 mm (12") and up to 4350 mm width (157"), depending on steel grade Extra large plates with unit weights up to 100 MT (in thicknesses 100/300 mm (4 to 12"))
- Stainless plates up to 200mm thick up to 18 tons
- Roll-bonded clad plates up to 120 mm (4.75")
- Beams for reactors internals stainless steels up to 200 mm thick up to 18 tons

### • SINGLE PIECE DISCS (for tubesheets) up to

- 4 500 mm diameter (180")
- 800 mm thick (32")
- Larger diameters available in ready to weld multi-segment discs

### SINGLE FORMED HEADS PIECE Hemispherical

- Inner diameter 1000 to 3000 mm (39 to 118")
- Thickness up to 250 mm (10")

### Elliptical

- Inner diameter 2000 to 3500 mm (78 to 138")
- Thickness up to 250 mm (10")

### MULTI-PIECES HEADS AND SHELLS

- Ready to weld half shells (diameter up to 6000 mm
- depending on cut back)
- Ready to weld cap and petals for heads (diameter up to 12000 mm)

# In a wide range of grades...

Industeel has developed specific solutions to resist demanding environments.

Our trademarks offer improved properties for particular applications, still maintaining specific code requirements.

For the thicker range of products, Industeel offers the capability to produce forge grades thanks to its proprietary forging+rolling process.

#### Many grades:

- Hydrogen resistant
- High temperature grades
- Corrosion resistant
- Nuclear grades
- Creep resistant grades

# towards new products

SuperElso® 500HIC	A387gr91 CromElso®91	A533B	A387gr22 CromElso®22	A387gr91 CromElso®91
A516gr70 SOHIC CarElso®70 SOHIC	A542D CromElso®22V	20mnMoNi4.5	A387gr11 CromElso®11	16MND5
H I C CLR5 CLR10	2 ¼ Cr 1Mo	A387gr11	3.5Ni	A533
CarElso® HIC	CromElso®22 1 ¼ Cr 0.5Mo	15NiCuMoNb5-6-4 13MnNiMo 5-4	C-Mn steels <i>CarElso</i> ®	A508
C-Mn steel	CromElso®11	16Mo3	A516	MnMo
CarElso®	1 Cr 0.5Mo CromElso®12	A299	A310	C-Mn steels CarElso®
A516		А302В		
Carbon Steels for Pressure Vessels	CrMo grades	Heat Resistant Boiler Steels	Steels for Coal Chemicals Applications	Low Alloy Steels for Nuclear Application

Example of low alloy steel families.

# From research to innovation...

In a rapidly evolving environment, Research, Development and Innovation are keys to success. Industeel has a world class Research Centre equipped with very powerful and technologically advanced means and experienced teams to develop new and better adapted steel solutions and provide technical assistance at every stage of the material life. Working with Industeel is a guarantee to find help and support at each stage of your project.

