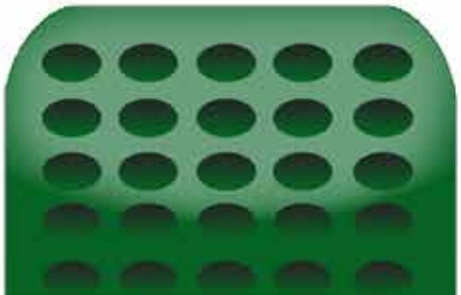
TECTUBI RACCORDI S.p.A.

TECTUBI RACCORDI

GIEMINOX

WELDED PIPES DIVISION



CLADDING PERFORMANCE

Our production on the market
of clad-lined pipes, bends and fittings

Machinery and production process in Tectubi Raccordi factories.

A range of clad piping products unique in the world

Tectubi Raccordi with its Unit **Gieminox-Tectubi Raccordi Welded Pipes Division**, has committed considerable investment to be able to provide pipes, fittings and bends starting from hot-roll bonded clad plates, unique in the world, with excellent results.

At the present time, the above companies are specialized in the production of cladded fittings, cladded bends, longitudinally welded clad and lined pipes, made in every type of backing steel.

The most cost effective solution against corrosion

Today, great efforts are made by the pipeline industry to satisfy the need to transport gas from distant regions to the final market and to find new solutions in terms of both design criteria and new high performance materials. Material resistance requirements are growing due to the fact that easy-to-reach Oil&Gas reserves are largely exploited and new fields are increasingly likely to be located in deep and ultra-deep water, where pressures and temperatures are higher and the environments are more corrosive.

In this situation, low-alloy carbon steels tend to be structurally adequate, but they lack corrosion resistance. On the other hand, stainless steels and nickel alloys resist corrosion environments, but they lack strength and their cost is excessively high. However, pipes, bends and fittings made from metallurgically-bonded clad plates are both a good technical and economic choice for the transport of oil and gas.

CLAD PIPES

Metallurgically clad pipes are mainly produced from roll-bonded clad plates in which bonding, during hot rolling, is created by high temperatures and high pressures.
Clad plates are formed into an open pipe, using a vertically guided forming tool (JCO process), then welded longitudinally using specific welding techniques. Post-welding heat treatments can be carried out according to customer specifications. The quality level, in terms of soundness, of the finished pipe can be assessed using different non-destructive testing: magnetic particle, dye-penetrant, X-ray, automatic ultrasound (phased array), hydrotest. Finally, internal cleaning is carried out by sandblasting or pickling of the CRA layer. The mechanical properties of the pipes can be manufactured according to standard specifications (e.g. API 5LD, DNV OS-F101) and customer requirements.

PRODUCT RANGE

Gieminox-Tectubi Raccordi Welded Pipes Division manufactures a wide range of clad fittings for applications under the most demanding conditions and services.

Outer pipe outside diameter	from 6” to 100”
Wall thickness outer pipe	from 6 mm to 60 mm
Length range	up to 12 m – with a girth weld 18 m or 24 m can be provided
Backing materials	carbon steels, hi-yield grades, low alloy steels
Corrosion Resistant Alloy	S30403, S31603, S31703, S41000, N06625, N08825, etc.

ADVANTAGES

The main advantages of clad pipes are the following:

Clad pipes compared with solid CRA pipes
reduced material costs
less weight due to reduction of wall thickness

Clad pipes compared with overlay welded pipes
improved internal surface condition
no dilution from the base material
homogeneous chemical composition of the CRA layer
N08825 can be used as CRA layer

Clad pipes compared with lined pipes
usable for higher technical demands (risers, steel catenary risers, etc.)
linepipes can be laid by reeling
wider dimensions (higher diameter and thickness) are possible

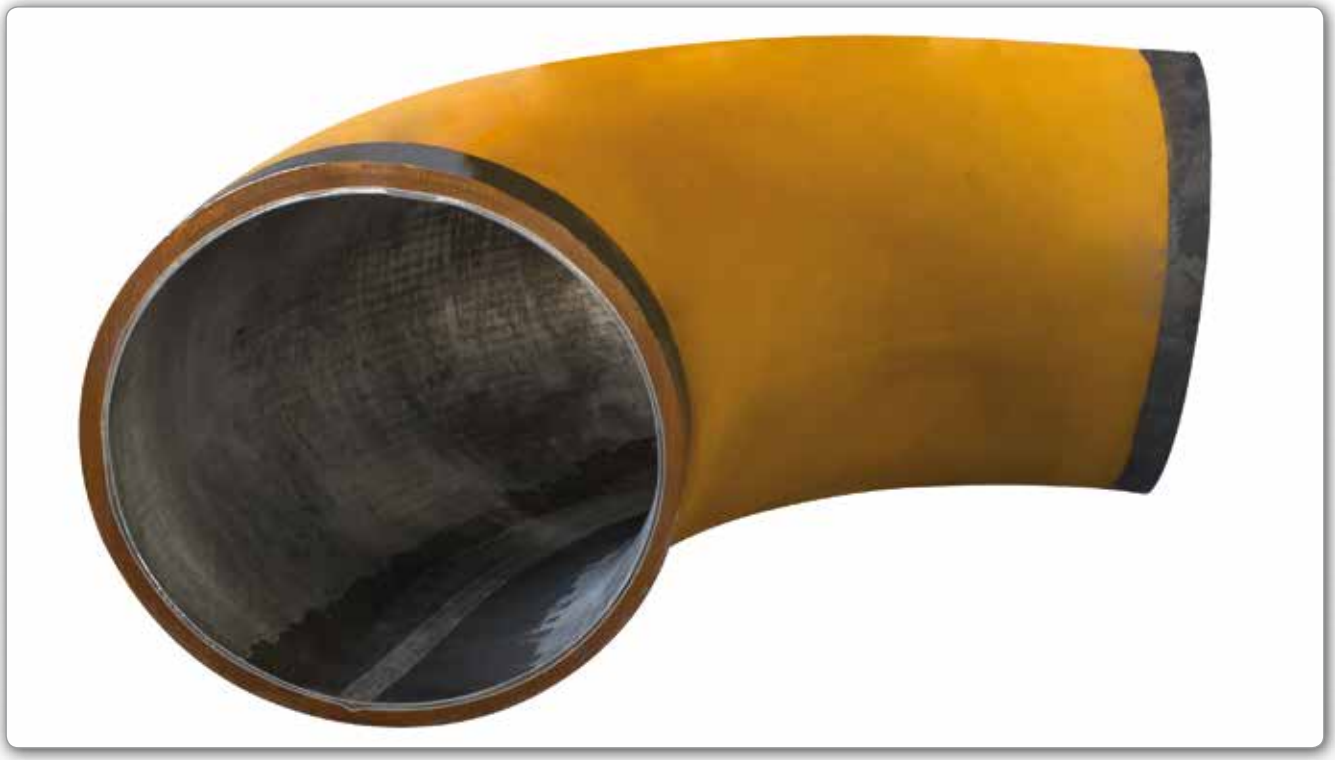
APPLICATIONS

Oil&Gas and Energy sectors: risers, steel catenary risers, pipes for elbows and fittings, gas plant piping systems, refinery piping systems, water injection pipelines, etc.

CERTIFICATES AND ACCREDITATIONS

API Monogram API 5LD

CLAD FITTINGS



Clad fittings can be produced starting with metallurgically clad pipes or by directly processing metallurgically clad plates. Cold formed elbows are produced using clad pipes, produced by **Gieminox Tectubi Raccordi**, using a cold pipe bending machine at the **Tectubi Raccordi** plant.
Hot formed elbows are manufactured either starting with hot formed shells, obtained by forming metallurgical clad plates, longitudinally welded together or by forming in open dies. Reducers are produced by end expansion of clad pipes made by clad plates that are cold rolled and longitudinally welded. End caps are manufactured by hot forming an opportunely cut clad plate. Each fitting can be heat-treated according to customer specifications and requirements. The quality level, in terms of soundness, of the finished fitting can be assessed by different types of non-destructive testing: magnetic particle, dye-penetrant, X-ray, ultrasound. Finally, internal cleaning by sandblasting or pickling of the CRA layer is carried out. The mechanical properties of the fittings can be manufactured according to standard specifications and customer requirements.

PRODUCT RANGE

Tectubi Raccordi manufactures a wide range of clad fittings for applications under the most demanding conditions and services.

Cold formed elbows	outer pipe outside diameter	from 6” to 16”
Hot formed elbows		from 18” to 36”
Reducers		up to 42”

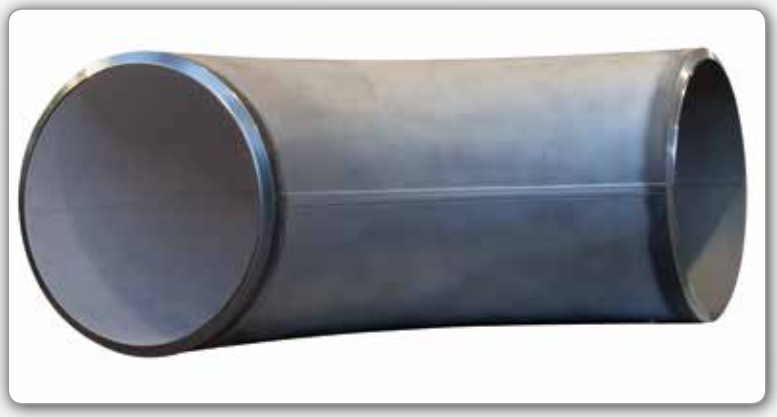
Backing materials	carbon steels, hi-yield grades, low alloy steels
Corrosion Resistant Alloy	S30403, S31603, S31703, S41000, N06625, N08825, etc.

ADVANTAGES

The main advantages of clad fittings are the following:

Clad fittings compared with solid CRA pipes
reduced material costs
less weight due to reduction of wall thickness

Clad fittings compared with overlay fittings
improved internal surface condition
no dilution from the base material
homogeneous chemical composition of the CRA layer
N08825 can be used as CRA layer



APPLICATIONS

Oil&Gas and Energy sectors.

CERTIFICATES AND ACCREDITATIONS

API Monogram API 5LD (starting clad pipe)

CLAD INDUCTION BENDS

Clad induction bends can be produced by using metallurgically clad pipes longitudinally welded as mother pipes. Bending is obtained by heating a narrow circumferential band with an induction coil, which advances continuously along the length of the pipe during the bend forming operation.
Induction bending is followed by a full body heat treatment (usually quench and temper).
The quality level, in terms of soundness, of the finished bends can be assessed by different non-destructive testing: magnetic particle, dye-penetrant, X-ray, ultrasound. Finally, internal cleaning by sandblasting or pickling of the CRA layer is carried out. The mechanical properties of the fittings can be manufactured according to standard specifications (e.g. DNV OS-F101, ISO 15590) and customer requirements.

PRODUCT RANGE

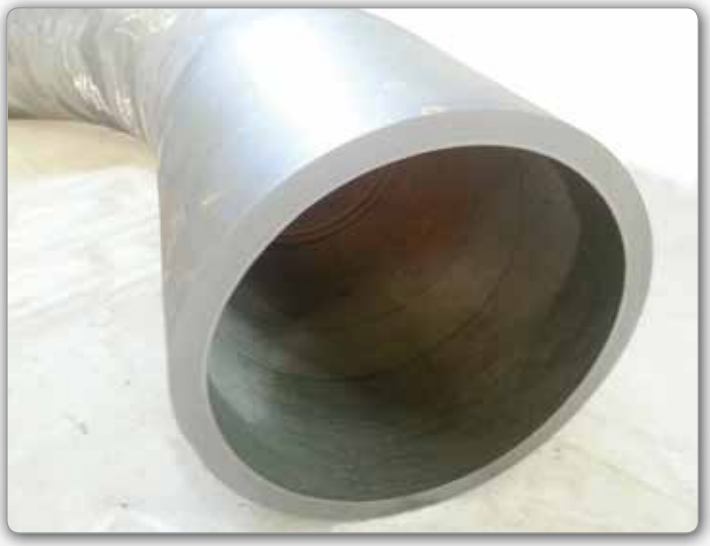
Tectubi Raccordi manufactures a wide range of clad induction bends for applications under the most demanding conditions and services. All bends with R/D<4 are offered as hot induction bends, whereas for R/D≥4, **Tectubi Raccordi** offers cold formed bends, as a valuable alternative to hot ones.

Outside diameter	from 6” to 56”
Wall thickness	from 7 mm to 35 mm
Pipe length range	from 8.4 m to 15.4 m
Bending radius	from 400 mm to 10,000 mm
Maximum envelope	from 5 m to 11.5 m
Backing materials	carbon steels, hi-yield grades, low alloy steels
Corrosion Resistant Alloy	S30403, S31603, S31703, S41000, N06625, N08825, etc.

ADVANTAGES

The main advantages of clad induction bends are the following:

Induction bends compared with overlay induction bends
improved internal surface condition
no dilution from the base material
homogeneous chemical composition of the CRA layer



APPLICATIONS

Oil&Gas and Energy sectors: pipelines.

CERTIFICATES AND ACCREDITATIONS

API Monogram API 5LD (starting clad pipe)

CLAD OVERLAY PIPES AND FITTINGS

Weld overlay is a well established technique in **Tectubi Raccordi**, and is used to produce pipe and fittings able to transport corrosive fluid and gas production streams: overlay pipes, reducers, tees, elbows, bends, end caps. Each component can be heat-treated according to customer specifications and requirements. The quality level, in terms of soundness, of the finished fitting can be assessed using different non-destructive testing: magnetic particle, dye-penetrant, X-ray, ultrasound. Finally, internal cleaning by sandblasting or pickling of the CRA layer is carried out. The mechanical properties of the fittings can be manufactured according to standard specifications and customer requirements.

PRODUCT RANGE

Tectubi Raccordi manufactures a wide range of overlay pipe and fittings for applications under the most demanding conditions and services

Overlay pipes and bends (from overlay mother pipe)	
internal diameter	from 6”
Overlay tees	
internal diameter	from 6”
Reducers	
outer pipe outside diameter	up to 42”

Backing materials
carbon steels, hi-yield grades, low alloy steels
Overlay layer
S30403, S31603, S31703, S41000, N06625, N07725, S41000, etc.

ADVANTAGES

The main advantages of overlay fittings are the following:

Overlay fittings compared with solid CRA fittings
reduced material costs
less weight due to reduction of wall thickness

APPLICATIONS

Oil&Gas and Energy sectors

CERTIFICATES AND ACCREDITATIONS

API Monogram API 5LD

LINED PIPES

Mechanically clad pipes (lined pipes) consist of a corrosion-resistant liner telescopically inserted into a low alloy external carbon steel pipe. The carbon steel outer pipe can be produced using a seamless or welded manufacturing process; the liner is produced separately using a longitudinal welding process. The CRA liner is expanded hydraulically, thus creating a purely mechanical bond. This method of manufacture does not create a metallurgical bond between the outer pipe, used for structural integrity, and the inner liner pipe, which is selected for its appropriate corrosion resistance. Successively, the ends of the pipe are sealed using overlay welding carried out by a robotized welding station, so the lined pipe ends are ready, after the bevel has been machined, to be girth welded on site without any further work. The quality level, in terms of soundness, of the weld overlay pipe ends is assessed by non-destructive testing: dye-penetrant and automatic ultrasound. The mechanical properties of the pipes can be manufactured according to standard specifications (e.g. API 5LD, DNV OS-F101) and customer requirements.

PRODUCT RANGE

Gieminox-Tectubi Raccordi Welding Pipes Division manufactures a wide range of clad pipes for applications under the most demanding conditions and services:

Outer pipe outside diameter	from 6” to 24”
Wall thickness outer pipe	from 10 mm to 35 mm
Length range	from 2 m to 12 m

Outer pipes
API 5L grades: X45 – X52 – X60 – X65 – X70
EEMUA grades: EP360 – EP415 – EP450 – EP485
DNV grades: 360MPa – 415MPa – 450MPa – 485MPa

CRA lined pipes
Stainless steels 300 series: S30403, S31603, S31703
Super-austenitic alloys: N08367, S31254, N08904
Nickel alloys: N04400, N06625 and N08825

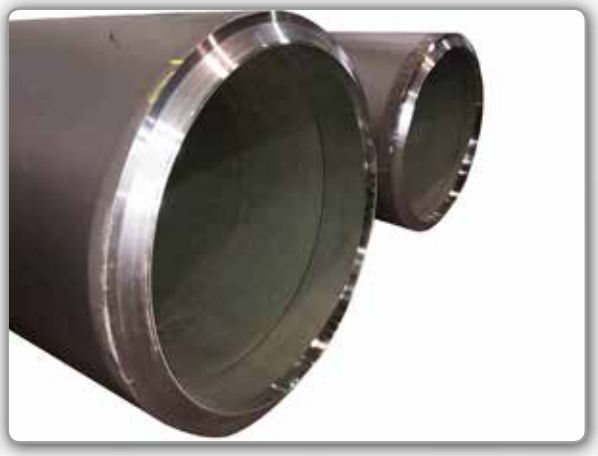
ADVANTAGES

The main advantages of lined pipes are the following:

Lined pipes compared with solid CRA pipes
reduced material costs
less weight due to reduction of wall thickness

Lined pipes compared with overlay welded pipes
improved internal surface condition
no dilution from the base material
homogeneous chemical composition of the CRA layer

Lined pipes compared with clad pipes
lower procurement cost and shorter lead time
higher variable combination of coupled materials
either seamless or welded outer pipes can be utilized



APPLICATIONS

Oil&Gas and Energy sectors: onshore pipelines or off-shore submarine-pipelines, gas plant piping systems, refinery piping systems, water injection pipelines.

CERTIFICATES AND ACCREDITATIONS

API Monogram API 5LD
API Monogram API 5L (outer pipe longitudinally welded)

Tectubi Raccordi: the one-stop solution partner for all clad piping requirements

Nowadays clad materials, i.e. low-alloy carbon steel with a thin layer of a Corrosion Resistant Alloy (CRA), are increasingly considered to be a suitable solution to the most demanding requirements for strength, corrosion resistance and cost-effectiveness arising from flowlines designed to carry wet, corrosive oil and gas production streams with high pressures and temperatures. In a clad pipe or fitting, the unalloyed carbon steel sustains the internal and external pressure, while the high-alloy cladding provides the corrosion protection.

Tectubi Raccordi manufacturing sites produce:

- Clad pipes (metallurgically clad pipes)
- Clad fittings (cold and hot formed elbows, end caps, reducers)
- Clad induction bends

The components listed above are completed with:

- Hydroformed clad lined pipes (mechanically clad pipes)
- Weld overlay pipes
- Weld overlay fittings (cold and hot formed elbows, end caps, reducers, tees)
- Weld overlay induction bends

The company is currently able to provide the Oil&Gas market with any kind of clad products and to plan implementation also for the Power Generation sector, as a one-stop solution partner for design, engineering services, customization of the coating process, welding technology components and separate interventions. **Tectubi Raccordi** can guarantee the management of projects from start to finish, flexibility of the technological solution, the full range of products as well as related technological services.

Machinery and production process in Tectubi Raccordi factories.

ALLIED IN THE WORLD

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The fitting choice worldwide

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