Stainless Steels for

Cryogenic Applications

The demand for gas as a cleaner source of energy and feedstock for petrochemicals has been growing markedly over the last decade and is forecast to continue to do so into the foreseeable future. The distances involved in transporting gas from source to market require significant investments in transport and storage facilities. In response to this demand, Aperam offers a range of stainless steels specially designed for cryogenic storage and the transportation of hydrogen and hydrocarbons like natural gas, ethane or ethylene. Aperam also offers grades for the handling of liquefied air gases like nitrogen, oxygen, argon and others.

High performance at very low temperatures

Meeting the increasing demand often requires that gas be transported great distances from source to market. That's why many producers use liquefied natural gas (LNG), natural gas that has been cooled down to liquid form for simple and safe non-pressurized storage and transport. The LNG is then stored and transported in specially designed cryogenic equipments.

Whether used for storage or transportation, all cryogenic applications require a material capable of withstanding very low temperatures.

That material is austenitic stainless steel.

The advantages of stainless steel

- Durability
- High resistance to temperature variations
- High ductility, strength and toughness at cryogenic temperatures
- No embrittlement
- Weldability
- Corrosion resistance

Focus

Aperam is a leading provider of stainless steels for cryogenic applications, including Liquefied Natural Gas (LNG) storage. Recently, Aperam provided stainless steel used in the construction of a new, small-scale LNG facility in Gibraltar. The regasification terminal is part of the territory's transition away from diesel power generation to cleaner burning LNG.

Designed by Chart, each of the five cryogenic tanks is 50 m long, 5.8 m in diameter, and has a capacity of 1 million litres. The 80 MW sustainable power plant fed by the LNG is expected to lower NO_x emissions by 80% vs. the former diesel-based facility and virtually eliminate SO_x and fine particulate emissions.

Several stainless steel grades are suitable for such uses, including classic austenitics and such high strength low alloy, economical material, as our 201LN grade, which is specifically tailored to meet the needs of cryogenic equipment fabrication.

LIQUEFIED GAS PRODUCTION

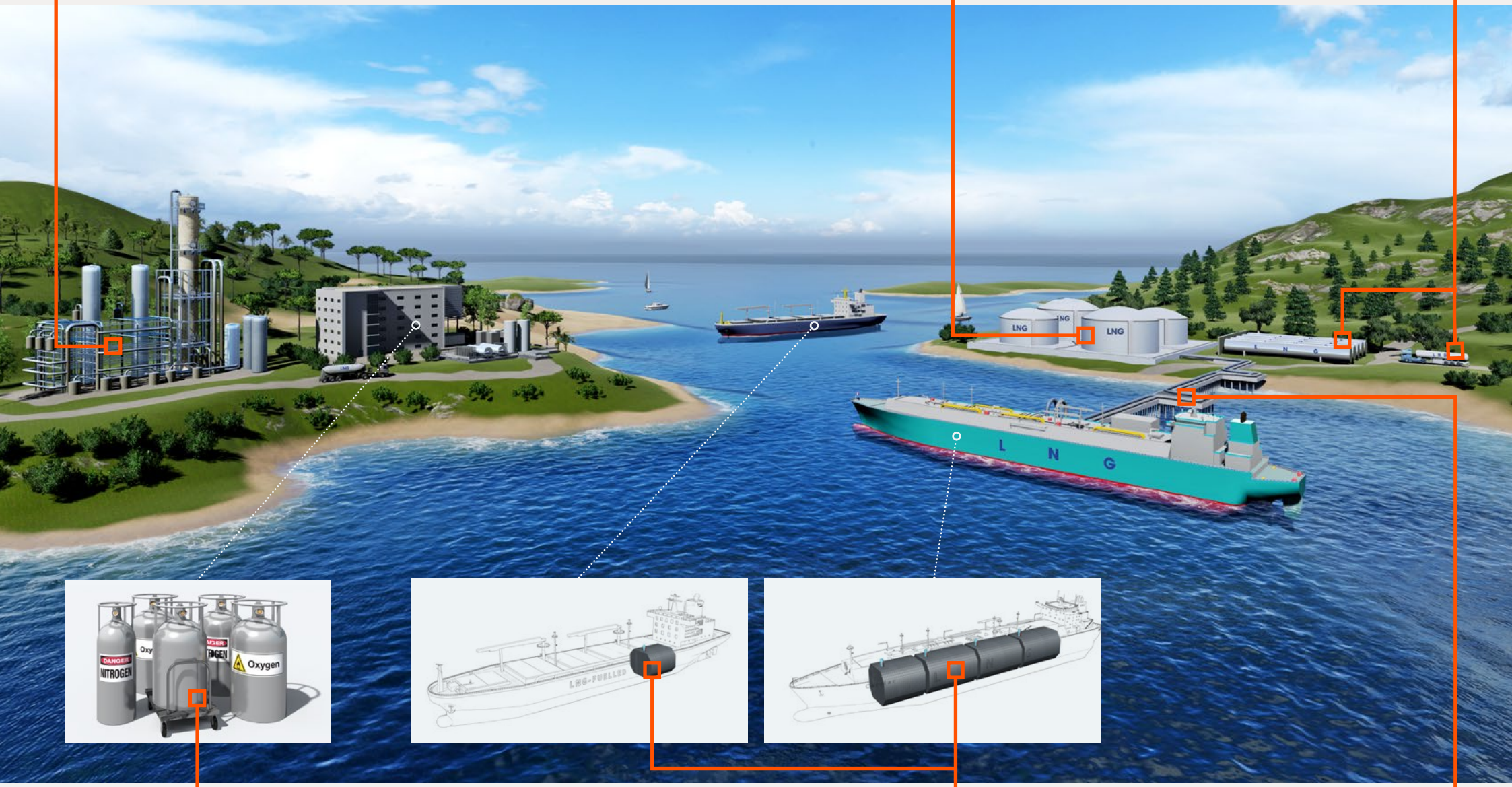
Distillation columns, piping and heat exchangers

LARGE SCALE LIQUEFIED GAS STORAGE

Membrane-based or solid wall tanks

SMALL SCALE STORAGE & TRANSPORTATION

Cylindrical, spherical and bullet shaped tanks



LIQUEFIED GAS BOTTLES

Storage and handling of liquid gases

TRANSPORTATION VESSELS & LNG AS FUEL

On-board storage and processing equipment

CRYOGENIC PIPES

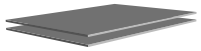
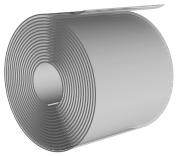
Welded pipes, pump columns, straight sections and sub-sea pipes

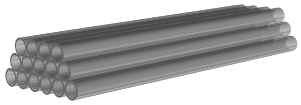
Our cryogenic grades

Grade designations		Standards			Chemical composition (typical values)							Mechanical properties annealed condition (typical values)		
		AISI	UNS	EN	C	Si	Mn	Cr	Mo	Ni	Others	R_m	$R_{p0.2}$	A%
Austenitic stainless steels containing manganese	**Aperam 201LN**	**201LN**	**S20153**	**1.4371**	0.025	0.50	7.00	16.30	—	4.75	N = 0.18 Cu = 0.30	730	370	52
Austenitic stainless steels standard grades	Aperam 304L	**304L**	**S30403**	**1.4307**	0.025	0.40	1.40	18.20	—	8.05	—	630	310	54
	Aperam 304M	**304L**	**S30403**	**1.4306**	0.025	0.40	1.30	18.20	—	10.10	—	580	250	54
Austenitic stainless steels containing nitrogen	Aperam 301LN	**301LN**	**S30153**	**1.4318**	0.025	0.50	1.70	17.50	—	6.60	N = 0.11	760	350	48
	Aperam 304LN	**304LN**	**S30453**	**1.4311/1.4315**	0.025	0.40	1.35	18.20	—	8.55	N = 0.14	650	350	54
Austenitic stainless steels containing molybdenum	Aperam 316B	**316L**	**S31603**	**1.4435**	0.020	0.40	1.35	17.30	2.60	12.70	—	590	290	49
	Aperam 316C	**316L**	**S31603**	**1.4432**	≤0.03	0.40	1.35	16.80	2.60	11.10	—	620	320	49
	Aperam 316L	**316/316L**	**S31600/S31603**	**1.4401/1.4404**	0.025	0.40	1.20	18.20	2.10	10.10	—	610	300	52

These grades are suitable for strain hardening and cold-stretched fabrication.

Product range



- **Forms**: sheets, blanks, coils, strips, tubes
- **Thicknesses**: from 0.8 up to 13 mm (consult us for thicknesses < 0.8 mm)
- **Width**: up to 2,000 mm according to thickness and grade
- **Finish**: cold rolled, hot rolled according to thickness and grade

Our size range is based on our production capabilities. Please contact us for the latest information per grade on offer.

As to cryogenic applications, Aperam is qualified by some of the industry's leading players.

Services

We offer multiple, high-performance and innovative stainless and alloys solutions that are environmentally friendly and tailored to our customers' expectations from technical assistance to product co-development.

More technical request may benefit from the support of our Research & Development Centre.

Contact us

www.aperam.com
www.e-aperam.com
energy-industry@aperam.com
24/7 www.e-aperam.com
YouTube

Aperam Stainless Europe