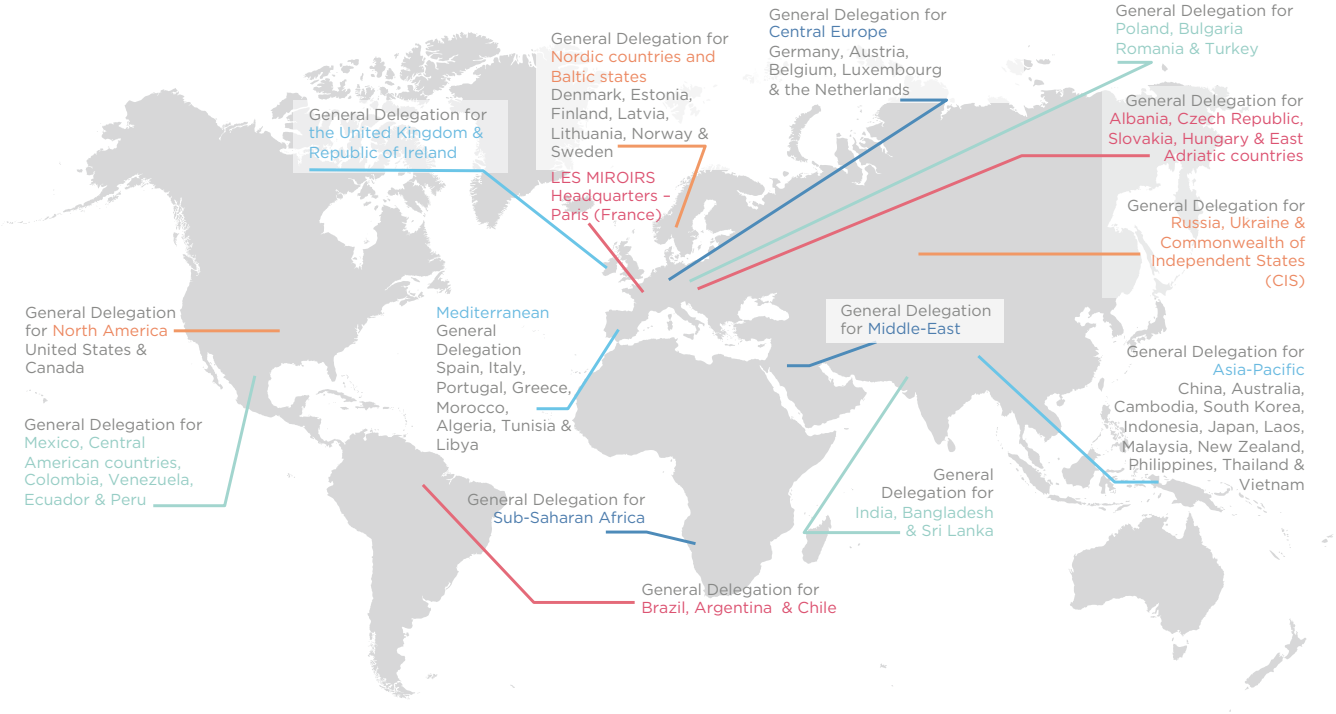
ISOVER CRYOLENE
for LNG and LPG applications

Engineered thermal insulation solutions
for cryogenic applications

ISOVER
SAINT-GOBAIN

Introduction

Saint-Gobain Group
Saint-Gobain designs, manufactures and distributes materials and solutions which are key ingredients in the wellbeing of each of us and the future of all.
They can be found everywhere in our living places and our daily life: in buildings, transportation, infrastructure and in many industrial applications. They provide comfort, performance and safety while addressing the challenges of sustainable construction, resource efficiency and climate change.
€40.8 billion in sales in 2017
Operates in 67 countries
More than 179 149 employees



ISOVER Technical Insulation
The ongoing rise in energy prices has highlighted the urgent need to reduce energy loss. This has led the insulation industry to focus on developing new and improved structural insulation products. The potential of energy savings in technical areas is still often underestimated or ignored.

As the world's leading insulation company ISOVER has highlighted the importance of effective insulation in the so-called technical areas, such as Marine and Offshore, Industry, HVAC and Original Equipment Manufacturer (OEM), where effective insulation is not only important to save energy, but is often essential to personal protection.

We have used our recognised innovation skills to bring innovative and efficient technical solutions for these critically important markets.

CRYOLENE – Solutions

Design specifications for storage tanks holding cryogenic fluid such as liquefied natural gas (LNG), liquid oxygen or nitrogen for chemical or combustion processes, are not only highly demanding in terms of construction, but also in terms of the insulation systems used. With the tank volume expanding and contracting depending on the level of liquid inside, the insulation must offer high levels of both compressibility and resilience.

To meet this requirement, ISOVER has developed the unique CRYOLENE solution for the insulation of cryogenic tank walls, suspended decks and pipe connections.

CRYOLENE products are highly resilient mineral wool rolls designed to retain their fibre elasticity over time at temperatures ranging from -170°C to +120°C. Different solutions have been developed for tank shells and suspended deck insulation. The product's extended length means that CRYOLENE solutions are easy and fast to install, with reduced thermal bridging.

Different facings, such as reinforced glass tissue or reinforced aluminium foil, give CRYOLENE products high tensile strength.

The properties and performance of CRYOLENE have been extensively tested by external laboratories, and the products are well-proven through decades of successful use worldwide in chemical and LNG applications.

CRYOLENE – Specification

Product description:
- CRYOLENE is a highly resilient mineral wool blanket. It is faced on one side either with a reinforced glass tissue (V.V.) or a reinforced aluminium foil (A.A.);
- CRYOLENE is supplied in rolls for use as a resilient thermal insulation for all types of storage tanks and vessels operated at cryogenic temperatures;
- CRYOLENE is suitable for use in combination with Perlite and other cryogenic insulation materials.

CRYOLENE standard product range:
- CRYOLENE 681 for suspended decks;
- CRYOLENE 682 for tankshells;
- CRYOLENE 684 for pipe connections.

Tensile strength:
- A unique manufacturing process of our mineral wool together with the incorporated facing, gives the CRYOLENE blanket high tensile strength values. Other high tensile facings can be provided on request to meet the most exigent requirements from our customers;
- Especially for the shell the reinforced aluminium foil facing has been carefully designed to prevent blanket failure resulting from the friction imposed during perlite filling and subsequent settling (Data Sheets of facings available upon request).

Temperature range: - 170 °C to + 120 °C

Fire performance:
The extremely low content of binder provides our CRYOLENE with an Optimum Fire Performance Euroclass Classification (testing in hand):
- With glass tissue (V.V.): A1
  Fire Spread Index = 0
  Smoke Development Index < 20;
- With aluminium foil (A.A.): A2-s1, d0
  Fire Spread Index < 25
  Smoke Development Index < 25.

CRYOLENE	Tolerance	Standard	CRYOLENE 681	CRYOLENE 682	CRYOLENE 684
density(kg/m³)	±5%	EN 1602	12	17.5	24
thickness (mm)	–	EN 823	50 to 150 (- 0 + 15 mm)	50 to 150 (- 0 + 15 mm)	50 to 150 (- 0 + 5 mm)
width (mm)	±5 mm	EN 822	1 200	1 200 to 2 400	1 200
length (mm)	- 0 + 200 mm	EN 822	Depends on thickness and product type Up to 40 000 for CRYOLENE 682		

Other dimensions are available upon request

Resilience: CRYOLENE 682

CRYOLENE 682 successfully passes compression tests typically required by our Customers.

(e.g. Test according to SNCMP-ENTREPOSE):

Load KN/m²	Average (%)	Min (%)	Max (%)
0.5	65	59	71
1.0	50	44	56
2.5	35	29	40
4.0	29	25	33

Limit values of thickness under load as percentage of the nominal thickness

Thermal conductivity W/(m·K)*

**CRYOLENE 681 P156978, CT18-050690*
CRYOLENE 682 P175448, CT18-050689
CRYOLENE 683 LNE M120719. CT18-050688

	-150°C	-100°C	-50°C	0°C	10°C
CRYOLENE 681	0.014	0.022	0.029	0.038	0.040
CRYOLENE 682	0.014	0.020	0.027	0.034	0.035
CRYOLENE 684	0.012	0.018	0.024	0.031	0.033

EXCELLENT THERMAL PERFORMANCE

EASY & FASTER INSTALLATION

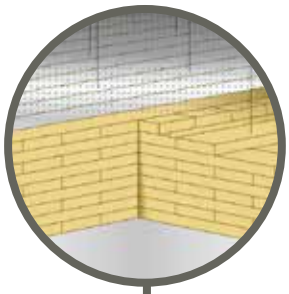
MAXIMUM RESILIENCE AND FLEXIBILITY

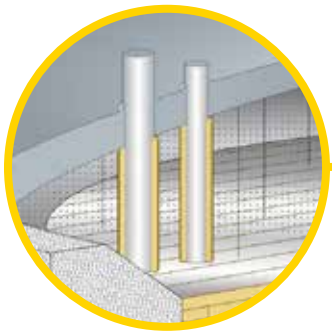
EFFECTIVE FIRE PROTECTION

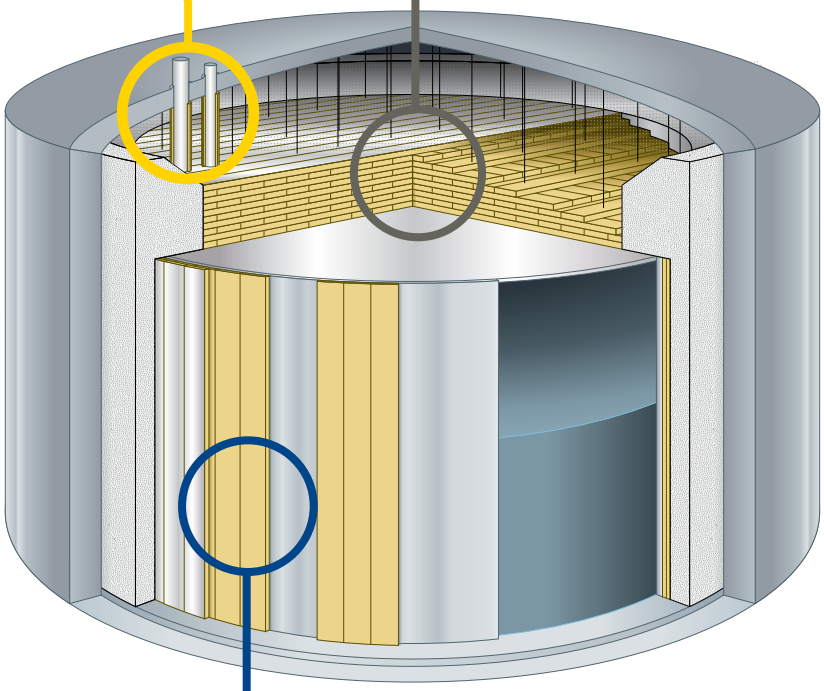
CRYOLENE – Installation

DECK SECTION:

The top layer of CRYOLENE must be covered by an Alu glass scrim laminate, a facing for mineral wool used as vapour barrier and reflection layer, to avoid dust drop into the insulation. Studs must be taped when penetrating insulation.
It is recommended to install the last 2 m section of the deck after the wall perlite works have been completed.

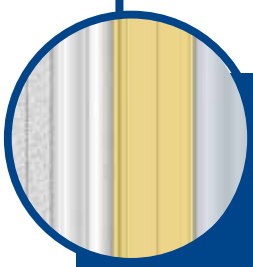






PIPE SECTION:

CRYOLENE 684 is resilient glass wool blanket designed for the insulation of cryogenic pipe connections.
CRYOLENE 684 has an improved mechanical resistance while maintaining the flexibility the same time. The product is applicable to roof nozzles and internal piping located in the dome space.



WALL SECTION:

CRYOLENE 682 with large dimensions (length up to 40 m, width up t 2.4 meters) as well as optimum thermal, fire and tensile performance provides excellent benefits for our customers:

- Improved thermal performance due to less joints and bridges;
- Installation time reduced up to 75%;
- Much more insulation installed in just one go;
- Less safety risk on site: less man-hours & less fire risk;
- Easier installation: unrolling process top-down or bottom-up.

CRYOLENE – References

ISOVER has more than 30 years practical experience in LNG insulation gained through participation in major projects worldwide. Sharing knowledge with our clients, we have developed optimised solutions that combine performance with practicality and reliability.

ISOVER takes its responsibilities to customers seriously, ensuring quality products through internal and external quality control and certification – coupled with just in time delivery so our products are there when you need them.

Project	Country	Customer	Schedule	Products	Remarks
Montoir	France	Consortium	1983	CRYOLENE	LNG
Zeebrugge	Belgium	Consortium	1985	CRYOLENE 682	LNG
Enagas Huelva	Spain	CBI	1986	CRYOLENE	LNG
Dhabol	India	Raven / Insultec / Punj	2001	CRYOLENE 681 & 682	LNG
Hazira	India	Wanner	2002	CRYOLENE 684	LNG
Damietta	Egypt	Wanner	2002	CRYOLENE 684	LNG
Sines	Portugal	Entrepose Contracting	2003	CRYOLENE 681	LNG
Ratnagiri	India	Raven / Insultec / Punj	2006	CRYOLENE 682	LNG
Kharg Island	Iran	Tissot / Technip	2006	CRYOLENE 681 & 682	Ethylene
Reganosa	Spain	Entrepose Contracting	2006	CRYOLENE 681	LNG
Houston Freeport	USA	SPI / Technip	2007	CRYOLENE 681	LNG
Zeebrugge (Fluxys)	Belgium	Technigaz / Saipem	2007	CRYOLENE 681	LNG
Fos Cavaou	France	Sofregaz	2007	CRYOLENE 681	LNG
South Pars	Iran	Raven / Weir	2007	CRYOLENE 681 & 682	LPG
Adriatic LNG	Italy	Raven / Whessoe	2008	CRYOLENE 681 & 682	LNG (GBS)
Canaport	Canada	SNC / CENMC	2008	CRYOLENE 681	LNG
Pearl GTL	Qatar	Qatar Shell GTL	2008	CRYOLENE 684	LNG
Ratnagiri	India	Raven / Insultec / Punj	2008	CRYOLENE 682	LNG
Xinjiang Guanghui	China	Bis-Oki	2009	CRYOLENE 682	LNG
Arzew	Algeria	Entrepose Contracting	2009	CRYOLENE 681	LNG
Gate Rotterdam	Holland	Entrepose Contracting	2009	CRYOLENE 681	LNG
Algeria	Algeria	Prezioso	2009	CRYOLENE 684	LNG
Ratnagiri	India	Raven / Insultec	2009	CRYOLENE 682	LNG
Iran	Iran	Kaefer Wanner	2009	CRYOLENE 684	LNG
Tongyoung	Korea	Haniso / Jeong Yeon	2009	CRYOLENE 682	LNG
Canaport	Canada	CNC / SNAM	2009	CRYOLENE 681	LNG
Tananger	Norway	Glava / Bis Industrier	2009	CRYOLENE 682	LNG
Tongyeong	South Korea	Deawoo	2009	CRYOLENE 682	LNG
Tongyeong	South Korea	Hyundai	2009	CRYOLENE 682	LNG
Gate Rotterdam	The Netherlans	Entrepose Contracting	2010	CRYOLENE 681	LNG
Dabhol	India	Raven / Insultec	2010	CRYOLENE 682	LNG
Ningbo	China	Kaefer GmbH	2010	CRYOLENE 682	LNG
Huelva	Spain	UTE ACEC	2010	CRYOLENE 681	LNG
Nynäshamn	Sweden	Glava / Bis Industrier	2010	CRYOLENE 682	LNG
Guang'an	China	Chemtex USA	2010	CRYOLENE 681	LNG
Ningxia Hanas	China	Technip Malaysia	2010	CRYOLENE 681	LNG
UAE	UAE	Kaefer UAE	2010	CRYOLENE 684	LNG
Pyeongtaek	South Korea	Doosan	2010	CRYOLENE 682	LNG
Pyeongtaek	South Korea	Hanyang	2010	CRYOLENE 682	LNG
Nantong	China	Consortium	2010	CRYOLENE 681	LNG

Project	Country	Customer	Schedule	Products	Remarks
Pyeongtaek	South Korea	Hyundai	2011	CRYOLENE 682	LNG
Mexico LNG	Mexico	Samsung Engineering	2011	CRYOLENE 681	LNG
Nantong	China	Consortium	2011	CRYOLENE 681	LNG
Nantong	China	Consortium	2012	CRYOLENE 681	LNG
Sines	Portugal	Lindner	2012	CRYOLENE 681	LNG
Rotterdam	The Netherlands	Entrepose Contracting	2012	CRYOLENE 681	LNG
Tongyeong	South Korea	KyungNam	2012	CRYOLENE 682	LNG
Bungtau	Vietnam	POSCO	2012	CRYOLENE 682	LPG
Goteborg	Sweden	Consortium	2013	CRYOLENE 681	LNG
Dunkirk	France	Entrepose Contracting	2014	CRYOLENE 681 & 684	LNG
winouj cie	Poland	Saipem Prezioso	2014	CRYOLENE 681	LNG
Ichthys	Australia	Entrepose Contracting	2014	CRYOLENE 681	LNG
Wheatstone	Australia	Entrepose Contracting	2014	CRYOLENE 681	LNG
Mexico DF	Mexico	Maraldi	2014	CRYOLENE 682	Ethylene
Kuwait	Kuwait	Kaefer	2014	CRYOLENE 682	Ethylene
Samcheok	South Korea	Daerim	2014	CRYOLENE 681 & 682	LNG
Samcheok	South Korea	GS	2014	CRYOLENE 682	LNG
NLTF	Kuwait	GS Engineering	2014	CRYOLENE 681	LPG
Pori	Finland	Gasum	2015	CRYOLENE 681 & 684	LNG
Samcheok	South Korea	KyungNam	2015	CRYOLENE 682	LNG
Samcheok	South Korea	Daewoo	2015	CRYOLENE 681 & 682	LNG
Samcheok	South Korea	SCI	2015	CRYOLENE 682	LNG
Samcheok	South Korea	SK	2015	CRYOLENE 682	LNG
Samcheok	South Korea	Hyundai	2015	CRYOLENE 681 & 682	LNG
Yamal	Russia	Entrepose Contracting	2016	CRYOLENE 681 & 684	LNG
Samcheok	South Korea	POSCO	2016	CRYOLENE 681 & 682	LNG
Boryeong	South Korea	GS	2016	CRYOLENE 681 & 682	LNG
Boryeong	South Korea	SK	2016	CRYOLENE 682	LNG
Samcheok	South Korea	HanWha	2017	CRYOLENE 681 & 682	LNG
Samcheok	South Korea	Hanyang	2017	CRYOLENE 681 & 682	LNG
SLNG	Singapore	SCT	2017	CRYOLENE 681	LNG
RGT-2	Malaysia	SCT	2017	CRYOLENE 681	LNG

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