



Certified Sustainable Cable Maintenance

Lifetime extension, repair and fire protection of electrical cables on
LNG VESSELS AND PLANTS WORLDWIDE





PROTECTING ELECTRICAL CABLES ON LNG VESSELS AND PLANTS WORLD WIDE



Jesper Rexen, Managing Partner at Fire Security Middle East oversees the LNG sector at Fire Security. As a founder of Fire Security Middle East in 2003, he has more than 15 years experience in the field and has seen more than twenty LNG carriers being upgraded since 2015 ranging from MOSS type, Q-Flex, Q-Max and conventional LNG carriers.

tion of Q-Flex, Q-Max and ARC-7 designs. These vessels carry very costly and very sensitive cargo and can experience loss of operations due to damaged cables on cargo pumps whilst others have experienced small fires in their machinery spaces which lead to high levels of loss of production. Here Fire Security's DNV approved coating systems have been utilized for repairs and environmental protection both on deck and for fire technical upgrades of cables in high risk areas below deck. Fire Security's main objective is to enhance the safety onboard and protect against both loss of life and loss of production in the event of a fire.

Jesper Rexen
Managing Partner

Tel: +971 6 7478842
Fax: +971 6 7478843
Mob: +971 50 6453425
jrx@fire-security.com

The Global LNG market is growing rapidly and therefore the fleet of LNG carriers continues to experience tremendous growth. The world's first LNG carrier Methane Pioneer was launched in January 1959 delivering its cargo from the US to the UK. Since then these types of carriers have developed into the most sophisticated commercial vessels operating on the world's oceans. In recent years, the size and capacity of LNG new builds has increased rapidly with the introduc-

Fire Security Middle East also operates onshore in LNG refineries and holds a three-year repair and coating contract with Shell GTL where thousands of meters of early ageing damaged HV cables have been repaired and coated. In 2004 Fire Security upgraded all cables above ground fire technically for Technip at the Oryx GTL refinery in Ras Laffan, Qatar.

Fire Security Middle East delivers turnkey projects globally, with riding crews on passage or during your dry-docking cycle and we remain available to conduct surveys of your cables anywhere in the world.



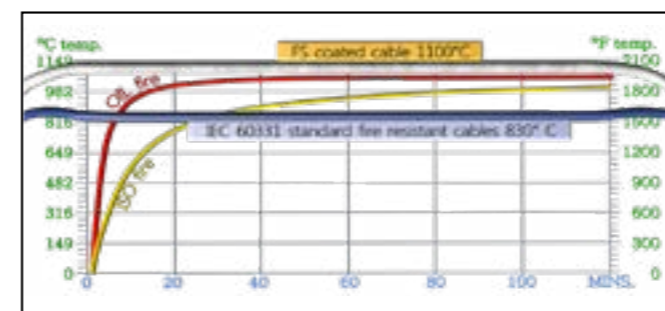
FS1 is an intumescent coating that will expand 100 times its thickness during a fire - thus protecting the cables from fire damage and making sure the cables function when needed the most.

SAVING COST, SAVING ASSETS, SAVING LIVES

In a fire situation our systems will prevent:

- Ignition of the cable insulation
- Release of toxic fumes from the cable insulation
- Release of poisonous gas (HCL) from the cable insulation
- The cable tray from melting and collapsing

Will your cables survive a hydrocarbon fire?



The red curve represents the temperature of an oil fire - up to 1100° Celsius - the temperature to which Fire Security has tested their coatings. This is the temperature you will be facing if you had such a fire.

How the protection works

During a fire, the coating will expand upto 100 times its thickness, thus protecting the cable from fire damage. Coated cables will function during a fire and be usable afterwards. If the fire is extinguished within reasonable time, there is no need for cable replacement.

The yellow curve shows the temperature of an ISO fire - 830° Celsius, which is a normal cellulose fire.



Uncoated cables experience a short circuit after less than 2 minutes in a hydrocarbon fire. Cables with FS coating will function up to 90 minutes without a short circuit.

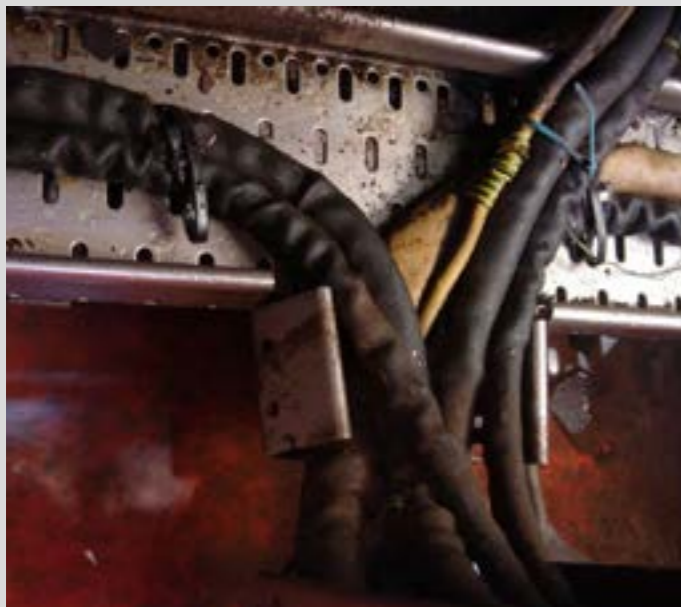
ELECTRICAL CABLE LIFE EXTENSION CONSISTS OF THE FOLLOWING:



FS coatings restore and upgrade the cable's fire protection, reduces the toxicity release and delays short circuiting in a fire scenario.



FS Coating enhances the cables UV resistance, ozone resistance and increases the dielectric strength.



FS Coating offers excellent mud protection, oil and chemical protection.



FS Coating brings back and upgrades insulation properties, FS offers to repair cables where the outer sheath is damaged.

DAMAGED CABLES CAN BE REPAIRED DURING NORMAL OPERATION. NO SHUTDOWN IS REQUIRED.



Damaged electrical cable



Repaired electrical cable



FS is protecting electrical cables on LNG ships and plants worldwide, including Shell's \$19bn (£12.2bn) Pearl Gas to Liquid (GTL) facility in Qatar.



الشركة العمانية للغاز الطبيعي المسال ش.م.م
Oman LNG LLC

Date: 13th May, 2020

To: Fire Security Middle East FZE
Office 1216
Building C1
Ajman Free Zone
United Arab Emirates

Attention: Mr. Jesper Rexen

Subject: LV Protection Cable Repair & Coating of live HV Cables

Dear Mr. Jesper,

This is to confirm that Fire Security Middle East successfully repaired and coated live HV cables perished by UV exposure in our Sur, Qalhat LNG plant utilizing their DNV-GL Certified repair solutions and FS5 Cable Coating system.

This application was completed safely and efficiently and without outages or incidents in early 2020.

Total length of HV cable repaired was approximately 2,546 meter.

Yours sincerely,

Moussa Al Tarazi
Project Manager



Date: 21/02/2016

Ref: Ops/056/15

REFERENCE LETTER

To : Jesper Rexen

Fire Security Middle East

Office 1216, Building C1 - Ajman Free Zone

Subject : Life Extension Repairs And Fireproofing of Cargo Electrical Cables On-board ADNATCO NGSCO LNG Fleet.

This letter has been issued to Fire Security Middle East . Ajman, UAE, in recognition for their technical contribution and outstanding works carried out to improve the condition of the electrical cabling protection for cargo system on-board ADNATCO NGSCO LNG fleet vessels.

Fire Security Middle East has successfully completed life extension repair, and fireproofing of brittle electrical cables on our 08 LNG fleet vessels :

LNG / C Mubaraz

LNG / C Mraweh

LNG / C Al Hamrah

LNG / C Umm Al Ashtan

LNG / C Al Khaznah

LNG / C Shahamah

LNG / C Ghasha

LNG / C Ish

Work was conducted safely and efficiently under passage by riding application squad certified in rope access with no interruption to ship's operations.

FS5 repair and coating system was applied on live electrical cables and intrusive repairs on expansion joints were carried out in the following areas:

Deck level main cable trays - Cable trays running full length above all dome tops - Manifold areas - Port and Starboard Compressor House.

Youcef Grebici

Sr. Technical Superintendent - LNG Fleet

Ahmed al Muhairi

LNG Fleet Manager



Qatar Shell GTL
 CR No. 28051
 Al Mirqab Tower, 1st Floor
 P.O. Box 3747
 Doha, State of Qatar
 Internet <http://www.shell.com>
 Tel: +974 6600 5743
 Fax: +974 4403 2267

Mr. Jesper Røxen
 Fire Security
 Office 1216, Bldg C1
 Ajman Free Zone
 UAE
 Tel. no. +4795488800
 Fax. no. +4738021531

24th Jan. 2013

Our Ref: QSGTLOLENG.2013.001.001

Dear Mr Røxen,

RE: Coating of HV cables using Fire Security FS5

This is to confirm that the HV cables used in Qatar Shell Pearl GTL with outer sheath HDPE which had been shown cracks have been repaired by coating with FS5 in a very professional way, maintaining the specified quality and to a very high safety standard.

The cables affected were 33, 11 and 6.6kV around 100 circuits where coated wherever the cables are not underground.

The work was completed in December 2012 and we are satisfied with Fire Security coating system.

Kind regards,

Henk F. J. Kommers
 Electrical Engineering Manager / Senior Electrical Authority
 Qatar Shell GTL Limited

Qatar Shell GTL Limited
 Incorporated in Bermuda
 Registered Number EC 34279,
 Registered Office: 4th Floor, Cedar House, 41 Cedar Avenue, Hamilton HM 12, Bermuda



MOL LNG Transport (Europe) Ltd.
 3, Thomas More Square, London E1W 1WY

Mr. Jesper Røxen
 Fire Security Middle East F.Z.E.
 Office 1216, Building C1
 Ajman Free Zone
 United Arab Emirates.
 Tel: +971 6 7478843

September 20, 2018.

MOL Ref: Electrical Cable Fire Protection Project

Dear Mr. Røxen,

RE: Passive fire protection of electrical cables in high risk areas onboard MOL LNG Carriers by way of cable coating.

This is to confirm that MOL Fleet Team 1 & Fleet Team 2 have utilized Fire Security Middle East for passive fire protection of electrical cables within high risk areas on several of our LNG vessels.

These applications have enhanced the fire protective properties of our electrical cables by utilizing Fire Security's FS1 intumescent coating system.

The projects have been safely completed with riding crew rope access application teams, ensuring no disturbance to our operations.

We are hereby pleased to give Fire Security our best recommendation based on their smooth deliveries to MOL LNG since 2016.

Yours sincerely,

Euan McIntyre
 Fleet Manager
 MOLLNG (Europe)



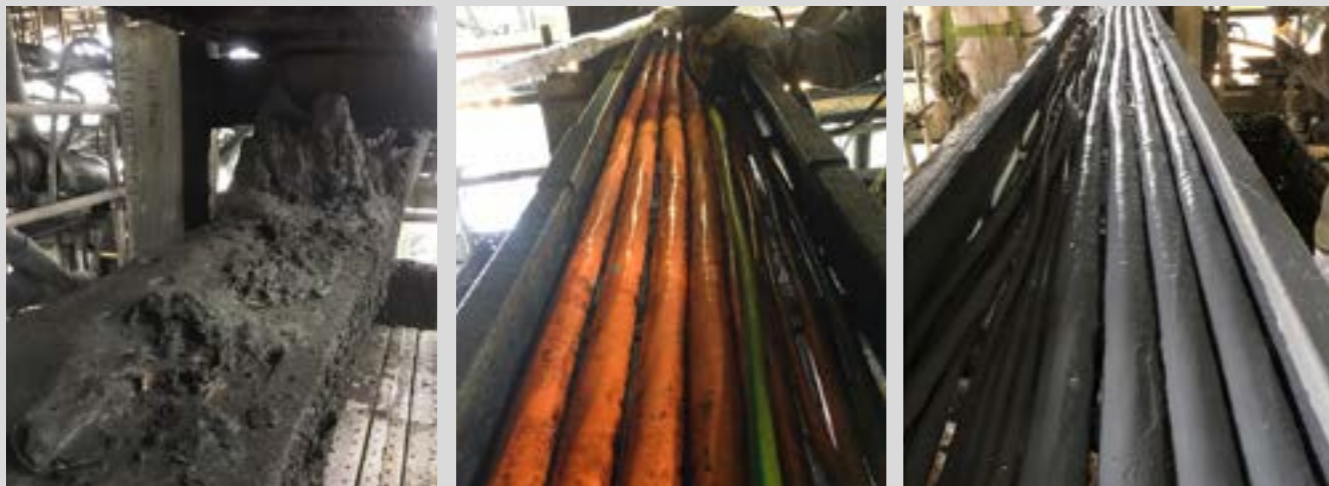
Telephone: +44 20 3764 8000

Registered Office: 3, Thomas More Square, London E1W 1WY
 Registered in England No. 5954128



Sustainable Cable Maintenance

Protecting and prolonging the life span of electrical cables, FS has proven its worth for decades. We have an extensive reference list stretching from industrial plants, oil rigs and cruise ships to offshore wind farms. Our products are approved by leading classification societies and authorities. Our core activities are:



Using warranty backed applications only, FS repairs and upgrades damaged cables.

Cable life extension

The FS coating systems upgrade your cables and extend the lifetime by up to 3 times. No other fire protective cable coating is certified to be as resistant to UV, water, mud, oil, and a wide variety of damaging chemicals.

Cable repair

We repair cable sheaths that are damaged by UV, oil, mud, and mechanical stress. The coating restores the cable value, prevents future damage to cables and cable jackets, and eliminates the need for large-scale replacement. This is done with minimum shutdown time.

Fire protection

No other cable coating system has equal or better fire protection properties. Our coating provides superior fire protection compared to standard cables and can upgrade existing cables to the highest fire technical standard.

SAVE LIVES / SAVE COSTS / SAVE THE ENVIRONMENT





Certified Sustainable Solutions

FS offer certified sustainable solutions to extend cable life and avoid electrical fire, using nothing but non-toxic materials.



Our commitment to the environment is documented through our DNV ISO 14001 environmental management systems certification.

mitigates the negative end-of-life environmental impact of cables, as well as the inherent environmental and resource cost of excessive production and installation of new cables.

Repaired cables are fully restored and functioning

FS procedures are tested and approved. We deliver a turnkey solution that avoids operation shutdown, removes the costly need for cable replacements, and halts the spread of further damages. Rejuvenated cables continue their operation with a warranty backed application.

Fire Security products and systems are LEED compliant, non-toxic, solvent-free, phosphate-free, and do not contain asbestos or any other substance identified as being carcinogenic. Our products release no poisonous and corrosive gases and smoke.

Significant reduction of excessive production and waste

By extending the life of cables, FS limits the need for resource-intensive cable replacement. Cables contain large volumes of plastic, PVC, XLPE in sheets and insulation. Those components are commonly incinerated openly or disposed of in landfills. Extending cable lifetimes

Prevention of toxic and poisonous gasses

Our coatings prevent flame propagation and prevent escalation from a small fire to a major incident. FS cable fire protection minimizes impact from short circuits, removes cables as a source of combustion and prevents the release of toxic & poisonous gasses.

GREENHOUSE GAS EQUIVALENCIES CALCULATIONS

The Global Warming Potential (GWP 100) of production of 1000 meters of Single Core 630 mm² Voltage Grade 64/110KV cable is 32863 kgCO₂eq. Extending the operating life of such cables and avoiding replacement has significant positive impacts.



1 meter = 82 miles
Keeping just 1 meter of cable in service is the equivalent of removing the GHG emissions of an average family car being driven for 82 miles.



10 meters = 39,975 charges
Keeping just 10 meters of cable in service is the equivalent of removing the CO₂ emissions 39,975 smartphones being charged.



100 meters = 1.1 tonnes
Keeping just 100 meters of cable in service is the equivalent of avoiding the GHG emissions of 1.1 tonnes of unrecycled waste in a landfill.



1000 meters = 76 barrels
Keeping just 1000 meters of cable in service is the equivalent of removing the CO₂ emissions from the consumption of 76 barrels of oil.





Certified Sustainable Cable Maintenance

FS offer certified sustainable solutions to extend cable life and avoid electrical fire, using non-toxic materials.

Save Lives / Save Costs / Save The Environment

Our products have been approved by leading classification societies and authorities including U.S. COAST GUARD, IMO MED D & IMO MED B, Lloyd's Register, Achilles, Bureau Veritas, DNV, RINA, NMA, ABS, FM and UL



Global headquarters

Skibåsen 20B, 4636 Kristiansand, NORWAY

Tel: +47 95 47 80 00 Fax: +47 38 02 15 31

Email: headquarter@fire-security.com

www.fire-security.com

