

### Certified Sustainable Cable Maintenance

Lifetime extension, repair and fire protection of electrical cables on Container Ships, Passenger Ferries, RO-RO Vessels and Speciality Vessels









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.





## CERTIFIED SUSTAINABLE SOLUTIONS TO EXTEND CABLE LIFE AND AVOID DAMAGES FROM FIRE



John Olaf Ryen COO for Cruise & Shipping Division

Mobile: +47 48 09 30 81 Phone: +47 95 47 80 00 jor@fire-security.com John Olaf Ryen, COO for Cruise & Shipping Division, has more than 25 years of experience working for Fire Security. He has actively participated in and witnessed more than 500 maritime vessels protected by our teams of applicators worldwide.

When choosing a partner to conduct fire protection of cables, it is of outmost importance to use a company who knows how to perform the project according to requirements. Engage a company with a truly professional organization that uses well documented products to provide fire protection

that saves lives and extends the lifetime cycle of installed cables. This will mitigate climate change, preserve our planet and generate an economic prosperity.

IMO/MED and DNV Certified Fire Security meet all these requirements as well as additional leading classification societies.

"In shipping, we must always have safety at the forefront of our thinking," said Knut Ørbeck-Nilssen, CEO, DNV - Maritime. "As we move forward in design and in operation, becoming more sustainable and more efficient, safety must still underpin every decision. Therefore, we are so proud to work with innovators like MSC, who when they push the envelope with designs are also looking to initiate a step change in safety" The new FCS (C) Extended level beyond SOLAS notation is

The new FCS (C) Extended level beyond SOLAS notation is targeted exclusively towards container ships. It is designed around a function-based approach, for an enhanced safety level beyond present SOLAS requirements, an increased hazard awareness.

#### RO-RO VESSELS

There have been several serious fires in Ro-Ro spaces recent years, and how to address this has been discussed in length, as well as considering impact of new rules and "new" cargoes represented by alternative-fuel vehicles. Ro-Ro passenger ships in trade resembling carry various types of vehicles, e.g., private cars, electric cars, motorcycles and camper vans, which all contain different components that under specific circumstances, such as faults or wear, can constitute fire hazards. It is not possible for the crew to take preventive measures against these fire hazards, which means that fires will occur occasionally. These uncontrollable fire hazards are mitigated by having systems in place to ensure early detection of fires and by having technically reliable fire extinguishing capacities combined with FS coating systems that will immediately start to function upon direct flame contact.

By using FS approved coating systems, a valuable combination of total fire protection will be achieved, as well as ensuring a Life Extension of all the cables routed on car Decks that have been exposed to corrosion water damaged, and eventual vibration cracks to the cable sheaths of exposed cables. Cable trays will also be protected in this coating process to protect against corrosion and to minimize the risk of cable trays collapsing in the unfortunate event of a fire onboard. No other cable coating system has equal or better fire protection properties. FS coating provides superior fire protection compared to standard cables and can upgrade existing cables to the highest fire technical standard.

The demand for alternative-fuel vehicles (AFV) is increasing, and many carmakers offer new models in these segments. The following categorization can be made: 1. Electric vehicles 2. Natural-gas vehicles (including LNG/LPG) 3. Hydrogen-fueled vehicles 4. Ethanol vehicles 5. Hybrid vehicles Vehicle carriers carrying electric vehicles shall comply with SP 961 and 962 in the IMO Code for Dangerous Goods which implies that cargo hold with electric vehicles provided with lithium-ion batteries shall comply with the requirement applicable for class 9 dangerous goods. For vehicles fueled with compressed hydrogen or natural gas the regulations are now available (SO-LAS Ch. II-2 Reg.20-1 and IMO MSC.1/Circ. 1471). For new vessels all electrical equipment shall be EX, ventilation shall be operated, and portable gas detectors shall be provided. Existing vessel shall also have portable gas detectors on board and they "should comply with the other requirements (EX and ventilation) as appropriate / to the satisfaction of the Administration." There are not yet reliable fire risk data for electric vehicles and the issue of charging electric cars (in particular supercharging) at 100 kW or more per unit) has by some been identified as a hazard and that these vehicles should be regarded as a hazard-

FS5 coating once applied forms a protection membrane that will allow heat from operational cables to dissipate but will prevent heat or flames from penetrating this membrane and damage cables integrity.

One of FS main goals is to contribute to an enhanced marine safety culture, and we know that being a step ahead is paramount when it comes to loss prevention measures. Reduction on fleet insurance premiums is a known factor by implementing safety precautions that save lives, protect the environment and reduce loss. FS coating systems cultivate all these key factors and will enhance ROI over a relatively short period.

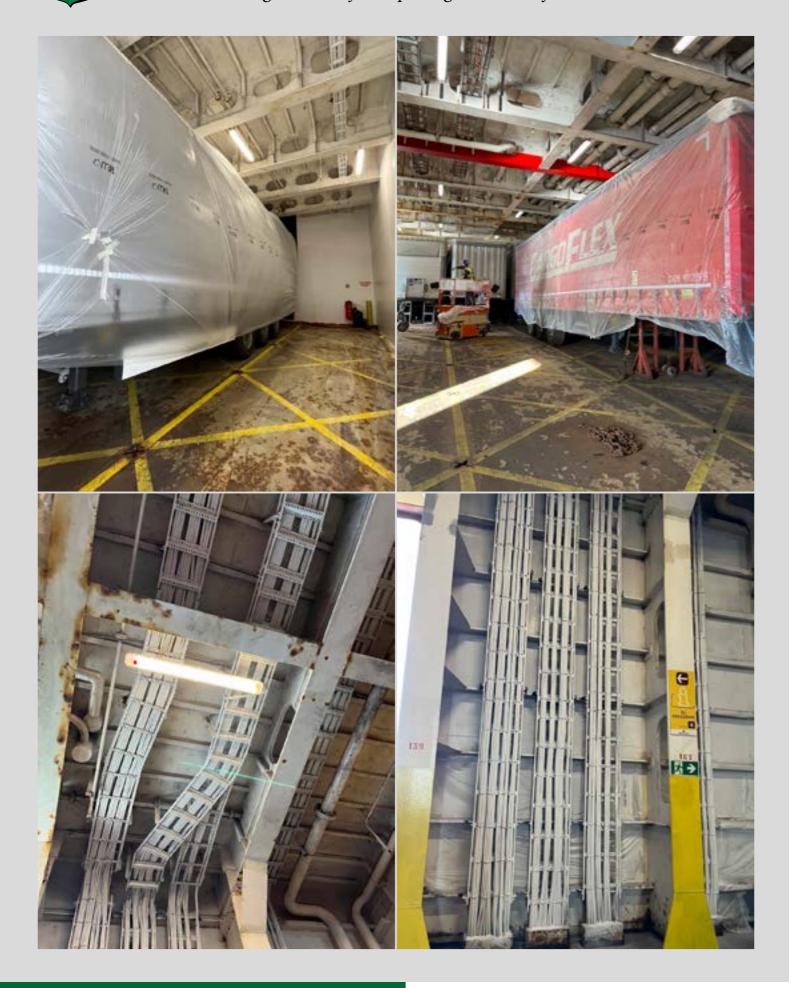
Critical safety systems together with main power source and other safety protocols rely on the reliability of marine cables to function effectively during emergencies. FS coatings prevent ignition of cable insulation and prevent release of poisonous gas (HCL) and toxic fumes from the ignited cable sheath. FS coated cables will function during a fire and cable replacement will not be necessary if the inferno is extinguished within a reasonable time.

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# FS

### PROTECTING RO-RO FERRIES IN OPERATION

FS is constantly fire protecting cables on Ro-Ro ferries also if needed in full operation due to the increasing demand of transporting alternative-fuel vehicles.





### **PROTECTING ENGINE ROOMS**

FS fire protects cables in high-risk areas such as Engine rooms onboard Container Vessels, as fire in engine rooms are increasing globally.



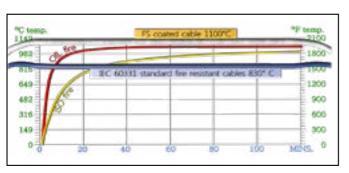
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## SAVING COST, SAVING ASSETS, SAVING LIVES In a fire situation our systems will prevent:

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



### 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

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### **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.

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 cancerogenic. 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

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.

## 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 mm<sup>2</sup> 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

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 o

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.





Sandefjord, 16.09.2005

To: Whom it may concern

#### **Fire Security Coating**

Color Line is one of the leading cruise- and ferry operators in Scandinavia. On all our vessels we have protected the cables in high risk areas, such as engine rooms, purifier rooms etc. by using the products of Fire Security.

In August 2005 we experienced a fire in the main engine room on board one of our vessels. Lighting fixtures and smoke detectors melted completely, nevertheless the consequences were insignificant.

Over a short period temperatures were extreme until the local fire protection system - Hifog - extinguished the fire. The cables were found to be in normal working order and there was no need for any cable replacements as a result of this incident.

We assign this fortunate outcome to the products of Fire Security, which allowed the ship to continue it's normal service.

We are pleased to give Fire Security and their coatings our best recommendation.

Best regards for COLOR LINE MARINE AS

Johann Martinussen

Superintendent, Electric & Automation

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Certified Sustainable Cable Maintenance

## CERTIFICATE

For

Fireproofing of Electrical Cables Onboard

## MSC RINI III

We confirm that we have applied our approved coating system FS1 on cables in Engine room bottom floor above deck plates, deck 1, Aux, Purifier room, deck 2, Workshop,

deck 3, Incinerator, boiler, Bosun store, Engine store, Transformer rooms, Fuel valve store, Bow Thruster room up to entry hatch, Emergency generator room.

The application has been done in accordance with our documentation and your PO: 620-90483

FS1 Batch numbers: 230641, 230740

Work completed November 2024 Certificate valid until November 2034



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Leif Harald Tveitnes
Technical Director



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Ent.no. 980 339 807 | headquarter@fire-security.com







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 Onboard 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

Cre\_ing

LNG Fleet Manager

Ahmed al Muhairi

Sr. Technical Superintendent - LNG Fleet

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## CERTIFICATE

For

Fireproofing of Electrical Cables Onboard

## STENA SPIRIT

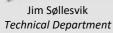
We confirm that we have applied our approved coating system FS5 for fireproofing of cables on car deck 3 and Workshop Welding Area.

The application has been done in accordance with our documentation and your PO: 115F-2024-9007.

FS5 Batch numbers: 241047, 241048, 241508.

Work completed October 2024 Certificate valid until October 2034





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Ceil bill Took

Leif Harald Tveitnes
Technical Director



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FS





#### MOL LNG Transport (Europe) Ltd.

3, Thomas More Square, London E1W 1WY

Mr. Jesper Rexen
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. Rexen,

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 3784 8000

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

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CLIENT	PROJECT	MCSC - Bahrain	Alba Line 6
ADNATCO		MDPC	FPSO Kikeh
ADNATCO		MOL	LNG Ammariya
ADNATCO		MOL	LNG Fraiha
ADNATCO		MOL	
ADNATCO	LNG MUBARAZ		LNG Gigira Laitebo
ADNATCO		MOL	
ADNATCO	LNG UMM AL ASHTAN	MOL	-
ADNATCO	LNG Shahama		LNG Southern Cross
Bergesen D.Y. Offshore ASA	Berge Hus	MOL	1
Bergesen D.Y. Offshore ASA		MOL	
Bluewater Energy	Haewene Brim	MSC	C
BP Azule		MSC	
BP	FPSO Schiehallion	MSC	
BP		MSC	
BW Offshore		MSC	
Color Line		MSC	
Color Line	· · · · · · · · · · · · · · · · · · ·	MSC	•
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Color Line		MSC	
Color Line		MSC	
	COSL Pioneer Semi sub drilling rig	MSC	
COSL		MSC	
COSL Diamond Offshore		MSC	
DML	č	MSC	MSC Arushi R
DML	C	MSC	
Dolphin Drilling	C	MSC	MSC Astrid III
Dolphin Drilling		MSC	MSC Atlantic
Dolphin Drilling		MSC	MSC Auriga
Dolphin Drilling		MSC	MSC Azurit F
Dolphin Drilling		MSC	MSC Banu III
Dolphin Drilling	-	MSC	
Dubai Drydocks NDC		MSC	
Dubai Dry Docks	KOTC Vessel AL Salmi	MSC	
Eaglestar	Lerici LNG Tanker	MSC	
Egyptian Drilling Company	Rig Zozer	MSC	
Egyptian Drilling		MSC	
Equinor	Aasta Hansten Platform	MSC	
Exmar Shipmanagement		MSC	
ExxonMobil		MSC	
ExxonMobil	•	MSC	
Frontier Drilling		MSC	
Fugro		MSC	
Global Marine		MSC	
Greenfleet Ship Management	•	MSC	
Grupo R Mexico		MSC	•
Grupo R Mexico		MSC	
Grupo R. Mexico		MSC	MSC Diva F
Grupo R Mexico		MSC	•
Høegh Fleet		MSC	MSC Edith
Høegh Fleet		MSC	MSC Ela
IHC Krimpen		MSC	MSC Elma
IHC Krimpen		MSC	MSC Elodie
KS Drilling		MSC	MSC Emily II
KS Rigmar 301		MSC	MSC Emma
Kumho Petrochemical		MSC	
Kuwait Tanker Company	MV Gas Tanker Al Mutlaa	MSC	
Maersk Drilling		MSC	
Maersk Oil & Gas			MSC Hailey Ann III
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MSC	.MSC	Reet II
MSC	.MSC	Rini III
MSC		
MSC MSC		
MSC	.MSC	Shuba B
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MSC	.MSC	Silvia
MSC		
MSC MSC	MSC MSC	Tokata E
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MSC	
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National Drilling Company	
Navion	
Noble Drilling	
North Atlantic Drilling	West Navigator
Ocean Rig	Eirik Raude
Ocean Rig	
Odfiell Drilling	
Odfjell Drilling	
ONGC	Rig Sagar Uday
ONGC	
ONGC	
ONGC	Rig Sagar Kattia Rig Sagar Shakti
ONGC	Rig Sagar Khiran
Otto Candies	
Petrobras	
Petrobras	
Petrobras	P-16
Petrobras	
Petrobras	P-33
Petrobras	P-35
Petrobras	P-37
Petrobras	
Petrolia Drilling	
R&B Falcon	
Reading & Bates	
Remontowa S.A.	DDH 973 ROKS Yang Manchoo
Safe Service AB	
Saipem	
Saipem	
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Samsung Heavy Industry	
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Sedco Forex	
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Smedvig	West Alpha
Smedvig	West Delta
Smedvig	
Smedvig	
Smedvig/Navion	West Navion
Statoil	
Statoil	
Stena Drilling	High Seas Driller
Stena Drilling	
Stena Drilling	
Stena Drilling	
Stena Line	
Stolt Nielsen Seaways	Seaway Osprey
Stolt Parcel Tankers	Stolt Topaz
Subsea 7	
Talisman	
Technip	
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Technip-Coflexip	CSO Wellservicer
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Vanguard SPC	
Well Ops	
Woodside	
Workfox	Seafox3

Fire Security also provides cable fire protection for cruise ships, industrial plants, oil installations, tunnels and high rise buildings.

..... FPSO Fluminense

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Shell.....



#### 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

























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