

3X ENGINEERING

OVER 30 YEARS OF EXPERIENCE IN
CRITICAL INDUSTRIAL ASSETS REPAIR
AND SUSTAINABILITY SOLUTIONS



ONSHORE / OFFSHORE



SUBSEA



STRUCTURAL



POWER ENERGY



3X ENGINEERING

PIPE REPAIR & PROTECTION



ONSHORE / OFFSHORE



SUBSEA



REINFORCEKit® 4D



STOPKit®



REINFORCEKit® 1D



REINFORCEKit® 4D SUBSEA



ROLLERKit®

PRESSURE VESSEL & TANK REPAIR



ONSHORE / OFFSHORE



REINFORCEKit® PATCH



TANKit®



STOPKit® VESSEL

SF6 LEAKING FLANGE REPAIR



POWER GENERATION



REFLANGEKit®

STRUCTURAL REPAIR & PROTECTION



STRUCTURE



REINFORCEKit®
STRUCTURE

3X products are approved
by key certification bodies



ABOUT US

Founded in 1990, **3X ENGINEERING (3X)** is a global leader in critical industrial assets repair using composite technology and sustainability solutions to extend asset lifespan and protect the environment. Developer, manufacturer, seller and installer of our products we offer to our clients a complete integrated service. From our head offices in Monaco, we operate worldwide, in any environments (onshore, offshore and subsea), thanks to our large qualified distribution network of over 60 partners.

Since 2024, 3X is part of EKOSCAN INTEGRITY GROUP (E.I.G). We are the Sustainability Division of a group providing innovative solutions for the integrity of industrial assets.

3X is member of the most active and recognized associations operating in material protection, sustainability and performance.



3X IN FIGURES

**OVER 30 YEARS
OF EXPERIENCE**

600 CLIENTS WORLDWIDE

**OVER 60 DISTRIBUTORS
ACROSS THE GLOBE**

14 PATENTED CONCEPTS

62000 LEAKS SEALED

**NEARLY 3300 STRUCTURES
REINFORCED**

550 KILOMETERS OF PIPELINE REPAIRED

**NUMBER 1
IN SUBSEA
PIPE REPAIR**

OUR CLIENTS



OUR SERVICES

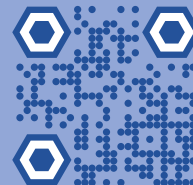
3X WORLDWIDE DISTRIBUTION NETWORK



Albania . Algeria . Angola . Argentina
Australia . Bangladesh . Bahrain . Belarus
Bosnia & Herzegovina . Brazil . Brunei . Canada
Chile . China . Colombia . Congo . Croatia
Cyprus . Denmark . Ecuador . Egypt . France
French Guiana . Gabon . Greece . Guadeloupe
Iceland . India . Indonesia . Iraq . Ivory Coast
Japan . Kazakhstan . Kosovo . Kuwait . Libya
Macedonia . Malaysia . Martinique . Mexico
Myanmar . Monaco . Montenegro . New
Zealand . Nigeria . Norway . Oman . Panama
Peru . Poland . Portugal . Qatar . Russia
Saudi Arabia . Serbia . Singapore . Slovenia
Taiwan . Turkmenistan . Ukraine . United Arab
Emirates . USA . Vietnam



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3X ENGINEERING

REINFORCEKiT® 4D



HIGH-PERFORMANCE COMPOSITE REPAIR SOLUTION FOR PIPE REINFORCEMENT



ONSHORE / OFFSHORE

- Any pipe diameters
- Any pipe geometries
- High pressure
- °C -50°C to +150°C
- °F -58°F to +302°F
- Oil Gas Water

REINFORCEKiT® 4D (R4D) is a wet lay-up repair system, wrapped around the pipe to reinforce the damaged area, restore original pipe integrity and prevent further deterioration.

This composite technology, made of Kevlar® tape and bi-component epoxy resin, is a great alternative to metal clamp, welded sleeve and pipe replacement.

3X ENGINEERING (3X) developed its own software to design the repair and define the material requirements according to ISO 24.817 and ASME PCC-2 standards.

REINFORCEKiT® 4D RANGE



ONSHORE / OFFSHORE TOPSIDE



EXTERNAL CORROSION



INTERNAL CORROSION



THROUGH WALL DEFECT,
LEAK, HOLE



MECHANICAL DAMAGE,
DENT, CRACK, SABOTAGE ...

REINFORCEKiT® 4D MAIN FEATURES & BENEFITS

- › Emergency Pipeline Repair System (EPRS)
- › Online repair (no loss of production)
- › Long-term performance (up to 20-year lifetime)
- › Designed according to the standards (ISO 24.817 and ASME PCC-2 compliant)
- › Versatile product with a large range of applications (O&G assets, plants, refineries, platforms, FPSO ...)
- › Suitable for transmission and distribution pipelines, piping, pipework ...
- › Suitable for any pipe geometries (straight, elbow, tee) including irregularities (welds ...), without pipe size limitation
- › User-friendly (no hot work, non conductive repair, light product)
- › Premium installation by trained and certified applicators only
- › Traceability using smart tag

DOC MKT 019 - C - ENG - 03/2024

REINFORCEKiT® 4D IMPLEMENTATION



1
Designed as per
ISO 24.817
and ASME PCC-2



2
Surface preparation
Sa2½ / St3 & roughness
Rz > 60 µm (2.4 mil)



3
3X filler application



4
3X bi-component epoxy
resin preparation



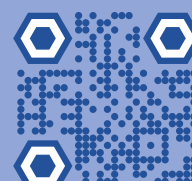
5
R4D wrapping



6
Coating protection
and smart
traceability tag



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3X ENGINEERING

REINFORCEKit® 4D SUBSEA



SUBSEA COMPOSITE REPAIR SOLUTION FOR PIPE REINFORCEMENT



SUBSEA

- Any pipe diameters
- Any pipe geometries
- High pressure
- +5°C to +65°C
- +41°F to +149°F
- Oil Gas Water

REINFORCEKit® 4D SUBSEA (R4D-S), specifically dedicated to subsea environment, is a wet lay-up repair system wrapped around the pipe to reinforce the damaged area, restore original pipe integrity and prevent further deterioration.

This composite technology, made of Kevlar® tape and subsea curing epoxy resin, is a great alternative to metal clamp, welded sleeve and pipe replacement.

3X ENGINEERING (3X) developed its own software to design the repair and define the material requirements according to ISO 24.817 and ASME PCC-2 standards.

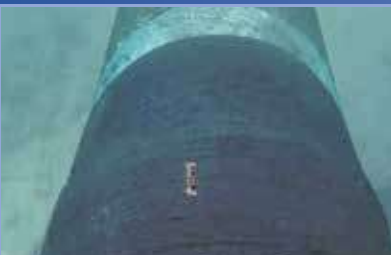
REINFORCEKit® 4D SUBSEA RANGE



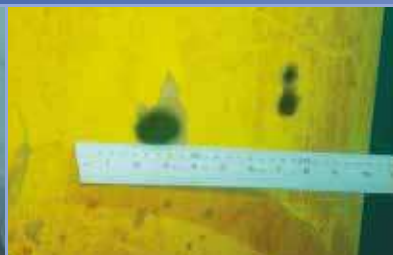
OFFSHORE SPLASH ZONE / SUBSEA



EXTERNAL CORROSION



INTERNAL CORROSION



THROUGH WALL DEFECT,
LEAK, HOLE



MECHANICAL DAMAGE,
DENT, CRACK ...

REINFORCEKit® 4D SUBSEA MAIN FEATURES & BENEFITS

- › Emergency Pipeline Repair System (EPRS)
- › Online repair (no loss of production)
- › Long-term performance (up to 20-year lifetime)
- › Designed according to the standards (ISO 24.817 and ASME PCC-2 compliant)
- › Versatile product with a large range of applications (subsea pipes, subsea caissons, risers, casings, conductor pipes, umbilicals ...)
- › User-friendly (no hot work, non conductive repair, light product)
- › Suitable for any pipe geometries (straight, elbow ...) including irregularities (welds...), without pipe size limitation
- › Specific subsea implementation by trained and certified divers only
- › Traceability using smart tag

**LEADER IN SUBSEA REPAIRS WITH
A LARGE TRACK RECORD WORLDWIDE
(approved by major O&G companies)**

**1
NUMBER
ONE**

DOC-MKT 0036 - B - ENG - LC - 03/2024

REINFORCEKit® 4D SUBSEA IMPLEMENTATION

REINFORCEKit® 4D SUBSEA installation is very specific and technically challenging. All the installation steps need to be performed with highly qualified staff and using tools specially designed for this application. 3X ENGINEERING developed a range of subsea tools to apply R4D-S in controlled conditions and guarantee the good implementation and the product sustainability.



- › Field-impregnation machine
- › Guarantees the good impregnation resin-fiber before immersion



- › Quick and easy wrapping device
- › Ensures proper tensile strength during application underwater



- › Divers training and supervision by 3X
- › 3X supervisors check the product implementation remotely (control room)

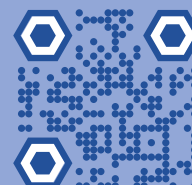


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3X ENGINEERING

REINFORCEKiT® 1D

READY
TO-USE
PROTECTION
SYSTEM

ABRASION RESISTANT OVERCOAT (ARO) FOR PIPE PROTECTION



ONSHORE / OFFSHORE

- Any pipe diameters
- Any pipe geometries
- 50°C to +150°C
- 58°F to +302°F
- Oil Gas Water

REINFORCEKiT® 1D (R1D), is a water activated prepreg protective system wrapped around the pipe.

This technology is a composite Abrasion Resistant Overcoat (ARO) made of fiberglass tape and polyurethane resin. It will minimize the need for costly repairs and provide a strong protection for pipeline coating against impacts, abrasion and external corrosion.

It can be applied directly over existing pipe coating, requiring no calculations and ready for immediate use. This product can also be used for reinforcement in Low Risk Application conditions as defined by the standards.

REINFORCEKiT® 1D RANGE

ONSHORE / OFFSHORE TOPSIDE



COATED PIPE PROTECTION



IMPACT PROTECTION



EXTERNAL CORROSION PREVENTION



ABRASION PROTECTION

REINFORCEKiT® 1D COMPONENTS

5 tape sizes

- R1D - 285mmx15m (11,2" x 49ft)
- R1D - 150mmx15m (6" x 49ft)
- R1D - 150mmx5m (6" x 16ft)
- R1D - 100mmx15m (4" x 49ft)
- R1D - 50mmx5m (2" x 16ft)



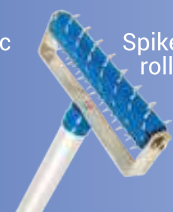
Needed accessories for application



Water spray



Plastic wrap



Spiked roller

REINFORCEKiT® 1D MAIN FEATURES & BENEFITS

- Protective overcoat for pipelines
- High impact resistance
- Ensures future pipeline integrity
- Prevents future external corrosion
- No environmental hazards
- Cost-effective (2 layers recommended for optimal protection)
- Easy and fast application (fiber already impregnated with resin, no mixing nor measuring)

DOC MKT 017 - D - ENG - I.C. - 01/2025

REINFORCEKiT® 1D IMPLEMENTATION



R1D wrapping (spray water continuously)



Compression film application



Compression film perforation



Remove compression film after full curing



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3X ENGINEERING

STOPKiT®

WORLD
LEADING
LEAK SEALING
SYSTEM

ONLINE LEAK SEALING SOLUTION FOR EMERGENCY PIPE REPAIR



ONSHORE / OFFSHORE



SUBSEA

- Many pipe geometries
- 2" to 56" pipe diameters
- Up to 150 bars (2175 psi)
- 20°C to +150°C
- 4°F to +302°F
- Oil Gas Water

STOPKiT® is a world leading repair system able to seal a leak online in few minutes.

This emergency and temporary solution is available under various references to cover a wide range of applications.

STOPKiT® is a patented concept made of rubber patch and tightening system. By compressing the patch over the leaking defect, the rubber seals the leakage.

STOPKiT® RANGE FROM 2" TO 56"

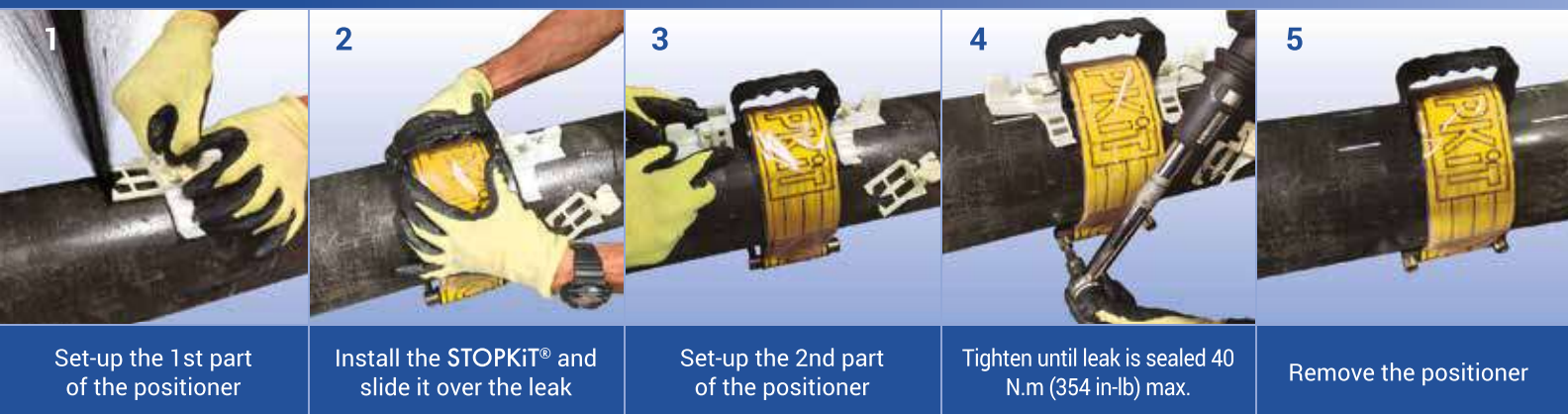
	STOPKiT® SD	STOPKiT® 50	STOPKiT® 100
	Pipe temperature -20°C to +150°C (-4°F / +302°F)		
	Pipe diameter 2" and 3"	Pipe diameter From 4" to 56"	Pipe diameter From 4" to 56"
	Maximum pressure 150 bars (2175 psi) according to pipe diameter and temperature (see Technical Data Sheet)	Maximum pressure 120 bars (1740 psi) according to pipe diameter and temperature (see Technical Data Sheet)	Maximum pressure 50 bars (725 psi) according to pipe diameter and temperature (see Technical Data Sheet)
	Maximum hole Ø 20mm (0.8")	Maximum hole Ø 25mm (1")	Maximum hole Ø 50mm (2")
ONSHORE			

	STOPKiT® SD	STOPKiT® 50	STOPKiT® 100
	Pipe temperature -20°C to +150°C (-4°F / +302°F)		
	Pipe diameter 2" and 3"	Pipe diameter From 4" to 56"	Pipe diameter From 4" to 56"
	Maximum pressure 150 bars (2175 psi) according to pipe diameter and temperature (see Technical Data Sheet)	Maximum pressure 120 bars (1740 psi) according to pipe diameter and temperature (see Technical Data Sheet)	Maximum pressure 50 bars (725 psi) according to pipe diameter and temperature (see Technical Data Sheet)
	Maximum hole Ø 20mm (0.8")	Maximum hole Ø 25mm (1")	Maximum hole Ø 50mm (2")
OFFSHORE SUBSEA			

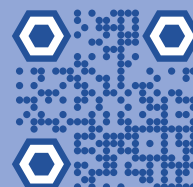
STOPKiT® MAIN FEATURES & BENEFITS

- › Emergency pipeline repair system (EPRS)
- › Online sealing (no shutdown or de-pressurization required)
- › Temporary system (for long-term solution, refer to REINFORCEKiT® product)
- › Large range of performance: can stop a leak up to 150 bars (2175 psi), on pipe operating up to 150°C (302°F), from 2" to 56" diameters, in onshore, offshore and subsea environments
- › Yellow belt dedicated to onshore environment
- › Specific red belt dedicated to offshore and subsea environments
- › Suitable for oval pipe, elbow, weld ...
- › Light product, no additional load on pipe
- › Easy to store and ready to use
- › 5-year shelf life
- › Quick and easy installation (can be performed by a single person in 5mn using STOPKiT® positioner device)
- › Installation by trained and certified applicators only

STOPKiT® IMPLEMENTATION



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3X ENGINEERING

ROLLERKit®



PROTECTIVE COMPOSITE SOLUTION FOR CORROSION UNDER PIPE SUPPORT



ONSHORE / OFFSHORE

-  Any pipe support designs
-  Old & new installations
-  4" to 56" pipe diameters
-  °C -30°C to +150°C
-  °F -22°F to +302°F
-  Oil  Gas  Water

ROLLERKiT® is a preventive and curative repair system for corrosion under support (CUS), for new and old installations.

This patented composite technology, made of high performance polymer pads welded on glass fiber fabric and epoxy resin, protects the pipe and its

support against corrosion in order to preserve pipe integrity. Pads are designed to support the weight of the pipe, according to ASME B31.1.

ROLLERKiT® COMPONENTS



ROLLERKiT® RANGE

Model	ROL-28	ROL-56
Pipe O.D.	4" to 28"	30" to 56"
Application	Onshore & Offshore topside	
Temperature	-30°C / +150°C (-22°F // +302°F)	
Resin	F3X8	
Size of pad (length x width x thickness)	30 x 160 x 8 mm (1,2" x 6,3" x 0,3")	30 x 300 x 12 mm (1,2" x 11,8" x 0,5")
Length of roll	3m (10ft) = 86 pads	
For SPLASH ZONE & SUBSEA applications, contact us: info@3xeng.com		

ROLLERKiT® MAIN FEATURES & BENEFITS

- › Dual use: protective and curative
- › Avoids contact between trapped water and pipe support
- › Avoids galvanic corrosion (non-metallic solution)
- › Avoids catastrophic failures caused by crevice corrosion
- › Protects from impacts
- › Eliminates and prevents from further corrosion at pipe support
- › Installation on pipe, on support or on composite wrapping depending on the level of corrosion
- › A single ROLLERKiT® allows up to 28 repairs according to pipe diameter
- › Installation by trained and certified applicators only

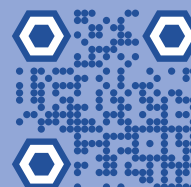
ROLLERKiT® IMPLEMENTATION ON PIPE



ROLLERKiT® IMPLEMENTATION ON SUPPORT



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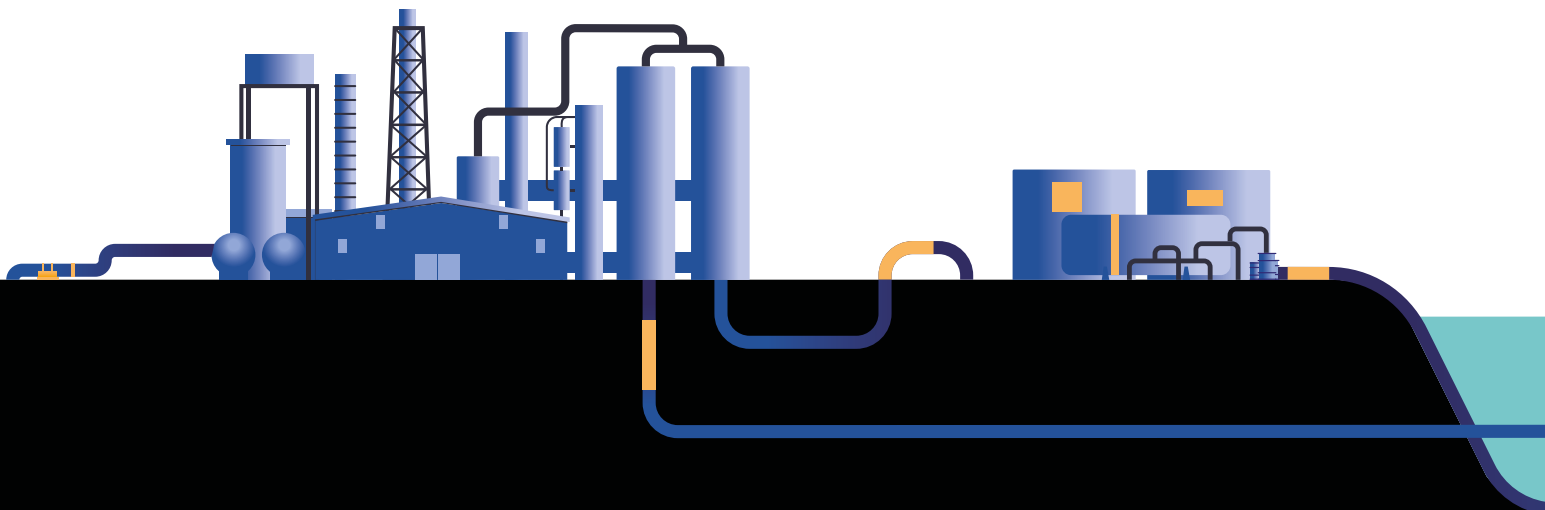
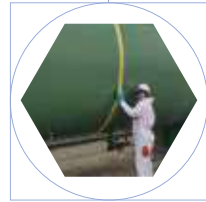


3X ENGINEERING

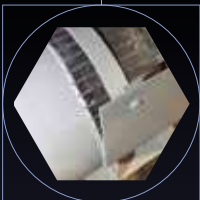
REINFORCEKIT® PATCH
Long-term tank repair



STOPKIT® VESSEL
Online leak sealing for tank



ROLLERKIT®
Pipe / support protection



STOPKIT®
Online leak sealing for pipe



REINFORCEKIT® 1D
Coated pipe protection



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INNOVATIVE REPAIR SOLUTIONS FOR YOUR INSTALLATIONS

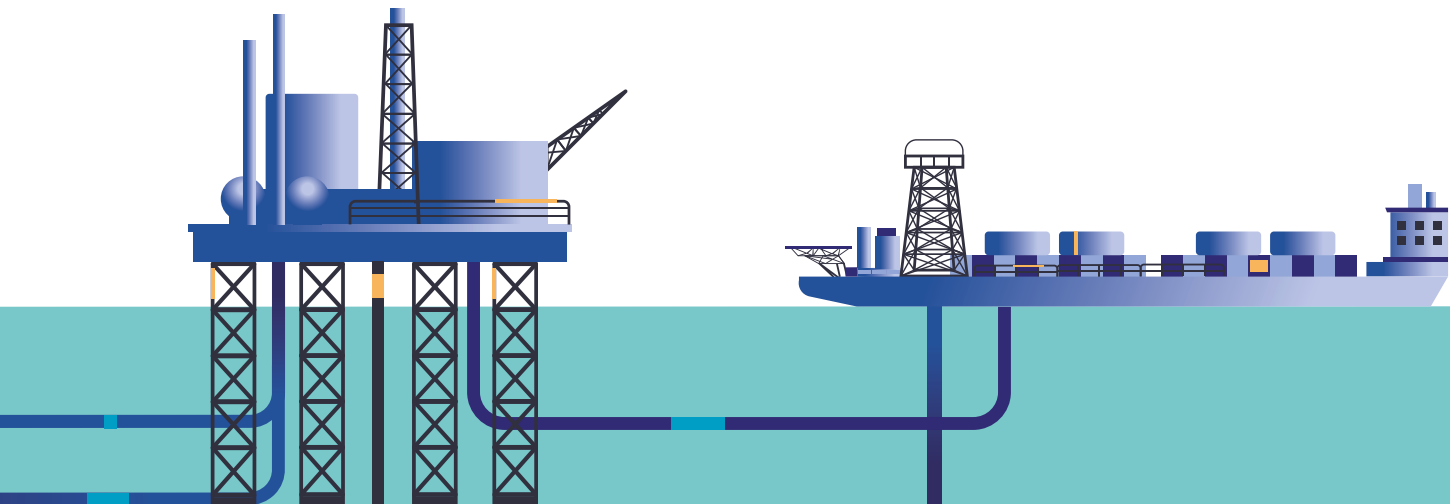
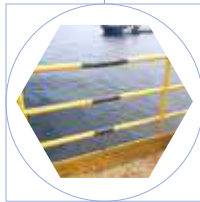
TANKiT®
Emergency tank repair



REINFORCEKiT® 4D
Pipe reinforcement



REINFORCEKiT® STRUCTURE
Structural repair



REINFORCEKiT® 4D
Riser reinforcement



REINFORCEKiT® 4D SUBSEA
Subsea pipe repair



STOPKiT® SUBSEA
Subsea leak sealing



3X ENGINEERING

REINFORCEKiT® PATCH



LONG-TERM COMPOSITE REPAIR SOLUTION FOR TANK AND PRESSURE VESSEL REINFORCEMENT



ONSHORE / OFFSHORE

-  Any designs
-  Any diameters
-  Any defect sizes
-  Storage and pressure
-  -50°C to +150°C
-  -58°F to +302°F
-  Oil  Gas  Water

REINFORCEKiT® PATCH is a wet lay-up patching repair system designed to reinforce tanks and pressure vessels, restore original asset integrity and prevent further deterioration.

This composite technology, made of several Kevlar® patches and bi-component epoxy resin, is a great alternative to welded metal plate and equipment replacement.

3X ENGINEERING (3X) developed its own software to design the repair and define the material requirements according to ISO 24.817, ASME PCC-2 and API 653 standards.

REINFORCEKiT® PATCH RANGE



ONSHORE / OFFSHORE TOPSIDE



EXTERNAL CORROSION



INTERNAL CORROSION



THROUGH WALL DEFECT,
LEAK, HOLE



MECHANICAL DAMAGE,
DENT, CRACK ...

REINFORCEKiT® PATCH MAIN FEATURES & BENEFITS

- › Tailor-made for each repair
- › Online repair (no loss of production)
- › Long-term performance (up to 20-year lifetime)
- › Designed according to the standards (ISO 24.817, ASME PCC-2 and API 653 compliant)
- › Versatile product with a large range of applications (storage and GRP tanks, pressure vessels, separators, columns ...)
- › Suitable for any tank (wall, roof and bottom plate) and pressure vessel designs and diameters
- › No limitation in pressure and defect size
- › User-friendly (no hot work, non conductive repair, light product)
- › Installation by trained and certified applicators only
- › Traceability using smart tag

DOC MKT 037 - B - ENG - 1C - 03/2024

REINFORCEKiT® PATCH IMPLEMENTATION



1
Designed as per
ISO 24.817
and ASME PCC-2



2
Surface preparation
Sa2½ / St3 & roughness
Rz > 60 µm (2.4 mil)



3
3X filler application



4
3X bi-component
epoxy resin
preparation



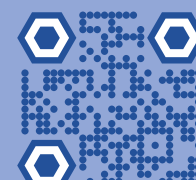
5
Kevlar® patching with
3X resin application



6
Final protection and
traceability tag



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3X ENGINEERING

TANKiT®

Ready-to-use
for emergency
repair

EMERGENCY COMPOSITE REPAIR SOLUTION FOR TANK AND PRESSURE VESSEL REINFORCEMENT

<  >
ONSHORE / OFFSHORE

-  Any designs
-  Up to 100mm (4") defect size
-  Storage & pressure
-  -50°C to +70°C
-  -58°F to +158°F
-  Oil  Gas  Water

TANKiT® is a wet lay-up patching repair system designed to reinforce tanks and pressure vessels, restore original asset integrity and prevent further deterioration.

This pre-engineered composite solution, made of five Kevlar® patches and bi-component epoxy resin, is a great alternative to welded metal plate and equipment replacement.

TANKiT® is ready to use and does not require calculations. It can be used in specific conditions, up to 100mm (4") defect size and maximum temperature +70°C (+158°F).

TANKiT® RANGE

ONSHORE / OFFSHORE TOPSIDE



EXTERNAL CORROSION

INTERNAL CORROSION

THROUGH WALL DEFECT,
LEAK, HOLE

MECHANICAL DAMAGE,
DENT, CRACK ...

Limited to 100mm (4") defect size with maximum temperature +70°C (+158°F)

TANKiT® COMPONENTS



Steel plate
& F3X8 filler



5 Kevlar® patches
300mmx300mm (12"x12")
& bi-component resin R3X70+



Accessories

TANKiT® MAIN FEATURES & BENEFITS

- Ready to use (no calculations required)
- Online repair (no loss of production)
- Versatile product with a large range of applications (storage and GRP tanks, pressure vessels, separators, columns ...)
- Suitable for any tank (wall, roof and bottom plate) and pressure vessel designs
- 1 TANKiT® = 1 repair (always 5 patches/layers)
- Cold welding system, no heating or post-curing required
- Cost-effective and easy to store
- Easy installation by trained and certified applicators
- Traceability using smart tag

TANKiT® IMPLEMENTATION



1 Surface preparation Sa2½ / St3 & roughness Rz > 60 µm (2.4 mil)

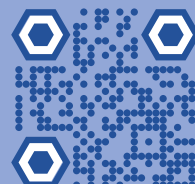
2 Steel plate application
(with filler & magnets)

3 Kevlar® patches with 3X resin
application (5 layers)

4 TANKiT® installed &
traceability tag



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3X ENGINEERING

STOPKiT® VESSEL



ONLINE LEAK SEALING SOLUTION FOR EMERGENCY TANK AND PRESSURE VESSEL REPAIR



ONSHORE / OFFSHORE



Any designs



1,5m to 3,5m (59" to 138") diameters



Up to 40mm (1.6") defect size



Up to 30 bars (435 psi)



-20°C to +80°C



-4°F to +176°F



Oil



Gas



Water

STOPKiT® VESSEL is a repair system for tank and pressure vessel able to seal a leak online in few minutes.

This emergency and temporary solution is available under 4 references depending on the environment and the pressure vessel size.

STOPKiT® VESSEL is a patented concept made of

elastomeric patch (force converter), aramid belt and innovative tightening system. The ratchet mechanism pre-tensions quickly the strap and the final tightening is performed with screws.

STOPKiT® VESSEL RANGE

Denomination	STOPKiT® VESSEL ONSHORE 2.5 (98")	STOPKiT® VESSEL ONSHORE 3.5 (138")	STOPKiT® VESSEL OFFSHORE 2.5 (98")	STOPKiT® VESSEL OFFSHORE 3.5 (138")
Use	ONSHORE ENVIRONMENT - EMERGENCY REPAIR		OFFSHORE ENVIRONMENT - EMERGENCY REPAIR	
Pressure vessel Diameter	1.5m to 2.5m (59" to 98")	2.5m to 3.5m (98" to 138")	1.5m to 2.5m (59" to 98")	2.5m to 3.5m (98" to 138")
Minimum Temperature	-20°C (-4°F)		-20°C (-4°F)	
Maximum Temperature	+80°C (+176°F)		+80°C (+176°F)	
Maximum Hole Size	Ø < 40mm / 1.6"		Ø < 40mm / 1.6"	
Maximum Pressure	30 bars (435 psi)		30 bars (435 psi)	

STOPKiT® VESSEL COMPONENTS

STOPKiT® VESSEL sold in a rigid case including following components



- 1 Belt + rubber patch + tightening system (ratchet strap and screws)
- 2 Torque wrench
- 3 Additional patch (5 units) + magnet system for vertical installation + white marker
- 4 Positioner



STOPKiT® VESSEL MAIN FEATURES & BENEFITS

- › Emergency repair system for tank, pressure vessel and column (any designs: horizontal or vertical)
- › Online sealing (no shutdown or depressurization required)
- › Temporary system (for long-term solution, refer to REINFORCEKiT® PATCH product)
- › Chemical resistant: elastomeric (HNBR) patch compatible with a wide range of chemical fluids
- › Large range of performance: can stop a leak up to 30 bars (435 psi), on pressure vessels operating up to +80°C (+176°F), from 1.5m (59") to 3.5m (138") diameters, in onshore and offshore environments
- › Ready-to-use (the packaging includes all required tools including torque wrench)
- › Reusable (delivered with 5 additional patches and possibility of purchasing spare parts)
- › Fast installation by trained and certified applicators

DOC MKT 049 - B - ENG - IIC - 03/2024

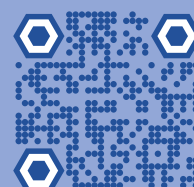
STOPKiT® VESSEL IMPLEMENTATION (horizontal design*)



* For STOPKiT® VESSEL installation on vertical pressure vessel, an additional step using magnet system for fixing the belt is necessary (between steps 1 and 2)



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3X ENGINEERING

REINFORCEKIT® STRUCTURE

FINITE
ELEMENT
ANALYSIS
(F.E.A)
DESIGN

COMPOSITE SOLUTION FOR STRUCTURAL REPAIR



STRUCTURAL

HL [] [] [] [] [] [] Any structure designs



Any structure materials



Any structure sizes



Any weather conditions



Any environments



Any industries

REINFORCEKit® STRUCTURE is a tailor-made composite repair system to renovate any kind of corroded structure and restore original integrity, making it even stronger than the original one.

Depending on the structure design to be reinforced, the solution will be wrapping or patching. This technology is a combination of fiber tape (Kevlar®, carbon or glass fiber) and bi-component epoxy resin. Sometimes metal inserts can be added to specific

designs to distribute the efforts. This product is resistant to any climatic conditions and temperature variations. A protective version, made of a combination of several high-performance coatings, is also available to prevent corrosion issues.

REINFORCEKit® STRUCTURE APPLICATIONS

REINFORCEMENT or PROTECTION

OIL AND GAS



(conductor supported platforms, caissons, splash zones, pressure vessels, tanks ...)

CONSTRUCTION



(bridges, shed structures, beams, columns, roof, walls, decks, sheet piles, jetty piles ...)

ENERGY



(windfarms, electrical pylons ...)

TRANSPORTATION



(catenary supports, beams, poles ...)

Suitable for many others industries ...



FOCUS ON RAILWAY SECTOR

Specific solutions were co-developed and are commonly used by the French National Railway Company to reinforce their catenary supports. Since 2010, thousands of structures have been protected and repaired successfully thanks to DKIT® and REINFORCEKit® BEAM patented products.

REINFORCEKit® STRUCTURE MAIN FEATURES & BENEFITS

- › Repair solution for corroded structures
- › Suitable for steel, concrete, composite and many others material structures
- › Protection against impact, UV and climatic aggression
- › Versatile solution adaptable to any industries/sectors, any structure designs (even complex geometries), any environments (onshore, offshore including underwater) and any structure sizes (no limitation)
- › Live repair, no impact on production or traffic
- › Tailor-made for your structure design using Finite Element Analysis
- › Compliant with international standards:
 - ASME PCC-2, ISO 24817, ABS rules, DNV guidances ... (steel)
 - ACI 440, AFGC guidelines ... (concrete)
- › Long-term repair (20 years minimum)
- › Cost-effective (structure replacement avoided)
- › Installation by trained and certified applicators

REINFORCEKit® STRUCTURE - CASE STUDIES

(non-exhaustive list)



SUBSEA CAISSON REPAIR



CATENARY SUPPORT REPAIR



DECK REPAIR



WALL TANK REPAIR



HANDRAIL REPAIR



JETTY PILE REPAIR



WIND TURBINE REPAIR



SHEET PILE REPAIR



CONDUCTOR SUPPORTED PLATFORM REPAIR

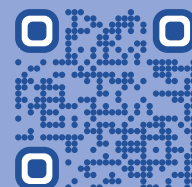


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3X ENGINEERING

REFLANGEKiT®

Gas
Insulated
Substation
(G.I.S)

ONLINE SF6 LEAK SEALING SOLUTION FOR FLANGE REPAIR



-  Many flange geometries
-  SF6 gas
-  High voltage
-  °C -50°C to +65°C
-  °F -58°F to +149°F
-  Power stations

REFLANGEKiT® is a sealing technique designed to capture and seal SF6 leaks on G.I.S flanges, applicable online.

REFLANGEKiT® is a patented concept made of a double shell system that encapsulates the leaking flange. The first soft cover protects the whole flange (including gasket, bolts and nuts), collects and

concentrates SF6 leak through the valve (located on the top). The second hard shell (positioned above the soft one) contains 3X specific resin.

REFLANGEKiT® RANGE

Product already designed for many flange types:

SIEMENS

AREVA

VATECH

ABB

Westinghouse



If existing models are not adaptable with your installation, 3X will manufacture it.



Designed, developed and tested in partnership with EDF (French Electricity Supplier).

REFLANGEKiT® CONCEPT

Soft cover |
equipped with valve

Resin |

Hard shell |



REFLANGEKiT® MAIN FEATURES & BENEFITS

- › Power stations
- › Online repair and under pressure
- › Tailor-made for your installation using Finite Element Analysis
- › Suitable for many flange geometries
- › Suitable for aluminium, stainless steel, ceramic and carbon steel materials
- › Flange, bolt and screw system protection
- › Easy disassembly without damage
- › Non-invasive system (none risk of resin intrusion into the flange)
- › High-quality product certified (many pressure and aging tests performed)
- › Cost-effective product (costly shutdown avoided)
- › Can also be used as preventive solution
- › Installation by 3X specialists to guarantee the sustainability of the product
- › Already used and approved by many companies around the world

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REFLANGEKiT® IMPLEMENTATION

1



Surface preparation
Sa2½ / St3 & roughness
Rz > 60 µm (2.4 mil)

2



Leak sealing with
soft cover application
and valve

3



Hard shell installation

4



3X resin injection

5

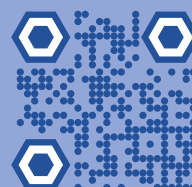


Valve plugged
and sealed

3X
ENGINEERING



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Pipe Defect Register (PDR)

Client
Project
Defect ref.

3X distributor
Contact details

PIPE DIMENSION

mm ☐ inch ☐

STRAIGHT



D: Original diameter

t: Wall thickness

BEND



D: Original diameter

t: Wall thickness

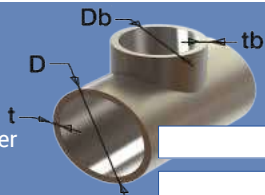
A: Medium radius of the bend

α: Opening angle bend

Bend defect location

Axial ☐ External ☐ Internal ☐

TEE



Main branch

D: Original diameter

t: Wall thickness

Secondary branch

Db: Original diameter

tb: Wall thickness

PIPE INFORMATION

Grade:

Other:

CONNECTION

Seamless (1.0)..... ☐
Electric Resistance Weld (1.0).. ☐
Electric Flash Weld (1.0)..... ☐
Electric Fusion (Arc) Weld / Spiral Weld (0.8)..... ☐
Furnace Butt Weld / Continuous Weld (0.6)..... ☐
(Double) Submerged Arc Weld (1.0).... ☐
Laser Beam Weld (1.0)..... ☐

FLUID

Oil..... ☐
Gas..... ☐
Water..... ☐
Chemical product..... ☐

If the fluid is chemical, specify its nature

FLUID SYSTEM COMPONENT

Pipeline..... ☐
Piping..... ☐
Riser..... ☐

ENVIRONMENT

Onshore..... ☐
Buried..... ☐
Offshore Subsea..... ☐
Offshore top side..... ☐

DESIGN FACTOR

According to the ASME B31.4 & ASME B31.8

Class 1	Class 2	Class 3	Class 4
☐	☐	☐	☐
0,72	0,6	0,5	0,4
Other			

PRESSURE

Psi ☐ Bar ☐ MPa ☐

Pipe design pressure (only for information)

Pipe operating pressure (only for information)

Repair design pressure

Repair Installation pressure (plive)

Plive: pressure during application of the repair

TEMPERATURE

°C ☐ °F ☐

Pipe design temp. (only for information)

Pipe operating temp. (only for information)

Min. Max.

Repair design temp.

Repair installation temp.

Min. Max.

PIPE DEFECT

DEFECT TYPE External ☐ Internal ☐

Metal loss..... ☐

Through-wall..... ☐

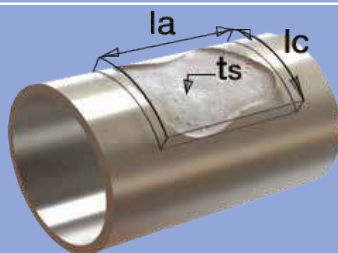
Crack..... ☐

Dent..... ☐

CALCULATION CHOICE

ISO 24.817..... ☐

ASME PCC-2..... ☐



REPAIR DESIGN LIFETIME Years

DEFECT DIMENSIONS mm ☐ inch ☐

la: Defect axial length.....

Lc: Defect circumferential length...

ts: Minimum residual wall thickness.

DEFECT ORIGIN

Corrosion..... ☐

Abrasion / Erosion..... ☐

Impact..... ☐

PIPE ENVIRONMENT AND REPORTS

Do you have an inspection report of the defect?..... Yes ☐ No ☐

Do you have pictures of the affected zone?..... ☐ ☐

Do you have clearance 40cm all around the pipe for working?..... ☐ ☐

Is the defect situated close to weld, nozzle, tee, bend, support?..... ☐ ☐

Is the defect close to habitations, machines, industries?..... ☐ ☐

Is there a sand blasting possibility (Sa½ & 60µm (Rz))?..... ☐ ☐

COMMENTS

Full name:

Signature & company stamp

Date : / /



In order to determine the repair technology, this document has to be fulfilled accurately. All missing information will affect the design, quality and standard acceptance and will be treated making assumptions. We will not be responsible for data input. We will only accept signed forms. The person fulfilling this form assumes full responsibility

Tank Defect Register (TDR)

Client
Project
Defect ref.

3X distributor
Contact details

TANK DIMENSION ☐ mm ☐ inch

D: Tank diameter
t: Wall thickness
H: Wall height



ROOF INFORMATION

What kind of tank roof do you have ?
Floating roof..... ☐
Immobile roof..... ☐

ACCESSIBILITY

If an internal tank repair is required, is it possible to access inside ?
Yes ☐ No ☐

TANK INFORMATION

Grade:
Other:

CONNECTION

Bolted..... ☐
Riveted..... ☐
Seamless..... ☐
Electric Resistance Weld..... ☐
Electric Flash Weld..... ☐
Electric Fusion (Arc) Weld / Spiral Weld..... ☐
Furnace Butt Weld / Continuous Weld.. ☐
(Double) Submerged Arc Weld..... ☐

If you have a required Joint Efficiency factor:

FLUID

Oil..... ☐
Gas..... ☐
Water..... ☐
Chemical product..... ☐

If the fluid is chemical, specify its nature:

FLUID SYSTEM COMPONENT

Storage..... ☐
Pressurized Vessel..... ☐

ENVIRONMENT

Onshore..... ☐
Offshore top side..... ☐

If you have a design factor required :

PRESSURE ☐ Psi ☐ Bar ☐ MPa

Tank design pressure (only for information)

Tank operating pressure (only for information)

Repair design pressure

Repair Installation pressure (plive)
Plive: pressure during application of the repair

TEMPERATURE ☐ °C ☐ °F

Tank design temp. (only for information)

Tank operating temp. (only for information)
Min. Max.

Repair design temp.

Repair installation temp.
Min. Max.

TANK DEFECT

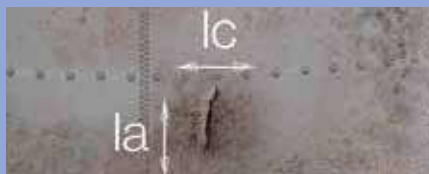
DEFECT TYPE Internal ☐ External ☐

Metal loss..... ☐
Through-wall..... ☐
Crack..... ☐
Dent..... ☐

DEFECT ORIGIN

Corrosion..... ☐
Abrasion / Erosion..... ☐
Impact..... ☐

REPAIR DESIGN LIFETIME Years



CALCULATION CHOICE

ISO 24.817..... ☐
ASME PCC-2..... ☐

DEFECT DIMENSIONS ☐ mm ☐ inch

la: Defect axial length.....
lc: Defect circumferential length....
ts: Minimum residual wall thickness

DEFECT LOCATION

Roof..... ☐
Wall..... ☐
Between 2 welded sheets..... ☐
Near a screw..... ☐

TANK ENVIRONMENT AND REPORTS

	Yes	No
Do you have an inspection report of the defect?.....	☐	☐
Do you have pictures of the affected zone?.....	☐	☐
Do you have clearance all around the defect?.....	☐	☐
Is the defect situated close to weld, to a rivet?.....	☐	☐
Is the tank close to habitations, machines, industries?.....	☐	☐
Is there a sand blasting possibility (Sa½ & 60µm (Rz))?....	☐	☐

COMMENTS

Full name:

Signature & company stamp

Date : / /



In order to determine the repair technology, this document has to be fulfilled accurately. **All missing information will affect the design, quality and standard acceptance and will be treated making assumptions.** We will not be responsible for data input. We will only accept signed forms. The person fulfilling this form assumes full responsibility



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