

NON Welded Piping Technology



고압 및 저압
무용접 피팅



(주)키텍코리아
www.keytechkorea.co.kr

Tube-Mac® (PYPLOK) 본사



Stoney Creek, Ontario, 캐나다
55,000 SF (5,100SM) Facility

- 1977년 설립
- 250 명 이상의 직원들이 현재 근무중
- 전세계 20개국 이상에서 판매망 갖추고 있음.

PYPLOK® (파이프락)

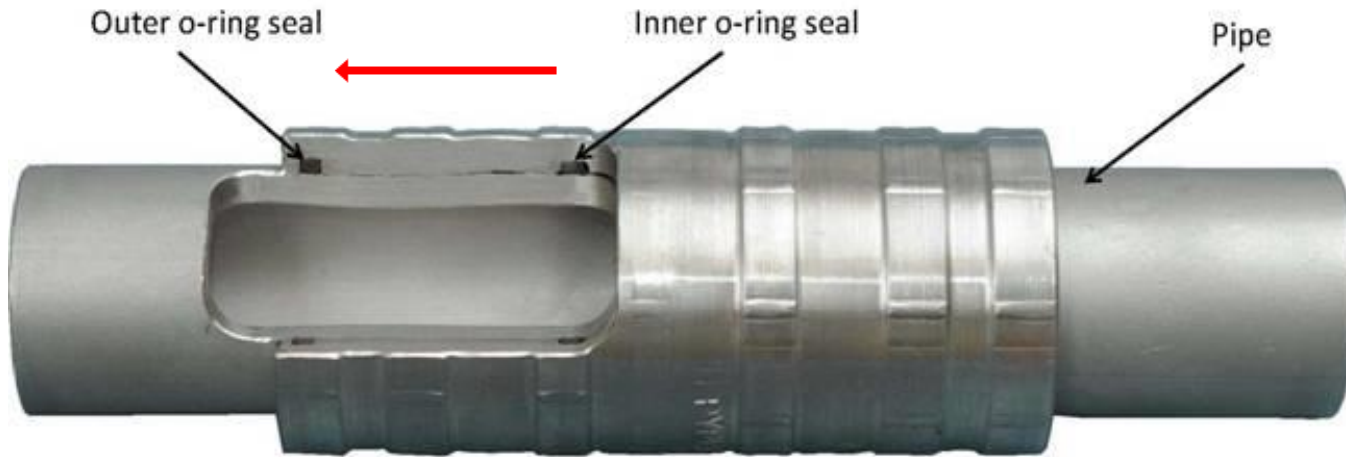
무용접 피팅

- 저압 및 고압 Application
- 무용접
- 간편한 설치
- 비용 감소
- ASME B31.1, B31.3, B31.4 & B31.8 compliant



무용접 이며 한번 체결로 영구적 사용함. (파이프, 튜브)

삼중 밀폐를 통한 밀폐완성 (내부 오링 밀폐 , 메탈 면/선밀폐 보조, 외부 오링 밀폐)



밀폐 수준: 나사, Lok, Braizing 보다 높고 용접과 동등 수준임.

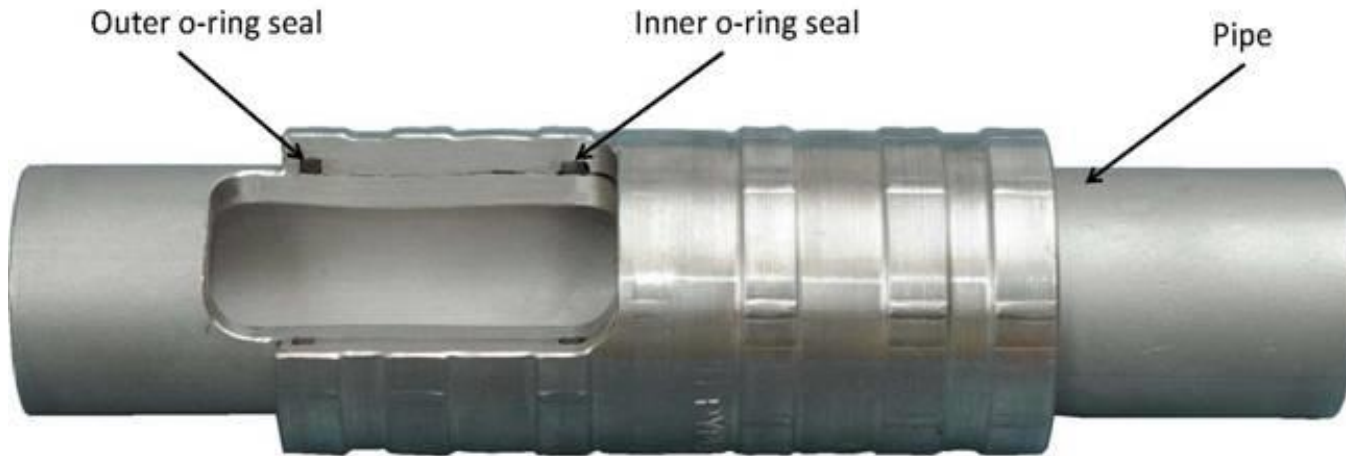
무용접 이며 한번 체결로 영구적 사용함. (파이프, 튜브)

PYPLOK® Fittings 재질

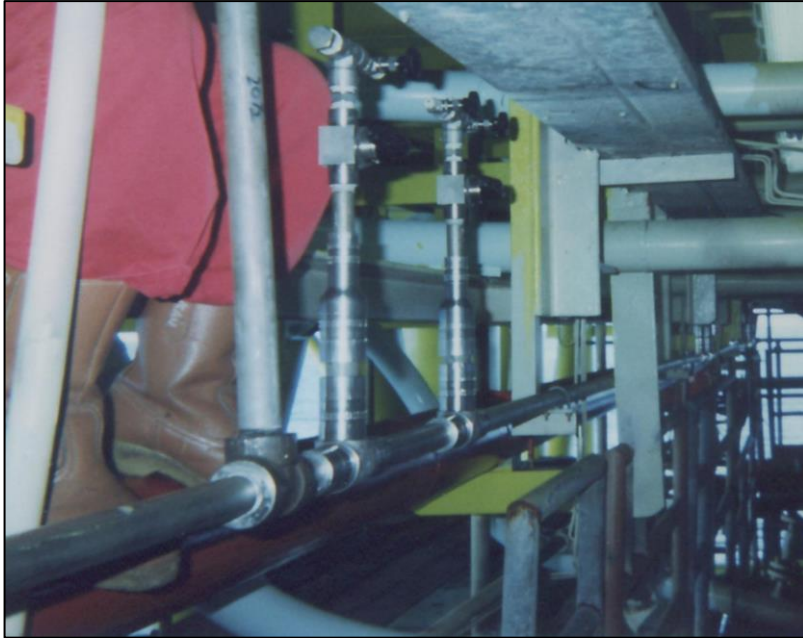
- Carbon Steel, 316 Stainless Steel, Duplex, Super Duplex, & CuNi 70/30

O-Ring 재질별 온도 대역

- VITON -15°F to 400°F (-26°C to 205°C)
- EPDM EO962-90 (for steam) -60°F to 400°F (-51°C to 205°C)



25년 경과후 누설 여부 체크 (영구 사용)



January 1994



February 2019

PYPLOK 1994년 1월 파일럿 라인에 설치 : South Furious Platform (Shell Malaysia)

25년 경과후 : 2019년 2월 모든 피팅에 대해 전수 검사 실시 : 단 한포인트의 누설도 없음

튜브, 파이프 (거의 모든 사이즈 대응 가능)

Numerous shapes, configurations and materials to meet any need

- PIPE. Sizes 6A~100A (KS,JIS) , 1/4" ~ 4" (ASTM),
- O.D. Tube Sizes 1/4" thru 2"
- Metric Sizes 6mm thru 60mm



요약 : 적용 사이즈 , 온도 및 허용 압력

파이프 락 무용접 피팅

(Inert Gas, CDA, PCW, Vacuum Exhaust. Steam)

- 파이프 락(Pyplok)은 가장 단순하고 쉽게 조립.
: ASME B 31.1. 31.3, 31.4 & 31.8 등에 부합함
- 적용 사이즈 : 튜브 1/4" ~ 2" (6mm~60mm)
파이프 8A~100A (1/4" ~4")
- 온도 범위 (-51°C ~ 205°C)
- 최대 허용 압력 : Up To 10,000 PSI (690 Bar)
(현존 가장 압력 등급이 높은 무용접 피팅)
(사이즈별 압력 등급은 카다 로그 참조)

PYPLOK® Test Summary (테스트 요약)

Test	Requirements	Results
Gas Leak Test	Gn2 Nitrogen 1,000 PSI for 10 minutes	No leakage
Hydrostatic Burst	Based on 4 x Operating Pressure held for 5 minutes	No leakage
Hydrostatic Proof	Based on 1.5 x Operating Pressure held for 5 minutes	No leakage
Vibration Test	20,000,000 cycles at displacement @ operating pressure	Passed
Impulse Test	500,000 cycles @ 1.33 x Operating Pressure based on ISO/BS Impulse Cycle	Passed
Impulse/Flexure and Fatigue at Low Temperature	Simultaneous impulse and bending stress, 8 times during test of 10,000 cycles each under peak pressure and rated bending each fitting was subjected to -100 deg F for one hour utilizing liquid CO2	No leakage
Tensile Test	Fitting was installed in tensile machine with cross head speed of 0.20 in/min and pulled until one side of pipe dismembered from the fitting/pipe joint	Exceeded Tensile Strength by a factor of 1.33 to 1.63
Torsion Test	At various Torsion Angles and Ft-Lbs of Torque @ 4500 Psig (Gn2) and 6000 Psig (Hydraulic Fluid)	No Leakage
Heat Aging	Maintained at 400 deg F(205°C) ± 5 deg F for 168 hours, Proof test @ 6000 Psig for 30 minutes	Passed



API Standard 6FB 3rd Edition Fire Test



850도 30분 노출후 식힌후 고압을 흘려 누설 체크 실시

Fire Test 결과

Table 1. Sample Description as Provided by Tube-Mac Industries Ltd.

Sample ID	Construction	Fitting Size	Proof Pressure
DM60001K04	316 SS	¼ in.	960 bar (13,923 psig)
DM20001K16	316 SS	1 in.	780 bar (11,313 psig)
DM20001K32	316 SS	2 in.	660 bar (9,573 psig)
DM20001G04	Carbon Steel	¼ in.	680 bar (9,863 psig)
DM2001G12	Carbon Steel	¾ in.	670 bar (9,718 psig)
DM80001G60	Carbon Steel	60 mm	580 bar (8,412 psig)

예) 2인치(50A) 파이프 피팅 연결후 850도 Fire Test 30분 노출된 피팅을 식힌후 5분간 660Bar의 압으로 물 흘려서 누설 체크 : 누설 없다면 비로소 ISO 19921 부합함.

Table 2. Summary of Test Results.

Sample ID	Result of Fire Endurance Test	Results of Proof Pressure Test	Met ISO 19921 Requirements
DM60001K04	No leakage observed	No leakage observed	Yes
DM20001K16	No leakage observed	No leakage observed	Yes
DM20001K32	No leakage observed	No leakage observed	Yes
DM20001G04	No leakage observed	No leakage observed	Yes
DM2001G12	No leakage observed	No leakage observed	Yes
DM80001G60	No leakage observed	No leakage observed	Yes

테스트 결과 :

전 사이즈 누설 없음.



PYPLOK® Applications

- CNG – Compressed Natural Gas
- CO2 Cofferdam Inerting
- Condensate Piping
- Deluge Systems
- Down Well Coiled Tubing
- Drains and Plumbing Vents
- Ethylene Glycol/Water
- Fuel Oil and Fuel Gas
- Gases – Nitrogen, Air, Helium
- Heating Coil
- High Pressure Water Mist/Fog – Fire Suppression Systems
- Hydraulic Oil
- Low Temperature Steam
- LPG – Liquefied Petroleum Gas
- Lubrication and Grease
- Natural Gas
- Waste Water
- RAD Waste Systems
- Solvents and Water Based Paints
- Subsea Piping
- Steam Tracer Lines
- Plant Instrumentation and Utility Air



A : Reference

Company	Location/Project	Application
BASF	USA	Acrylic Acid
ExxonMobil	USA	LP Steam, Hydraulic, Lube Oil & Glycol
DOW Chemical	Columbia, Thailand, China and USA	Solvents, Coatings and Resins, Polystyrene
Dupont	USA and Singapore	Steam Condensate, Nitrogen, Gasolines, Butyl Butylene Vapour, Hydraulic Oil
Caltex	Australia and Indonesia	Steam Tracing, Steam Distribution, Cooling Coil, Hot Boiler Feed Water Line
BP	USA, Scotland and Australia	LP Steam, Nitrogen
Chevron	USA, Scotland, Australia and Venezuela	LP Steam, Water Sprinkler System, Hydraulic Oil, Steam Distribution
Shell	Australia, Malaysia, Singapore and USA	LP Steam, Steam Distribution, Hydrogen, Rad Waste System, Glycol, Hydraulic Oil, Lube Oil, LP CO2
PPG	USA	Hydraulic Oil, Water Sprinkler, LP Steam, Nitrogen
Baltimore Gas & Electric	USA – East Coast	Hydrocarbon – Natural Gas, 1/2” through 2” PYPLOK®
Conoco Phillips	U.K. and USA	Steam Tracing, Steam Distribution, 1/2” tube, 3/4” & 1” N.P.S. PYPLOK



B: Reference

Company	Location	Project	Application
Maersk	Nguijma-Yin	FPSO	Carbon steel PYPLOK®
Kleven Yard	Norway	Sanko Swift Seismic Vessel	PYPLOK installed on various Hydraulic Systems
Montco	USA - Louisiana	L/B Caitlan and L/B Paul Liftboats	Hydraulic piping 1/2" through 3" NPS PYPLOK
Woodside	Australia	Cossack Pioneer	3" NPS PYPLOK
Austal	USA – Mobile Alabama	Huakai High Speed Ferry	1/2" through 1" NPS PYPLOK
Larsnes Mek. Verksted	Larsnes, Norway	Eros Line Trawler	PYPLOK installed on various Hydraulic Piping Systems
SEMCO	USA - Gulf Coast	Jack-up Boats	Hydraulic piping - Flare Flange and PYPLOK
ST Marine	Singapore	Coast Guard Patrol Boat	PYPLOK installed on Hydraulic piping and water mist
Dakota Creek	USA, Anacortes, WA	Ross Candies - Supply Ship	PYPLOK installed on nitrogen lines
CSSC Wenchong	Guangzhou, China	(14) Dredgers 300,800 dwt	PYPLOK and 37° Flare Flange systems
COSCO	China	180,000 dwt Bulk Carriers	PYPLOK installed on hydraulic systems
Simon Mokster Shipping	Astilleros Gondan, Spain	Stril Merkur	Hydraulic piping 20mm through 50mm PYPLOK
Holland America	USA - Tampa, Florida	MS Veendam Cruise Ship	44.5mm CuNi fuel heating coil piping
Factoria Naval de Marin	Marin, Spain	(2) Super Yachts	High pressure fire suppression system
Boeing	USA –Hawaii	Sea Based X-Band Radar	Winch and Crane Hydraulic Piping



C: Reference

Company	Location	Project	Application
NOV	Abu Dhabi, U.A.E.	ODN Delba III - Odebrecht Oil Rig	PYPLOK® installed on Hydraulic and Air Systems
Shell Brunei	Brunei	Small Bore Pipe repair contract	Pipe repair for all sizes 3" and below
Woodside	Australia	Goodwyn Oil Platform	Pipe repairs for 2" and below
Statoil	Norway	Piping Repairs on multiple Platforms	Duplex /Super Duplex Process Piping & Utility Piping
Attwood Oceanics	Alexandria, Egypt	Aurora Jack-up Rig	1/2" through 2" NPS PYPLOK
ESSO	Australia	Oil platforms	Utility Line Repairs on-shore / off-shore
Worldwide Oilfield Machines	Texas, USA	Helix Q4000, Oil Well Intervention Rig	Subsea BOP - 1/2" through 1-1/2" NPS PYPLOK
Helix Energy	USA – Gulf Coast	Helix Express, Helix Q4000 and Helix Producer I	High Pressure Compensator Piping, Winch and Crane Hydraulic Piping, 25mm PYPLOK
Keppel AmFELS	USA – Texas	(4) Rowan Rigs EXL	BOP and other hydraulics – PYPLOK and Flare Flange
Shell Sarawak	Malaysia	South Furious Rig	Air Instrument – PYPLOK installed over 30 years ago
Transocean	Eastern Canada and Gulf of Mexico	Cajun Express, GS Grand Banks and Pathfinder	Thruster piping, Derrick and BOP - 1/2" through 2" NPS



Reference :Offshore Hydraulic Repair



Petrobras P61 Rig



Referecne : ODN Delba III

GPC shipyard in Abu Dhabi



Rig Owner
Odebrecht Oil & Gas
Brazil



Reference : Domestic Gas Distribution



Reference : Total Fina Elf Gas Line



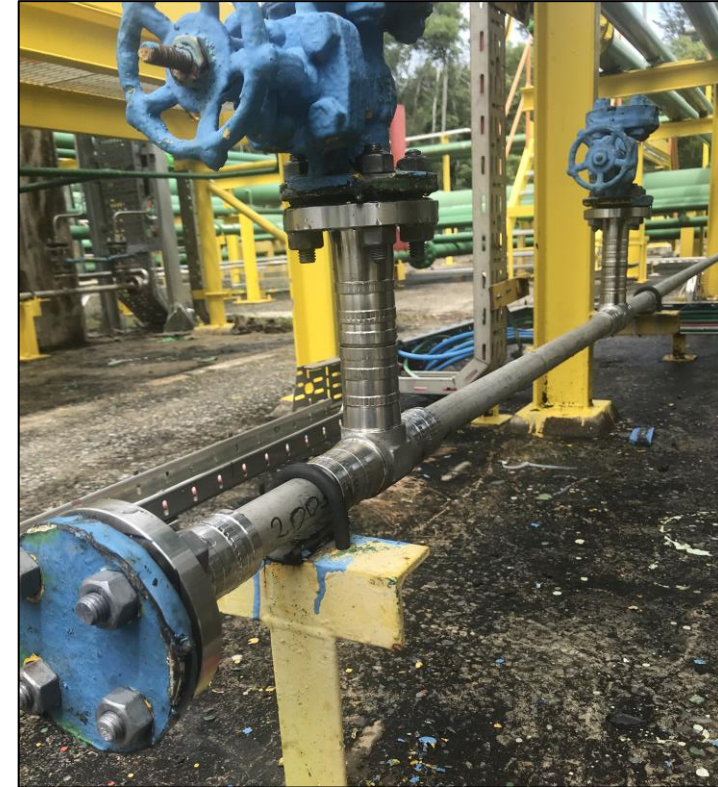
Reference : Light and Heavy Crude Oil Lines



2" N.P.S. PYPLOK[®], stainless steel type
316/316L for light and heavy crude oil lines



Reference : Instrumentation Air Lines



PETRONAS

2" N.P.S. PYPLOK[®], stainless steel type 316/316L for Instrumentation Air Lines: Malaysia LNG Plant (MLNG)



Reference : Steam Trap Replacement



SOLVAY Spinetta Refinery, Italy

3/4" NPS PYPLOK®



Reference : Steam Trap Replacement



Chevron Cape Town Refinery

Reference: Heating Coil

Project Details:

<u>Customer:</u>	MISC Bhd./ Petronas Carigali Bhd.
<u>Vessel:</u>	FSO Puteri Dulang
<u>Location:</u>	Offshore – Dulang Field, Block PM 305 (135km off East Coast Malaysia)
<u>System:</u>	Cargo Heating System – Steam and Condensate
<u>Pipe & PYPLOK Size:</u>	1 1/2" & 1" NPS
<u>Pipe & PYPLOK Material:</u>	316/316L
<u>PYPLOK Used:</u>	Approximately 180-200pcs Stainless Steel PYPLOK Couplings were installed



Reference : Heating Coil Repairs in Tanks / Confined Spaces



Job carried out by crew after short training by Tube-Mac

Reference: FPSO



Maersk Ngujima – Yin FPSO
Carbon Steel PYPLOK used in
repair of piping after on board fire

Cossack Pioneer FPSO
Woodside, AUSTRALIA

3" PYPLOK® for utility pipe repair
and other PYPLOK repair jobs



Reference : Seismic Vessel



Sanco Swift Seismic Vessel
PYPLOK® installed by
Kleven Yard in Norway

Reference : Tug Boats

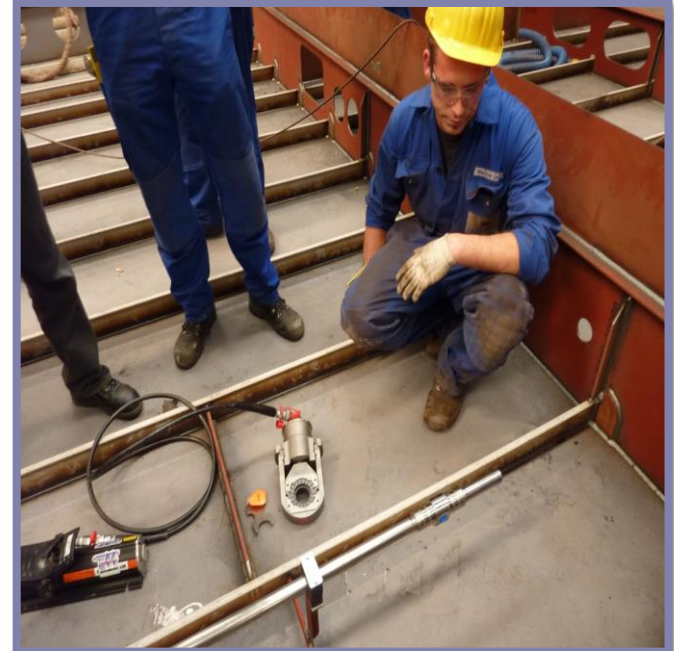


Tube-Mac® Spain completes hydraulic piping systems on 18 tug boats at Armon shipyard

Reference: Cruise Ships



Aida Cruise ship
Fire suppression system utilizing PYPLOK®
technology



Meyer Werft
Papenburg Germany

Thank You For Your Time Today

