



Airborne

Oil & Gas

TCP Jumper

Airborne Oil & Gas is the world's first and leading manufacturer of fully bonded, Thermoplastic Composite Pipe (TCP). The lightweight, high strength and corrosion resistant composite pipes provide cost and operational benefits in subsea production & oil field service applications.

airborneoilandgas.com

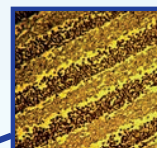
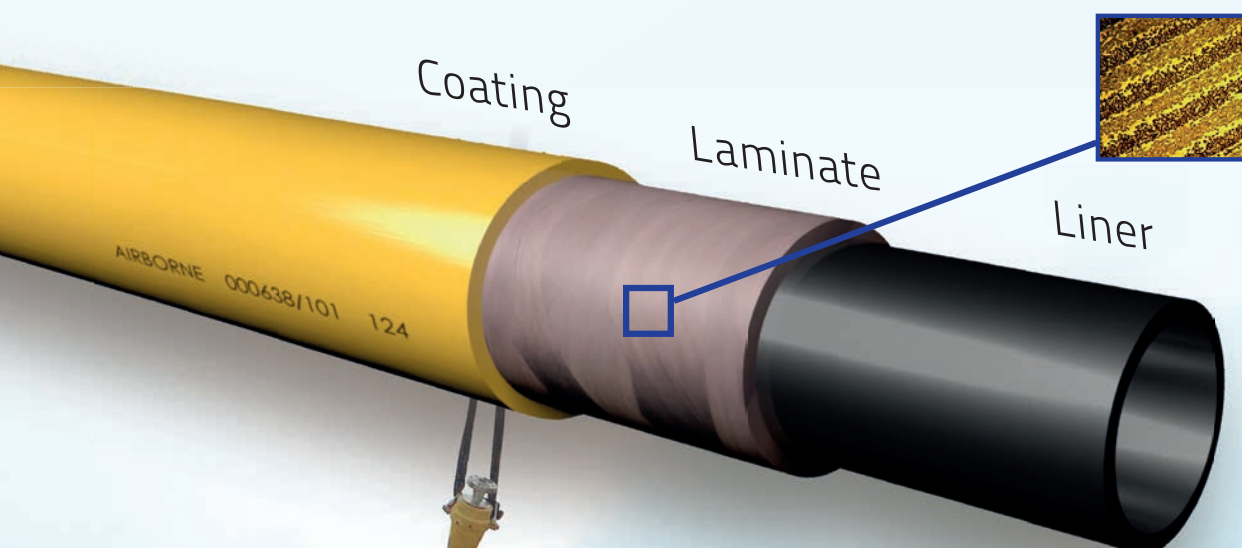


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The Thermoplastic Composite Pipe (TCP) developed by Airborne Oil & Gas features a solid pipe wall, constructed from glass or carbon reinforcement fibres and thermoplastic polymeric materials. The unique, certified and proprietary manufacturing process results in a fully bonded composite pipe structure, with the fibres fully embedded within the polymer matrix and ensuring the strongest interface possible between the different pipe layers.

TCP Jumper

The TCP Jumper provides the flexible fluid connection between coiled tubing or TCP Downline and the subsea wellhead, injection skid or pig launcher. Combining a high internal pressure strength with collapse resistance to 3000 meter water depth, the TCP Jumper is the product of choice for deepwater Subsea Well Intervention, Riserless Plug and Abandonment and Pipeline Pre-commissioning.



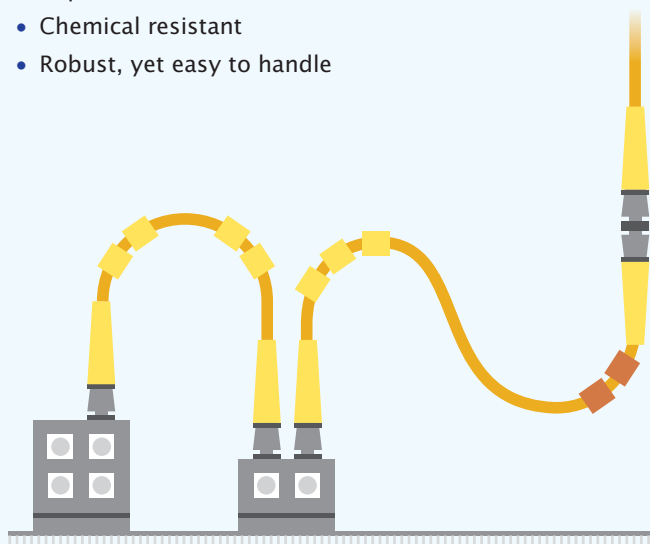
Microscopic picture of composite laminate





The TCP Jumper offers the following advantages:

- Spoolable with small MBR
- Highest burst and collapse capabilities (3000 meter water depth)
- Smooth bore with very low friction loss
- Allows cement pumping
- Capable of handling vacuum at rated depth
- Able to disengage emergency quick disconnect
- Can be re-terminated in the field
- Tough, yet smooth outer layer
- Impervious to corrosion
- Chemical resistant
- Robust, yet easy to handle



Fast, Flexible and Safe Deployment

The TCP Jumper connects the TCP Downline or steel coiled tubing to the injection skid, wellhead or pig launcher. On deck, the jumper is spooled from a small reel and buoyancy and/or ballast elements are attached. The jumper is deployed over a small chute and run down connected to the coil or downline. It is manipulated and connected subsea by ROV, after which the pumping operation commences. With the coil or downline remaining at a fixed position on the chute, the jumper subsea absorbs the heave motions of the vessel while maintaining high pressure and collapse integrity. In case of vessel drift, the jumper is strong enough to disengage the emergency quick disconnect, making a pod wire redundant.

TCP Jumper Specifications

The table below shows an overview of the TCP Jumpers available. To meet the industry's demand for short delivery times, the 2" ID, 10,000 psi TCP Jumper is available on stock.

TCP Jumper product overview

Internal Diameter	Design Temperature	Maximum Pressure Rating	Maximum Water Depth	Storage MBR
1.0 inch	-20°C to +60°C	1034 bar / 15,000 psi	3048 m / 10,000 ft	1.0 m / 3 ft 2 inch
1.5 inch	-20°C to +60°C	690 bar / 10,000 psi	3048 m / 10,000 ft	1.2 m / 3 ft 11 inch
2.0 inch	-20°C to +60°C	690 bar / 10,000 psi	3048 m / 10,000 ft	1.6 m / 5 ft 3 inch
2.5 inch	-20°C to +60°C	690 bar / 10,000 psi	3048 m / 10,000 ft	1.8 m / 5 ft 11 inch
3.0 inch	-20°C to +60°C	345 bar / 5,000 psi	3048 m / 10,000 ft	1.7 m / 5 ft 7 inch

Qualification

Airborne Oil & Gas is the world's first company to have certified and qualified the design methods and production process in compliance to the new DNV standard for TCP, DNVGL RP F119. Our products are designed in accordance with this Recommended Practice and supplied with a Manufacturer's Certificate of Conformity.

DNV-GL	
STATEMENT OF CONFORMITY	
Statement No: 2015-3256	
Owner:	Airborne Oil & Gas
Name of system/installation:	Production principles for manufacturing Thermoplastic Composite Pipes (TCP) based on tape-winding on a liner and extruding an outer cover
Location:	Airborne Oil & Gas, IJmuiden, The Netherlands
Description:	Generic methodology describing the production process and the production parameters for making a range of TCPs, including methods to obtain permissible production tolerances
Main Operational Limitations:	
Designated use:	The production principles will be used for obtaining production procedures for specific thermoplastic composite pipes. The principles describe what parameters to control and how accurately the process needs to be controlled
Conditions:	This statement is only valid together with the Report on the Verification of Production Principles (ref. /1/) that specifies the product, the general production process and limitations and conditions that apply. The main limitations are the choice of fibre reinforced thermoplastic tape, production speed, dimensional range and fibre angles
Verification:	A specific production process shall be verified against the procedures and limitations described in /1.3.1. No deviations of the general approach shall be verified according to /3.4/.
This is to verify:	That the above mentioned principles for manufacturing have been verified, by appropriate methods, to comply with the requirements of DNV-OS-C501 and DNV-RP-F119, for the main operational limits stated above and further described in the Reference documents listed below.
Verification involvement:	The verification involvement has included: <ul style="list-style-type: none">production procedureschecking the procedures against the actual processevaluation of the completeness of the described production parameters
Validity:	This statement is valid on the date of issue.
Reference documents:	/1/ DNVGL Report No. 2015-3022 Rev.0 "Verification of Production Principles for TCP", 29 January 2015 /2/ Production Principles, Airborne Oil & Gas Report ADG30504R001, Rev. 04, 24 Dec. 2015 /3/ DNV-OS-C501, Composite Components, November 2013 /4/ DNVGL-RP-F119, Thermoplastic Composite Pipes, December 2015
Issued at Havik on 2016-02-08	for DNV GL Gustav Heiberg Project Sponsor

DNV-GL		
TECHNOLOGY CERTIFICATE		
Certificate no.: 2015-3256	Initial date: 26 January 2016	Valid until: 26 January 2020
This is to certify that the		
General Design Methodology for Thermoplastic Composite Pipes		
as detailed in /1/ is qualified in accordance with DNV-RP-A203 Technology Qualification /2/ and specifically for design of products according to DNVGL RP-F119 Thermoplastic Composite Pipes /3/ (TCP) provided that the conditions below and specified in /4/ are met.		
This is a certificate for the design methods and tools. This is not a product certificate. Products can be subjected to design verification according to DNVGL RP-F119/3/ and manufacturing survey		
Technology owner:	Airborne Oil & Gas	
Name of technology:	Generic Design Methodology and Tools for Thermoplastic Composite Pipes based on finite element analysis and micromechanics.	
Description:	Analysis of the TCP pipe body and end fitting by finite element calculations based on material tests on the coupon level and confirmation tests on pipe samples.	
Designated use:	The design methodology will be used for design calculations of TCPs. It describes how the calculations are based on material test data and validated against pipe sample tests.	
Conditions:	This certificate is only valid together with the Qualification Report /4/ that specifies the intended use and limitations and conditions that apply. For application to a specific product, material inputs must be confirmed for the actual production and the modelling results verified by comparing them to full-scale test results as described in /3/.	
Involvement:	DNV GL has been involved in the qualification process in accordance with /5/, has evaluated the design procedures and commented on reports as detailed in /4/.	
Verification and certification:	Specific design calculations shall be verified against the procedures and limitations described in /1.3.4/. Additional calculations beyond the general approach shall be verified according to /3/.	
Reference documents:	/1/ Generic design qualification - design analysis methodology, Airborne Oil and Gas Report ADG30504R004, Rev. 03, 11 Dec. 2015 /2/ DNV-RP-A203, Qualification of New Technology, July 2013 /3/ DNVGL-RP-F119, Thermoplastic Composite Pipes, December 2015 /4/ DNVGL Technical Report No. 2015-3036 Rev.0 "Evaluation of the General Design Methodology for TCP", 26 January 2016 /5/ DNVGL-SE-C160, Technology Qualification Management and Verification, December 2015	
DNV GL shall not be held liable for undiscovered failure modes or causes or for missing qualification activities.		
26 January 2016 for DNV GL Gustav Heiberg Business Development Leader, Materials		

DNV-GL				
STATEMENT OF CONFORMITY				
Statement No: 2015-3256				
Owner:	Airborne Oil & Gas			
Name of system/installation:	Airborne HDPE TCP material properties			
Location:	Airborne Oil & Gas, IJmuiden, The Netherlands			
Description:	This dataset provides a summary of verified material properties for Airborne-HDPE TCP family materials.			
Main Operational Limitations:				
Materials covered:				
Material ID	Description	Designation		
1181	Glass fibre reinforced HDPE tape	Tape		
1182	HDPE liner material, black	Liner		
1184	HDPE welding material, orange	Cover		
Conditions: This statement is only valid together with the Report on the Evaluation of the Generic Design Methodology for TCP /1/ for the use in Airborne-HDPE TCP.				
This is to verify:				
That the summary material properties of the above given materials were verified, by appropriate methods, to comply with the requirements of DNV-OS-C501 and DNV-RP-F119, for the main operational limits stated above, and further outlined in the Reference documents /2-3/ listed below.				
Thermal and physical properties				
	Tape	Liner	Cover	Unit
Density	1480	1420	960	kg/m ³
Permeability CH4 (23 / 60 °C)	0.5 / 0.8	1.1 / 1.8	1.8 / 1.4	m ³ / (m ² s MPa)
Permeability CO2 (23 / 60 °C)	0.5 / 0.8	1.1 / 1.8	1.8 / 1.4	m ³ / (m ² s MPa)
Thermal conductivity (23 / 60 °C)	0.15 / 0.20	0.15 / 0.20	0.15 / 0.20	W / (m K)
CTE L flow / fiber direction	3	288	121	µm / (m K)
CTE L flow / fiber direction	80	10	220	µm / (m K)
Specific heat capacity (20 °C)	1.4	1.4	1.4	J / (kg K)
Static mechanical properties				
Typical stiffness properties ¹				
	-20 °C	23 °C	60 °C	Unit
Tape E-modulus (E fiber)	15.1	14.7	14.3	GPa
Tape shear modulus	1.1	0.8	0.4	GPa
Liner	2.3	1.0	0.4	GPa
Cover	2.3	1.0	0.4	GPa
¹ Typical properties for TCP design a non-linear material model 175 is used.				

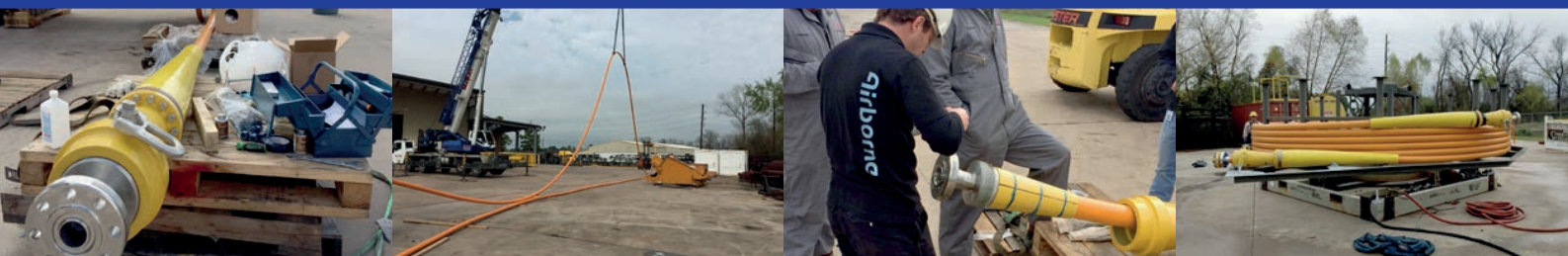


Manufacturing

Airborne Oil & Gas' manufacturing facility is based in IJmuiden (Port of Amsterdam), The Netherlands. With a floorspace of 9000 m² and three production lines, our production capability extends to continuous pipe systems from 1 inch ID up to 7.5 inch ID. The facility has direct sea access and the products can be loaded directly on our client's vessels. The quay has a length of 330 m with a water depth of 9.5m.

Contact us!

Info@airborneoilandgas.com



Airborne Oil & Gas B.V.

Monnickendamkade 1 | 1976 EC IJmuiden
P.O. box 127 | 1970 AC IJmuiden | The Netherlands
Tel. +31(0)25 5763500
www.airborneoilandgas.com | info@airborneoilandgas.com
© 2017 Airborne Oil & Gas B.V. | K.v.k. 27294005

Regional office USA

Airborne Oil & Gas LLC
16225 Park Ten Place | Suite 500
Houston, Texas 77084 | USA
Tel. +1 713 338 3453