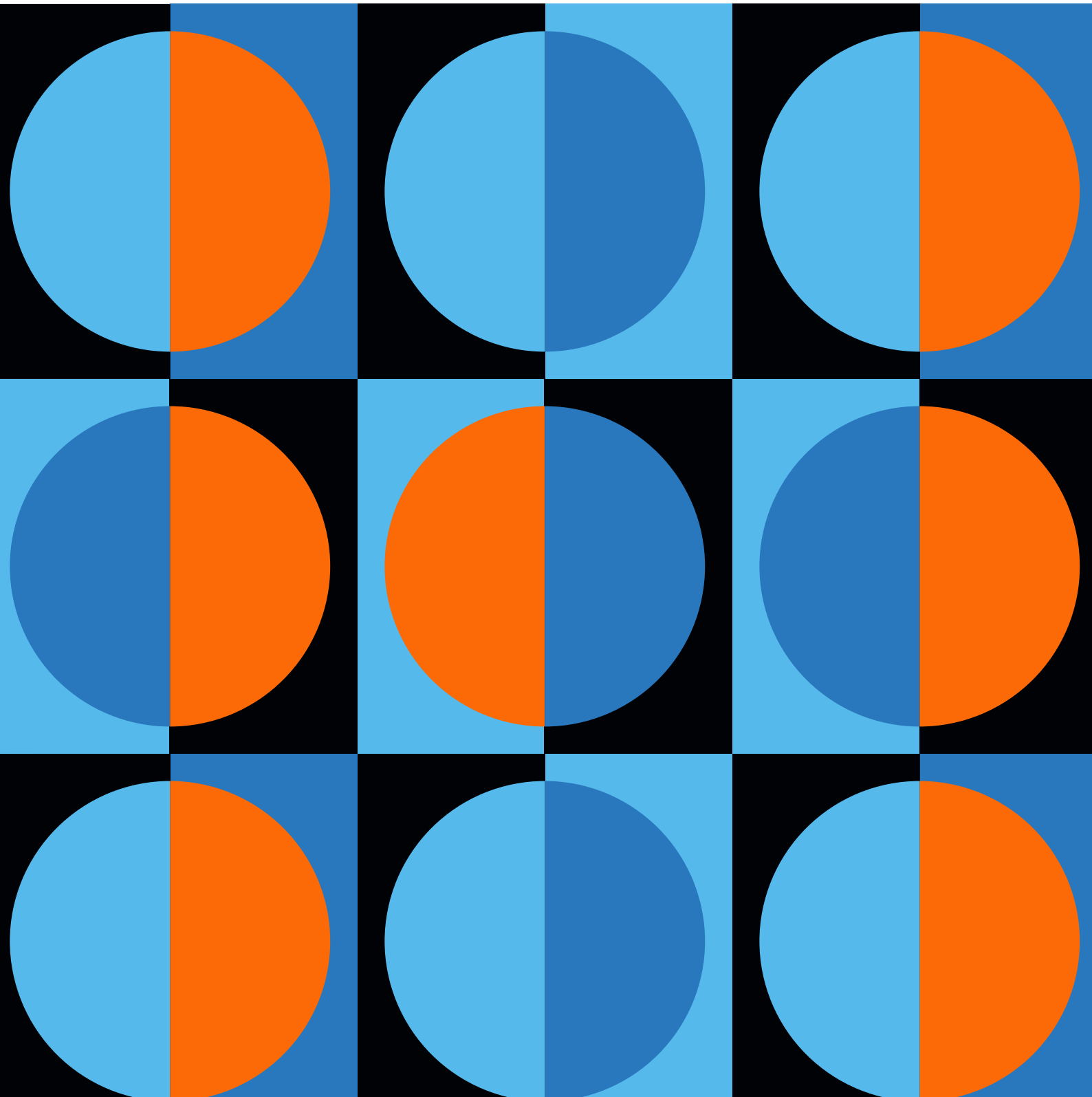
Vacuum and non-vacuum insulated tubing

CATALOG

TMK-GROUP.COM



VACUUM AND NON-VACUUM INSULATED TUBING

Designed for use as production tubing sections at oil and gas fields located in the most challenging oil and gas production conditions: in permafrost regions and / or regions characterized by the presence of gas hydrate / asphaltene, resin and paraffin deposits, and high viscosity of the produced hydrocarbons.

APPLICATIONS

- Prevent permafrost thawing around the wellbore
- Prevent gas hydrate and asphaltene, resin and paraffin deposits

- For well operation using thermal cycling methods of hydrocarbon production (including CSS and SAGD) to heat high-viscosity oil

KEY PERFORMANCE AND TECHNICAL PARAMETERS

Performance parameters	Limit value
Operating temperature, °C	Up to +350
Maximum string length (m)	Calculated individually, depending on the selected threaded connection
Thermal conductivity of the coupling insert material, max, W/(m·K)	0.25

Parameter	Non-vacuum insulated tubing		Vacuum insulated tubing	
Insulated tubing operating temperature (°C)	up to +50	up to +180	up to +220	up to +350
Thermal conductivity, W/(m·K)	0.03	0.06	0.012	0.02

Technical parameters	Limit value
Residual air pressure in the annular space, max, Pa (mm Hg)	8×10^{-2} (6×10^{-4})
Tubing length (m)	10–11.7*
Heat treatment of weld seams	+
Hydrostatic testing	Insulated tubing with a made-up coupling is hydrostatically tested at 80% of the minimum pipe body internal yield pressure
Grades	Carbon steel (55–110 ksi); 13Cr (80 ksi)
Charpy impact test	At least 50 J/cm² at –60 °C

* By agreement with the customer, tubing may be manufactured in lengths ranging from 6 to 10 m



1 VACUUM INSULATED

Insulation	Multi-layer vacuum insulation
Service temp.	+350 °C
Application	Prevent permafrost thawing around the wellbore
	Inject superheated steam into the reservoir to heat high-viscosity bituminous oil and increase its fluidity, including oil recovery by steam-assisted gravity drainage (SAGD)
Design features	Layers of foil and basalt fiber fabric (containing getters)
	Vacuum in the annular space
	Pre-tensioning of the internal tube for operation at elevated temperatures
	Fluoroplastic thermal insulator in the coupling

BASIC DESIGN

1	Centralizer
2	External tube
3	Multi-layer insulation
4	Internal tube
5	Connecting element
6	Coupling insert (fluoroplastic)
7	Coupling connection
8	Vacuum valve
9	Getter (gas absorber)

2 NON-VACUUM INSULATED TUBING

Insulation	Inorganic thermal insulation materials
Service temp.	+180 °C
Application	Prevent permafrost thawing around the wellbore
	Inject superheated steam into the reservoir to heat high-viscosity oil
	Prevent asphaltene, resin and paraffin deposits (ARPD)
Design features	Layers of foil and basalt fiber fabric
	Fluoroplastic thermal insulator in the coupling

BASIC DESIGN

1	Centralizer
2	External tube
3	Multi-layer insulation
4	Internal tube
5	Connecting element
6	Coupling insert (fluoroplastic)
7	Coupling connection
8	–
9	–



PRODUCTION PROCESS

1. Rolling, heat treatment, testing, cutting to length, tube blank surface cleaning
2. Installation of multi-layer insulation
3. Assembly of the external and internal tubes
4. Joining the tubes with vacuum-tight welds

For non-vacuum insulated tubing

5. Quality control of the welded joints
6. Tubing evacuation at a vacuum pumping station and welded joint integrity testing
7. Thermal conductivity control of insulated tubing
8. Final finishing of insulated tubing (threading, coupling make-up, hydrostatic testing, marking)

SIZE RANGE

Insulated tubing size	External load-bearing tube		Internal tube	
	Outside diameter, mm	Wall thickness, mm	Outside diameter, mm	Wall thickness, mm
168 x 8.94 – 127 x 7.52	168.28	8.94	127.00	7.52
168 x 8.94 -114 x 7.37	168.28	8.94	114.30	7.37
168 x 8.94 – 114 x 6.88	168.28	8.94	114.30	6.88
168 x 8.94 -102 x 6.65	168.28	8.94	101.60	6.65
168 x 8.94 -102 x 5.74	168.28	8.94	101.60	5.74
146 x 9.5 – 102 x 6.65	146.05	9.50	101.60	6.65
146 x 9.5 – 102 x 5.74	146.05	9.50	101.60	5.74
140 x 9.17 – 102 x 6.65	139.70	9.17	101.60	6.65
140 x 9.17 – 102 x 5.74	139.70	9.17	101.60	5.74
140 x 9.17 – 89 x 6.45	139.70	9.17	88.90	6.45
127 x 9.19 – 89 x 6.45	127.00	9.19	88.90	6.45
127 x 7.52 – 89 x 6.45	127.00	7.52	88.90	6.45
114 x 6.88 – 89 x 6.45	114.30	6.88	88.90	6.45
114 x 6.88 – 73 x 5.51	114.30	6.88	73.02	5.51
114 x 6.35 – 89 x 6.45	114.30	6.35	88.90	6.45
114 x 6.35 – 73 x 5.51	114.30	6.35	73.02	5.51
102 x 6.65 – 73 x 5.51	101.60	6.65	73.02	5.51
102 x 5.74 – 73 x 5.51	101.60	5.74	73.02	5.51
89 x 6.50 – 60 x 5.00	88.90	6.50	60.32	5.00
89 x 6.45 – 60 x 4.83	88.90	6.45	60.32	4.83
89 x 6.50 – 48 x 4.00	88.90	6.50	48.26	4.00

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