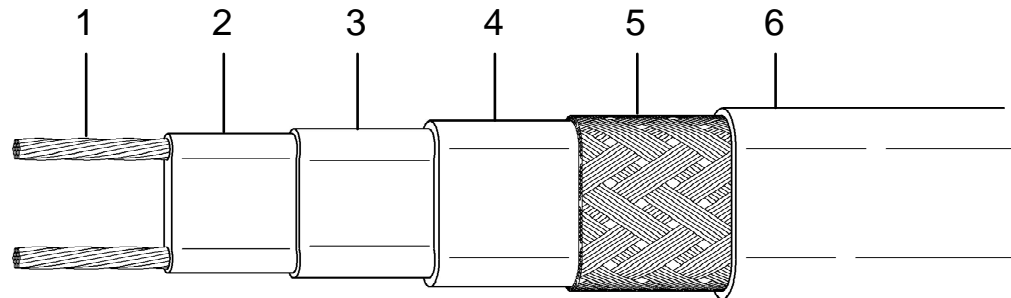


Heating Tape Structure

- 1) Tinned copper bus wire
- 2) Radiation cross-linked self-limiting heating element
- 3) Polyurethane inner jacket
- 4) Flame retardant polyolefin dielectric insulation
- 5) Tinned copper braid
- 6) Fluoropolymer outer jacket (SJ), Modified polyolefin outer jacket (SJP)

Description:

The Klöpper-Therm heating tape type KTL is a parallel heating cable with self-limiting characteristic. As shown above, the multi-stranded, tinned copper bus wires (1.31mm²) are encased by an extruded, radiation cross-linked semiconductive polymer core material. Induced by temperature changes the heat output of the semi-conductive core material rises or declines.

Moisture resistance, special dielectric strength and protection against impact and abrasion damage is realised by two jackets. An inner Polyurethane jacket is extruded over and bonded to the core material, followed by a flame retardant polyolefin outer jacket which is extruded over the inner jacket. In order to ensure a continuous ground path, a tinned copper braid is installed over the second jacket.

For the outer jacket covering the tinned copper braid there are two options available: 1) A fluoropolymer outer jacket (type description: SJ), featuring an excellent chemical resistance. Thus, the heating tape provides an optimal protection against corrosive or chemical impacts. 2) A modified polyolefin outer jacket (type description: SJP). Thus, the heating tape is highly suitable for applications in humid or chemically low aggressive atmosphere.

Operation principle:

Voltage is applied along the complete length of the heating tape by the parallel bus wires. Due to the semiconductive core which provides an infinite number of parallel conductive paths, the heating tape can be cut to any length at site without generating dead or cold zones. The self-limiting characteristic of the heating tape is drawn from the in-built properties of the semiconductive core material.

When the temperature of the core material increases, the number of conductive paths in the core material is reduced, automatically reducing the heat output. When the core material temperature decreases, the number of conductive paths is raised, thus leading to a higher heat output at every point along the length of the heating tape. Hereby the power output of the heating tape is adjusted to the varying conditions along the pipe.

Due to the self-limiting effect the heating tape can be overlapped without creating burnout or hot spots. By regulating its heat output itself, the heating tape provides an efficient use of power. Heat is only produced when and where it is needed and simultaneously the maximum sheath temperature is limited.

Utilization:

The Klöpper-Therm heating tape type KTL is supremely applicable when it comes to maintaining the fluid flow of a medium under low ambient temperatures. Characteristically, our product is utilized for frost protection systems and systems with low power density such as process water, product pipelines, fire protection, dust suppression systems, hot water and anti-icing (domestic technique).

Rating Data of Heating Tapes:

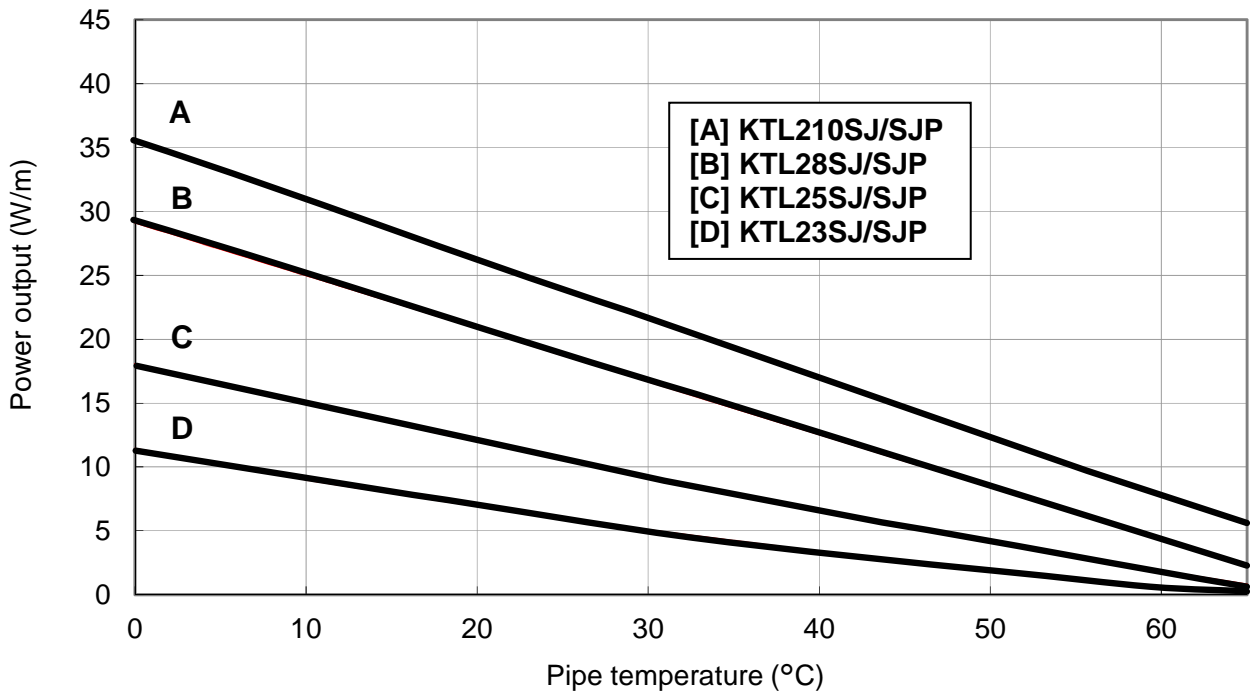
Type Designation	Watts/Meter at 10°C	Service Voltage	Maximum Length of Heating Tape [m]	Maximum Exposure Temperature Continuous [°C]	Maximum Exposure Temperature Intermittent [°C]	Temperature Class (Gas Ex-Area)*
		[V AC]				
KTL23SJ / KTL23SJP	9	230	207	65	85	T6
KTL25SJ / KTL25SJP	15	230	165	65	85	T6
KTL28SJ / KTL28SJP	25	230	127	65	85	T6
KTL210SJ / KTL210SJP	32	230	74	65	85	T6

*The temperature classification of electrical equipment is applied in hazardous areas and defines the surface temperature the electrical devices do not exceed during proper operation.

The heating tapes have been certified for the use in hazardous areas, endangered by gases, of zones 1 and 2 according to EU Type Examination Certificate No. CML 16ATEX3124X and must only be completed by connection and end seal kits delivered by Klöpper-Therm making use of the power termination type HP-A69R and the end seals type HP-A17 plus HP-A30. In addition, Klöpper-Therm delivers a complete range of connection boxes, too,

Dimensions (nominal): width 12.8 mm, thickness 5.5 mm (SJ)
width 13.0 mm, thickness 5.7 mm (SJP)
Weight: 130 g/m (SJ), 125 g/m (SJP)
Outer jacket colour: Black (SJ/SJP)
Minimum installation temperature: -40°C
Minimum bending radius: 30 mm at -40°C

Heating Tape Power Output Rating at 230 V AC:



Remark: The power rating is valid for applications on insulated steel pipes.

Circuit Breaker Selection (C-Characteristic):

Type Designation	Start-up Temperature [°C]	Max. Recommended Heating Tape Length (in Meters) vs. Circuit Breaker Size			
		16A	20A	25A	32A
KTL23SJ / KTL23SJP	+10	207	207	207	207
	0	207	207	207	207
	-10	184	207	207	207
	-20	156	196	207	207
	-30	135	169	207	207
	-40	118	147	184	207
KTL25SJ / KTL25SJP	+10	163	165	165	165
	0	133	165	165	165
	-10	112	140	165	165
	-20	97	121	151	165
	-30	85	107	133	160
	-40	76	95	119	153
KTL28SJ / KTL28SJP	+10	88	110	127	127
	0	77	96	120	127
	-10	69	86	107	127
	-20	62	77	96	123
	-30	56	70	88	112
	-40	51	63	79	102
KTL210SJ / KTL210SJP	+10	37	46	58	74
	0	34	42	53	67
	-10	31	38	48	61
	-20	28	35	44	57
	-30	26	33	41	53
	-40	24	31	38	49

Remarks:

1. The circuit breaker size must be based on minimum start-up temperature, since the inrush current of the heating tapes increases with decreasing ambient temperature.
2. Do not exceed maximum recommended heating tape length, indicated for each type of heating tape.
3. When connecting two or more different wattage heating tapes in parallel on the same breaker, please use the 16 amps column (16A) and divide 16 amps by the maximum heating tape length indicated with reference to the desired minimum start-up temperature. Thus you get an amps/meter value for each type of heating tape. Multiply the length of each heating tape with the derived amps/meter value. The single amp values calculated have to be added up. The added value must not exceed the amperage rating of the breaker.
4. For electrical heating systems, Klöpper-Therm stipulates the use of a residual current device with a residual current rating not exceeding 300 mA. Residual current devices with a residual current rating of 30 mA should be used preferably.