

SKIN-SYSTEM

SAFE AND RELIABLE HEATING SYSTEM FOR PIPELINES OF AN UNLIMITED LENGHT DESIGNED FOR ABOVE-GROUND, BURIED AND UNDERWATER PIPELINING, INCLUDING ONES IN EXPLOSION HAZARDOUS ZONES

induction-resistive heating system for long-distance pipelines



- The only way to heat pipelines with the length up to 30 km without parallel supply network
- The most efficient way to heat any trunk pipelines of an unlimited length
- Inherent strength and reliability of system design
- Up to 120 W/m power output of the heating element
- Certificate of conformity GOST R (State Standart) and Permit of Federal Service for Ecological, Technological and Atomic Inspection for application in explosion hazardous zones
- Operating temperature up to 200°C
- Zero electrical potential on outer surfaces of heating elements. After earthing and heating elements do not require any electrical insulation

APPLICATION FIELD

Induction-resistive heating system (IRHS) or SKIN-system is designed to maintain the product temper-ature, protect long trunk pipelines against freezing and ensure their start heating. SKIN-system is the only one, which is capable to heat a pipeline run of up to 30 km long with power supply from one point (without any parallel network); it is as well the most efficient and cost-effective solution for heating trunk pipelines of an unlimited length with parallel supply network.

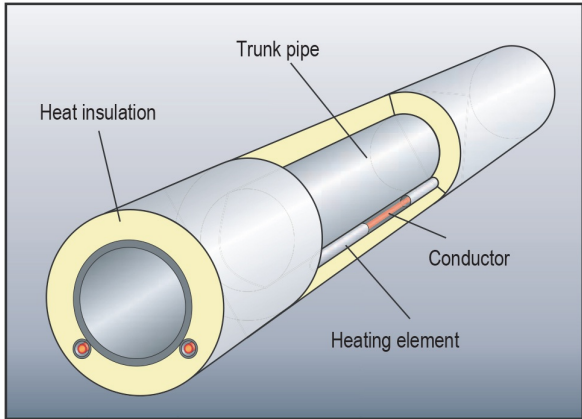
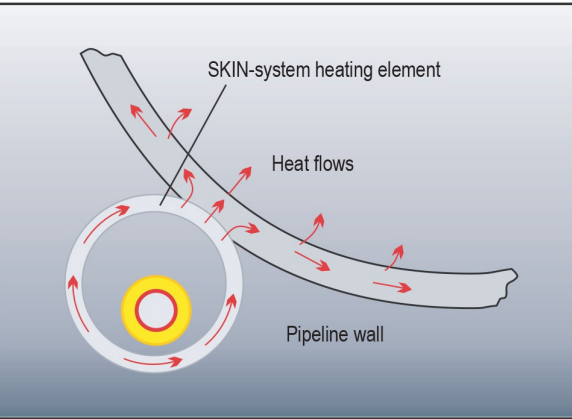
PRINCIPLE OF OPERATION

Heating element of the system consists of a ferro-magnetic steel tube with the outer diameter of 20-60 mm and the wall thickness of at least 3.0 mm; there is an insulated copper or aluminum conductor with cross section of 10-50 mm² placed inside the tube.

The conductor is electrically connected to the tube at the end of a heating run while AC voltage is sup-plied between the conductor and the pipe at the run head; the voltage value is calculated basing on the required heat output and the heated run length.

Currents of the conductor and the tube have oppo- site directions and thus skin and proximity effects originate in the system. As a result the tube current flows in the inner layer close to the inner surface of the tube and there is no voltage available on the outer surface of the tube.

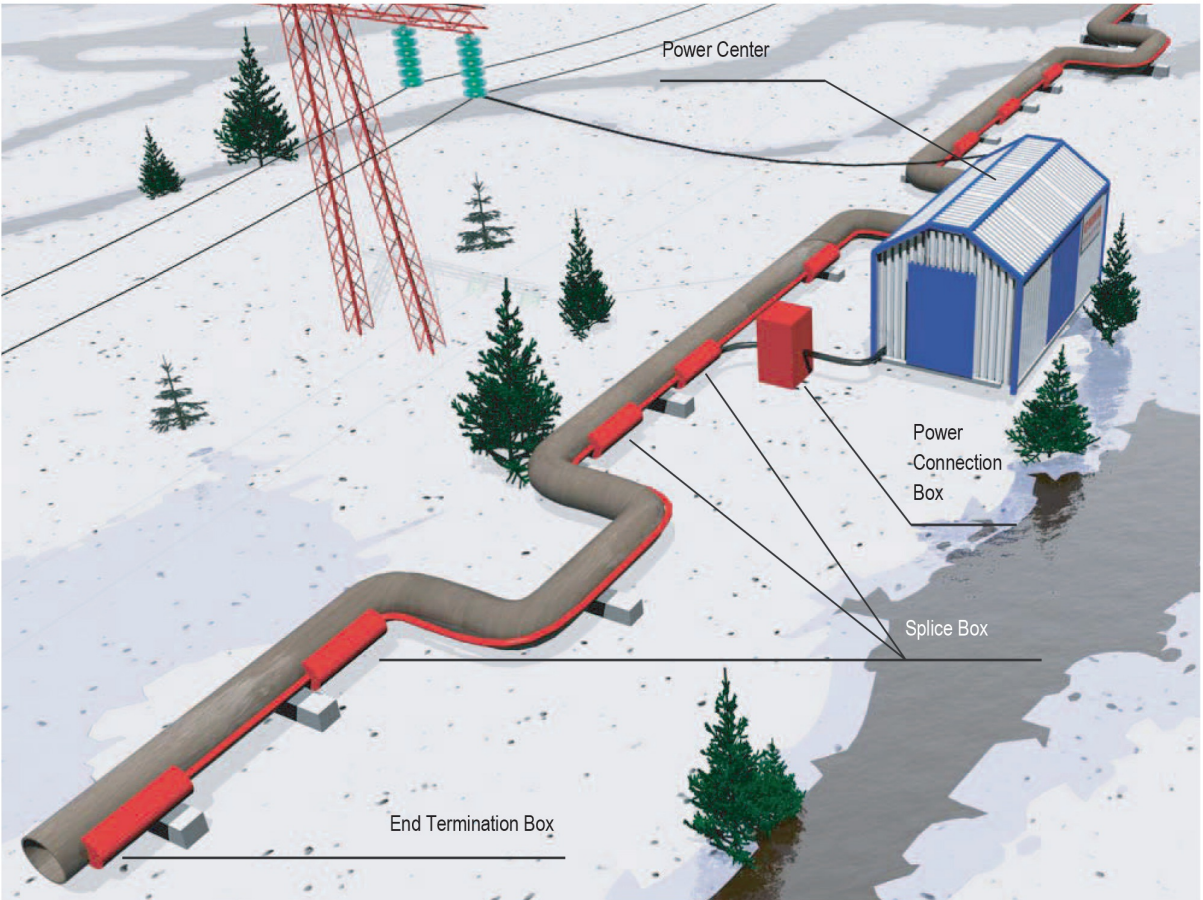
The conductor is non-magnetic (made of copper, aluminum), thus, it does not feature any noticeable skin effect and AC flows throughout the whole sec-tion of the conductor. The main heat producing ele-ment of IRHS is the tube, which produces up to 80% of the system output.



ADVANTAGES

1. Long range of a pipeline heated run. The system low resistance per a meter of length along with its high supply voltage makes possible to feed heated runs of up to 30km long from a single source.
 2. One end powering. The SKIN#system inherently is designed to be electrically supplied from one end of a heated run.
 3. Electrical safety. Outer surface of the heating ele-ment is earthed and its voltage potential relative to the earth is zero.
 4. Good thermal contact. Metal heating element is welded directly to the pipeline or is fixed to it with special fasteners. In order to improve the thermal contact a special heat conducting paste is applied.
 5. Easy installation. Heat producing elements have not any outer electric insulation which may be dam-aged during installation works.
 6. Reliability. The steel heating tube ensures mechanical stability of the conductor and protects it against damages. This fact is especially important for buried and underwater pipelines.
- One, two or three heating elements can be fitted on a trunk pipe depending on the required heating power and pipeline length. SST designs and supplies IRHS-system as a full set including a special integrated transformer substation, all elements belonging to the heating system itself, monitoring and control systems.

ELECTRIC SUPPLY OF A PIPELINE RUN HEATED BY SKIN-SYSTEM



Electric power supply system is performed as an integrated transformer substation including distrib-uting sells of the HV and LV sides, specialized ba- lancing transformer, monitoring and control system. The integrated power center is located in a herme-tically sealed and heated container.

Skin Effect System

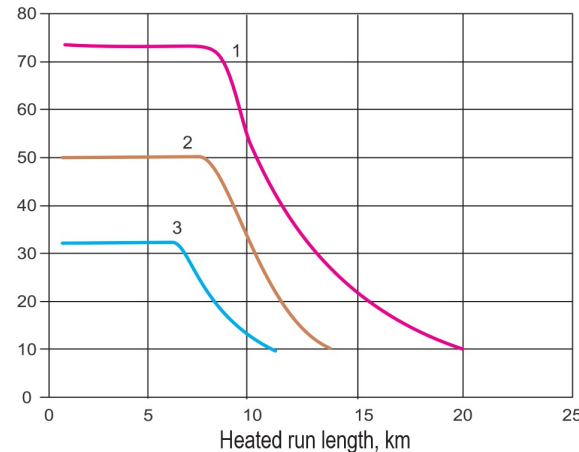
TECHNICAL SPECIFICATION

Operating temperature range -50°C ... +200°C

Power supply up to 5 kV~ 50 Hz

POWER OUTPUT

Rated power output of one heating element, W/m

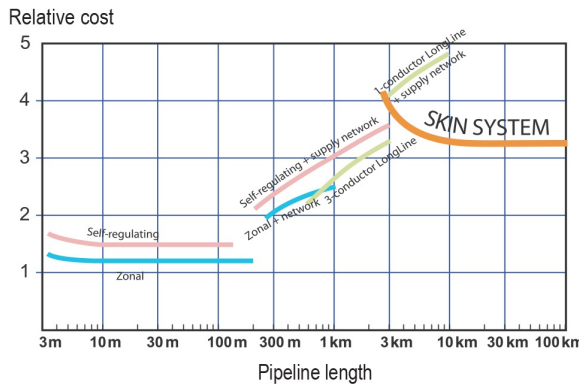


	Heating element tube diameter	Current-carrying conductor cross-section
1	42x3	40 mm ²
2	32x3	20 mm ²
3	25x3	10 mm ²

CONSTRUCTION

Heat producing element	Low carbon steel tube with diameter of 20-60mm and wall thickness of 3-4mm
Current carrying conductor	Special conductor resistive to high voltage (up to 5kV), high temperature (up to 200°C) and mechanical stress at installation
Anticorrosion protection (at Customer request)	epoxy coating of a SKIN heater

EFFICIENCY OF SKIN SYSTEM IN COMPARISON WITH HEATERS OF OTHER TYPES



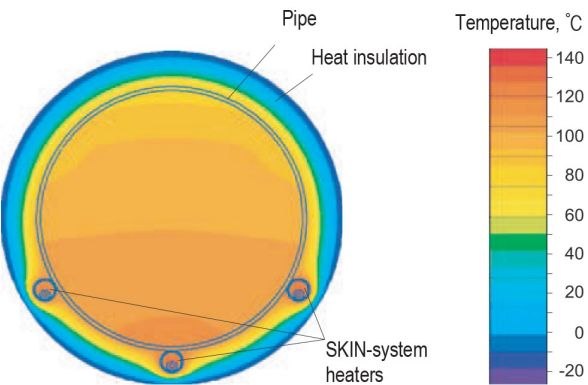
CONTROL SYSTEM

In order to improve its efficiency SKIN-system is provided with a control system, which decreases heating power in response to rise of ambient temperature.

Control system ensures reliable monitoring of the system status and revealing of emergency conditions.

ESTIMATED TEMPERATURE DISTRIBUTION

Rated power output of one heating element, W/m



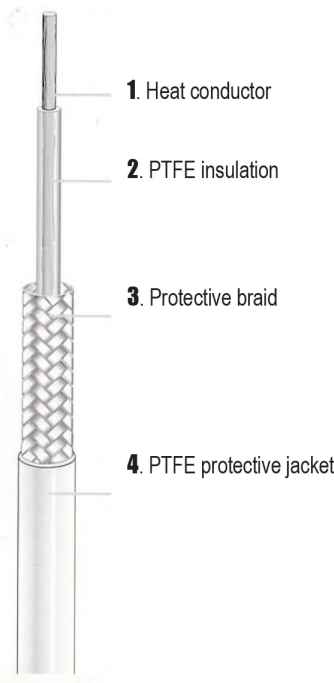
Example of heat insulated pipeline heating by three heating elements of SKIN-system with the total output of 130 W/m.
Pipe diameter is 530 mm, tambient air.= -20°C

APPROVAL DETAILS

Certificate of conformity with GOST R (State Standart) system issued for heating systems with explosion protection marking 2ExellT3...T6 X.



Flexible single-core heating cable EKL light



Features

- Stable heat output per metre
- Resistant to steam purging
- Easy installation
- Highly resistant to chemicals
- Simple tailoring on site
- Optimum price/performance ratio

Description

EKL light is an extremely flexible heating cable with a fixed specific resistance. Thanks to its small outer dimensions, the EKL light can be easily installed even on uneven objects such as pumps, valves and flanges.

The heating cable can be easily tailored on construction sites. The electrical connection of the EKL light heating cable is realized via the tried-and-tested CONPAC EKL system.

Technical data

Nominal voltage	300 V/500 V
Test voltage	2.5 kV (core/braiding)
Diameter of Cu wires	> 0.15 mm
Protective braid resistance	< 18.2 Ω/km
Working temperature	max. +260°C (permanent, switched off)
Min. installation temperature	-60°C
Bending radius	min. 5 x external diameter
Resistance values	from 2.9 Ω/km to 8000 Ω/km

Selection chart EKL light

Designation	Resistance in Ω/km	Outside diameter in mm	Order no.
EKL light 01R8	1.8	6.50	27-5821-586401R8
EKL light 02R9	2.9	5.70	27-5821-586402R9
EKL light 04R4	4.4	5.10	27-5821-586404R4
EKL light 07R0	7	4.60	27-5821-58640007
EKL light 0010	10	4.20	27-5821-58640010
EKL light 0015	15	3.90	27-5821-58640015
EKL light 0025	25	3.60	27-5821-58640025
EKL light 31R5	31.5	3.50	27-5821-586431R5
EKL light 0050	50	3.30	27-5821-58640050
EKL light 0068	68	3.20	27-5821-58640068
EKL light 0100	100	3.40	27-5822-58640100
EKL light 0150	150	3.60	27-5825-58640150
EKL light 0240	240	3.60	27-5822-58640240
EKL light 0370	370	3.70	27-5826-58640370
EKL light 0500	500	3.50	27-5826-58640500
EKL light 1000	1000	3.40	27-5822-58641000
EKL light 1440	1440	3.30	27-5822-58641440
EKL light 2160	2160	3.10	27-5822-58642160
EKL light 3000	3000	3.30	27-5824-58643000
EKL light 4000	4000	3.20	27-5824-58644000
EKL light 8000	8000	3.00	27-5824-58648000