

# GOOD PRACTICES IN SME

## Insulating pipelines



*Designed by freepik*

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## Where should pipelines be insulated?

All building pipelines (heating, cooling, ventilation) and industrial pipelines carrying high temperature mediums (e.g. hot steam installations) should be insulated.

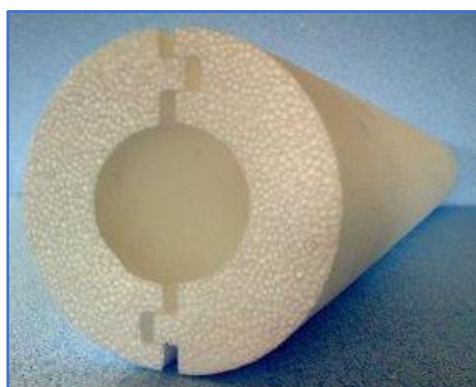
## What material should be used for insulation?

Selecting the insulation material, one must keep in mind:

- Thermal conductivity of the material – the lower, the better the insulator,
- Temperature range,
- Impregnability – after absorbing water the material will have lower insulation properties,
- Mechanical durability,
- Ease of installation,
- Resistance to factors such as chemical and organic substances, solar radiation or fire.

The parameters of common insulation materials are listed in the table below:

	Thermal conductivity $\lambda$ [ $W/mK$ ]	Temperature range	Impregnability	Plasticity	Resistance to environmental factors
Polystyrene foam	0,030-0,040	<80°C	Does not absorb water	Brittle	Non-resistant to organic solvents
Polyethylene foam	0,035-0,045	-80°C do 105°C	Does not absorb water	Elastic, flexible	Resistant to chemic substances
Polyurethane foam	0,030-0,040	-50°C do 135°C	Can absorb water	rigid	Resistant to chemical substances, sensitive to solar radiation
Synthetic rubber	0,030-0,040	-60°C do 170°C	Does not absorb water	elastic	Resistant to solar radiation and atmospheric conditions
Mineral wool	0,030-0,060	<250°C	Does not absorb water	elastic	Non-flammable
Glass wool	0,030-0,060	<500°C	Does not absorb water	elastic	Non-flammable



Pic. 1 ekobud: polystyrene insulation



Pic. 2 caldo izolacja: mineral wool insulation

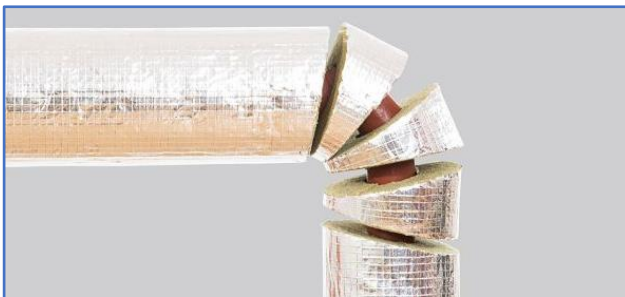
## How to properly insulate?

1. The temperature of the pipeline to be insulated and the insulating material should be close to the ambient temperature, but not lower than 10 °C. Insulating pipelines in operation is not allowed. After insulating the pipeline, a day should pass before the pipeline is used again.
2. Insulation with a much larger inside diameter than the outside diameter of the piping should not be done – in the case of pipelines with a cold medium water condensate can collect in the space between the pipe and the insulation, which lowers the insulation performance of the material and accelerates corrosion.
3. The seam along the insulation should be on the bottom of the pipe – in case of leakage the medium can seep out of the insulation
4. Each segment of the insulation should be joined and reinforced at the splits – this prevents thermal bridges and potential corrosion sites.
5. Elbow joints, valves, T-fittings, welds, support fastenings and clamps should also be thoroughly insulated.

Source: KAPE



Pic. 1 centrum izolacji: securing segment joints



Pic. 2 centrum izolacji: insulating an elbow joint



Pic. 3 centrum izolacji: properly insulated elbow joint



Pic. 4 centrum izolacji: insulating a T-fitting

## The minimal thickness of the insulation with respect to a given pipe diameter

Pipe diameter [mm]	Minimal thickness of the insulation [mm] depending on the thermal capacity of the insulating material [ $W/mK$ ]										
	0,030	0,031	0,032	0,033	0,034	0,035	0,036	0,037	0,038	0,039	0,040
10	15	16	17	18	19	20	21	21	24	25	26
14	15	16	17	18	19	20	21	22	23	25	26
18	16	16	17	18	19	20	21	22	23	24	25
22	16	17	17	18	19	20	21	22	23	24	25
26	23	25	26	27	29	30	31	32	35	36	38
30	23	25	26	27	29	30	31	33	34	36	38
34	24	25	26	27	29	30	31	33	34	36	37
38	30	31	33	35	36	38	40	41	44	46	48
42	33	35	36	38	40	42	44	46	48	50	53
46	36	38	40	42	44	46	48	50	53	55	58
50	39	41	43	45	48	50	52	54	57	60	63
54	42	44	47	49	51	54	56	59	62	65	68
58	45	48	50	53	55	58	60	63	67	70	73
62	48	51	54	56	59	62	65	67	71	74	78
66	52	54	57	60	63	66	69	72	76	79	83
70	55	58	61	64	67	70	73	76	80	84	88
74	58	61	64	67	71	74	77	80	85	89	93
78	61	64	67	71	74	78	81	85	90	94	98
82	64	67	71	75	78	82	86	89	94	98	103
86	67	71	74	78	82	86	90	93	99	103	108
90	70	74	78	82	86	90	94	98	103	108	113
94	74	77	81	85	90	94	98	102	108	113	118
98	77	81	85	89	93	98	102	106	113	118	123
100	78	82	87	91	95	100	104	109	115	120	125
200	81	85	88	92	96	100	106	111	112	116	121
300	82	86	89	93	96	100	107	114	111	115	119

Source: KAPE based on: Rozporządzenie Ministra Transportu, Budownictwa i Gospodarki Morskiej z dnia 5 lipca 2013 r. zmieniające rozporządzenie w sprawie warunków technicznych, jakim powinny odpowiadać budynki i ich usytuowanie (t.j. Dz.U. z 2019 r. poz. 1065)