



## Material consumption for the application of Kaiflex

# Calculation of the minimum insulation thickness acc.to VDI 2055

## Basis of calculation

- No covering (black rubber)
- Installation with spacing acc. to DIN 4140 (air convection), pipe: steel
- Synthetic rubber Kaiflex KKplus s2/ST (tube material) and its technical properties
- Kaiflex special adhesive 414

### Insulation thickness at 60 % relative humidity (room temperature +20 °C)

OD pipe (mm)	Medium temperature						
	+10 °C	+5 °C	0 °C	-5 °C	-10 °C	-15 °C	-20 °C
Insulation thickness (mm)							
33.7	1	3	4	6	8	9	10
42.4	1	3	5	6	8	10	11
48.3	1	3	5	6	8	10	11
60.3	1	3	5	7	8	10	12
76.1	1	3	5	7	9	11	12
88.9	1	3	5	7	9	11	13
114.3	1	3	5	7	9	11	13
139.7	1	3	5	8	10	12	14

### Insulation thickness at 70 % relative humidity (room temperature +20 °C)

OD pipe (mm)	Medium temperature						
	+10 °C	+5 °C	0 °C	-5 °C	-10 °C	-15 °C	-20 °C
Insulation thickness (mm)							
33.7	2	5	7	10	12	14	16
42.4	3	5	8	10	12	15	17
48.3	3	5	8	10	13	15	17
60.3	3	6	8	11	13	16	18
76.1	3	6	9	11	14	16	19
88.9	3	6	9	12	14	17	19
114.3	3	6	9	12	15	18	20
139.7	3	6	9	13	15	18	21

### Insulation thickness at 80 % relative humidity (room temperature +20 °C)

OD pipe (mm)	Medium temperature						
	+10 °C	+5 °C	0 °C	-5 °C	-10 °C	-15 °C	-20 °C
Insulation thickness (mm)							
33.7	6	10	13	17	20	23	26
42.4	6	10	14	18	21	24	27
48.3	6	10	14	18	21	25	28
60.3	6	11	15	19	23	26	29
76.1	7	11	16	20	24	27	31
88.9	7	12	16	20	24	28	32
114.3	7	12	17	21	26	30	34
139.7	7	12	17	22	26	31	35

### Insulation thickness at 90 % relative humidity (room temperature +20 °C)

OD pipe (mm)	Medium temperature						
	+10 °C	+5 °C	0 °C	-5 °C	-10 °C	-15 °C	-20 °C
Insulation thickness (mm)							
33.7	16	23	30	37	43	48	54
42.4	17	25	32	39	45	51	57
48.3	17	25	33	40	47	53	59
60.3	18	27	35	42	49	56	62
76.1	19	28	37	45	52	59	66
88.9	19	29	38	46	54	61	68
114.3	20	30	40	49	57	65	72
139.7	21	31	41	51	59	68	76

# Guide quantities for the application of Kaiflex sheet material

## Basis of calculation

- No covering (black rubber)
- Pipe: cast
- Synthetic rubber Kaiflex KKplus s2/ST (sheet material) and its technical properties
- Kaiflex special adhesive 414

### Guide quantities for application Kaiflex KKplus s2/ST 6 mm sheet material without covering

Kaiflex KKplus s2/ST 6 mm insulation thickness						
Nom width	Outer diameter excl. insulation (mm)	Outer diameter incl. insulation (mm)	Circumference excl. insulation (mm)	Circumference incl. insulation (mm)	Possible running meters per carton/packaging unit	Required insulation per linear meter of pipe (m <sup>2</sup> )
DN 50	60	72	182.21	226.08	81 m	0.22608
DN 80	83	95	260.75	298.30	61 m	0.29830
DN 100	110	122	345.58	383.08	46 m	0.38308
DN 125	135	147	424.12	461.58	38 m	0.46158
DN 150	160	172	471.24	540.08	33 m	0.54008
DN 200	210	222	659.73	697.08	25 m	0.69708

### Guide quantities for application Kaiflex KKplus s2/ST 10 mm sheet material without covering

Kaiflex KKplus s2/ST 10 mm insulation thickness						
Nom width	Outer diameter excl. insulation (mm)	Outer diameter incl. insulation (mm)	Circumference excl. insulation (mm)	Circumference incl. insulation (mm)	Possible running meters per carton/packaging unit	Required insulation per linear meter of pipe (m <sup>2</sup> )
DN 80	83	103	260.75	323.42	30 m	0.32342
DN 100	110	130	345.58	408.20	24 m	0.40820
DN 125	135	155	424.12	486.70	20 m	0.48670
DN 150	160	180	471.24	565.20	17 m	0.56520
DN 200	210	230	659.73	722.20	13 m	0.72220

### Guide quantities for application Kaiflex KKplus s2/ST 13 mm sheet material without covering

Kaiflex KKplus s2/ST 13 mm insulation thickness						
Nom width	Outer diameter excl. insulation (mm)	Outer diameter incl. insulation (mm)	Circumference excl. insulation (mm)	Circumference incl. insulation (mm)	Possible running meters per carton/packaging unit	Required insulation per linear meter of pipe (m <sup>2</sup> )
DN 80	83	109	260.75	342.26	23 m	0.34226
DN 100	110	136	345.58	427.04	18 m	0.42704
DN 125	135	161	424.12	505.54	15 m	0.50554
DN 150	160	186	471.24	584.04	13 m	0.58404
DN 200	210	236	659.73	741.04	12 m	0.74104

**Guide quantities for application** Kaiflex KKplus s2/ST 16 mm sheet matrial without covering

Kaiflex KKplus s2 16 mm insulation thickness						
Nom width	Outer diameter excl. insulation (mm)	Outer diameter incl. insulation (mm)	Circumference excl. insulation (mm)	Circumference incl. insulation (mm)	Possible running meters per carton/packaging unit	Required insulation per linear meter of pipe (m <sup>2</sup> )
DN 80	83	115	260.75	361.10	19 m	0.36110
DN 100	110	142	345.58	445.88	15 m	0.44588
DN 125	135	167	424.12	524.38	13 m	0.52438
DN 150	160	192	471.24	602.88	11 m	0.60288
DN 200	210	242	659.73	759.88	9 m	0.75988

**Guide quantities for application** Kaiflex KKplus s2/ST 19 mm sheet matrial without covering

Kaiflex KKplus s2/ST 19 mm insulation thickness						
Nom width	Outer diameter excl. insulation (mm)	Outer diameter incl. insulation (mm)	Circumference excl. insulation (mm)	Circumference incl. insulation (mm)	Possible running meters per carton/packaging unit	Required insulation per linear meter of pipe (m <sup>2</sup> )
DN 80	83	121	260.75	379.94	15 m	0.37994
DN 100	110	148	345.58	464.72	12 m	0.46472
DN 125	135	173	424.12	543.22	11 m	0.54322
DN 150	160	198	471.24	621.72	9 m	0.62172
DN 200	210	248	659.73	778.72	7 m	0.77872

**Guide quantities for application** Kaiflex KKplus s2/ST 25 mm sheet matrial without covering

Kaiflex KKplus s2/ST 25 mm insulation thickness						
Nom width	Outer diameter excl. insulation (mm)	Outer diameter incl. insulation (mm)	Circumference excl. insulation (mm)	Circumference incl. insulation (mm)	Possible running meters per carton/packaging unit	Required insulation per linear meter of pipe (m <sup>2</sup> )
DN 100	110	160	345.58	502.40	7 m	0.50240
DN 125	135	185	424.12	580.90	6 m	0.58090
DN 150	160	210	471.24	659.40	6 m	0.65940
DN 200	210	260	659.73	816.40	4 m	0.81640

**Guide quantities for application** Kaiflex KKplus s2/ST 32 mm sheet matrial without covering

Kaiflex KKplus s/ST2 32 mm insulation thickness						
Nom width	Outer diameter excl. insulation (mm)	Outer diameter incl. insulation (mm)	Circumference excl. insulation (mm)	Circumference incl. insulation (mm)	Possible running meters per carton/packaging unit	Required insulation per linear meter of pipe (m <sup>2</sup> )
DN 150	160	224	471.24	703.36	4 m	0.70336
DN 200	210	274	659.73	860.36	3 m	0.86036

## Calculation of the approx. consumption of Kaiflex Tape during the application of Kaiflex tube material

Kaiflex Tape is used for sealing adhesive joints and seams, junctions, bandages and for mounting hard-to-reach areas. Absolutely necessary for the insulation of refrigeration systems.

The tape is self-adhesive and thus quick and easy to apply.

### Formula for the adhering of cross seams (along the circumference):

$$L_B = \frac{\pi \times (\varnothing_t + 2 \times t)}{1000} \times 1.1$$

$L_B$  (m) = Length ■  $t$  (mm) = Insulation thickness ■  $\varnothing_t$  = External diameter of the tube

**Note:** The formula includes a reserve of 10 %.

By adhering longitudinal seams, the length of the seam is equivalent to the tape consumption.

### Tape consumption table Adhesive tape for bonding a radial seam (m)

**Example:** For a radial seam of a tube with an outer diameter of 6 mm and a insulation thickness of 6 mm 0.062 m tape is needed (marked box).

External $\varnothing$ AD <sub>t</sub> (mm)	Insulation thickness t (mm)					
	6 mm	9 mm	13 mm	19 mm	25 mm	32 mm
6	0.062	0.083	0.111	0.152	0.193	0.242
10	0.076	0.097	0.124	0.166	0.207	0.256
12	0.083	0.104	0.131	0.173	0.214	0.263
15	0.093	0.114	0.142	0.183	0.225	0.273
18	0.104	0.124	0.152	0.193	0.235	0.283
22	0.117	0.138	0.166	0.207	0.249	0.297
28	0.138	0.159	0.187	0.228	0.269	0.318
35	0.162	0.183	0.211	0.252	0.294	0.342
42	0.187	0.207	0.235	0.276	0.318	0.366
60	0.249	0.269	0.297	0.338	0.380	0.428
76	0.304	0.325	0.352	0.394	0.435	0.484
89	0.349	0.370	0.397	0.439	0.480	0.528
108	0.414	0.435	0.463	0.504	0.546	0.594
114	0.435	0.456	0.484	0.525	0.566	0.615
140	0.525	0.546	0.573	0.615	0.656	0.705
160	0.594	0.615	0.642	0.684	0.725	0.774

# Calculation of the approx. consumption of adhesive during the application of Kaiflex material

For adhering Kaiflex tubes two variations are commonly used:

- Insulation with unslit tubes and adhesion of the ends of the tubes.
- Insulation with slit tubes and adhesion of the ends of the tubes and the longitudinal seams

**Formula for the adhesion of the ends of the tubes:**      **Formula for the adhesion of longitudinal seams:**

$$V_k = \frac{\pi \times (\varnothing_t + 2 \times t) / 2 - (\varnothing_t / 2)}{4000} \times 1.1$$

$$V_k = \frac{t}{4000} \times 1.1$$

$V_k$  (l) = volume of adhesive    ■  $t$  (mm) = Insulation thickness    ■  $\varnothing_t$  = External diameter of the tube

**Note:** 1 litre Kaiflex adhesive is enough for the adhesion of an area of 4 m<sup>2</sup> Kaiflex material. For both variants: Adhere the edges of both tubes. The formula includes a reserve of 10 %.

## Adhesive consumption ml (assuming consumption of 250 ml/m<sup>2</sup>) (10 % supplement) (longitudinal and frontal bonding)

External $\varnothing$ AD <sub>t</sub> (mm)	Insulation thickness $t$ (mm)					
	6 mm	9 mm	13 mm	19 mm	25 mm	32 mm
6	0.062	0.117	0.213	0.410	0.669	1.050
10	0.083	0.148	0.258	0.476	0.756	1.161
12	0.093	0.163	0.281	0.509	0.799	1.216
15	0.109	0.187	0.314	0.558	0.864	1.299
18	0.124	0.210	0.348	0.607	0.928	1.382
22	0.145	0.241	0.393	0.673	1.015	1.492
28	0.176	0.288	0.460	0.771	1.144	1.658
35	0.212	0.342	0.539	0.886	1.295	1.851
42	0.249	0.396	0.617	1.001	1.446	2.045
60	0.342	0.536	0.819	1.296	1.835	2.542
76	0.425	0.661	0.999	1.559	2.180	2.984
89	0.492	0.762	1.145	1.772	2.461	3.343





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