



kaiflex[®] rail SYSTEM

Solutions for railway vehicles

Our first-choice product for the thermal and acoustic insulation of traction units, passenger carriages and sleepers.

- Closed-cell elastomeric foams that meet the stringent fire protection requirements of EN 45445
- Conform to hazard levels HL2/HL3 of requirement class R1
- Halogen free (chlorine, bromine, PVC etc.)
- High thermal efficiency



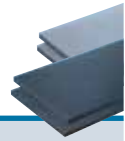
Solutions for railway vehicles

Kaiflex rail is our first-choice product for the thermal and acoustic insulation of traction units, passenger carriages and sleepers. Kaimann rail products are flexible, closed-cell,

elastomeric foams that have been developed specifically for use in railway vehicles. Our products conform to hazard levels HL2/HL3 of requirement class R1.



Kaiflex railSYSTEM Overview



	Kaiflex railCLAD	Kaiflex railPROTECT	Kaiflex railLSLT
EN 45545	R1 HL3	R1 HL3	R1 HL2
Further certificates	NFPA 130 A	–	NFPA 130 A
Halogenen free	•	•	•
Thicknesses	6-32 (50) mm	6-32 mm	6-25 mm



Kaiflex railCLAD

Halogen-free, this insulation product provides active protection by expanding when exposed to heat. Suitable for interior and exterior use on sleepers, underground carriages and tunnel vehicles.

Kaiflex railPROTECT

Passive protection for applications on potentially flammable surfaces. Suitable for interior use on sleepers, underground carriages and tunnel vehicles.

Kaiflex railLSLT

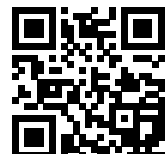
Halogen-free, low-smoke passive fire protection. Suitable for interior use on standard and high-capacity carriages with limited use in tunnels.

Kaiflex Accessories

Our recommendations for optimum, effective insulation.

Further information

www.kaimann.com/kaiflex-rail



Halogen-free insulation providing active protection by expanding when exposed to heat

According to EN 45545, in the event of a fire, the protection and safety of passengers and personnel should be awarded the highest priority. To ensure this, it is first and foremost necessary to prevent the spread of fire and the development of smoke gas.

Kaiflex railCLAD is a halogen-free elastomer composite with a very high insulation effect and smoke-restricting, fire-proof foil cladding. The insulation product provides active protection by expanding when exposed to heat, thus closing or shielding holes and preventing the fire from spreading to the next carriage. This also allows flammable substrates to meet the component inspection requirements of R1 HL3. The halogen- and heavy-metal-free materials prevent the development of toxic gases and dust particles in the event of a fire. This is particularly important in the case of railway vehicles that spend the majority of their travel time in underground sections with restricted evacuation conditions.

Kaiflex railCLAD also minimises energy losses and, thanks to its UV resistance, it is particularly suitable for exterior applications. The insulation product complies with all regional and national railway vehicle standards.

- Classification R1 HL3 acc. to EN 45545
- Active fire protection due to cladding (expanding in the event of a fire) – requirement-oriented application even on critical surfaces
- Halogen free (chlorine, bromine, PVC etc.)
- Low smoke development, low toxicity, low corrosivity in the event of a fire
- High-strength cladding protects against mechanical damage
- Suitable for exterior applications (UV-, ozone-, weather-resistant)
- High thermal efficiency, $\lambda \leq 0,037 \text{ W/(m}\cdot\text{K)}$ at $0 \text{ }^\circ\text{C}$
- Long-term functional protection, $\mu \geq 30.000$



Excellent thermal values minimise energy loss
Kaiflex features a low thermal conductivity that prevents the loss of energy from pipework making Kaiflex an excellent insulating material.



Durable protective covering
Insulation is easily damaged by deliberate or accidental impact. Durable protective coverings minimise damage to the insulation and simultaneously provide a maintainable surface finish.



Weather & UV resistant for outdoor use
Insulation used outdoors must be capable of withstanding sun, rain, wind and snow without suffering degradation. Kaiflex is available with a range of weather resistant coverings pre-applied for outdoor use.

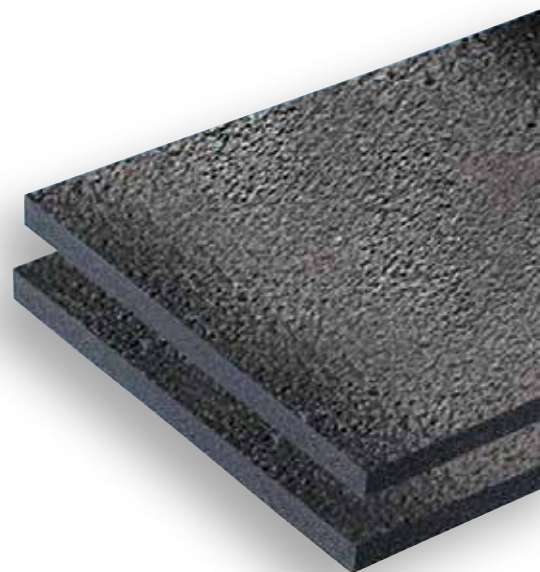
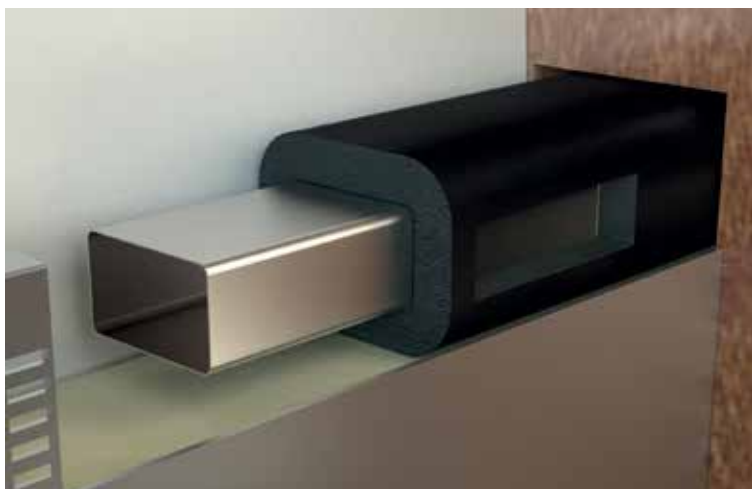


Effective acoustic performance reduces noise pollution
High-density materials absorb vibrations, thereby preventing noise penetration and noise pollution.



Fire protection standard compliance
Kaiflex rail products comply with the European fire protection standard EN 45545 for railway vehicles.

Halogen-free insulation providing active protection by expanding when exposed to heat



Kaiflex railCLAD Technical Data

Material		Elastomeric foam with fire protection cladding	
Cell structure		Closed cell > 95 %	
Colour		Black/anthracite	
Upper temperature limit	Foam Surface	+110 °C +85 °C	See remark (1)
Lower temperature limit		- 50 °C	See remark (1)
Thermal conductivity	λ_{θ} at -10 °C at 0 °C at +10 °C	$0,037 + 8,0 \cdot 10^{-5} \theta + 7,0 \cdot 10^{-7} \theta^2$ $\leq 0,036 \text{ W/(m}\cdot\text{K)}$ $\leq 0,037 \text{ W/(m}\cdot\text{K)}$ $\leq 0,038 \text{ W/(m}\cdot\text{K)}$	Test acc. to DIN EN ISO 8497
Water vapour permeability	Moisture resistance factor μ	≥ 30.000	Test acc. to DIN EN 13469 DIN EN 12086
Euroclass [°]		B-s1, d0	Test acc. to DIN EN 13501-1
Fire Classification	EU	R1 HL3	Test acc. to EN 45545-2
Practical fire behaviour		Intumescent / foaming in case of fire	
Corrosion resistance		very good	
Acoustic performance	Sound absorption	> 25 dB (A)	
Health aspects		Halogen free (chlorine, bromine, PVC etc.) Heavy metal free (e.g. cadmium, lead)	
Resistance to	UV Ozone Mechanical impact	very good very good very good	
Environmental aspects		ODP Zero GWP Zero	
Shelf life	Self-adhesive products	1 year	Store in a dry room at a typical relative humidity (between 50 % and 70 %) and room temperature (between 0 °C and +35 °C)
Tolerances		$\pm 10 \%$	
Outdoor applications		Suitable. Cut edges have to be appropriately masked.	

Remark (1) For temperatures above +100 °C or below -50 °C please contact our Technical Support Team for advice.

[°] The Euroclass rating applies to metallic or solid mineral substrates.

Halogen-free insulation providing active protection by expanding when exposed to heat

Kaiflex railCLAD Pre-covered sheet · continuous



Colour: Black · Covering: Anthracite

Insulation thickness mm	Sheet · continuous 1,2 m width · OD coil: 40 cm · foiled roll in carton				Sheet · continuous · self-adhesive 1,2 m width · OD coil: 40 cm · foiled roll in carton			
	Reference	Order No.	rm/roll	m ² /roll	Reference	Order No.	rm/roll	m ² /roll
6	rC-06-RL-1,2	4010419	18,0	21,6	rC-06-RL-1,2-SK	4010425	18,0	21,6
10	rC-10-RL-1,2	4010420	10,0	12,0	rC-10-RL-1,2-SK	4010426	10,0	12,0
13	rC-13-RL-1,2	4010421	8,0	9,6	rC-13-RL-1,2-SK	4010427	8,0	9,6
19	rC-19-RL-1,2	4010422	6,0	7,2	rC-19-RL-1,2-SK	4010428	6,0	7,2
25	rC-25-RL-1,2	4010423	4,0	4,8	rC-25-RL-1,2-SK	4010429	4,0	4,8
32	rC-32-RL-1,2	4010424	3,0	3,6	rC-32-RL-1,2-SK	4010430	3,0	3,6

Kaiflex railCLAD Accessories

	Description	Order No.	Width mm	Rolls/carton
	s-Tape · self-adhesive · 15 m length	4004660	50	12
		4004661	40	14

Passive protection for applications on potentially flammable surfaces

Kaiflex railPROTECT is used wherever a high hazard level is present. For instance, this applies to plastic water tanks in sleepers or railway vehicles used in tunnel traffic.

The potentially flammable materials which lie under the insulation are afforded passive protection by the film cladding, which also prevents the development of smoke. The visually sophisticated silver surface cladding is also notable for its low emission ratio and protects the insulation against mechanical loads and damage.

- Classification R1 HL3 acc. to EN 45545
- Passive fire protection thanks to foil cladding
- Visually appealing silver surface finish
- Foil cladding protects against mechanical damage
- Halogenen free (chlorine, bromine, PVC etc.)
- UV-resistant
- High thermal efficiency, $\lambda \leq 0,040 \text{ W/(m}\cdot\text{K)}$ at $+10 \text{ }^\circ\text{C}$
- Long-term functional protection, $\mu \geq 20.000$



Non-metallic covering free from corrosion
Metallic cladding can experience galvanic corrosion over time or even cause bi-metallic corrosion. Insulation coverings from Kaimann are completely non-metallic and cannot possibly experience or cause corrosion.



Weather & UV resistant for outdoor use
Insulation used outdoors must be capable of withstanding sun, rain, wind and snow without suffering degradation. Kaiflex is available with a range of weather resistant coverings pre-applied for outdoor use.



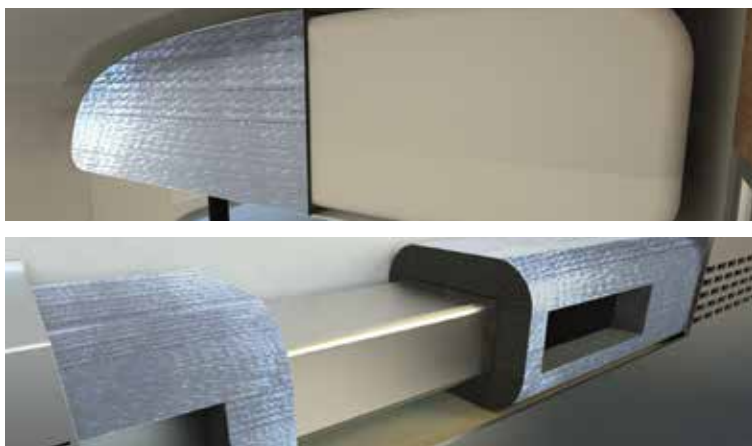
Free of Chlorines, Bromines and Deca Bromine
Chlorines, Bromines and Deca Bromine are chemicals which can accelerate corrosion and react to form toxic smoke. Kaiflex is available in grades which eliminate Chlorines, Bromines and Deca Bromine entirely.



Durable protective covering
Insulation is easily damaged by deliberate or accidental impact. Durable protective coverings minimise damage to the insulation and simultaneously provide a maintainable surface finish.



Fire protection standard compliance
Kaiflex Rail products comply with the European fire protection standard EN 45545 for railway vehicles.



Kaiflex railPROTECT Technical Data

Material		Elastomeric foam based on synthetic rubber.	
Cell structure		Closed cell	
Colour		Black	
Upper temperature limit	Pipe Flat surfaces	+110 °C +85 °C	See remark (1)
Lower temperature limit		-50 °C (-200 °C)	See remark (1)
Thermal conductivity	λ_0 at -10 °C at 0 °C at +10 °C	$0,040 + 8,0 \cdot 10^{-5} \vartheta + 7,0 \cdot 10^{-7} \vartheta^2$ $\leq 0,039 \text{ W/(m}\cdot\text{K)}$ $\leq 0,040 \text{ W/(m}\cdot\text{K)}$ $\leq 0,041 \text{ W/(m}\cdot\text{K)}$	Test acc. to DIN EN 12667
Water vapour permeability	Moisture resistance factor μ	≥ 20.000 No separate vapour barrier required	Test acc. to DIN EN 12086 DIN EN 13469
Fire Classification	EU	R1 HL3	Test acc. to EN 45545-2
Practical fire behaviour		Self-extinguishing, no drips, does not support flame spread	In acc. with EN 11925-2
Corrosion resistance		Satisfies requirements	In acc. with DIN 1988
Halogen content		Satisfies requirements	Test acc. to VDE 0472
Environmental aspects		Low VOC Zero halogen ODP Zero GWP Zero	In acc. with ISO 16000
Health aspects		Dust & fibre free Halogen free (chlorine, bromine, PVC etc.) Heavy metal (e.g. cadmium, lead) and formaldehyde free	
Other attributes	pH-Value	Neutral	In acc. with EN 13468
Shelf life	Self-adhesive products	1 year	Store in a dry room at a typical relative humidity (between 50 % and 70 %) and room temperature (between 0 °C and +35 °C)
Tolerances		In acc. with DIN EN 14304:2013-04	
Outdoor applications		UV-resistant	See remark (2)

Remark (1) For temperatures above +100 °C or below -50 °C please contact our Technical Support Team for advice.

Remark (2) Depending on the application environment further weather protection may be necessary.


Kaiflex railPROTECT Pre-covered sheet · continuous

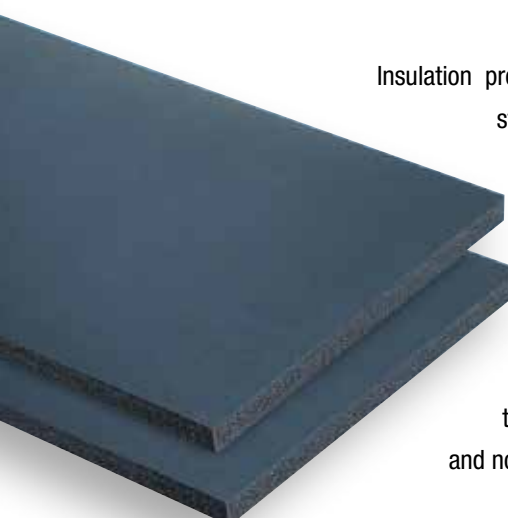


Farbe: Silber

Insulation thickness mm	Sheet · continuous 1,2 m width · OD coil: 40 cm · foiled roll in carton				Sheet · continuous · self-adhesive 1,2 m width · OD coil: 40 cm · foiled roll in carton			
	Reference	Order No.	rm/roll	m ² /roll	Reference	Order No.	rm/roll	m ² /roll
6	rPR-06-RL-1,2	4010431	18,0	21,6	rPR-06-RL-1,2-SK	4010437	18,0	21,6
10	rPR-10-RL-1,2	4010432	10,0	12,0	rPR-10-RL-1,2-SK	4010438	10,0	12,0
13	rPR-13-RL-1,2	4010433	8,0	9,6	rPR-13-RL-1,2-SK	4010439	8,0	9,6
19	rPR-19-RL-1,2	4010434	6,0	7,2	rPR-19-RL-1,2-SK	4010440	6,0	7,2
25	rPR-25-RL-1,2	4010435	4,0	4,8	rPR-25-RL-1,2-SK	4010441	4,0	4,8
32	rPR-32-RL-1,2	4010436	3,0	3,6	rPR-32-RL-1,2-SK	4010442	3,0	3,6

Kaiflex railPROTECT Accessories

	Description	Order No.	Width mm	Rolls/carton
	Tape · alu · 100 m length · 30 µm thickness	4010312	50	24



Insulation products in the interior of standard carriages with limited use in tunnels must comply with the highest requirements for both high- and low-temperature insulation, as well as corrosion and noise protection.

Kaiflex rail LSLT (low smoke, low toxicity) is a genuine all-rounder when it comes to technical insulation. In addition to providing thermal insulation for heating and ventilation systems, the passive fire protection, halogen-free elastomer also offers acoustic insulation of floors, walls and ceilings. The flexible insulation product also prevents the development of condensation at floor level

and is suitable for large-scale insulation between the shells of external walls.

With its Kaiflex rail LSLT, Kaimann actively contributes to the safety of persons in the event of a fire. Not only does less smoke develop than with classic elastomer insulation products, the smoke also tends to be white, making emergency exits easier to identify.

- Classification R1 HL2 acc. to EN 45545
- Passive fire protection without additional surface coating
- Halogen free (chlorine, bromine, PVC etc.)
- Low smoke development, low toxicity, low corrosivity in the event of a fire
- Excellent installation properties thanks to high flexibility
- High thermal efficiency, $\lambda \leq 0,040 \text{ W/(m}\cdot\text{K)}$ at $+10 \text{ }^\circ\text{C}$
- Long-term functional protection, $\mu \geq 2.000$



Excellent thermal values minimise energy loss
Kaiflex features a low thermal conductivity that prevents the loss of energy from pipework making Kaiflex an excellent insulating material.



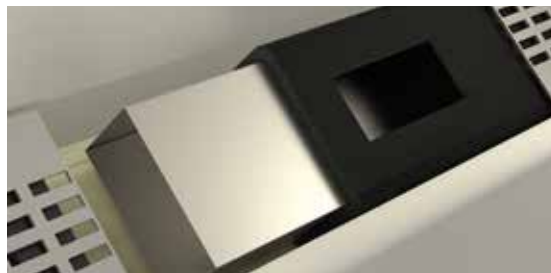
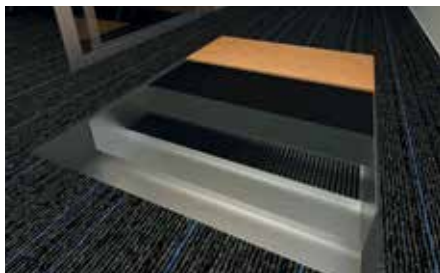
Fire protection standard compliance
Kaiflex Rail products comply with the European fire protection standard EN 45545 for railway vehicles.



Low smoke toxicity
Smoke toxicity is an important consideration for insulation used offshore and in sensitive environments. Kaiflex is available in halogen free grades with the lowest levels of smoke toxicity.



Free of Chlorines, Bromines and Deca Bromine
Chlorines, Bromines and Deca Bromine are chemicals which can accelerate corrosion and react to form toxic smoke. Kaiflex is available in grades which eliminate Chlorines, Bromines and Deca Bromine entirely.



Kaiflex railLSLT Technical Data

Material		Elastomeric foam based on synthetic rubber. Flexible Elastomeric Foam (FEF) in acc. to EN 14304	
Cell structure		Closed cell	
Colour		Black	
Upper temperature limit	Pipe Flat surfaces	+110 °C +85 °C	See remark (1)
Lower temperature limit		-50 °C (-200 °C)	See remark (1)
Thermal conductivity	λ_{10} at -10 °C at 0 °C at +10 °C	$0,040 + 8,0 \cdot 10^{-5} \vartheta + 7,0 \cdot 10^{-7} \vartheta^2$ $\leq 0,039 \text{ W/(m-K)}$ $\leq 0,040 \text{ W/(m-K)}$ $\leq 0,041 \text{ W/(m-K)}$	Test acc. to DIN EN 12667
Water vapour permeability	Moisture resistance factor μ	≥ 2.000 No separate vapour barrier required	Test acc. to DIN EN 12086 DIN EN 13469
Fire Classification	EU	R1 HL2	Test acc. to EN 45545-2
Fire Classification	U.S.	„A” rating Is < 25 $D_{s(4,0)} < 100$ $D_{s(4,0)} < 100$	In acc. with NFPA 130 Audited ASTM E 162 Audited ASTM E 662 non-flaming mode Audited ASTM E 662 flaming mode
Practical fire behaviour		Self-extinguishing, no drips, does not support flame spread	In acc. with EN 11925-2
Corrosion resistance		Satisfies requirements	In acc. with DIN 1988
Halogen content		Satisfies requirements	Test acc. to VDE 0472
Environmental aspects		Low VOC Zero halogen ODP Zero GWP Zero	In acc. with ISO 16000
Health aspects		Dust & fibre free Halogen free (chlorine, bromine, PVC etc.) Heavy metal (e.g. cadmium, lead) and formaldehyde free	
Other attributes	pH-Value	Neutral	In acc. with EN 13468
Shelf life	Self-adhesive products	1 year	Store in a dry room at a typical relative humidity (between 50 % and 70 %) and room temperature (between 0 °C and +35 °C)
Tolerances		In acc. with DIN EN 14304:2013-04	
Outdoor applications		Needs protection against UV-radiation	See remark (2)

Remark (1) For temperatures above +100 °C or below -50 °C please contact our Technical Support Team for advice.

Remark (2) To protect against UV-induced deterioration Kaiflex should be either painted using Kaifinish Color paint or covered with a suitable UV resistant cladding system within 3 days of being installed outdoors.

Kaiflex railSLT Tube



Colour: Black · Length: 1,2 m

Copper pipe Cu		Iron & steel pipe Fe			13 mm Insulation thickness			19 mm Insulation thickness		
OD mm	Nom width DN	Inch	OD mm	Nom width DN	Reference	Order No.	m/ carton	Reference	Order No.	m/ carton
15,0	10	1/4	13,5	8	rLSLT-13x015-1,2	4010625 *	108,0	rLSLT-19x015-1,2	4010884	67,2
18,0	15	3/8	17,2	10	rLSLT-13x018-1,2	4010626 *	88,8	rLSLT-19x018-1,2	4010885	50,4
22,0	20	1/2	21,3	15	rLSLT-13x022-1,2	4010627 *	80,4	rLSLT-19x022-1,2	4010886	49,2
28,0	25	3/4	26,9	20	rLSLT-13x028-1,2	4010396 *	62,4	rLSLT-19x028-1,2	4010887	39,6
35,0	32	1	33,7	25	rLSLT-13x035-1,2	4010628 *	50,4	rLSLT-19x035-1,2	4010397	30,0
42,0	40	1 1/4	42,4	32	rLSLT-13x042-1,2	4010880 *	42,0	rLSLT-19x042-1,2	4010888	26,4
		1 1/2	48,3	40	rLSLT-13x048-1,2	4010881 *	38,4	rLSLT-19x048-1,2	4010398	22,8
54,0	50		54,0		rLSLT-13x054-1,2	4010883 *	28,8	rLSLT-19x054-1,2	4010889	21,6
		2	60,3	50				rLSLT-19x060-1,2	4010890	19,2
76,1	65	2 1/2	76,1	65				rLSLT-19x076-1,2	4010891	14,4
88,9	80	3	88,9	80				rLSLT-19x089-1,2	4010892	12,0

* No stock item, delivery time on request.


Kaiflex railSLT Sheet · continuous



Colour: Black

Insulation thickness mm	Sheet · continuous 1,2 m width · OD coil: 40 cm · in carton				Sheet · continuous · self-adhesive 1,2 m width · OD coil: 40 cm · in carton			
	Reference	Order No.	mm/ roll	m ² / roll	Reference	Order No.	mm/ roll	m ² / roll
10	rLSLT-10-RL-1,2	4001893	10,0	12,0	rLSLT-10-RL-1,2-SK	4006683	10,0	12,0
13	rLSLT-13-RL-1,2	4001894	8,0	9,6	rLSLT-13-RL-1,2-SK	4007551	8,0	9,6
19	rLSLT-19-RL-1,2	4001895	6,0	7,2	rLSLT-19-RL-1,2-SK	4001897	6,0	7,2
25	rLSLT-25-RL-1,2	4001896	4,0	4,8	rLSLT-25-RL-1,2-SK	4007552	4,0	4,8

Kaiflex railSLT Accessories

	Description	Order No.	Width mm	Rolls/ carton
	railSLT Tape · self-adhesive · 15 m length · 3 mm thickness	4003841	50	12

