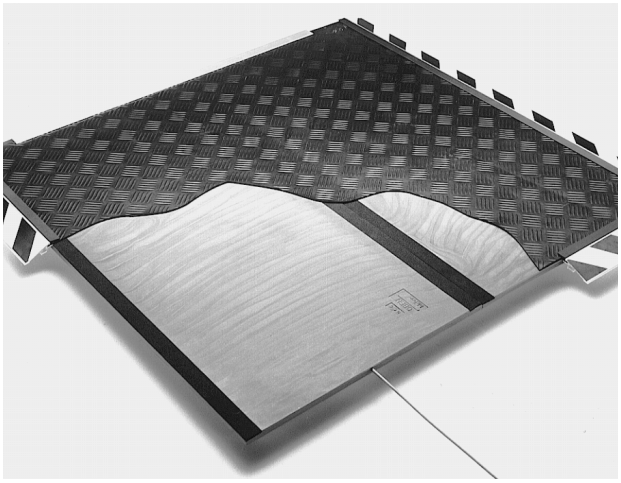


Contact Mats for Safety Applications

ESM-10, -11, -13
ESM-20, -21, -33

- Available in every imaginable shape
- Special active edges
- Highly responsivet

Safety Mats

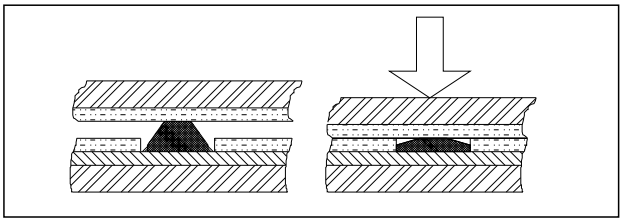
Safety Contact Mats are sensors and together with ESR-3 Switching Units form safety systems. They are mainly used for:
- to detect persons or objects which are in the danger area
- to prevent dangerous circumstances
- to stop dangerous movements

Function

Two parallel contact surfaces are separated from each other at a defined distance by rubber springs.
- When the upper contact surface is activated by pressure the isolation distance is compressed
- both contact surfaces touch each other.
- the built-in resistance falls below the defined value of 8.2kOhm.
- the switching unit evaluates the contact.

Switching Mats

There are only small technical differences between Switching mats and Safety mats. However Switching mats may not be intergrated in certified safety systems. These are the types ESM-13, -23, -33.



Cross-section

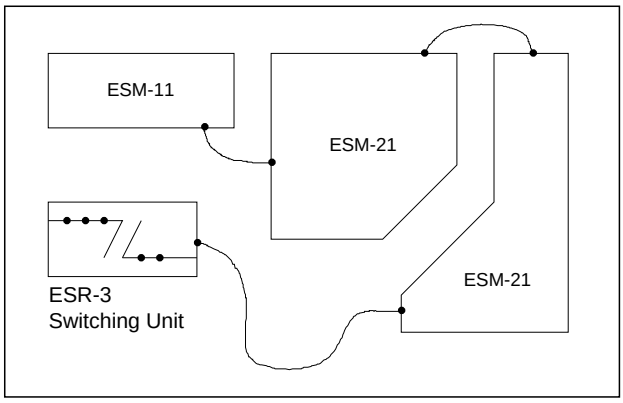
The active contact elements are cast in polyurethane. Normally the Contact Mats have a covering which, according to the application, have the following characteristics:
- slip resistant
- hard-wearing
- chemical resistant
- mechanical resistant

Selection of Contact Mats

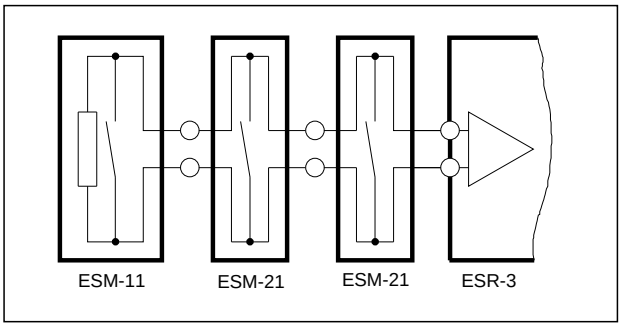
Type	Cable	Edge Zone Free	Resistance	Identification
Safety Mat	1		x	ESM 10
Safety Mat	1	x	x	ESM 11
Switching Mat	1		x	ESM 13
Safety Mat	2			ESM 20
Safety Mat	2	x		ESM 21
Switching Mat	2			ESM 23
Switching Mat	1			ESM 33

Connection and Wiring Possibilities

Up to 5m² of Contact Matting area can be connected to one sensor input of an ESR-3 Switching Unit. If multiple mats are connected together the final mat (ESM 11) has a termination resistor. The other Contact Mats have two cable connections (ESM 21).



Example of wiring possibility

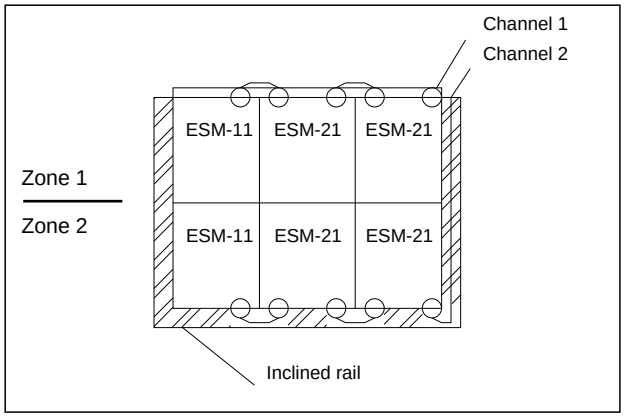


Alternate connecting diagramm

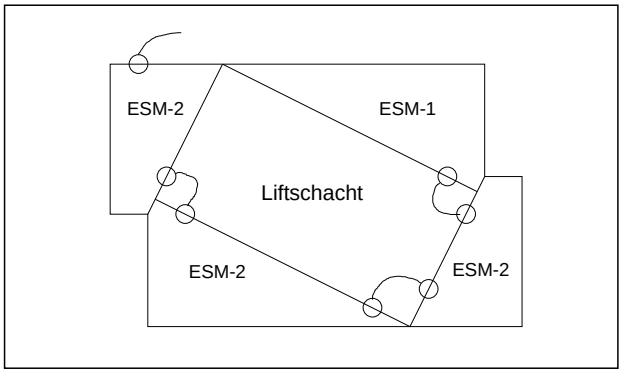
Shapes/Dimensions

Contact Matting Type ESR can be manufactured in every imaginable shape.

The following points should be observed:
- Contact Mats larger than 1.3m² are to be avoided.
- The largest permissible size of a single Contact Mat is 1200x1400mm.



Protection with two zones

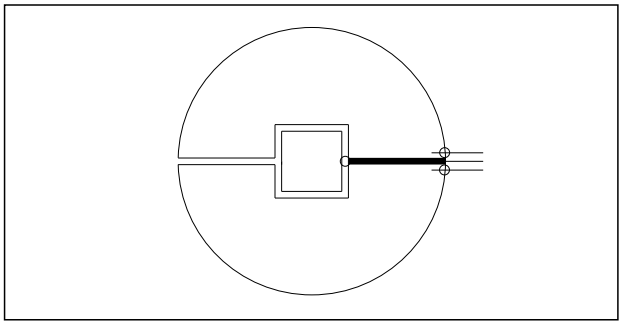


Elevator shaft protection

Active Surfaces/Edge Zones

Single contact mats can be installed in different zones each of which can be evaluated separately.

In order to protect large surfaces multiple mats must be combined together. Because of the production methods, so called edge zones are created.
A special technique allows these edge zones to be bridged in order that all contact mat surfaces can be activated with a 80mm dia. Test piece.



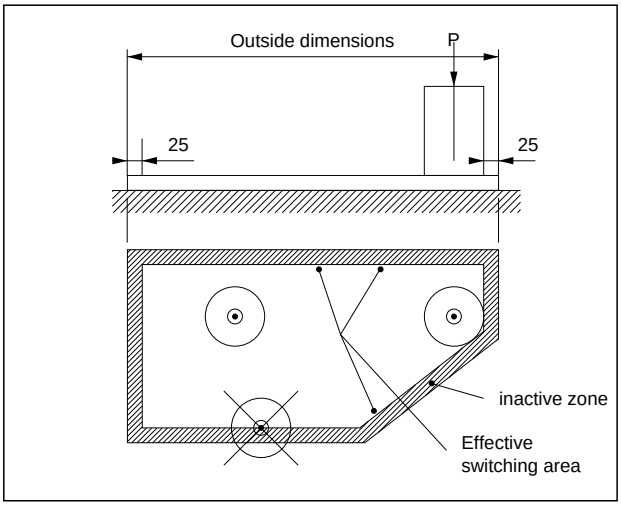
Presence detection

Installation of Contact Matting

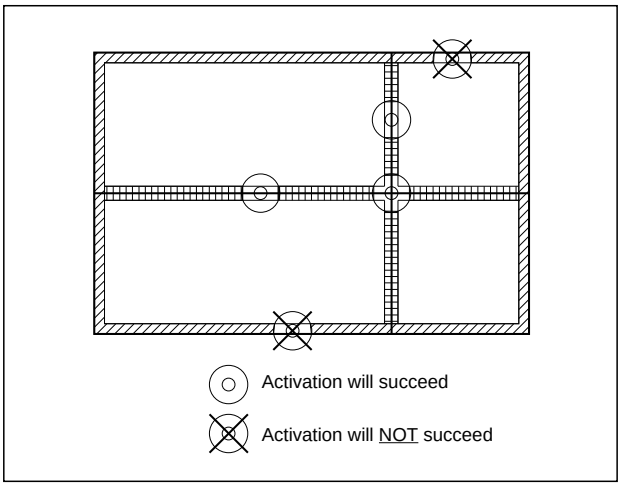
Before installation of the contact mats the following should be observed:

- The mounting surface must be absolutely level and clean.
- The collection of fluids under or around the Contact Mats is to be prevented.

Detailed assembly and operating information can be obtained from the Assembly and Operating Manual enclosed with the product.



Single Contact Mat ESM-10/ESM-20



Contact Matting Combination ESM-11/ESM-21

Technical Data

Moulding Material	Polyurethane, blue
Dimensions	Width 1.2m max. Length 1.4m max. min. 200x200mm
Thickness	10mm Standard
Manufacturing Tolerances	
– Width/Length	200–399mm: +1.5/-3 400–599mm: +2.5/-4 600–999mm: +3.5/-5 >1000mm: +4/-6
– Thickness	±1.5mm
Weight	15 kg/m² with cover
Temperature Range	-25°C to +50°C Operation -25°C to +70°C Storage
Endurance	- Weather, ozone, good - Water 20°C, sufficient good for short periods - Water 60°C, not good good for short periods - Oils, petrol, good - Acids, sufficient
Loading Capacity	2'000N/cm², max. 10'000 N/dm²
Vehicle Capacity	1 ton solid rubber tyre, 2 ton pneumatic tyre
No-load Resistance	
– Type ESM-1, -11	8.2kOhm ±5% or to customers specification
– Type ESM-21	>1MOhm switching travel 0.5mm
Actuating force	<300N (-25°C to +50°C), with test piece Ø80mm according to EN 1760-1 also for mats with rubber covers types «ES-KMB..»
Reaction Time	With ESR/ESD3-Switching Unit <70ms
Inactive Zone	
ESM10/20	25mm at all edges
ESM11/21	25mm at cable edge 0mm at joint edges
Operating Life	measured at the same position with a 80mm dia. test piece/14°, 750 N
- with ESR-Switching Unit	>5 million switching cycles
Isolation Class	IEC IP 67
Insulating Strength	>1500 VAC
Connecting Cable	2x0.34mm², type «DM» (VDE Li-YY, PVC-grey, Ø4.5mm)
Cable Length	2 metres long standard, can be extended in metre lengths
Connecting Plug	according to customers requirements and exact specification
Composition	>1% share of weight – Polyurethane (Moulding material) – epoxy-fiberglass sheets (Contact area support) – Copper (Cable, contact area) – silicone rubber (Distance springs)

Ordering Information

e.g. ESM-11 / 1200x55 mm / DM / Cable Connection

Type
ESM-10, -11, -13
ESM-20, -21, -23
ESM-33

Dimensions
max. 1200x1400 mm

Cable Type
Twin cover/DM

Cable Connection
to be determined by customer

ESM-6.E-06G

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bircher SafeTec®

Switching Mats

ESM-13A, -23A, -33A
ESM-13B, -23B, -33B

- Various Surface Structures
- Available in every imaginable shape
- Highly responsive

Contact Mats are sensors and together with ESR-Switching Units form Contact Mat Systems. Switching Mats may not be intergrated in certified switching systems.

Function

Two parallel contact surfaces are separated from each other at a defined distance:

- when the upper contact surface is activated by pressure the isolation distance is compressed
- both contact surfaces touch each other
- the built-in resistance falls below the defined value of 8.2kOhm
- the switching unit evaluates the contact

Surface Structure

The active contact elements are moulded in polyurethane. The Type A and B Switching Mats have a surface structure with the following characteristics:

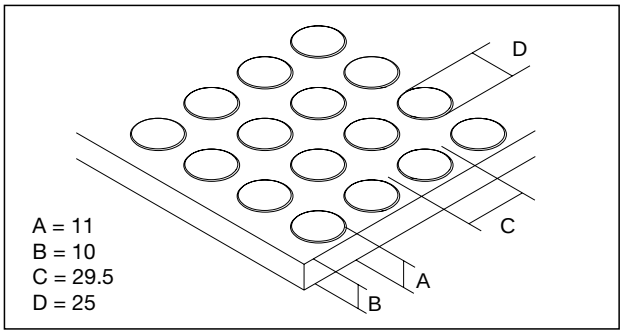
- slip resistant
- tread resistant
- hard-wearing
- chemical resistant mechanical resistant

There are two different surfaces available as standard:

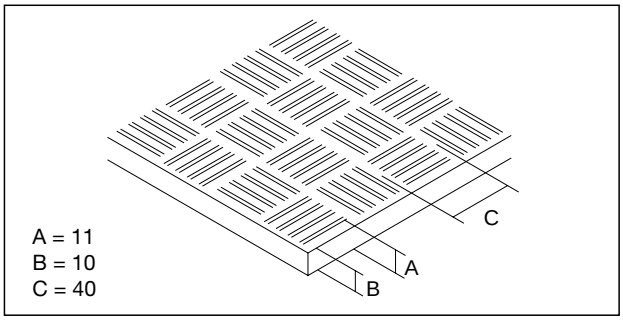
- stud pattern (A)
- chequered (B)

Dimension Sheet

Surface Structures



Stud Pattern (A)



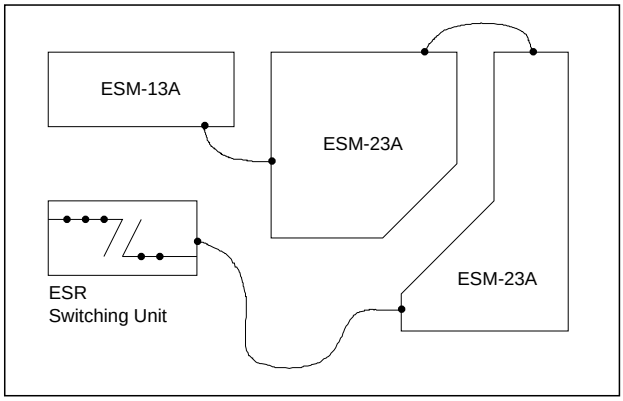
Chequered (B)

Selection of Contact Mats

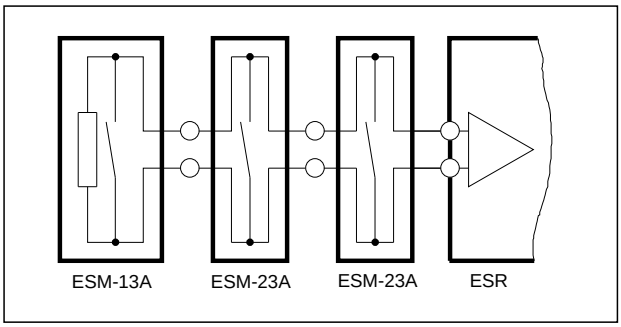
Cover Chequ.	Cover Stud	Cable	Resistance 8.2kOhm	Type
	x	1	x	ESM13**A**
	x	2		ESM23**A**
	x	1		ESM33**A**
x		1	x	ESM13**B**
x		2		ESM23**B**
x		1		ESM33**B**

Connection and Wiring Possibilities

Up to 5 m^2 of Contact Matting area can be connected to one sensor input of an ESR Switching Unit. If multiple mats are connected together the final mat (ESM-13) has a termination resistor. The other Contact Mats have two cable connections (ESM-23).



Example of wiring possibility



Alternate connecting diagram

Shapes/Dimensions

Contact Matting Type ESM can be manufactured in every imaginable shape.

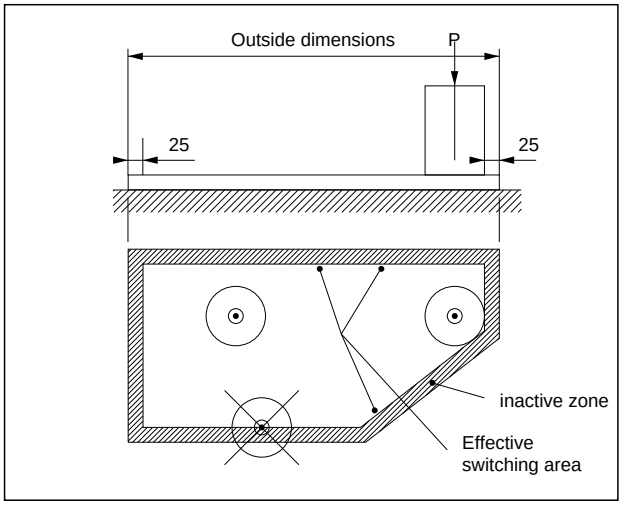
The following points should be observed:

- contact Mats larger than 1.3m^2 are to be avoided
- the largest permissible size of a single Contact Mat is 1200x1400mm

Active Surfaces/Edge Zones

Single contact mats can be installed in different zones each of which can be evaluated separately.

In order to protect large surfaces multiple mats must be combined together. Because of the production methods, so called edge zones are created.



Single Contact Mat ESM-13A

Installation of Contact Matting

Before installation of the contact mats the following should be observed:

- the mounting surface must be absolutely level and clean
- the collection of fluids under or around the Contact Mats is to be prevented

Detailed assembly and operating information can be obtained from the Assembly and Operating Manual enclosed with the product.

Technical Data

Moulding Material	Polyurethane, black
Dimensions	Width 1.2m max. Length 1.4m max. min. 200x200mm
Thickness	11mm Standard (±1mm)
Manufacturing Tolerances	
– Width/Length	200–399 mm: +1.5/-3 400–599mm: +2.5/-4 600–999mm: +3.5/-5 >1000mm: +4/-6
Weight	approx. 11.5kg/m^2
Temperature Range	-25°C to +50°C Operation -25°C to +70°C Storage
Resistance to Wear	<90mm^3 (DIN 53516)
Endurance	
	– Weather, ozone, good – Water 20°C, sufficient (good for short periods) – Water 60°C, not good (good for short periods) – Oils, petrol, good – Acids, good
Loading Capacity	2000N/cm^2, max. 10000N/dm^2
Vehicle Capacity	1 ton solid rubber tyre, 2 ton pneumatic tyre
No-load Resistance	
– Type ESM-13	8.2kOhm ±5% or to customers specification
– Type ESM-23, -33	>1MOhm switching travel 0.5mm
Actuating force	<300N (-25°C to +50°C), with test piece Ø80mm according to EN 1760-1
Reaction Time	With ESR/ESD3-Switching Unit <70ms
Inactive Zone	25mm at all edges
Switching Frequency	measured at the same position with a 80mm dia. test piece/14°, 750 N
– with ESR-Switching Unit	>5 million switching cycles
Protection Class	EC IP 67
Insulating Strength	>1500VAC
Connecting Cable	2x0.34mm^2, type «DM» (VDE Li-YY, PVC-grey, Ø4.5mm)
Cable Length	2 metres long standard, can be extended in metre lengths
Connecting Plug	according to customers requirements and exact specification
Composition	>1% share of weight – Polyurethane (Moulding material) – epoxy-fiberglass sheets (Contact area support) – Copper (Cable, contact area)

Ordering Information

e.g. ESM-13A / 1000x550mm / DM / Cable Connection

Type
see selection table

Dimensions

Cable Type

Cable Connection
To be determined by customer

ESM-6-E- 10G

Contact Mats
Footboard Mats

ESM-16, -26, -36

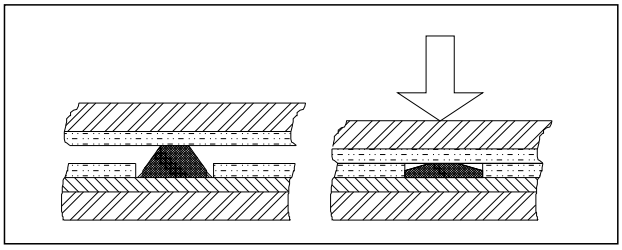
- Available in every imaginable shape
- Highly responsive
- Special active edges

Foot Board Mats

Safety Contact Mats are sensors and together with ESR-Switching Units form safety systems. They are mainly used:
- to detect persons or objects which are in the danger area
- to produce control commands
- to produce count impulses

Function

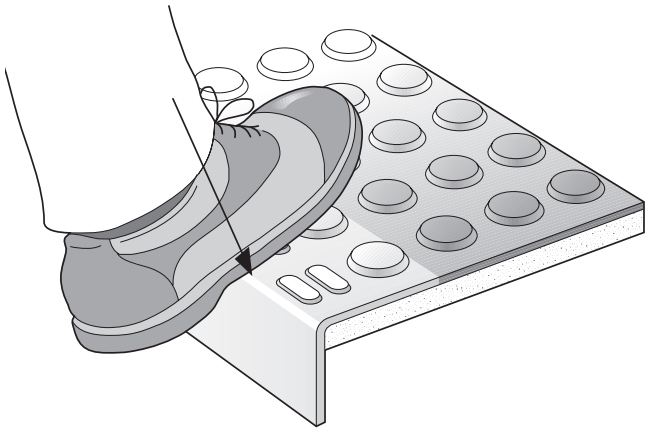
Two parallel contact surfaces are separated from each other at a defined distance by rubber springs.
n When the upper contact surface is activated by pressure the isolation distance is compressed
- both contact surfaces touch each other.
- the built-in resistance falls below the defined value of 8.2kOhm.
- the switching unit evaluates the contact.



Cross-section

The active contact elements are cast in polyurethane. Normally the Contact Mats have a covering which, according to the application, have the following characteristics:
- slip resistant
- hard-wearing
- chemical resistant
- mechanical resistant

The foot board mats types -16, -26, -36 are fitted with a special active edge.



Way in public transport

Public Transport Entry

Selection of Contact Mats

Type	Cable	Edge Zone Free	Resistance	Identification
Footboard Mat	1	x	x	ESM 16
Footboard Mat	2	x		ESM 26
Footboard Mat	1	x		ESM 36

Connection and Wiring Possibilities

Contact and also Footboard Mats can be connected in parallel as long as they are being used as command sensors and not as safety sensors, or when necessary, connected in series when used with the ESM-2,-3 switching units.
The contact surfaces of the contact mats are to be protected as follows if a non-ohmish load is connected:
- by connecting a recovery diode in parallel to the load with DC voltage
- or by connecting an RC combination in parallel with AC voltage

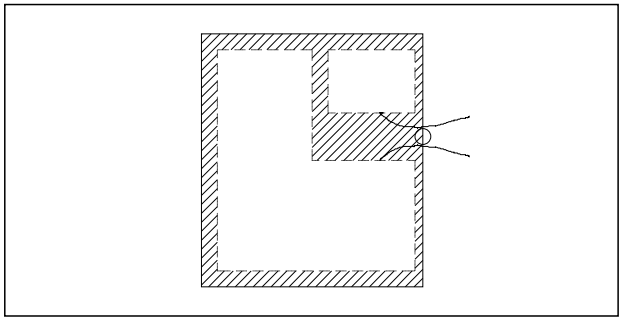
Typical values for the RC-combination are:

- I=0,2A: 4.7 uF/470Ohm
- I=0,5A: 47 uF/100Ohm
- I=1.0A: 0,1 uF/ 10Ohm

Shapes/ Dimensions

Footboard mats can be manufactured in every imaginable shape.

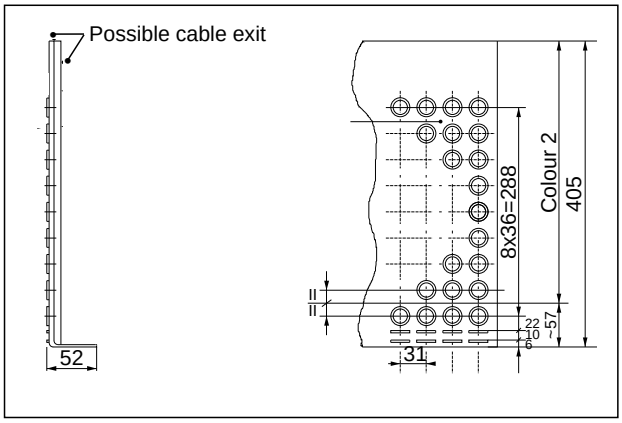
The following points are to be observed:
- The largest possible size of a contact mat is 1200 x 1400mm.
- Larger areas can be achieved by using multiple mats.



Special mats

Footboard Covering

The footboard coverings are black and the front edge is coloured yellow. These are moulded together with the footboard mat. Therefore an optimal and sealed joint is achieved between footboard covers and contact mats.



Dimensional sketch of Footboard cover

Active edge

The footboard mats types ESM-16, -26, -36 have an active edge on the frontside.
These react as follows:
- when operated from above
- with a reaction angle of 20°

Cable exit

The cable exit can be either at the rear, at the side or at the bottom.

Installation of Footboard Mats

Before installation of the footboard mats the following should be observed:
- The mounting surface must be absolutely level and clean.
- The collection of fluids under or around the Contact Mats is to be prevented.

Detailed assembly and operating information can be obtained from the Assembly and Operating Manual enclosed with the product.

Technical Data

Moulding Material	Polyurethane, blue
Dimensions	
– Contact Mats	max.1200x1400mm
– Foot Board Mats	max.1360 x 400mm
– Contact Mats	without covering 10mm thick
-Foot Board Mats	with covering 13.7mm thick
Manufacturing Tolerances (at 23°C)	
– Width/Length	200–399mm: +1,5/-3
	400–599mm: +2,5/-4
	600–999mm: +3,5/-5
	>1000mm: +4 /-6
– Thickness	±2mm
Weight	15kg/m^2
Temperature Range	-25°C to +50°C (storage and operation)

Endurance	Contact Mats (PUR)	Foot Board Mats (covering)
- Weather, ozone	good	good
- Water 20°C	good	good
- Water 60°C	limited time good	good
- Oils, petrol	good	good

Loading Capacity	2'000N/cm^2, max. 10'000 N/dm^2
No-load Resistance	typical >1MOhm
Switching Resistance	typical < 0.5Ohm
Switching Point	typical 0.8mm
Operating Pressure	(with a 80mm test piece)

Contact Mat	at 23°C	at -25°C
Covering SBR	<250N	<250N
Foot Board Mats	<150N	<150N

Reaction Time	<0.01s at an operating speed of 100mm/s
Inactive Zone	min. 25mm side and rear edges
Operating Life	measured at the same position with a 80mm dia.test piece/ 14° inclination, 750N
– 10 mA/10VADC	>5x10E6 switching cycles
– 0.5 A/24VADC	>3x10E6 switching cycles
-1.0 A/42VADC	>1x10E6 switching cycles
Isolation Class	IEC IP67
Insulating Strength	>1500VAC
Connecting Cable	2x0.34mm^2, type «DM» (VDE Li-YY, PVC-grey, Ø4.5mm)
Cable Length	2 metres long standard, can be extended in metre lengths
Connecting Plug	according to customers requirements and specification Automotive Industrie

Composition
(>1% share of weight)
- Polyurethane (Moulding material)
- epoxy-fiberglass sheets (Contact area support)
- Copper (Contact area support)
- silicone rubber (Distance springs)

Order Information

e. g. ESM-36/350x600mm/DM/Cable Connection

Type
ESM-16, -26
ESM-36

Dimensions
max. 1200x1400mm
Switching Mats
max. 400x1360mm
Footboard Mats

Cable Type
DM twin-cover cable

Cable Connection
To be determined by customer

ESM-6.E-10G

Accessories for Contact Mats

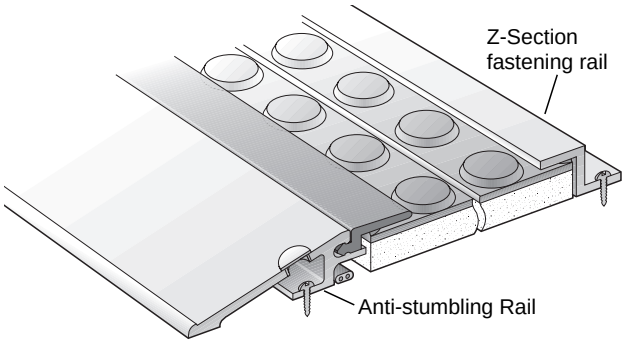
Anti-stumbling Rails ES-S/ES-S2 Z-Section Fastening Rail ES-SZ

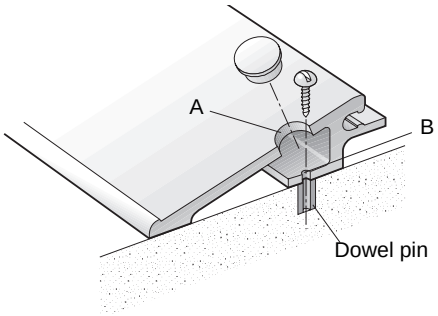
- Available in all sizes
- Installation friendly
- High stability

Anti-stumbling Rails

Anti-stumbling Rails type ES-S/ES-S2:
- are used for fixing type ESM Contact Mats
- must be securely screwed to the ground
- can be driven over by loaded vehicles
- can be cut as required without difficulty
- can be mitred as required

The Z-Section fastening rail is used to fasten the contact mat.





Installation

When installing the contact mat with anti-stumbling rail the following is to be observed:
- the cable must not be squashed or damaged
- the cable must be completely laid in the anti-stumbling rail cable channel.

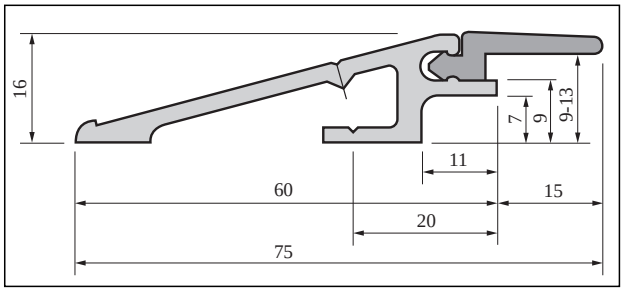
Detailed assembly and operating information can be obtained from the Assembly and Operating Manual enclosed with the product

Remarks:

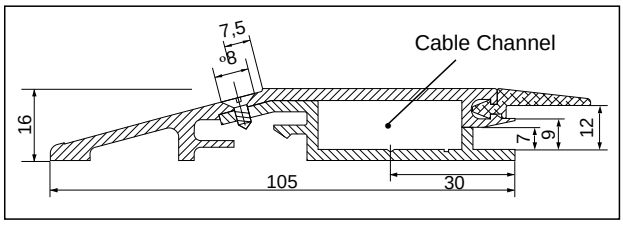
- If anti-stumbling rails are cut with a mitre joint, care should be taken that these are cut 2mm longer
- The rubber sections are always delivered a few centimetres longer and should be cut to the correct length, during final installation.

Technical Data

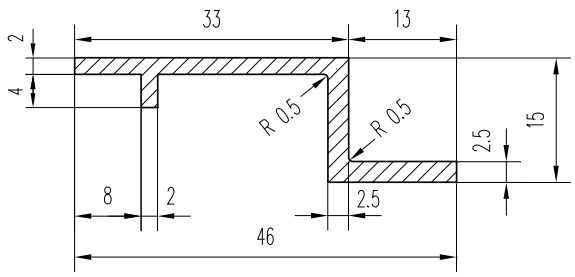
Type	Aluminium (ES-S)	Rubber (ES-S)	Aluminium (ES-S2)	Z-Section	Marking	Plug
	RAL 61	ES-SG	RAL 105	ES-SZ	ES-SB	ES-ST
Material	AlMgSi 0,5	TPE	AlMgSi 0.5	AlMgSi 0,5	PVC	PVC
Weight	640g/lfm	72g/lfm	1480g/lfm	228g/lfm	–	–
Load Capacity						
Rubber Wheel	10000N	10000N	10000N	500N	–	–
Pneu Wheel	20000N	20000N	20000N	1000N	–	–
Endurance Properties						
– Weather	very good	good	very good	very good	good	good
– Mineral Oil	very good	good	very good	very good	sufficient	sufficient
– Petrol	very good	good	very good	very good	good	good
– Solvents	very good	sufficient	very good	very good	poor	poor
Ambient Temperature-20°C to + 70°C						
Cutting Tolerance ±2 mm or max. ±2% (23°C)				–	–	



Anti-stumbling Rail ES-S



Anti-stumbling Rail ES-S2



Z-Section Fastening Rail ES-SZ

Recommended Screw Size and Pitch of Holes

Screw	Pitch Distance from End Face	1st Hole	Hole dia. A	Hole dia. B
5mm dia.	50cm	max. 10cm	14mm	5.5mm
6mm dia.	60cm	max. 10cm	14mm	6.5mm

Order Information

Description	Type
Stumbling Rail Complete (max.length 6m)	**ES-S**
Stumbling Rail Complete (ditto, with larger cable channel)	**ES-S2**
Spare Rubber Section	**ES-SG**
Z-Section Fastening Rail (max.length 6m)	**ES-SZ**
Marking Tape Self-adhesive (33m Roll)	**ES-SB**
Plug 14mm dia. (package of 12)	**ES-ST**
WECO-rawlplug M6 (package of 12)	**ES-SD**
Flat-headed Screw M6x20 (package of 12)	**ES-SS**

Covers

Contact mats can be selected with different covers as required. The following covers are available:

- Chequered natural rubber ES-KMBW
- Chequered nitrile rubber ES-KMBWO
- Round studded natural rubber ES-KMB
- Round studded nitrile rubber ES-KMBO

Covers manufactured from rubber or synthetic material as well as aluminium chequered plate can be used.

Technical Data

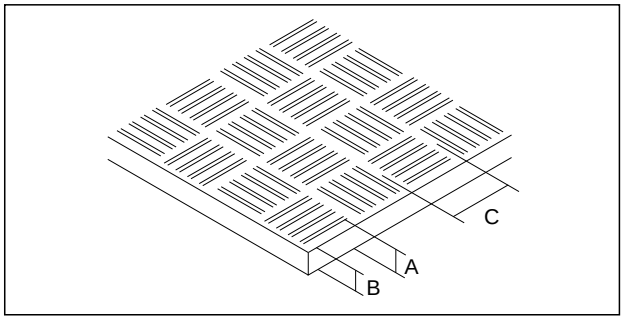
Type Art	ES-KMBW chequered	ES-KMBWO chequered	ES-KMB round studded	ES-KMBO round studded
Material	natural rubber	nitrile rubber	natural rubber	nitrile rubber
Colour	black	black	black	black
Application	normal	oil resistant	normal	oil resistant
Endurance properties				
– Weather	good	sufficient	good	sufficient
– Hydrolysis	very good	very good	very good	very good
– Mineral Oils	bad	very good	bad	very good
– Petrol	bad	good	bad	good
– Solvents	bad	sufficient	bad	sufficient
– Diluted Acids	sufficient	good	sufficient	good
Widths	1190mm	1190mm	1190mm	1190mm
			990mm	
Max. Length	9.9/19.9m	4.95m	4.95m	4.95m
Thickness A	3mm	3mm	2.7mm	2.7mm
Thickness B	2.5mm	2.5mm	2.5mm	2.5mm
Distance C	45mm	45mm	38mm	38mm
Diameter D	–	–	29mm	29mm
Cutting Tolerance	±3mm or max. ±3% (bei 23°C)			
Härte (°Sh-A)	65 ±5	60 ±5	70 ±5	60 ±5
Operating Temperature				
– min.	-20°C	0°C	-20°C	0°C
– max.	+90°C	+90°C	+90°C	+90°C

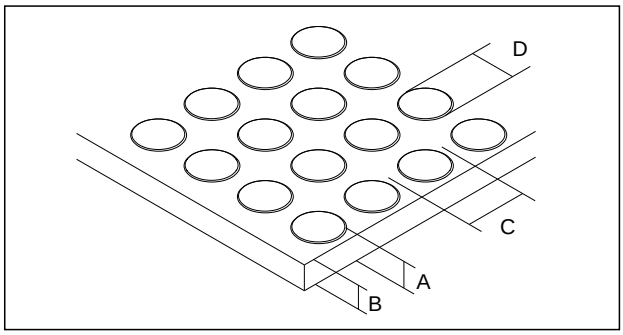
All technical data regarding endurance properties, hardness etc. are greatly dependent on the composition of the material used. All the values stated above are for comparison only and serve only for general information purposes.

Processing

Covers can be processed as follows:
- cut by means of a carpet knife and metal straight-edge
- fix to the contact mat by means of adhesive carpet tape
- ideally criss-crossed with a spacing of approx. 50cm between the tapes.

Attention: When covers are installed next to each other, care should be taken that the joints are correctly mated.





Order Information

Description	Type
Chequered natural rubber	**ES-KMBW1190**
Chequered nitrile rubber	**ES-KMBWO1190**
Round studded natural rubber	**ES-KMB990** **ES-KMB1190**
Round studded nitrile rubber	**ES-KMBO1190**