Safety-Bumper

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TecnelSystem SpA
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Safety-Bumper

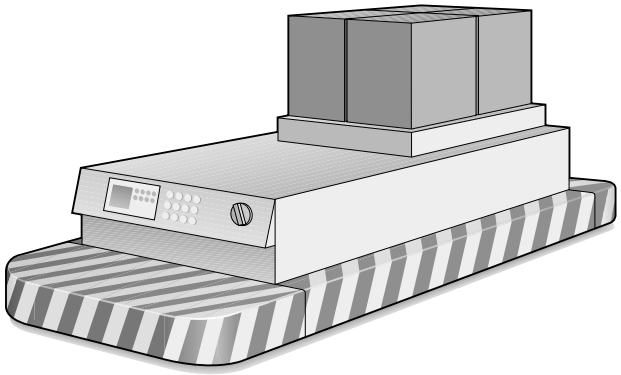
ESB Y-41, -51

- Available in almost every imaginable shape
- Extremely responsive

Safety Bumper

The purpose of Safety Bumpers is the prevention of damage caused by collisions between automatic guided vehicles (AVG's) and persons or objects. This is accomplished

- by immediate braking of the vehicle.
- by a soft collapsible zone on the bumper itself.

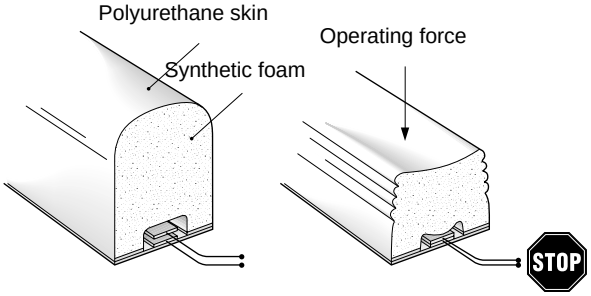


Function

The synthetic foam core is deformed by a light force on the outer bumper skin.

- two separated contact surfaces in the switching element touch each other.
- the built-in resistance falls below the defined value of 8,2kOhm.
- the switching unit evaluates the contact.

The reaction pressure is set ex-works and can not be changed.



Construction

The safety bumper core consists of :

- a synthetic foam block, manufactured to shape and covered.
- switching elements
- base plate

Covering

Generally bumpers are applied in dry environments and have the following characteristics:
- resistant against normal mechanical influences.
- the surface texture is roughly structured.

Selection of Safety Bumpers

Outer Skin	Cable	Termination Resistor	**Type**
PUR weaved	1x	Yes	**ESBY-41**
PUR weaved	2x	No	**ESBY-51**

Colours

Basically the Safety Bumpers are delivered in yellow (RAL 1021). On request Safety Bumpers can be manufactured in other colours as well as striped.

Dimension Details

The dimensions of a Safety Bumper is limited by production facilities, function and weight.
- Maximum Dimensions 2m long, 0,5m wide
- Minimum Dimensions 0.2m long, 0.1m wide
- Larger dimensions require technical clarification.

In order to guarantee the stability of the bumper, the ratio width/height must not exceed 1:2.5

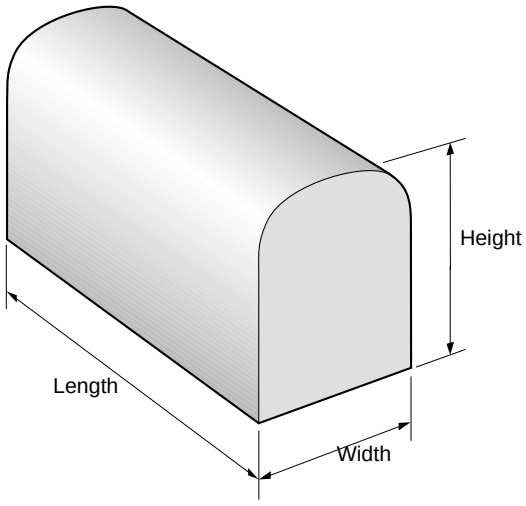


Diagram for the Calculation of Bumper Dimensions

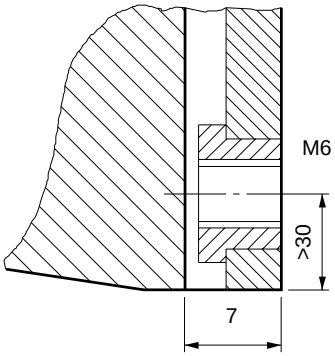
Height (Main activating direction)	
Speed of movement:	v _____m/s
Bumper operating travel:	40mm
Response travel of ES-System:	v x 0,02s_____mm
Response travel AGV-control:	
v x response time of controls	_____mm
Maximum braking distance	s_____mm
Total deformation travel	sG_____
Collapsible zone or	
Total deformation travel	sG_____mm
50% of sG (part which can not be deformed)	_____mm
Ideal total height of bumper	_____mm

Shapes and Construction

Almost any shape can be manufactured. Therefore a pleasing image and the functionality can be considered in the design.

Mounting

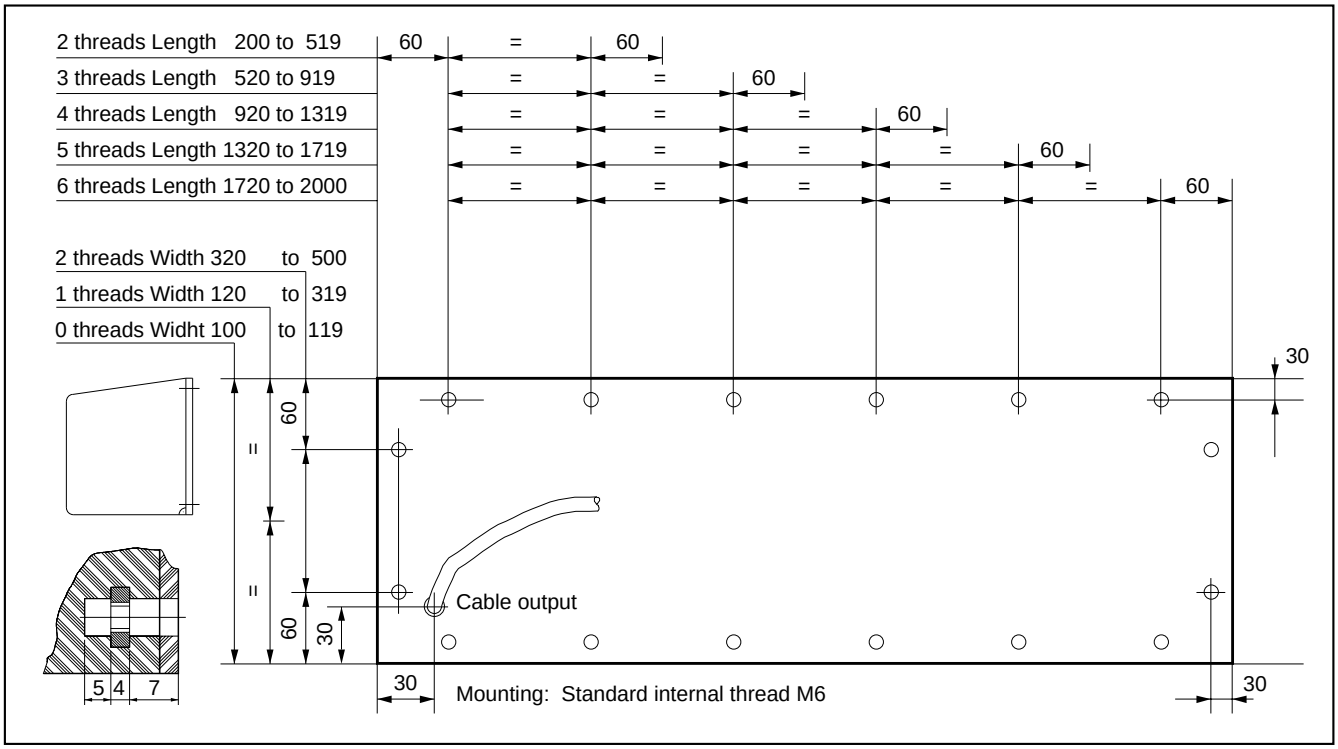
The bumpers can be mounted in the following way:
- M6 screws
- Standard drilling template or to customer requirements
- Other mounting possibilities according to customers wishes



Additional Standard Mountings

The standard mounting can be varied as follows:
- M3, M4, M5 or M8 threads
- Distance from edge (larger or equal) 60mm
- Pitch of holes as required
- Cable output (larger or equal) 30mm as required

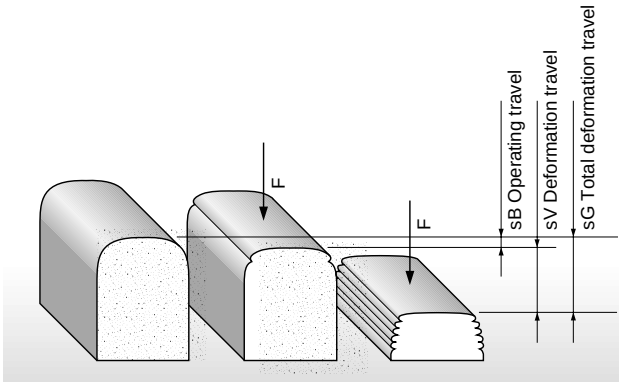
Detailed assembly and operating information can be obtained from the enclosed Assembly and Operating Manual



= means: same distance

Operating Travel/Deformation Travel

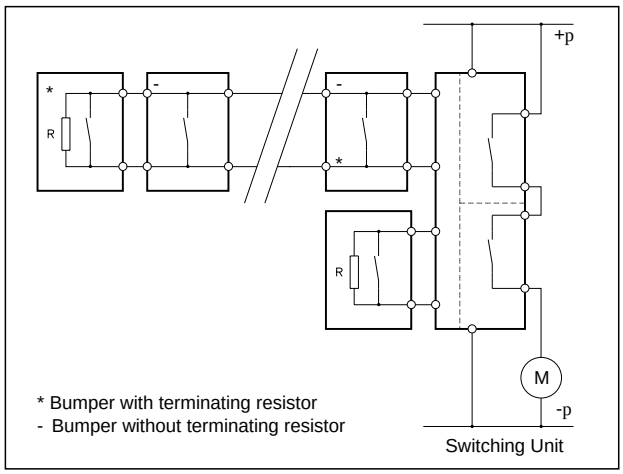
The maximum load required to obtain the total deformation travel, must not exceed 250N.
This is measured with a 80mm diameter test piece.



Connection and Wiring Possibilities

Bumpers contain a switching strip which has a termination resistor of 8.2kOhm.

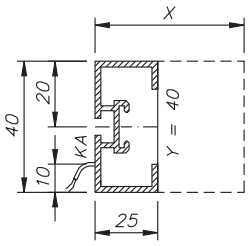
The following is to be observed:
- max. cable length 25m
- cross-sectional area of the cable must not exceed 2x0.25mm



To guarantee a sure evaluation standard
Switching Units with two input channels are used.

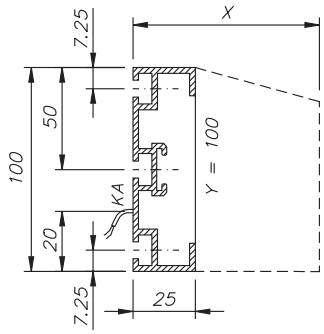
Standard System

Dimensions of aluminium mounting rail



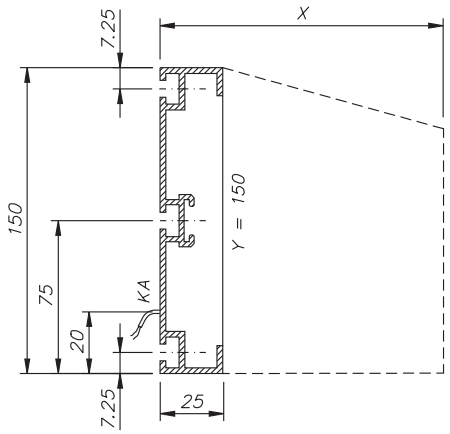
Form: **A**
Rail width: **Y = 40**

Bumper depth available: **X = 100**



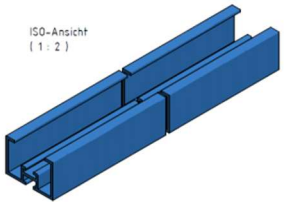
Form: **B**
Rail width: **Y = 100**

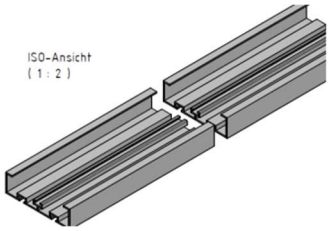
Bumper depth available: **X = 150 - 200 - 250**

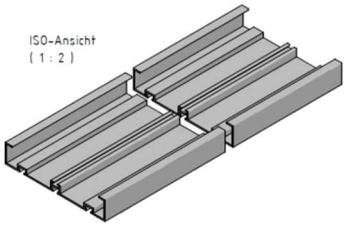


Form: **B**
Rail width: **Y = 150**

Bumper depth available: **X = 300 - 400**





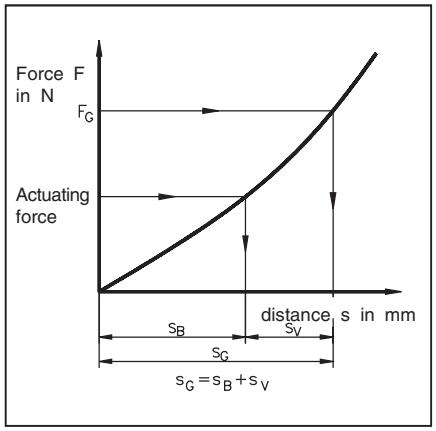


Standard System

Technical Details

Form	Y	X	Actuating force F_G [N]	Reaction distance S_B [mm]	Total deformation up to 250 N S_G [mm]
A	40	120	70	20	80
A	40	150	70	20	100
B	100	100	70	20	50
B	100	200	70	20	80
B	150	250	70	20	100
B	150	300	80	30	120
.					
.					

Example:
Chosen Bumper:
Form B; Y=150, X=300
The contact is triggered at a reaction distance of 30 mm.
90 mm braking distance now remains (at a limit force of 250 N) until the AGV comes to a halt.



The force F_G represents a limit force up to which a sensor deforms and/ or up to which it may continue to be moved.

In this connection it is assumed that no danger will arise for humans while this force is being applied.

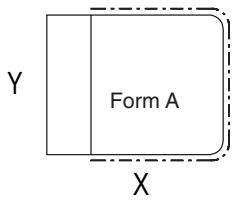
The suggested standard value for an adult is F_G = 250 N.

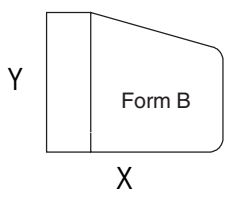
mm tolerances:	± 10 mm
N tolerances:	± 10 N
Test piece:	Ø 80 mm
Test speed:	100 mm/s

Formula for calculating the total deformation distance:

S_V [mm] = overtravel

$$S_G = S_B + S_V$$





Technical Data

Dimensions/Size	Dependent on customer (see Text)
Weight	Dependent on size (0.5x0.2x1.0m = approx. 6 kg)
Materials	
Core	PUR-polyurethane-foam
External Skin	PUR weaved (standard)
Mounting Plate	3 mm thick aluminium
Endurance PUR-Paint	
Weather, ozone	good
Oils, Petrol	good
Solvents	sufficient
Diluted Acids	good
Hydrolysis	sufficient >50°C: not good
Temperature Range	-20°C to +65°C
Switching Elements	actuated >0.5 Ohm nonactuated 8.2 kOhm +/- 10% (ESB-4) >100 kOhm (ESB- 5)
Connecting Cable	2x0.25mm², type «DM» (VDE Li-YY, PVC-grey, Ø4.5mm) normally
Cable Length	2 metres long standard, can be extended in metre lengths
Connecting Plug	according to customers requirements
Composition	>1% share of weight PUR-Foam (Bumper body) PUR-Paint (Bumper skin) Polyethylene Aluminium (Base plate) PVC (Cable cover)

Alterations which serve to improve the product are excluded

Overview ISO 13849

B10d value 2.000.000 cycles

MTTFd level and value depend on application.

Response time depends on the profile.

Subject to technical modifications