
# e-skin® clean-room

## SK | SKS | SKY - cleanroom corrugated tube energy supply systems

**Advantages of the e-skin® series:**

- Available in three versions
- e-skin® SK for longer unsupported lengths
- Compared to the SK series, e-skin® soft SKS has a more elastic material and smaller installation height <200mm
- e-skin® hybrid SKY combines the advantages of e-skin® SK and e-skin® soft SKF
- Corrugated tube consisting of an upper and lower shell that form a complete enclosure when connected together
- Easy filling with "zipper" function
- Special design allows unsupported lengths
- Less installation space required
- Cable-friendly with defined minimum bend radius
- Available with interior separation
- Prevents unintentional sideways movement
- Simple maintenance and inspection of the cables inside
- Protection against dust and water ingress
- Suitable for cleanroom according to IPA cleanroom Class 1

**When to use another energy supply system:**

- For longer unsupported lengths
  - **▶ E6.1 system, page 832**
  - **▶ E6 system, page 870**
- When installation space is limited
- **▶ e-skin® flat SKF, page 798**
- For high exposure to dirt
  - **▶ RX e-tubes, page 516**

Fraunhofer IPA TESTED® DEVICE igus GmbH e-skin RBR (prototype) Report No. IG 1504-755

Fraunhofer IPA TESTED® DEVICE igus GmbH SKS28.068.02.1 e-skin soft + cable Report No. IG 1907-1125

Fraunhofer IPA TESTED® DEVICE igus GmbH SKY28.068.02.1 e-skin hybrid Report No. IG 1907-1125


Attachment from any side: KMA mounting brackets with strain relief

Two-piece corrugated tube: upper and lower shell

Reclosable opening mechanism: easy opening and closing with "zipper" function

**IPA cleanroom Class 1**: virtually no wear or abrasion

Fully enclosed: protection against dust and water ingress

Space-saving: less installation space required

Cable-friendly: with defined minimum bend radius

Strong: prevents unintentional sideways movement

3 versions available: e-skin® SK, SKS and SKY

# SK, SKS and SKY cleanroom corrugated tube energy supply systems

The e-skin® is a hose consisting of an upper and lower shell that form a sealed tube when connected to each other. It consists of polymer material igumid SK developed specifically for this. The simple and reclosable opening mechanism enables easy maintenance and inspection of the installed cables. Operating temperature +10°C / +50°C. e-skin® has many advantages over conventional corrugated tubes and it is available in 3 different versions:

- e-skin® SK for longer unsupported lengths
- e-skin® soft SKS with more elastic material and lower installation height
- e-skin® hybrid SKY combines the advantages of e-skin® SK and e-skin® soft SKF
- 15% higher fill weight (based on the latest test results for e-skin® SK40 series done in the igus® laboratory)
- 50% more unsupported length (based on the latest test results for the e-skin® SK 40 series done in the igus® laboratory)
- Bend radii from 55mm up to 100mm
- IPA cleanroom Class 1
- 5dB(A) quieter than usual "clean cable"
- Interior separation system consisting of "tribo-optimised" iglidur® material – to further minimise abrasion between the cables

**Typical industries and applications**

● Cleanroom ● Fast, short, unsupported applications ● Standing or hanging applications ● Display and semiconductor production ● Pick & place applications ● Printers ● Medical technology ● Any machine where corrugated tubes are used



More information ▶ www.igus.eu/eskin



| Series<br>Part No. | Inner height<br>*hi* [mm] | Inner width<br>*Bi* [mm] | Outer width<br>*Ba* [mm] | Outer height<br>*ha* [mm] | Bend radius<br>*R min.** [mm] | Unsupported<br>length ≤ [m] | Page |
|---|---|---|---|---|---|---|---|
|  **e-skin® SK - two-piece corrugated tube** for longer unsupported lengths | | | | | | | |
| **SK28** | 28 | 68 | 95 | 40 | 055 | 1.1 | **822** |
| **SK40** | 38 | 85 | 118 | 57 | 100 | 2.0 | **822** |
|  **e-skin® soft SKS - two-piece corrugated tube** with more elastic material and lower clearance height | | | | | | | |
| **SKS20** New* | 20 | 33 | 50 | 25 | 055 | 0.6 | **823** |
| **SKS28** New* | 28 | 68 | 95 | 40 | 055 | 0.7 | **823** |
| **SKS40** New* | 38 | 85 | 118 | 57 | 100 | 1.3 | **823** |
|  **e-skin® hybrid SKY - two-piece corrugated tube** combines the advantages of e-skin® SK and e-skin® soft SKS | | | | | | | |
| **SKY28** New* | 28 | 68 | 95 | 40 | 055 | 0.9 | **824** |
| **SKY40** New* | 38 | 85 | 118 | 57 | 100 | 1.4 | **824** |

*__Note__: the minimum bend radius is determined by the inner side corrugated tube!

*New in this catalogue

**Available from stock.** Ready to ship in 72hrs.*

*Average time before the ordered goods are dispatched.

**Further information about igus® cleanroom e-chains® and the new, unique igus® cleanroom laboratory for IPA cleanroom Class 1 components ▶ From page 144**

**IPA Qualification Certificate - Report IG 1907-1125:**
Tested was e-skin® 0.SK28.068.02.1 (prototype) at $v_1$ = 0.5m/s, $v_2$ = 1m/s and $v_3$ = 2m/s or $a_1$ = 1m/s², $a_2$ = 2m/s², $a_3$ = 4m/s²

**IPA Qualification Certificate - Report IG 1907-1125:**
Tested was e-skin® SKS28.068.02.1 including cables at $v_1$ = 0.5m/s, $v_2$ = 1m/s and $v_3$ = 2m/s or $a_1$ = 1m/s², $a_2$ = 2m/s², $a_3$ = 4m/s²

**IPA Qualification Certificate - Report IG 1907-1125:**
Tested was e-skin® SKY28.068.02.1 at $v_1$ = 0.5m/s, $v_2$ = 1m/s and $v_3$ = 2m/s or $a_1$ = 1m/s², $a_2$ = 2m/s², $a_3$ = 4m/s²

# e-skin® | SK | SKS | SKY | System comparison

## The modularity of e-skin® enables flexible adjustment to your requirements

**System comparison of cleanroom e-skin® energy supply systems from igus® with relative specifications of the distinguishing parameters**

| Parameters | e-skin® SK | e-skin® soft SKS | e-skin® hybrid SKY |
|---|---|---|---|
| Diagrams of e-skin® coloured here for demonstration purposes |  |  |  |
| Required clearance height | 100% | 67% | 87% |
| Fill weight | 100% | 70% | 85% |
| Unsupported length | 100% | 60% | 81% |
| Price | 88% | 100% | 95% |
| Price compared to commercially available "Clean Cable" | 65% | 65% | 65% |
| DIN EN ISO Class 1 | Fraunhofer IPA TESTED DEVICE | Fraunhofer IPA TESTED DEVICE | Fraunhofer IPA TESTED DEVICE |
| Openable version | Yes | Yes | Yes |
| Enclosed version | Yes | Yes | Yes |
| Operating noise | 33dB(A) | 32dB(A) | 33dB(A) |
| Quieter than usual "clean cables" | 5dB(A) | 6dB(A) | 5dB(A) |
| Page number | ▶ Page 822 | ▶ Page 823 | ▶ Page 824 |

clean-room **Further information about igus® cleanroom e-chains® and the new, unique igus® cleanroom laboratory for IPA cleanroom Class 1 components ▶ From page 144**

In the igus® laboratory, e-skin® withstood more than 10 million double strokes at 3m/s (issue 12/2020)

The standard bending tests show how flexible the e-skin® soft is. It only bends, even under loads that would break other energy chains

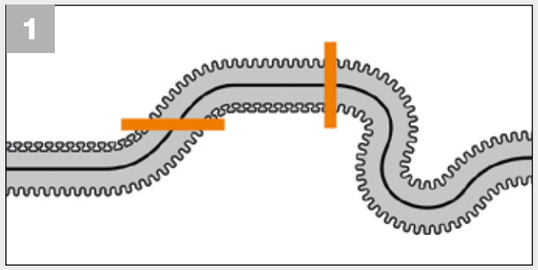


# e-skin® | SK | SKS | SKY | Tests in the technical centre, Cologne

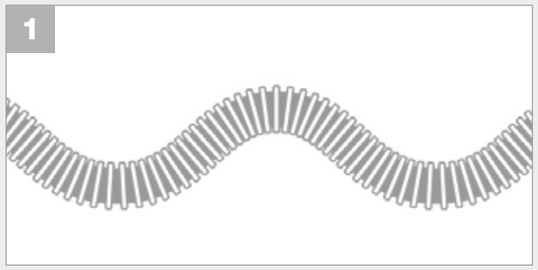
## In the new igus® cleanroom laboratory according to IPA certification


igus® cleanroom laboratory according to IPA certification ISO Class 1 in accordance with EN ISO 14644-1 in the igus® technical centre, Cologne. Cleanroom compatibility of chain applications can be tested quickly to your requirements.

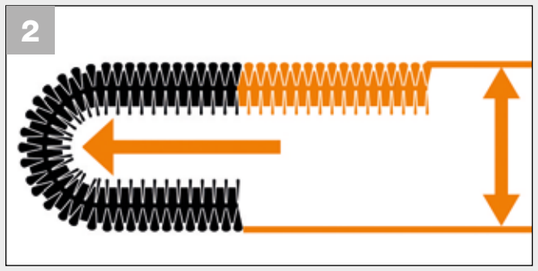
Service life test in the 3,800m² igus® laboratory in Cologne (Germany)



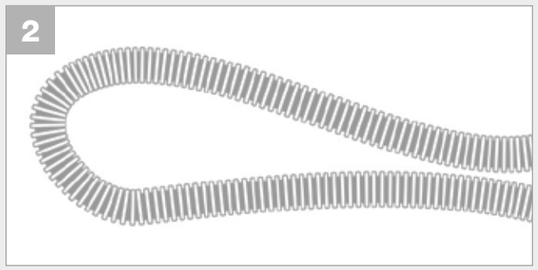

e-skin® consists of two shells (upper and lower). The shells can be configured in order to define specific movements



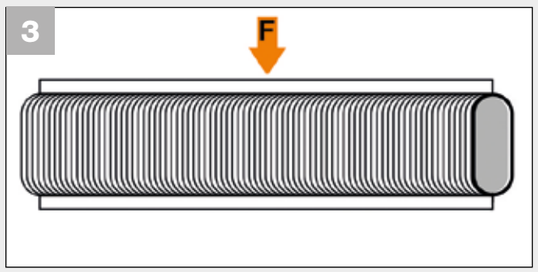

Conventional corrugated tubes have the same bend radius along their entire length



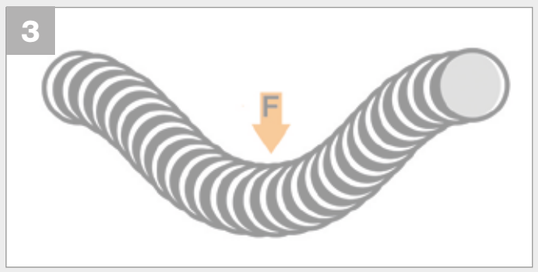

e-skin® is suitable for short unsupported lengths




Conventional corrugated tubes cannot be used for unsupported applications

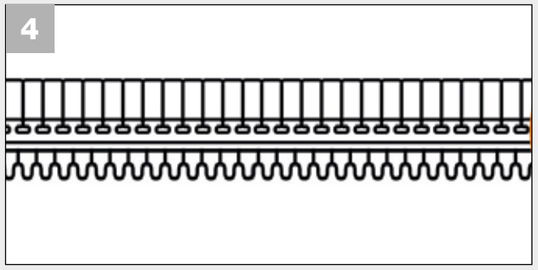



Lateral stability thanks to an oval geometry of the e-skin®

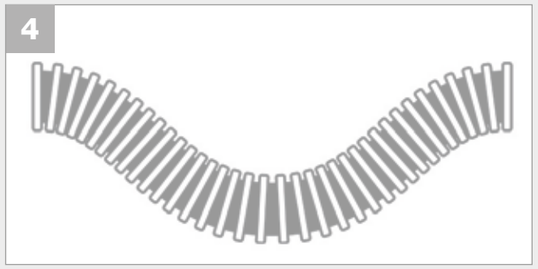



Very little any stability in respect of forces acting on the sides

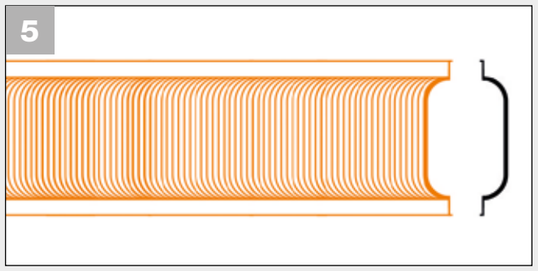
**e-skin®** | **SK** | **SKS** | **SKY** | Comparison with conventional products



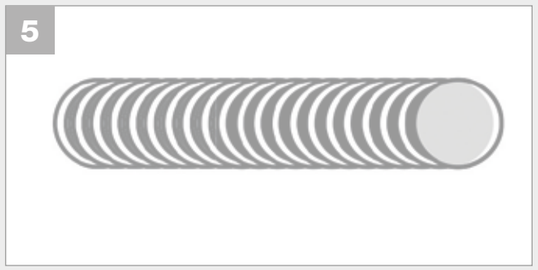

e-skin® supports itself



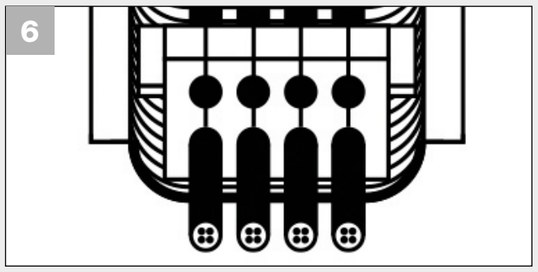

Conventional corrugated tubes have very little or any inherent rigidity. e-rib solves this ► **www.igus.eu/e-rib**



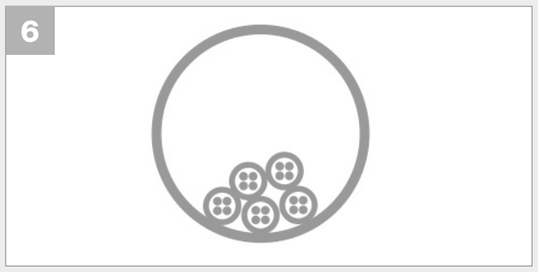

e-skin® is openable, easy to fill




Conventional corrugated tubes (for dynamic applications) cannot be opened




e-skin® can be fitted with interior separation and strain relief




No interior separation possible

## Technical data

| | |
|---|---|
| Speed $FL_G$ / acceleration $FL_G$ | ≤ 10 [m/s] / ≤ 75 [m/s²] |
| **SK** energy supply system, igumer S material - permitted temperature °C | +10°C up to +50° |
| **SKS** energy supply system, igumer SKS material - permitted temperature °C | +10°C up to +50° |
| **SKY** energy supply system, the material is a combination of igumer SK (upper shell) and igumer SKS (lower shell) - permitted temperature °C | +10°C up to +50° |
| Mounting bracket, igumid NB material - permitted temperature °C | +10°C up to +50° |
| Flammability class | UL94-HB |

$FL_G$ = unsupported with straight upper run

## Installation types, maximum travels

| Series | Unsupported | Vertical hanging | Vertical standing | Side mounted unsupported |
|---|---|---|---|---|
| SK28 | ≤ 2.20m | upon request | upon request | upon request |
| SK40 | ≤ 4.00m | upon request | upon request | upon request |
| SKS20 | ≤ 1.20m | upon request | upon request | upon request |
| SKS28 | ≤ 1.40m | upon request | upon request | upon request |
| SKS40 | ≤ 2.60m | upon request | upon request | upon request |
| SKY28 | ≤ 1.80m | upon request | upon request | upon request |
| SKY40 | ≤ 2.80m | upon request | upon request | upon request |







## Options with order keys | Examples based on series SK28

| | *Standard* | *Reverse Bend Radius* |
|---|---|---|
| Part No. | Standard | *RBR* |
| | | A version with Reverse Bend Radius (RBR) can be easily made by using the bottom shell for the complete e-skin®. Thus very defined movements can be implemented with the two parts. Note: the minimum bend radius is determined by the inner side corrugated tube! |
| | SK28.068.02.1 | SK28.068.02.*RBR*.1 |
| | Ready to ship in 72hrs.* | Ready to ship in 72hrs.* |

*Average time before the ordered goods are dispatched.

## Order example | Order key and colour examples | Examples based on series SK28

**Order example for complete energy supply system (1m), colour white, with mounting brackets and interior separation:**

| | | |
|---|---|---|
| **Energy supply system** (1,000mm) | Please order the required length in mm | SKS28.068.02.1 |
| **+ Mounting brackets** | KMA 1 set (with tiewrap plates) | SK280.068.12ZB.1 |
| **Interior separation** | Fitted every 112mm | SKS28.1.1.01 |
| **Order text:** | 1,000mm SKS28.068.02.1 + SK280.068.12ZB.1 + 16 x SKS28.1.1.01 | |

### Order key

Oval design — SK28.068.02.1
- Series / Type
- Inner height
- Width index
- Version
- Colour index (standard white)

### Order index

| Colour | | Order index |
|---|---|---|
| **White** | Standard | **.1** |

White e-skin® ready to ship in 72hrs.*

# e-skin® | Series SK | Product range

**15% higher fill weight and 50% longer unsupported length** [1]

28-38


## Series SK | Two-piece corrugated tube | With "zipper" opening principle

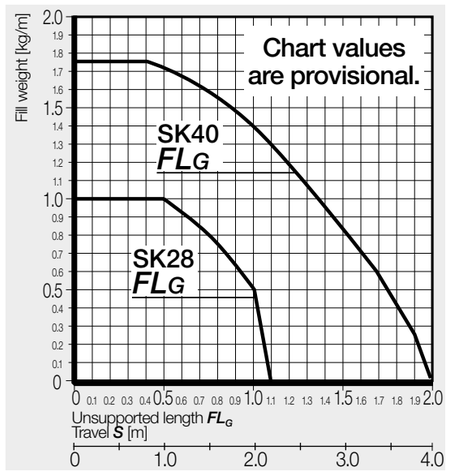
| Part No. | Bi | Ba | hi | ha | R min.* | Cable ⌀ | $H_F$ | Weight |
|---|---|---|---|---|---|---|---|---|
| SK | [mm] | [mm] | [mm] | [mm] | [mm] | ≤ Ø [mm] | [mm] | [kg/m] |
| SK28.068.02.1 | 68 | 95 | 28 | 40 | 055 | 20 | 265 [2] | ≈ 0.54 |
| SK40.085.02.1 | 85 | 118 | 38 | 57 | 100 | 30 | 450 [2] | ≈ 1.15 |

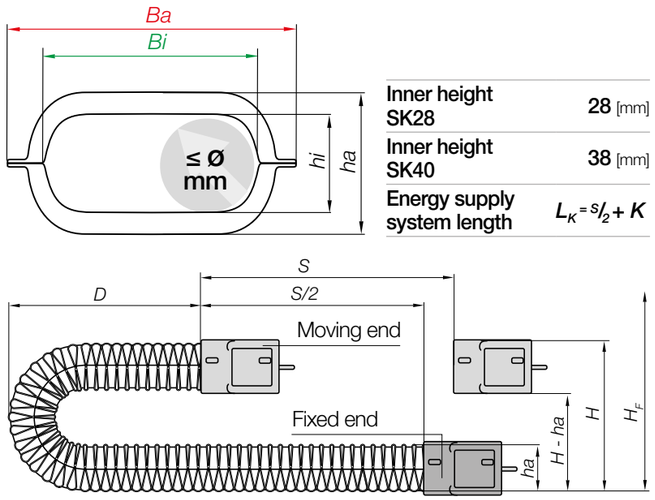
1) Based on the latest test results for e-skin® SK40 series done in the igus® laboratory

2) Required clearance height $H_F$ with 0.75kg/m fill weight

*__Note__: the minimum bend radius is determined by the inner side corrugated tube!

## Installation dimensions




| | |
|---|---|
| Inner height SK28 | 28 [mm] |
| Inner height SK40 | 38 [mm] |
| Energy supply system length | $L_K = S/2 + K$ |

| R min.* | SK28 R 055 | SK40 R 100 |
|---|---|---|
| H | 250 | 350 |
| D | 160 | 300 |
| K | 399 | 693 |

***Note:** the minimum bend radius is determined by the inner side corrugated tube!
No bend radius is specified in the part number, since it depends on travel and fill weight. The smallest specified radius below is the minimum to guarantee the service life of the cables. In most applications, however, the radius remains larger because the shape of the tube defines this.





# e-skin® soft | Series SKS | Product range

**32% less clearance height than e-skin® SK28** [1]

20-38


## Series SKS | Two-piece corrugated tube | With "zipper" opening principle

| Part No. | Bi | Ba | hi | ha | R min.* | Cable ⌀ | $H_F$ | Weight |
|---|---|---|---|---|---|---|---|---|
| SKS | [mm] | [mm] | [mm] | [mm] | [mm] | ≤ Ø [mm] | [mm] | [kg/m] |
| SKS20.033.02.1 | 33 | 50 | 20 | 25 | 055 | 13 | 160 [2]** / 200 [2]** | ≈ 0.20 |
| SKS28.068.02.1 | 68 | 95 | 28 | 40 | 055 | 20 | 200 [4] | ≈ 0.54 |
| SKS40.085.02.1 | 85 | 118 | 38 | 57 | 100 | 30 | 350 [4] | ≈ 1.15 |

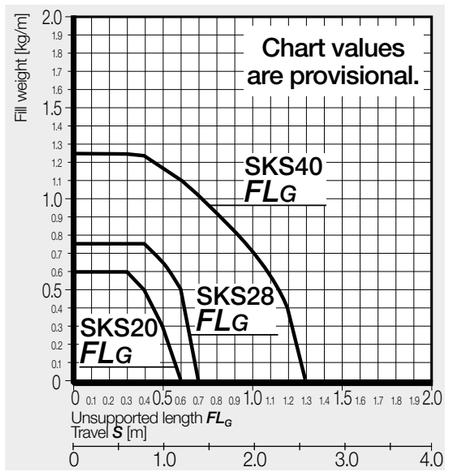
1) 32% lower clearance height than e-skin® SK28 (based on the latest test results done in the igus® laboratory)

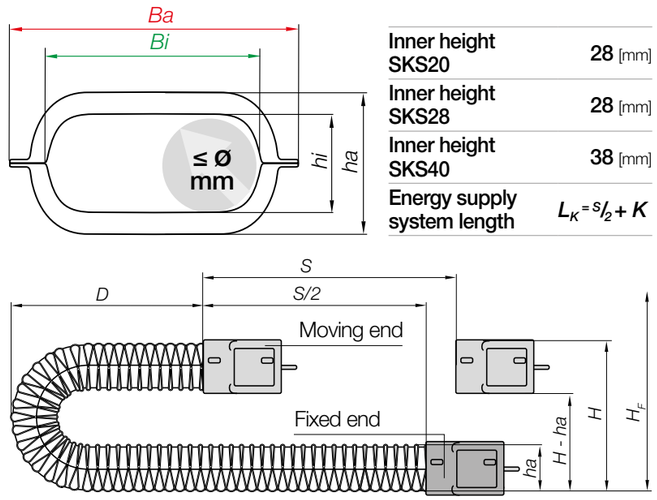
4) Required clearance height $H_F$ with 0.75kg/m fill weight / 2) Required clearance height $H_F$ with 0.50kg/m fill weight

**$H_F$: 160mm with $S$ < 200m / $H_F$: 200mm with $S$ > 200m

***Note:** the minimum bend radius is determined by the inner side corrugated tube!

## Installation dimensions




| | |
|---|---|
| Inner height SKS20 | 28 [mm] |
| Inner height SKS28 | 28 [mm] |
| Inner height SKS40 | 38 [mm] |
| Energy supply system length | $L_K = S/2 + K$ |

| R min.* | SKS20 R 055 | SKS28 R 055 | SKS40 R 100 |
|---|---|---|---|
| H | 150 | 150 | 300 |
| D | 125 | 130 | 300 |
| K | 300 | 266 | 693 |

***Note:** the minimum bend radius is determined by the inner side corrugated tube!
No bend radius is specified in the part number, since it depends on travel and fill weight. The smallest specified radius below is the minimum to guarantee the service life of the cables. In most applications, however, the radius remains larger because the shape of the tube defines this.

# e-skin® hybrid | Series SKY | Product range

28-38

## 13% lower clearance height and 28% longer unsupported length [1]


## Series SKY | Two-piece corrugated tube | With "zipper" opening principle

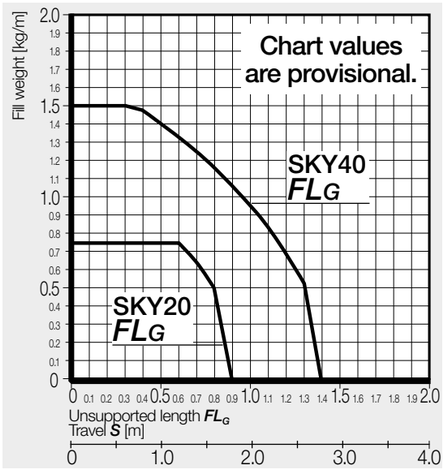
| Part No. | *Bi* | *Ba* | *hi* | *ha* | *R min.** | Cable ⌀ | $H_F$ | Weight |
|---|---|---|---|---|---|---|---|---|
| SKY | [mm] | [mm] | [mm] | [mm] | [mm] | ≤ Ø [mm] | [mm] | [kg/m] |
| SKY28.068.02.1 | 68 | 95 | 28 | 40 | 055 | 20 | 230 [2] | ≈ 0.54 |
| SKY40.085.02.1 | 85 | 118 | 38 | 57 | 100 | 30 | 400 [2] | ≈ 1.15 |

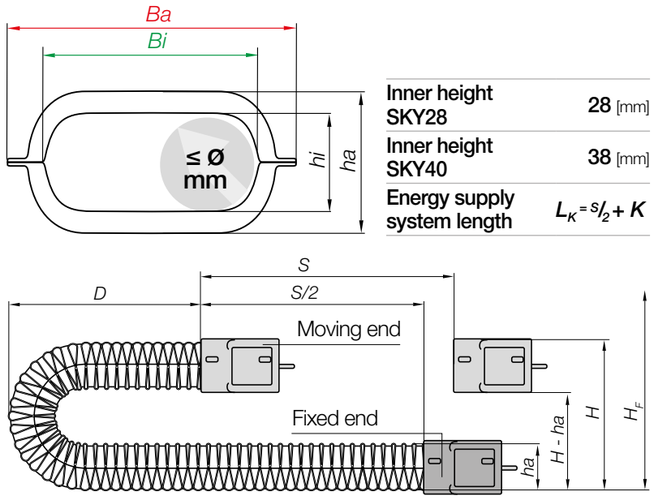
1) 13% lower clearance height than e-skin® SK28 und 28% longer unsupported length than SKS28 (based on the latest test results one in the igus® laboratory)

2) Required clearance height $H_F$ with 0.75kg/m fill weight

*__Note__: the minimum bend radius is determined by the inner side corrugated tube!

## Installation dimensions




| | |
|---|---|
| Inner height SKY28 | 28 [mm] |
| Inner height SKY40 | 38 [mm] |
| Energy supply system length | $L_K = S/2 + K$ |

| *R min.** | SKY28 *R* 055 | SKY40 *R* 100 |
|---|---|---|
| *H* | 200 | 325 |
| *D* | 160 | 300 |
| *K* | 322 | 693 |

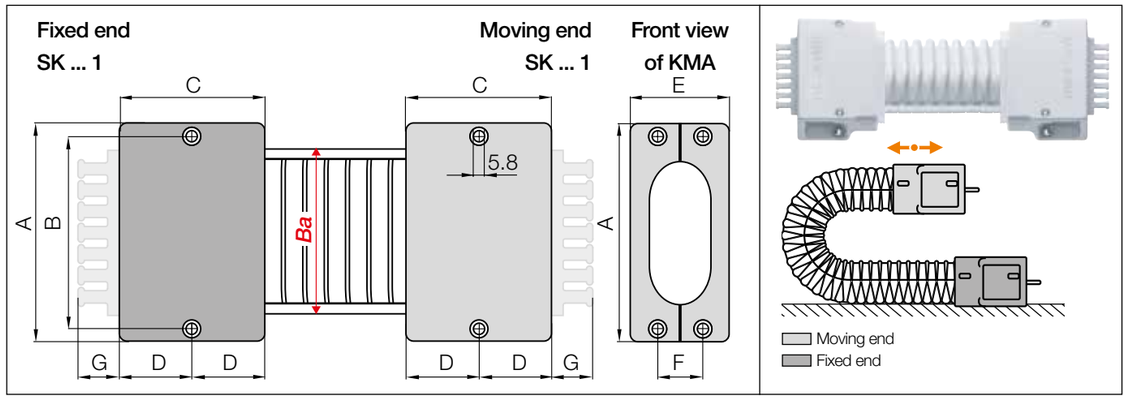
***Note: the minimum bend radius is determined by the inner side corrugated tube!**
No bend radius is specified in the part number, since it depends on travel and fill weight. The smallest specified radius below is the minimum to guarantee the service life of the cables. In most applications, however, the radius remains larger because the shape of the tube defines this.





# e-skin® | SK | SKS | SKY | Accessories

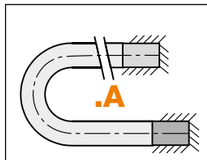
## KMA mounting brackets | Attachment from any side




## KMA | Recommended for unsupported, vertical hanging, standing applications

| Width index | Part No. full set without tiewrap plates | Part No. full set with tiewrap plates | A [mm] | B [mm] | C [mm] | D [mm] | E [mm] | F [mm] | G [mm] | Number of teeth |
|---|---|---|---|---|---|---|---|---|---|---|
| 033. | SK200.033.12.1 | SK200.033.12ZB.1 | 53 | 44 | 32 | 7 | 28 | – | 5 | 3 |
| 068. | SK280.068.12.1 | SK280.068.12ZB.1 | 104 | 92 | 68 | 35 | 46 | 21 | 18 | 7 |
| 085. | SK400.085.12.1 | SK400.085.12ZB.1 | 125 | 113 | 68 | 35 | 66 | 41 | 18 | 10 |

(KMA = polymer metal mounting bracket)

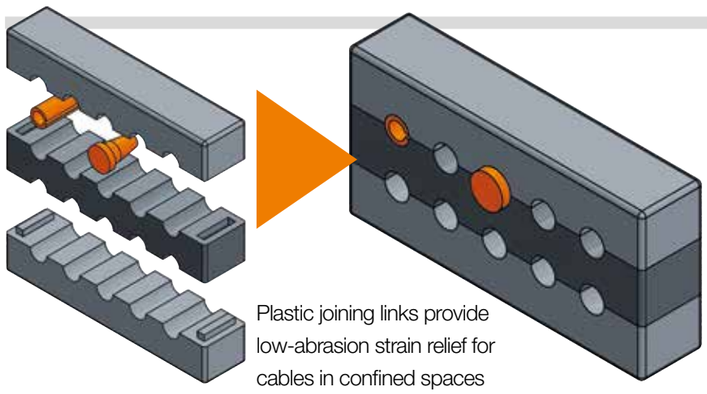



The bracket orientations are set automatically when using an igus® KMA mounting bracket with attachment from any side. To receive a KMA mounting bracket pre-fitted please add index **.A.**

**SK280.068.12ZB.1.A Order example**

- Pre-assembled
- Colour index
- With integrated strain relief tiewrap plates
- Full set
- Width index
- Series

**Strain relief e.g. clamps, tiewrap plates, nuggets and clips are available from stock. The complete chainfix range with ordering options ▶ From page 1392**

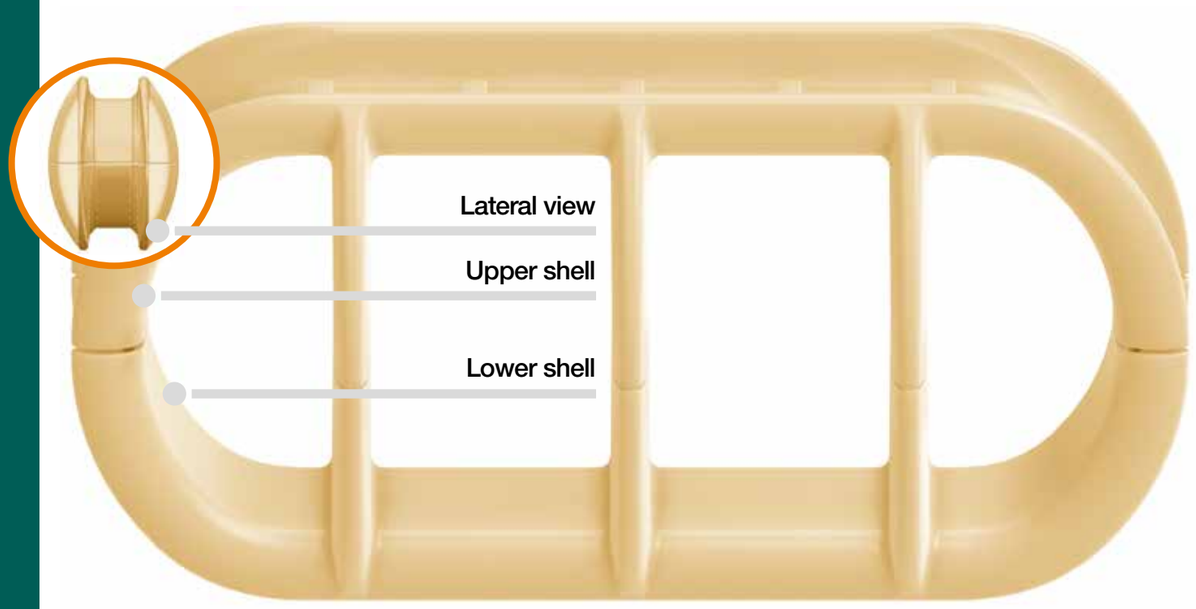


Plastic joining links provide low-abrasion strain relief for cables in confined spaces

Closed clamping block strain relief available upon request

# e-skin® | SK | SKS | SKY | Accessories

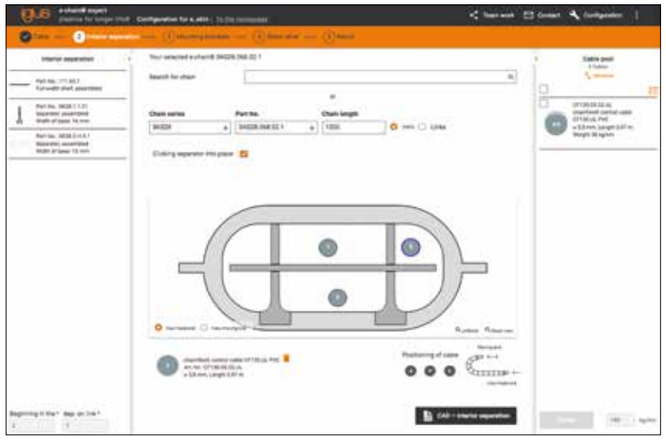
## Interior separation | Smooth, round interior separation, iglidur® J material New




### The new ring-shaped interior separation for minimum abrasion in the e-skin® energy supply system - easy to install, wear-optimised, iglidur J material

The wear-optimised interior separation of the igus® e-skin® consists of two upper and lower shells on which separators are already injection-moulded and which can be combined with shelves. In order to keep the abrasion between cables and e-skin® to a minimum, we rely on our tried-and-tested iglidur® J tribo-polymer.

**More information about iglidur® J material data**
**▶ www.igus.eu/info/iglidur-j-material-data**



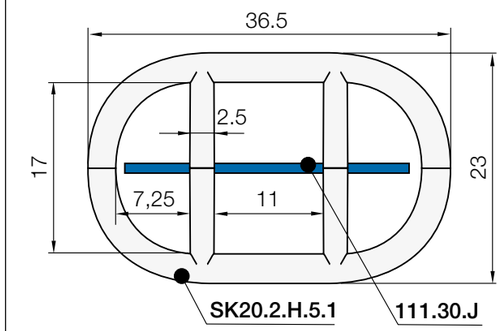
e-skin® energy supply system ...
designed in minutes
**▶ www.igus.eu/eskin-quickfill**



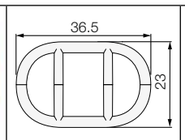


# e-skin® | SK20 | SKS20 | SKY20 | Accessories

## Interior separation | Smooth, round interior separation



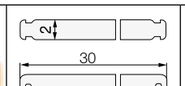

**For inner height *hi* 40 mm. The wear-optimised, ring-shaped interior separation is installed every 115 mm at the connecting points!**




| Smooth, round interior separation | |
|---|---|
| unassembled | SK20.2.H.5 |
| assembled | SK20.2.H.5.1 |

### Ring-shaped, wear-optimised

Upper an lower shells on which separators are already injection moulded can be combined with full-width shelves.




| Full-width shelf, continuous | |
|---|---|
| unassembled | 110.30.J |
| assembled | 111.30.J |

### Full-width shelves

This option is for applications with many small cables with similar diameters. The full-width shelves are simply clamped between them.

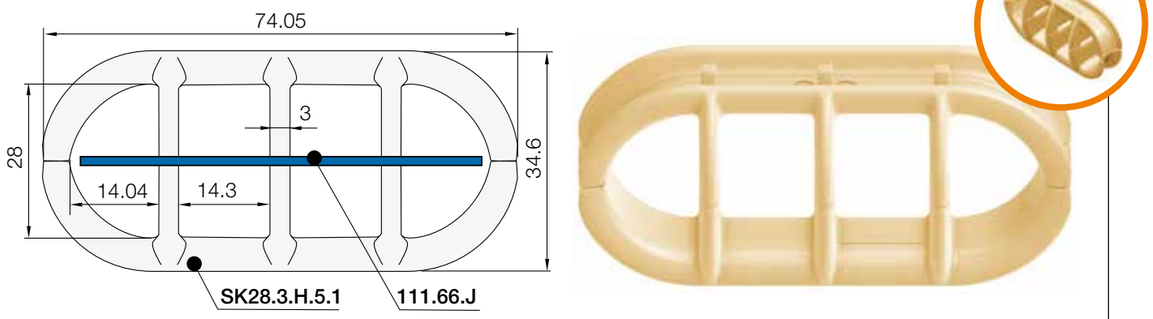
## Fast opening and closing of the e-skin®

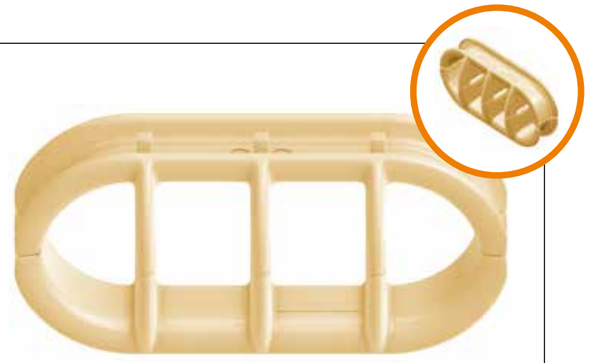
- **The tool for closing the e-skin® energy supply system part number MT.SK.914.868 - further information ▶ upon request**
- Cost-effective, handy and fits in every pocket: the proven tool for opening and closing the e-skin® energy supply system part number **MT.SK.02.1 - further information ▶ upon request**

Tool part number
MT.SK.914.868
shown here

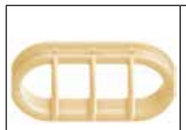
# e-skin® | SK28 | SKS28 | SKY28 | Accessories

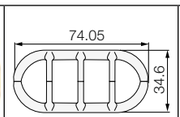
## Interior separation | Smooth, round interior separation, iglidur® J material New



For inner height *hi* 40 mm. The wear-optimised, ring-shaped interior separation is installed every 112 mm at the connecting points!

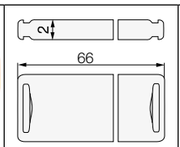





| Smooth, round interior separation | |
|---|---|
| unassembled | SK28.3.H.5 |
| assembled | SK28.3.H.5.1 |

### Ring-shaped, wear-optimised

Upper an lower shells on which separators are already injection moulded can be combined with full-width shelves.




| Full-width shelf, continuous | |
|---|---|
| unassembled | 110.66.J |
| assembled | 111.66.J |

### Full-width shelves

This option is for applications with many small cables with similar diameters. The full-width shelves are simply clamped between them.

## Fast opening and closing of the e-skin®

- **The tool for closing the e-skin® energy supply system part number MT.SK.914.868 - further information ▶ upon request**
- Cost-effective, handy and fits in every pocket: the proven tool for opening and closing the e-skin® energy supply system part number **MT.SK.02.1 - further information ▶ upon request**

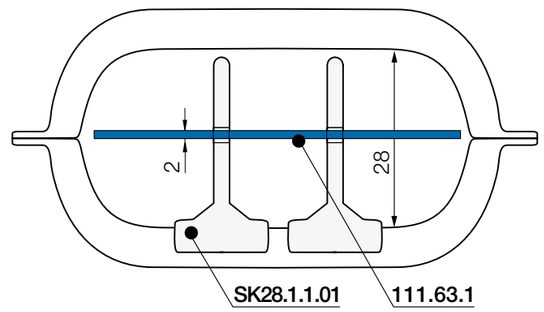
Tool part number
MT.SK.914.868
shown here



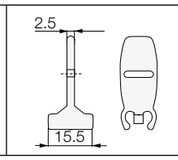


# e-skin® | SK28 | SKS28 | SKY28 | Accessories

## Interior separation | Conventional with single elements



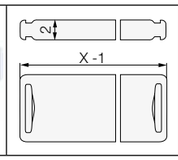

With conventional interior separation with individual elements, the separators are fitted every 112 mm at the connection points!




| Slotted separator | |
|---|---|
| unassembled | SK28.1.01 |
| assembled | SK28.1.1.01 |

### Vertical separation - slotted separators

The interior separation* system for the igus® e-skin® consists of individual separators and full-width shelves, which can be fitted in a variety of ways.




| Full-width shelf, continuous | |
|---|---|
| unassembled | 110.63.1 |
| assembled | 111.63.1 |

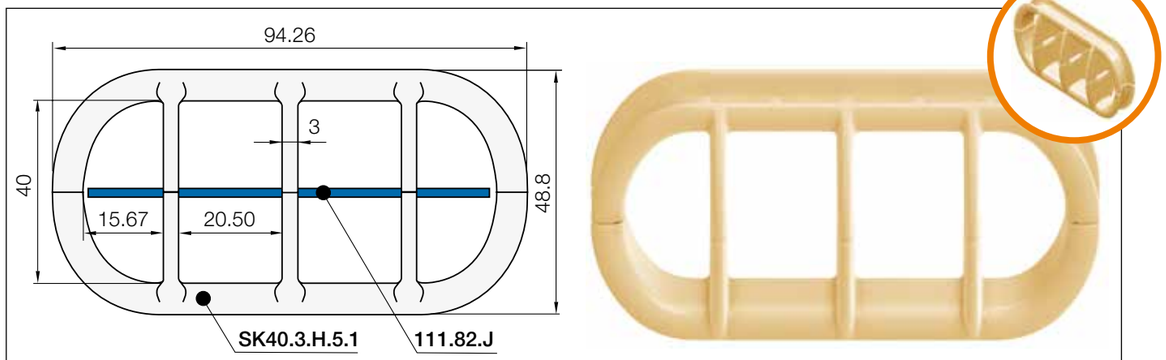
### Full-width shelves

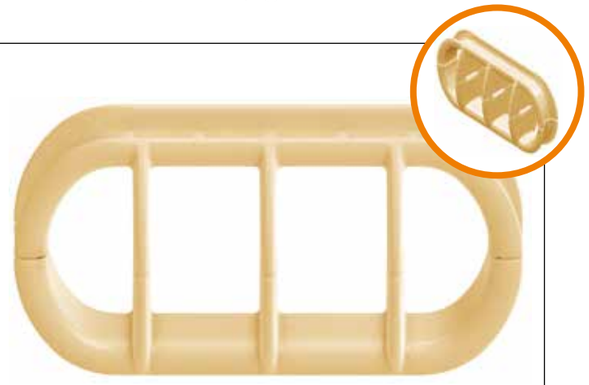
This option is for applications with many small cables with similar diameters. For full-width separation.

Absolutely dust-free environment for printed-circuit-board production using the abrasion-resistant e-skin® from igus®

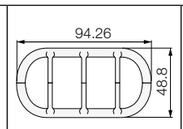
# e-skin® | SK40 | SKS40 | SKY40 | Accessories

## Interior separation | Smooth, round interior separation, iglidur® J material New



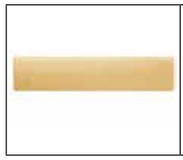
For inner height *hi* 40 mm. The wear-optimised, ring-shaped interior separation is installed every 112 mm at the connecting points!

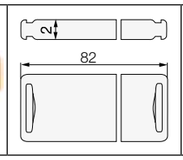



| Smooth, round interior separation | |
|---|---|
| unassembled | SK40.3.H.5 |
| assembled | SK40.3.H.5.1 |

### Ring-shaped, wear-optimised

Upper an lower shells on which separators are already injection moulded can be combined with full-width shelves.






| Full-width shelf, continuous | |
|---|---|
| unassembled | 110.82.J |
| assembled | 111.82.J |

### Full-width shelves

This option is for applications with many small cables with similar diameters. The full-width shelves are simply clamped between them.

## Fast opening and closing of the e-skin®

- **The tool for closing the e-skin® energy supply system part number MT.SK.914.868 - further information ▶ upon request**
- Cost-effective, handy and fits in every pocket: the proven tool for opening and closing the e-skin® energy supply system part number **MT.SK.02.1 - further information ▶ upon request**

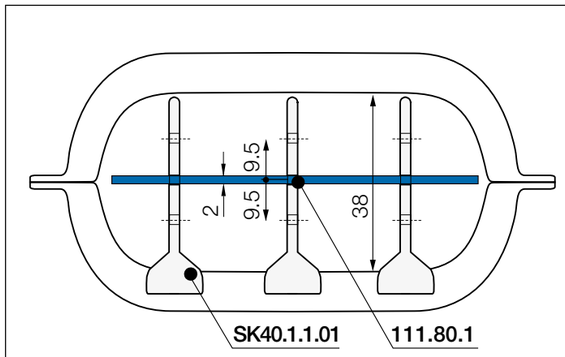
Tool part number
MT.SK.914.868
shown here



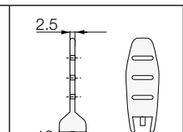


# e-skin® | SK40 | SKS40 | SKY40 | Accessories

## Interior separation | Conventional with single elements



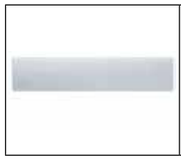

With conventional interior separation with individual elements, the separators are fitted every 112 mm at the connection points!

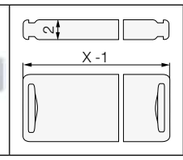



| Slotted separator | |
|---|---|
| unassembled | SK40.1.01 |
| assembled | SK40.1.1.01 |

### Vertical separation - slotted separators

The interior separation* system for the igus® e-skin® consists of individual separators and full-width shelves, which can be fitted in a variety of ways.

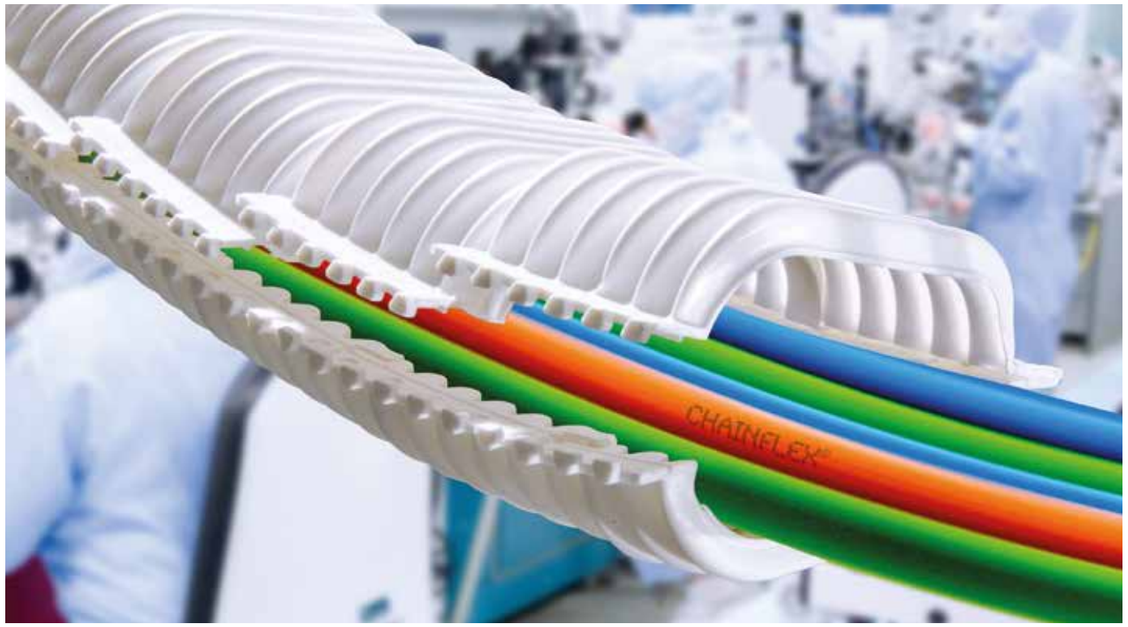





| Full-width shelf, continuous | |
|---|---|
| unassembled | 110.80.1 |
| assembled | 111.80.1 |

### Full-width shelves

This option is for applications with many small cables with similar diameters. For full-width separation.




The igus® e-skin® energy supply system can be used for short unsupported lengths in cleanrooms