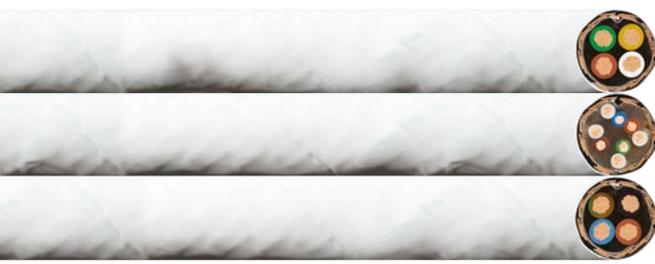


cleanroom



... igus cleanroom technology

...clean...



...igus.eu/cleanroom

plastics.

...motion plastics... igus.eu

Clean for cleanroom ... with igus® clean plastics

In display robots or pick-and-place applications, in semiconductor manufacturing and microelectronics, igus® offers components for any cleanroom that bring Tech Up and Cost Down.

In cleanrooms, moving component abrasion must be especially low, as any contamination is harmful to products and processes. This costs money. We develop and test our high-performance polymer products in our own cleanroom laboratory with the greatest care, and in order to show that our products are ideal for use in cleanrooms, we have the Fraunhofer Institute subject them to further tests. This gives us an IPA-tested product portfolio with the best possible cleanroom classification (ISO Class 1).

**REINER!
2021**

Fraunhofer Excellence Prize

2021 "Reiner!" award for pioneering developments in clean technology. The IPA Fraunhofer Institute awards this prize for outstanding innovations in clean technology.
www.ipa.fraunhofer.de/en.html

"The e-skin® flat cable guide system in combination with chainflex® CFCLEAN contributes to higher production output."

Rainer Rössel,
Vice President igus®

"The market demands openable energy supply solutions for cleanrooms."

Peter Mattonet,
igus® Product manager

Contents

Cleanroom: figures, data, facts	4
igus® clean plastics in testing	6
igus® clean plastics in manufacturing	7
igus® history of cleanroom technology	8
Cleanroom energy supply systems –	10
e-skin® flat with chainflex® CFCLEAN	
Cleanroom corrugated tube – e-skin®	14
Cleanroom system – E6.CLEAN e-chain®	16
chainflex® cables	18
Selection matrix for energy supplies	20
igus® test laboratory	22
igus® headquarters in Cologne	24
Practical examples	26
Cleanroom motion plastics®	28
drylin® linear guides, dry-tech®	
and 3D printed components	
igus® cleanroom technology online	31

Cleanroom classes according to DIN EN ISO 14644-1

Class	Particles per m³					
	≥0.1 µm	≥0.2 µm	≥0.3 µm	≥0.5 µm	≥1.0 µm	≥5.0 µm
ISO 1	10	2				
ISO 2	100	24	10	4		
ISO 3	1,000	237	102	35	8	
ISO 4	10,000	2,370	1,020	352	83	
ISO 5	100,000	23,700	10,200	3,520	832	29
ISO 6	1,000,000	237,000	102,000	35,200	8,320	293
ISO 7				352,000	83,200	2,930
ISO 8				3,520,000	832,000	29,300
ISO 9				35,200,000	8,320,000	293,000

We will support you!

We will work with you to find a clean solution that makes your production line safe and makes you happy. We can advise you on all questions concerning cleanrooms.

We look forward to your message.



Peter Mattonet
Product and Industry
Cleanroom Manager
Phone: +82 32 821-2911
E-mail pmattonet@igus.net



Rainer Rössel
Vice President
Head of chainflex® cables
Phone: +49 2203 9649-278
E-mail rroessel@igus.net

Clean for cleanroom
... investing pays off!

\$37.9 billion

Cost of production plants
and production equipment 2018¹⁾

Requirements in one cubic
metre of ambient air: no
more than ten particles ...

Maximum particle size
0.1 µm
or 0.0001 mm²⁾.

80%
productivity target
in semiconductor
manufacturing³⁾

Growth of the global
chip market to
\$575 billion
2022⁴⁾

\$50 billion
... in Europe⁴⁾

Semiconductor sales
2022 ...
\$372 billion
... in Asia⁴⁾

\$83 billion
... in the US⁴⁾

For more than **25 years**
stranded cores have been used in the industry
inside a welded, continuous PTFE strip ...⁵⁾

Cost-
intensive

Cable
usually not
available
from stock

Customer-
specific
manufacture
means long
waiting times

High
maintenance
requirements

! Problem: if a single
core breaks, the entire
system has to be
replaced

... use igus® to improve overall effectiveness and
achieve higher yields

**igus®
solution!**

e-skin® flat with
chainflex® CFCLEAN:
Cleanroom energy
supply systems ...
clean and lean!

You can't have clean without ...

lean!

- + Higher production yields
- + Greater overall effectiveness
- + Less waste
- + Shorter installation times
- + Reduced maintenance
- + Greater reliability
- + Quick delivery from stock

igus® e-skin® flat
service life ...

almost
60 million
double strokes⁵⁾

> 9,000

igus® energy chain
ranges certified for
cleanroom applications
ISO Classes 1 to 5⁵⁾

> 1,084

of all igus® chainflex® catalogue
cables are certified according to
ISO Class 1 or Class 2 IPA⁵⁾

1) <https://evertiq.de/news/26283>
 2) igus® GmbH
<https://blog.igus.eu/a-boost-to-your-overall-equipment-effectiveness-oeef/>
 3) igus® customer testimonial
 4) PwC research
<https://www.pwc.de/de/technologie-medien-und-telekommunikation/studie-gute-aussichten-fuer-den-globalen-halbleitermarkt.html>
 5) igus® GmbH

clean plastics testing

- ... pre-certified in our in-house cleanroom laboratory and then IPA-tested
- ... according to cleanroom guidelines
- ... guaranteed to be particle-free!
- ... www.igus.eu/cleanroom-lab

igus® is one of the leading manufacturers of energy chains in the area of cleanroom technology and has been having its products tested successfully since 1997. In order to be able to develop new cleanroom-compatible products faster, Fraunhofer IPA, working as a development and certification partner on behalf of igus®, has designed and built a tailor-made cleanroom laboratory with an ISO Class 1 cleanroom system in Cologne. The new lab allows igus® to perform advance customer tests and develop new products under realistic conditions in a very short time.

- Cleanroom tests according to EN ISO 14644-14
- Perform long-term tests under real conditions
- Improve products in a very short time
- Implement customer-specific assemblies



... in manufacture

- ... igus® cleanroom facility in Korea
- ... Packaging products in a cleanroom



For semiconductor producers such as Samsung and SK Hynix, even particles as small as 0.0001mm are a business risk. That is why they are placing ever stricter requirements on suppliers of cleanroom-compliant machine components. In Korea, we are responding by building a cleanroom to assemble and package our energy supply systems.

Suppliers like igus® must also take care not to contaminate cleanroom products during assembly and shipping. This is because more and more customers want to be able to use the components immediately – without having to clean them first.

In order to assemble and package cleanroom products so that they are as sterile as possible, we commissioned a cleanroom in Korea. A filter system creates constant negative pressure in its interior and replaces the air 450 times per hour. In order to keep contamination as low as possible, employees wear protective clothing.

The concept of assembling and packaging products in the cleanroom can be found in other igus® locations as well (such as the headquarters in Cologne, Germany). Another cleanroom is being built here in co-operation with the Fraunhofer Institute for Manufacturing Engineering and Automation (IPA).



2001

2006

2012

2007

2013

2015

1964

"Give me your most difficult part and I will find a solution."
Günter Blase,
Founder of igus® GmbH

1998

1997

First igus® cleanroom tests for energy chains

2001

Low-abrasion E6 e-chain® with "spring" instead of pin/bore chain link connection

2003

Initial test by the IPA Fraunhofer Institute with ISO Class 1 according to DIN 14644-1

2006

New tribo-materials for improved cleanroom properties

2007

chainflex® cables are tested and certified according to ISO Class 1 or Class 2 IPA.

2012

iglidur® tribo-polymers are being introduced to cleanroom energy chains; more than 100 million double strokes tested.

2013

The next E6 generation, E6.1 system will enter the market with an ISO Class 1 rating.

2015

New materials, new design principles: e-skin® corrugated tube launched

2017

First e-chain® designed according to "Hygienic Design" guidelines with FDA-compliant material

2019

In-house cleanroom laboratory in Cologne in cooperation with the IPA Fraunhofer Institute. e-skin® flat modular cleanroom energy supply launched.

2020

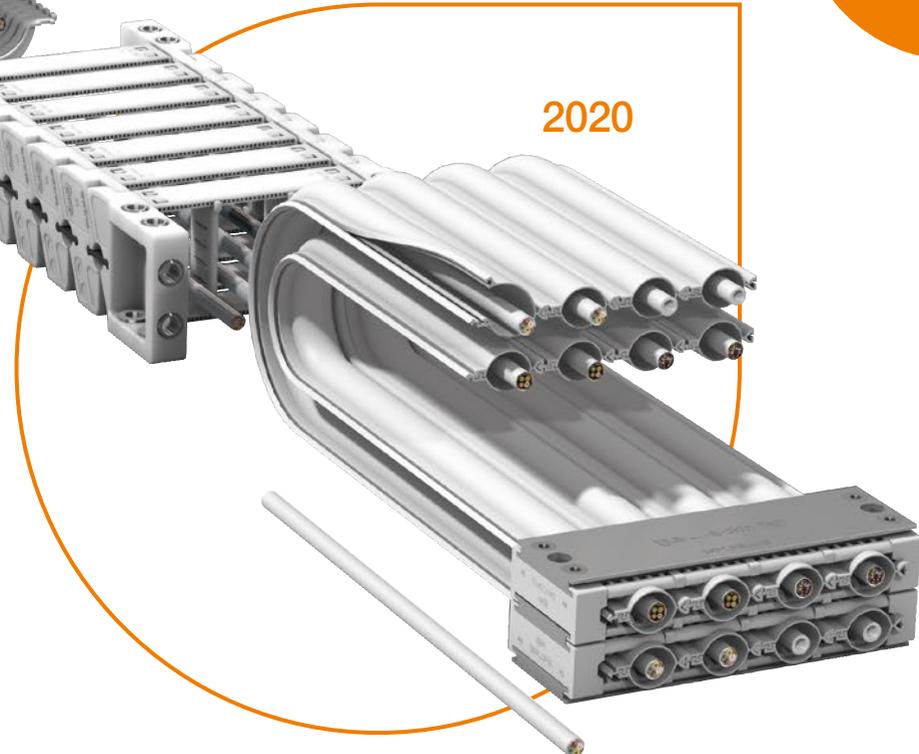
E6.clean: further development with abrasion-resistant tribo-polymer e-skin® flat with chainflex® CFCLEAN: cleanroom energy supply system

2021

"Reiner!" award for pioneering developments in clean technology



2020



e-skin[®] flat

... revolutionises your overall effectiveness

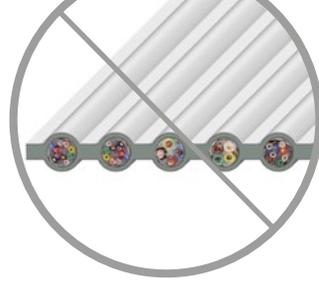
- ... generates higher production yields
- ... is modular and compact
- ... is resource and service-friendly
- ... www.igus.eu/e-skin-flat

clean-room

A boost to your overall equipment effectiveness? We explain in a blog: blog.igus.eu/a-boost-to-your-overall-equipment-effectiveness-oe/

The main advantages of the e-skin[®] flat are its modularity and ease of maintenance. Unlike commercially available solutions with clearly defined flat ribbon cables in which stranding elements are welded, the e-skin[®] flat energy supply system offers openable chamber designs. Flexible chainflex[®] CFCLEAN stranding elements (with or without connectors), e-skin[®] flat with support chains, hoses, etc. can now be replaced or added in a few minutes.

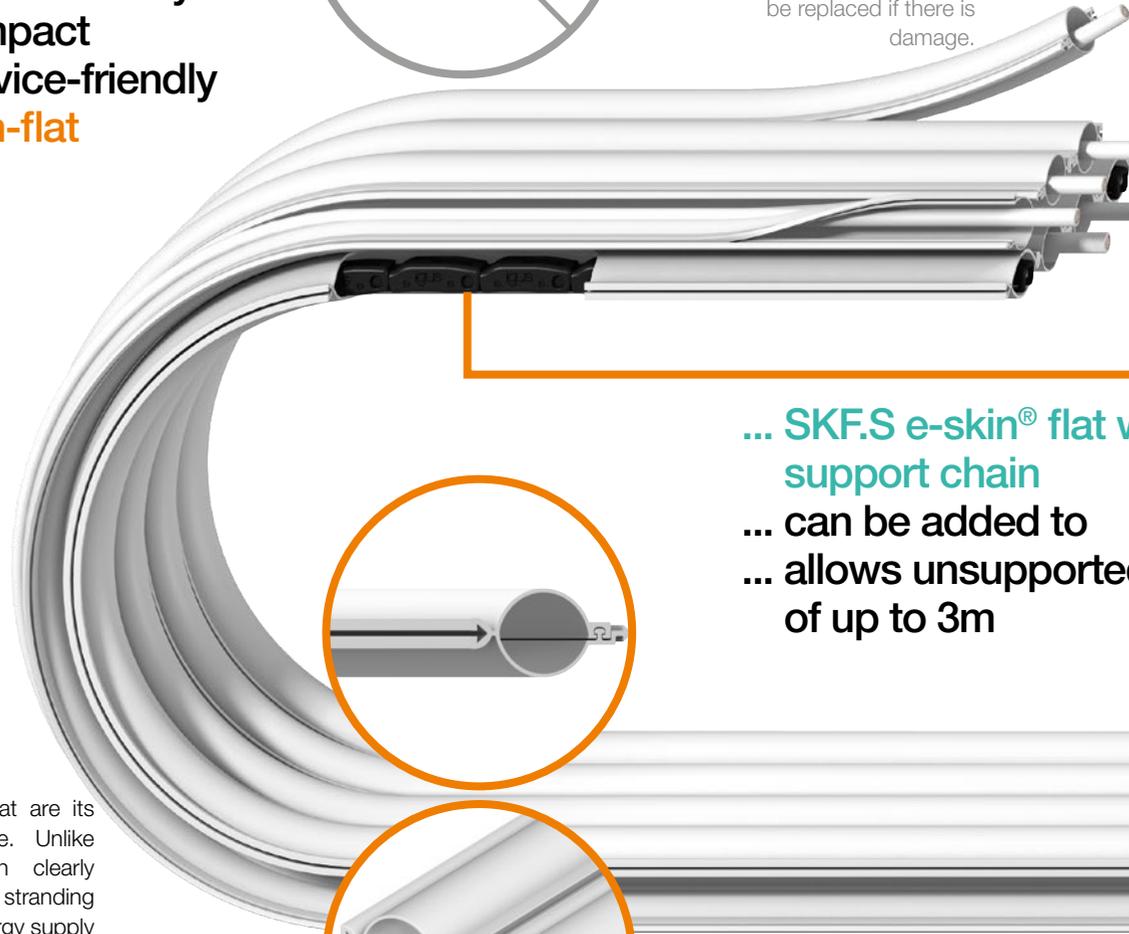
- Highly efficient in the prototype phase
- Maximum availability due to easy replacement of defective elements
- Resource-efficient, as only individual elements are replaced when there is damage



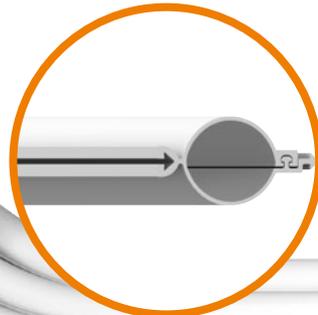
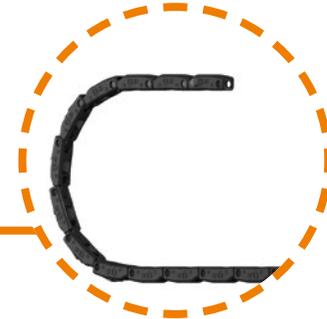
Commercially available ribbon cables with permanently welded stranding elements: the entire system must be replaced if there is damage.



e-skin[®] flat system certified according to EN ISO Class 1; Report IG 2102-1212



- ... SKFS e-skin[®] flat with support chain
- ... can be added to
- ... allows unsupported travels of up to 3m



- ... combined with chainflex[®] CFCLEAN
- ... highest flexibility for prototype construction
- ... offers quick cable replacement
- ... replaces customer-specific flat ribbon cable
- ... cost-effective and sustainable
- ... www.igus.eu/cfclean



chainflex® CFCLEAN
 ... made for the e-skin® flat

- ... great flexural strength thanks to very finely stranded special conductors
- ... protected by highly abrasion-resistant heat-sealed film
- ... has no outer jacket, so it is thin and lightweight
- ... transfers energy, bus and data ...
- ... www.igus.eu/cfclean



CFCLEAN DATA

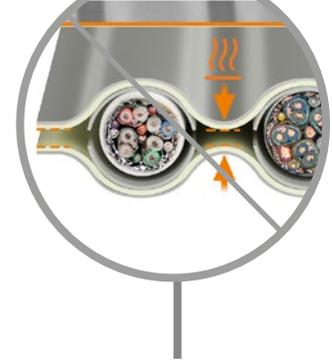
CFCLEAN BUS

CFCLEAN CONTROL

CFCLEAN MOTOR



e-skin® flat cable guide systems combined with chainflex® CFCLEAN cables represent the systematic further development of conventional PTFE trackless cables for cable guides in flat-panel displays (FPDs) and semiconductors, in the production of microelectronic components and in medical technology. The strengths of the PTFE ribbon cable have been enhanced and the weaknesses eliminated. The new e-skin® flat cable guide system is the result of this refinement.



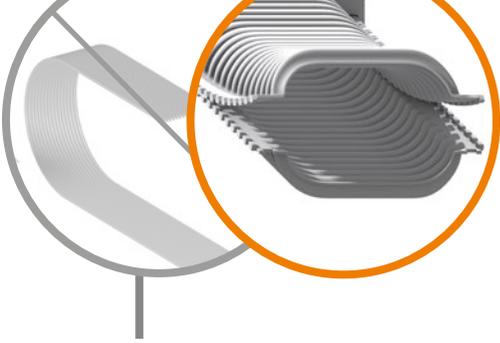
Commercially available ribbon cables with permanently welded stranding elements

- Stiff cable jackets prevent system bending
- Low restoring forces:
 - ... due to highly flexible stranded structures
 - ... special conductors
 - ... No outer jacket
- CFCLEAN chainflex® adapted to the application with up to 21% less weight than conventional cables
- About 16% smaller diameter than standard cables with jacket
- No minimum length
- Conductor prototypes: finished in 48-72 hours
- All standard core/cross section combinations: data, bus, control, motor – available from stock, with a guarantee of up to 36 months⁶⁾

Guarantee
 igus chainflex
 Up to **36**
 month guarantee

igus 36-month chainflex cable guarantee and service life calculator based on 2 billion test cycles per year

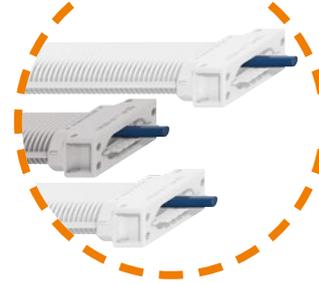




e-skin[®]
 ... reclosable corrugated tube
 ... easy to maintain
 ... for small installation spaces
 ... www.igus.eu/e-skin

Commercially available ribbon cables: fixed width and filling, tightly sealed, no interior separation, same bend radius throughout, very little to no inherent rigidity or strength

e-skin[®] is a corrugated tube consisting of an upper and lower shell that form a complete enclosure when connected. The simple and reclosable opening mechanism allows easy maintenance and inspection of the cables inside. This gives e-skin[®] many advantages over conventional corrugated tubes.



... in three variants
 ... **e-skin[®] SK**
 ... for unsupported lengths of up to 4m



● 0.SK28.068.02.1 certified according to EN ISO Class 1 IG Report 1907-1125

... **e-skin[®] soft SKS**
 ... made of elastic material
 ... for lower clearance height than SK



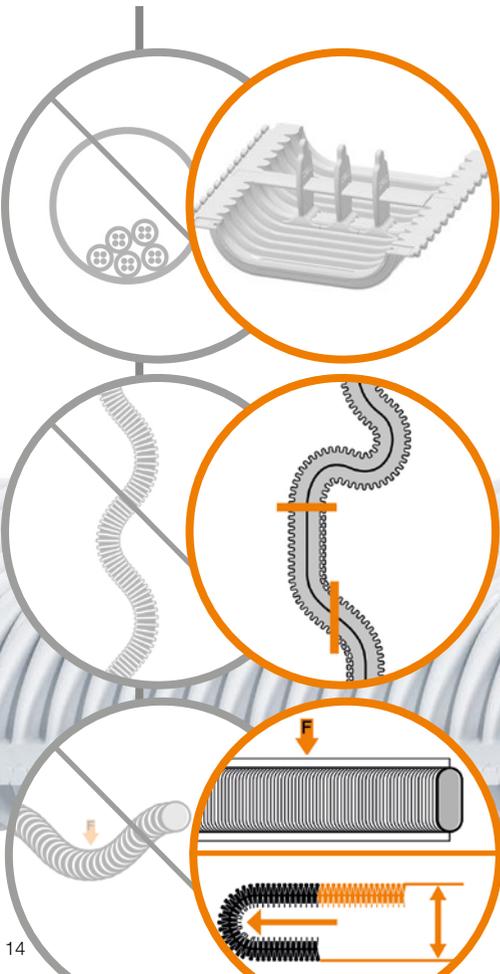
● SKS28.068.02.1 certified according to EN ISO Class 1 including chainflex[®] cables Report IG 1907-1125

... **e-skin[®] hybrid SKY**
 ... combines the advantages of e-skin[®] SK and SKY



● SKS28.068.02.1 certified according to EN ISO Class 1 including chainflex[®] cables Report IG1907-1125

- Easy filling with "zipper" opening principle
- The special design allows unsupported lengths
- Reduces the installation space required
- Cable-friendly with defined minimum bend radius
- Available with interior separation (optional)
- Prevents unintentional lateral movement
- Simple maintenance and inspection of the cables inside
- Protection against dust and water ingress
- Suitable for cleanroom according to IPA ISO Class 1



The improved corrugated hose for cleanroom applications was awarded the 2nd prize at the Fraunhofer Clean Technology Awards 2018. www.ipa.fraunhofer.de/en.html



e-chains[®] certified according to DIN EN ISO Class 1

... extremely lightweight and smooth-running

... System E6.CLEAN

... www.igus.eu/cleanroom



- Certified according to EN ISO Class 1 Report IG 0704-400
- Tribologically optimised material specifically for cleanroom applications
- Extremely quiet due to small pitch and "brake" in the stop dog system (E61.29.070.055.0 at 1 m/s = 32 dB[A] according to igus[®] Internal Test 4479)
- Extremely low vibration
- Low-abrasion connector system (no pin/bore connections)
- Very smooth operation due to the almost total absence of a polygon effect
- Smooth surfaces and absence of interfering edges on the inside ensure a long service life for cables and hoses
- Lightweight
- Cost-effective



... quiet and low vibration
... E6.1 system

... www.igus.eu/E6.1



- E61.29.50.075.0 certified according to EN ISO Class 1 Report IG 1303-640
- Next generation of smoothly operating, cleanroom-compatible e-chains[®]
- Quiet: 32 dB(A)

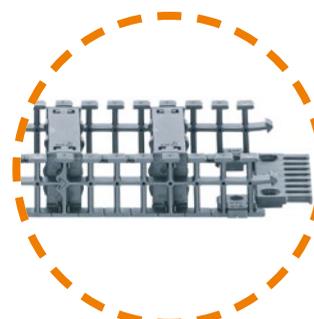


... highly dynamic and small
... E3 system

... www.igus.eu/E3



- Certified according to EN ISO Class 1 Report IG 0704-400
- Small and low vibration
- Quiet: 38 dB(A)



... Highly flexible and low vibration
... T3 system

... www.igus.eu/T3



- E3.29.050.038.0 certified according to EN ISO Class 2 Report IG 1303-640
- For high speeds and accelerations
- Quiet: 33dB(A)

More clean plastics

... 1,084 cleanroom-compatible chainflex® cables*

... certified by the IPA Institute for cleanrooms of ISO Class 1 or 2

... www.chainflex.eu



igus 36-month chainflex cable guarantee and service life calculator based on 2 billion test cycles per year



... Pneumatic hose ... chainflex® Clean Air



- Highly flexible
- High abrasion resistance
- Oil-resistant and coolant-resistant

Our cables are designed exclusively for movement and continuously optimised in testing. Our goal is durability, which is constantly monitored and improved under real-world conditions in our 3,800m² laboratory for moving cables, the largest in the world. We pay special attention to optimising our cables for alternating bending and apply highly abrasive-resistant jacket materials. We make clear statements about durability and guarantee® service life.

www.igus.eu/chainflexlife

Pneumatic hoses and various cables with IPA ISO Classes 1 and 2 are also available, ready for connection, suitable for Bosch Rexroth, Festo, Parker, Siemens, and many other manufacturers.

... Control cables



- Bend radii down to 4xd
- Shielded/unshielded
- Jacket materials: PVC, PUR, TPE

... Data cables



- For bend radii down to 4xd
- Optimised shields with high coverage
- Jacket materials: PVC, PUR, TPE

... Motor cables



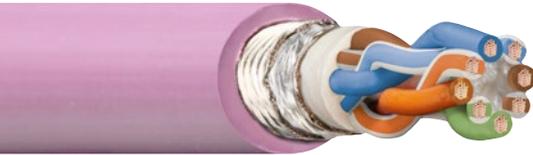
- For bend radii down to 7.5xd
- Shielded/unshielded
- Jacket materials: PVC, PUR, TPE

... Robot cables



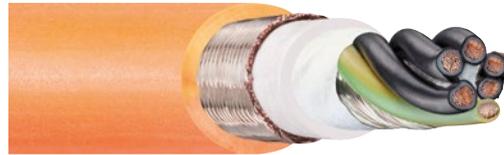
- For twistable applications up to ± 360°/m
- Available as a hybrid, fibre optic cable, motor cable and servo cable

... Bus cables



- For bend radii down to 7.5xd
- Ethernet, USB, Profinet, Profibus, DeviceNet
- Jacket materials: PVC, PUR, TPE

... Servo cables



- For bend radii down to 7.5xd
- With inner jacket for very high dynamics
- Jacket materials: PVC, PUR, TPE

... Measuring system cables



- For bend radii down to 7.5xd
- For 20 drive manufacturers
- Jacket materials: PVC, PUR, TPE

... Fibre Optic Cables



- For bend radii down to 7.5xd
- POF, gradient, single-mode fibres
- 2-12 fibres

* Various igus® chainflex® cable ranges have been certified according to DIN EN ISO 14644-1 ISO Class 1 or 2 by the IPA Fraunhofer Institute (Reports IG1303-640-1 and IG0704-400). This represents 1,084 different chainflex® catalogue cables with tested outer jacket material, 918 types with IPA Class 1, and 166 types with IPA Class 2.

	e-skin® flat (with CFCLEAN)	e-skin® SK	e-skin® SKS	e-skin® SKY	E6/E6.1	E6.CLEAN	Commercially available ribbon cables
							
Class 1 according to DIN EN ISO 14644-1	✓	✓	✓	✓	✓	✓	✓
Modular design	●●●●●	●●●	●●●	●●●	●●●	●●●●	●●
Components individually interchangeable	✓	✓	✓	✓	✓	✓	✗
Quick filling, openable	●●●●	●●●●●	●●●●●	●●●●●	●●●●●	●●●●●	✗
Fast delivery	●●●●	●●●	●●●	●●●	●●●	●●●●●	●●
Easy maintenance	●●●	●●●●	●●●●	●●●●	●●●●	●●●●	●
Available from stock	✓	✓	✓	✓	✓	✓	✗
Individual shortening	✓	✓	✓	✓	✓	✓	✗
Individual widening	✓	✗	✗	✗	✓	✓	✗
High productivity	●●●●	●●●●	●●●●	●●●●	●●●	●●●	●●●
No minimum order quantity	✓	✓	✓	✓	✓	✓	✗
Cost-effective	●●●	●●●●	●●●	●●●●	●●●	●●●●●	●●●
Suitable for unsupported applications	●●●●	●●●	●●	●●	●●●●●	●●●●●	●●
For high dynamics	●●●	●●●	●●●	●●●	●●●●●	●●●●●	●●●
Low clearance height	●●●●●	●●●	●●●●	●●●●	●●●	●●●	●●●●●
Space-saving	●●●●●	●●●	●●●	●●●	●●●●	●●●●	●●●●●
Fill weight	●●	●●●●	●●●	●●●	●●●●●	●●●●●	●●
Guaranteed for up to 36 months ⁶⁾	✓	✓	✓	✓	✓	✓	✗
Saves resources	✓	✓	✓	✓	✓	✓	✗
Everything from one source (chain, cable, connector)	✓	✓	✓	✓	✓	✓	✓
Products also available individually	✓	✓	✓	✓	✓	✓	✗
ESD compatibility	in testing	in testing	in testing	in testing	✗	✗	✓
Quiet and low vibration	●●●●●	●●●●	●●●●	●●●●	●●●	●●●●	●●●●
Online service life calculation	✗	✗	✗	✗	✓	✓	✗
Online interior separation configurator	in preparation	✓	✓	✓	in preparation	✓	✗
Suitable for the following industries	3C industries AOI Bonding Dispensers Electrical manufacturing FPD production Medical technology Microelectronics Semiconductors	3C industries AOI Dispensers Electrical manufacturing FPD production Glass-cutting Microelectronics Semiconductors	3C industries AOI Dispensers Electrical manufacturing FPD production Glass-cutting Microelectronics Semiconductors	3C industries AOI Dispensers Electrical manufacturing FPD production Glass-cutting Microelectronics Semiconductors	Camera technology Electrical manufacturing FPD production Measuring machines Microelectronics Panel robots Printers Semiconductors	Electrical manufacturing FPD production Medical technology Microelectronics Packaging Panel robots Plotter Semiconductors	3C industries Electrical manufacturing FPD production Microelectronics Semiconductor industry
							

● Less suitable
●●●●● Ideal
✓ Yes
✗ No

... enquire now!

igus® motion plastics®
 ... guaranteed in the test laboratory
 ... www.igus.eu/info/chainflex-guarantee
 ... www.igus.eu/e-chain-guarantee



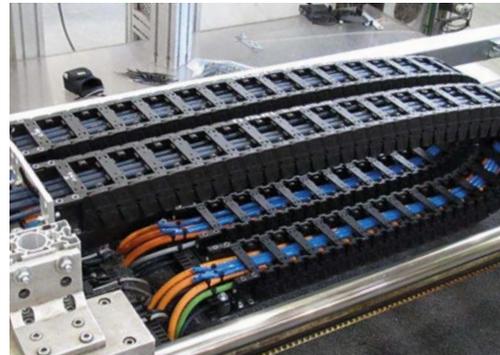
Bending test on the e-skin® soft corrugated tube



Endurance test on the e-skin® corrugated tube



E6 e-chain® in testing



chainflex® cables in testing

- 3,800m² test area
- 4,100 energy chain system tests annually at 180 test stations: climate chamber, outdoor tests, noise chamber, travel lengths of up to 130m, robot systems, etc.
- Ten billion e-chain® cycles per year in the e-chain® and chainflex® laboratory (three billion test cycles for e-chains® alone)
- 1 million electrical measurements recorded annually
- 15,000 tribological tests (friction and wear) in 300 test set-ups
- 140 trillion test movements in the plain bearing business unit
- Sensors on the test machines provide permanent measurement data, processed in the central database

Calculate service life online and get a guarantee of up to 36 months⁶⁾!



Guarantee
 igus chainflex
 up to **36**
 month guarantee

Guarantee
 igus e-chain
 up to **36**
 month guarantee

chainflex® Lebensdauerberechnung

Leitung
 Artikel:
 System:
 Serie:
 Kette:
 Standard CF 880 Steuerung PCC
 Art. Nr.: CF 880-00-02

Einsatz in Energiekette

Freibaugrad

Verfahren: m/s
 Geschwindigkeit: m/s
 Beschleunigung: m/s²

Materialsystem: metrich imperial
 Maßstab:

igus 36-month chainflex cable guarantee and service life calculator based on 2 billion test cycles per year

e-kettent® Lebensdauerberechnung

Artikel:
 System:
 Serie:
 Kette:

Freibaugrad
 Gleitrad

Temperatur: 40 °C

Beschleunigung: 0 m/s²
 Geschwindigkeit: 0 m/s
 Zustoßzeit: 0 µg/m
 Vorfahrtweg: 0 mm

Schutz:
 Harter Schläge:

Ergänze:

Materialsystem: metrich imperial Standard

igus® lab, Cologne. A section of the motion plastics® test laboratory spread over 3,800m²

igus®
... comes from an idea in 1964

As early as 1964, engineer and igus® founder Günter Blase had the idea of developing products for motion from low-wear, high-performance polymers. Today they are called motion plastics®. More than five decades of research into motion plastics® in the industry's largest test laboratory has led to the creation of highly durable materials that fulfil our "Cost down, service life up" promise.



... develops the first e-chain® made of polymers in 1971

The creation of the first energy chain made of plastic is typical of igus® GmbH: it was developed because Günter Blase listened carefully to Schlafhorst, a textile manufacturer. Schlafhorst was looking for a new concept for its textile machines that would protect cables on long travels in the harsh factory environment. igus® was already successfully manufacturing plain bearings made of high-quality polymers. The so-called Series 20 was then created in co-operation with Schlafhorst. It was an automation milestone.

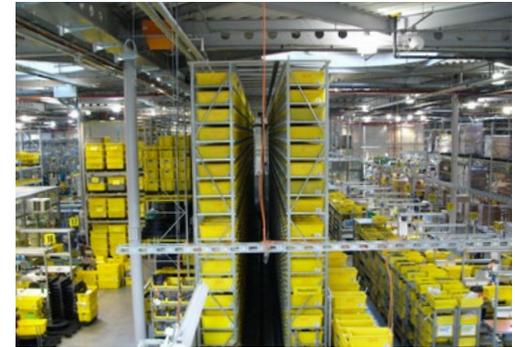
... today covers 90,000m²

The company moved into its newly-built headquarters in Cologne in 1994. Since then, the factory has grown: today, igus® produces, tests and researches in a building area of 90,000m². This includes surrounding buildings for further production, technical training and a large logistics centre. In the course of expanding the factory, we have used systematic lean management to examine all areas, from marketing and administration to research and development to tooling and production to warehousing and distribution.



Material preparation

- ... has so far set up 32 subsidiaries worldwide**
- ... has 55 sales partners in 51 countries**
- ... has 4,200 employees worldwide**



Warehouse



Toolmaking

igus® is also a world market leader in special products that only the initiated know and appreciate – a typical hidden champion among mid-sized industrial companies. igus® remains family-owned. Frank Blase, son of the founders, manages the company. Today, igus® has 32 subsidiaries around the world.



Assembly factory



Injection moulding

... expanding in 2021



Open offices

igus® headquarters in Cologne

clean plastics ... proven in the field ... a few examples here

Technology is constantly evolving, and we see this most clearly in digitalisation and automation. Energy chains, which are intended to safely guide and protect cables in technical and mechanical infrastructure, should also be constantly improved in order to deliver real utility to you. On robots, in vehicles, on the high seas, or in cleanrooms, our customised energy chains and complete systems guide energy easily and safely.



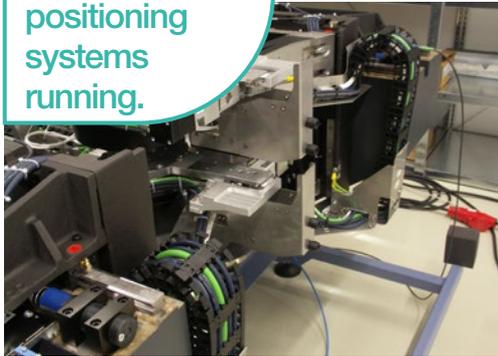
**e-chain® E6
accelerates
chip
production!**

An igus® e-chain® from the E6 range accelerates work processes in the wafer-handling application in chip production. The E6 easily supplies energy for wafer handling in chip production requiring acceleration rates of up to 4m/s² and speeds of up to 6m/s. Its low abrasion is especially important because a high degree of purity is critical in chip production. The E6 is cleanroom-compatible and has Fraunhofer IPA certification.

Use the QR code to find out more about this application ...



**The E3
e-chain® keeps
positioning
systems
running.**



Smartphones are booming. They become more powerful with each generation. The heart of a smartphone is a printed circuit board or card made with a laser imaging system. The high-precision machining process is performed reliably with the help of sophisticated positioning systems. Pre-assembled energy supply systems ensure the necessary long-term operational reliability, smoothness of operation, and low vibration and abrasion that is mandatory for cleanroom manufacturing.

Use the QR code to find out more about this application ...



**e-skin® flat
feeds through
to the tool
centre.**



Specialising in the manufacture and development of components for automation technology and a leader in the field of rotary indexing tables, Weiss GmbH needed to find a cable feed-through to the tool centre that could hold two sensor cables and two hoses, each with a diameter of 4mm. The solution was the igus® e-skin® flat cable guidance system. Its service life is over 57 million double strokes

Use the QR code to find out more about this application ...



**e-skin® SKS
functions
extremely well
in adhesive
dispensers.**



The e-skin® corrugated tube won over the Mingseal engineers. The unique openable corrugated tube for cleanrooms, which consists of an upper and lower shell, combined the engineers' requirements of accessibility, inherent rigidity, compactness and, of course, the highest cleanroom compatibility according to ISO Class 1. In future, the compact e-skin® series SKS20 will be installed in new machines.

Use the QR code to find out more about this application ...



**Ultra-fast pick
and place?
No problem
for chainflex®
cables.**



"Pick and place machines make lots of movements, and they are extremely fast", says Rainer Rössel. The weakest link in this challenging environment is often the cables, which must function continuously. In order to guarantee stability, they must be designed and manufactured to harmonise with the energy chain system. This is done according to the current state of the art – validated by painstaking tests. Two test facilities have been set up in the igus® test laboratory to simulate the special requirements of the pick and place machines. In addition to lateral acceleration, redundant cables are tested in three different radii, each with a double design, and monitored constantly.

Use the QR code to find out more about this application ...



Cleanroom-compatible motion plastics®

... drylin® linear guides

... design gliding movement

... www.igus.eu/info/linear-guides-cleanroom-applications



Linear guides are components in drive systems and machines used to generate linear movement. The best-known designs are dovetail, T and profile guides. igus® drylin® linear guides are clearly suitable for use in cleanrooms. The differentiation between the various cleanroom classes is only dependent on load and speed of the application. Our range of dry-operating linear guide systems includes four models certified for use in ISO Class 3 to 6 cleanrooms.



... lightweight and quiet

... drylin® TK

... www.igus.eu/drylinTK

- Certified according to EN ISO drylin® TK-01-25-02 – ISO Class 5
drylin® TK-01-30-01 – ISO Class 4
Report IG 0308-295
- ESD compatibility for "Level 1" according to SEMI E78-0998



... small and lightweight

... drylin® NK-02-40-02

www.igus.eu/drylinN

- ISO Class EN ISO Class 6
Report IG 0308-295
- ESD compatibility for "Level 1" according to SEMI E78-0998



... Modular system

... drylin® WK-10-40-15-01

www.igus.eu/drylinW

- ISO Class EN ISO Class 6
Report IG 0308-295
- ESD compatibility for "Level 1" according to SEMI E78-0998

... more dry-tech®

... a few examples here

... many more here:

www.igus.eu/dry-tech

The cleanroom suitability of our iglidur® plain bearings is determined on the basis of the wear particles released in applications. Their size and quantity depend on

- the pairing of shaft with bearing material
- other parameters such as load, speed, etc.

For this reason, there are no clearly defined cleanroom materials for our plain bearings; the material required depends on the particular application. Our experts would be happy to help you choose the right material.



... iglidur® slewing ring bearings

... www.igus.eu/PRT

- Ready-to-install slewing rings for lubrication-free dry operation



... iglidur® plain bearings

... www.igus.eu/igidur

- Cost-effective, requires no lubrication or maintenance



... xiros® ball bearings

... www.igus.eu/xiros

- Lubrication-free ball bearings made of high-performance polymers



... iglidur® liner

... www.igus.eu/tribotape

- For tribologically stressed surfaces and shapes

More clean plastics
... even more dry-tech®

... for 3D printers

... printed, injection moulded or machined

... configured very easily online

... www.igus.eu/3d-print

- Self-lubricating components
- Eminently suited to 3D printing replacements for spare and wear parts for plain bearings, drive nuts, gears and other wear parts
- Service life up to 50 times that of regular 3D printed materials
- Special plastics with ESD properties, food conformity, heat resistance, and many other features.
- No minimum order quantity – spare parts, prototypes and serial parts, up to 10,000 units, ready to ship in one to three days from the online 3D printing service



... iglidur® 3D print filaments

... www.igus.eu/filament



... such as iglidur® I150-PF

- Material: iglidur® 150-PF
- High abrasion resistance at low speeds
- Good mechanical properties
- The tribofilament® that is easiest to process (even without a heated print bed)
- Nozzle temperature: from 240-250°C

Online
... Cleanroom home page
... www.igus.eu/cleanroom



Much more information about igus® cleanroom solutions online ... Free-of-charge white papers, videos, tests, applications, and technical data on your desired product

Free-of-charge white paper:
"Energy supply systems for cleanrooms – revolutionise overall technical effectiveness of production equipment and generate higher yields"



Online selection guide:
Find and request the ideal cleanroom energy supply for you in just 30 seconds



Free e-skin® flat sample



Liability disclaimer: the information in this catalogue/brochure/website, and the data in the design section in particular, is based on our current knowledge of the products described. A legally binding assurance of certain properties or the suitability for a certain application cannot be derived. igus® is unable to assume liability of any nature for damage, loss or injury resulting from application of the products. Due to constant technical refinement, we reserve the right to make technical changes and improvements to products at any time. As of the date this catalogue/brochure/website is published, all previous versions and editions are invalid. We compiled this catalogue/brochure/website and the descriptions therein, including technical information and explanations, with the greatest of care. Nevertheless, we bear no liability for typesetting and printing errors, technical changes to products, or damage associated with our technical statements or our ability to deliver during the period in which this catalogue is valid. Diagrams and descriptions in this catalogue in no way constitute guaranteed properties.

We recommend that you always check the suitability of products for a particular purpose in a practical trial. Please avail of our consulting services.

Copyright: all articles and diagrams published in this catalogue/brochure/website are protected by copyright. Any use not authorised under copyright law requires prior written consent by igus® GmbH. This applies explicitly to reproduction, processing, translation, storage, editing, and transfer of content to other media (including electronic media), databases or systems. Downloads and copies may be made for personal, private, non-commercial uses only.

6) Guarantee information: the igus® e-chain® service life guarantee is valid for the number of double strokes calculated according to the igus® online service life calculator (<https://www.igus.eu/info/energy-chains-service-life-calculator>) or for a maximum of 36 months after the delivery date, whichever comes first. Guarantee conditions and scope: for the specified guarantee period, we will deliver a replacement free of charge (delivery ex works). This applies to igus® e-chain® components that fail due to wear and tear. This does not include failure due to mechanical impact and damage due to incorrect assembly. Replacement part shipment does not extend the guarantee period. The igus® chainflex® guarantee is conditioned upon operating conditions being valid for the cable family in question. These consist of parameters such as temperature, movement type, torsion, media influence and bend radius. The guarantee you receive will cover 36 months or ten million double strokes (for cables of the chainflex® 800 family, up to five million double strokes; for high-end cables, up to 40 million double strokes), whichever comes first. The number of double strokes depends on the type of installation and the cable quality. This is described in the current catalogue, in the data sheets and in the service life calculator (<https://www.igus.eu/ChainflexTools/ServiceLifeCalculator>).

igus®.eu/8pm

Place your orders until late. Ordering on business days from 7:00am to 8:00pm,
Sat. 8:00am to 12:00pm. No minimum order quantities, no surcharges.
Quick delivery.

www.igus.eu Phone: +49 2203 9649-0 Fax: -222

igus®.eu/24hrs

Buy online – 24hrs!

More catalogues and brochures online –

www.igus.eu/downloads

/9001:2015

/16949:2016

/14001:2015

igus® is certified according to ISO 9001: 2015 and IATF 16949: 2016 in the
field of energy chains, cables and packaging as well as plastic plain bearings.
igus® is also certified according to ISO standard 14001, a recognised basis for
environmental management systems.

/cleanroom

igus®.eu

igus® GmbH Spicher Strasse 1a 51147 Cologne, Germany
Phone: +49 2203 9649-800 Fax: +49 2203 9649-222
info@igus.eu www.igus.eu

© 2021 igus® GmbH

Subject to technical alterations.
Issue: 02/2021

MAT0071371.20

clean plastics