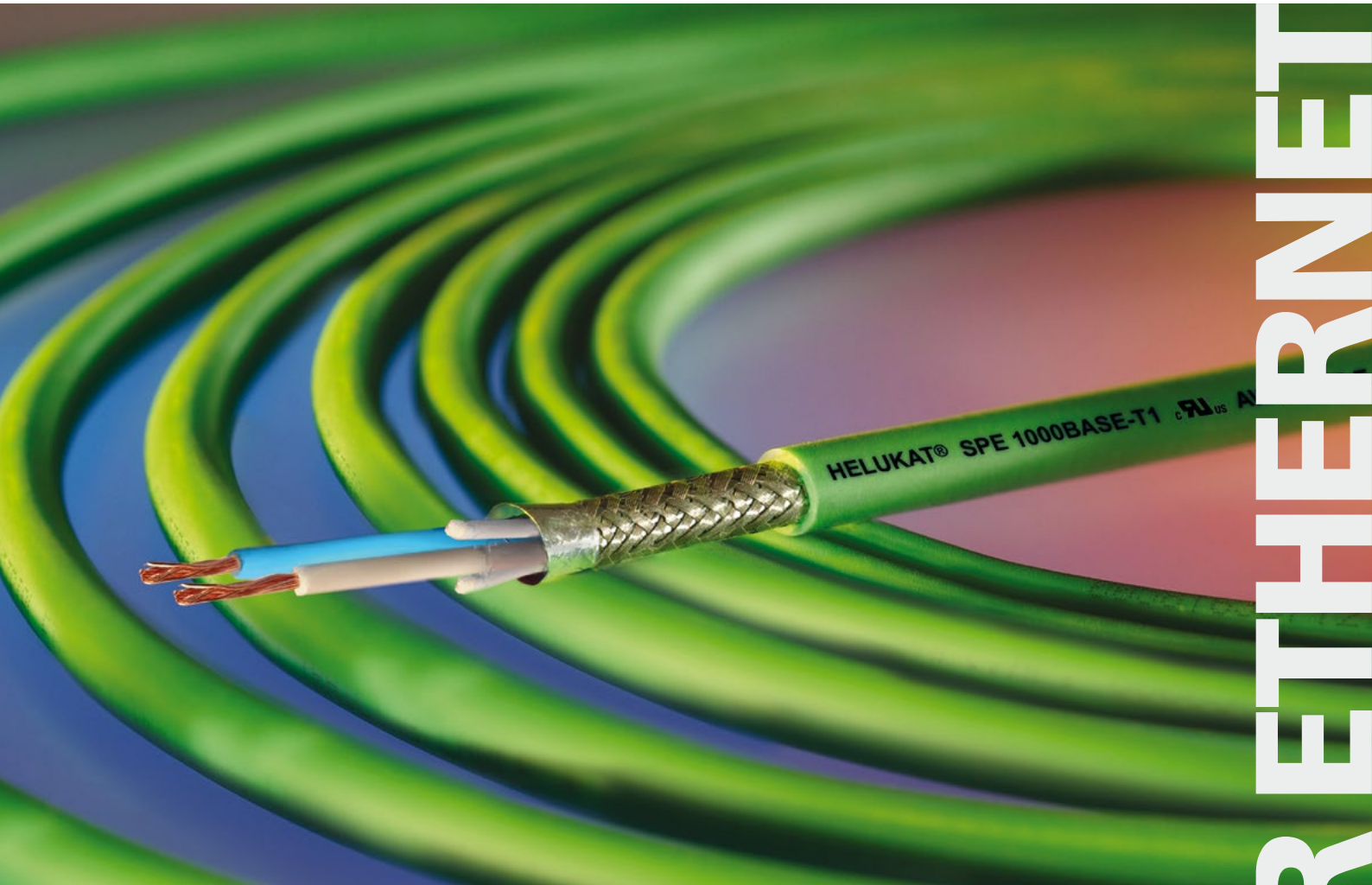




**HELUKABEL®**



SINGLE PAIR ETHERNET

**Data, Network & Bus Technology**

# Single Pair Ethernet



INDUSTRIAL  
PARTNER  
NETWORK

## ■ SINGLE PAIR ETHERNET (SPE) - WHY DO WE ACTUALLY NEED IT?

All smart devices, cameras and machines should become even smaller, lighter and faster. Miniaturization is all the rage and data rates are increasing all the time. Single Pair

Ethernet could be the perfect solution for high data transmission with low weight, small bending radii and space-saving cables.

## ■ HOW DOES 1-PAIR DATA TRANSMISSION ACTUALLY FUNCTION?

The classical Ethernet works with a 4-pair Cat 5 cable within a frequency range of up to 100 MHz. The individual pairs send/receive interchangeably, and thus up to 1 Gbit can be transmitted with a range of 100 meters. Whereas the one-

pair cables use chipsets with up to 600 MHz, by which 1 Gbit per 40 meters can be transferred. This means that some frequencies of the wide spectrum receive, while other frequencies send.

## ■ WHY IS SINGLE PAIR ETHERNET INTERESTING FOR THE INDUSTRY?

Single Pair Ethernet enables consistent data transmission up to field level. In contrast to before, only one pair is required to transmit the signals (instead of previously two or four pairs).

Consequently, Single Pair Ethernet matches the requirement profile of the industry exactly, and offers the following advantages (in contrast to the classical Industrial Ethernet):

- Thinner cables
- Reduced manufacturing costs
- Less space requirements, lower weight and if necessary, a smaller laying system is possible
- Smaller bending radii and smaller chains in the case of moving applications
- Lower fire load, less smoke development
- Less materials like copper or plastics => resource-sparing

▶ **Approx. 50% weight & copper reduction compared to 4-pair solutions**

## ■ AREAS OF APPLICATION

Single Pair Ethernet covers the requirements of diverse industries. This means that cables are used depending on the application, e.g. for fixed installation, flexible use, or highly dynamic applications, such as in drag chains or robots. Jacket materials can be PVC, FRNC, or PUR, depending on customer needs and application types.

High-temperature materials such as FEP may also be implemented. Very specific examples are camera transmissions, the use in cobots (collaborative robots that work with people) or measuring sensors. SPE could be the solution for miniaturization and holds out the prospect of small, space- and weight-saving cabling for the future.

## ■ STANDARDISATION

Cables, plugs and device sockets are stored with standards that clearly define all SPE components:

Definition for	Standardisation
Cables	acc. to IEC 61156 & ISO/IEC 11801-X
Cabling standards	acc. to ISO/IEC JTC 1/SC 25/WG3 & TIA42
Ethernet protocol standards	acc. to IEEE802.3
Plugs for industrial use	acc. to IEC 63171-6
Plugs for building cabling	acc. to IEC 63171-1

## ■ CLASSIFICATION FOR THE INDUSTRY

Since every industry has its special requirements, whether mechanical, thermal or chemical, different cable constructions are required to meet the respective needs. For this reason, cable classes have been defined for future variants:

Cross-section	Data rate	Application
AWG 26	1 Gbit 1000BASE-T1 to 40m	Type A - fixed installation
AWG 22	1 Gbit 1000BASE-T1 to 40m	Type B - flexible installation
AWG 22 + AWG 18 (Hybrid data + power)	1 Gbit 1000BASE-T1 to 40m	Type C - dynamic application e.g.. drag chain
AWG 18		Type R - Robotic
AWG 18	10 Mbit 10BASE-T1 to 1000m	Type A - fixed installation
AWG 16		Type B - flexible installation

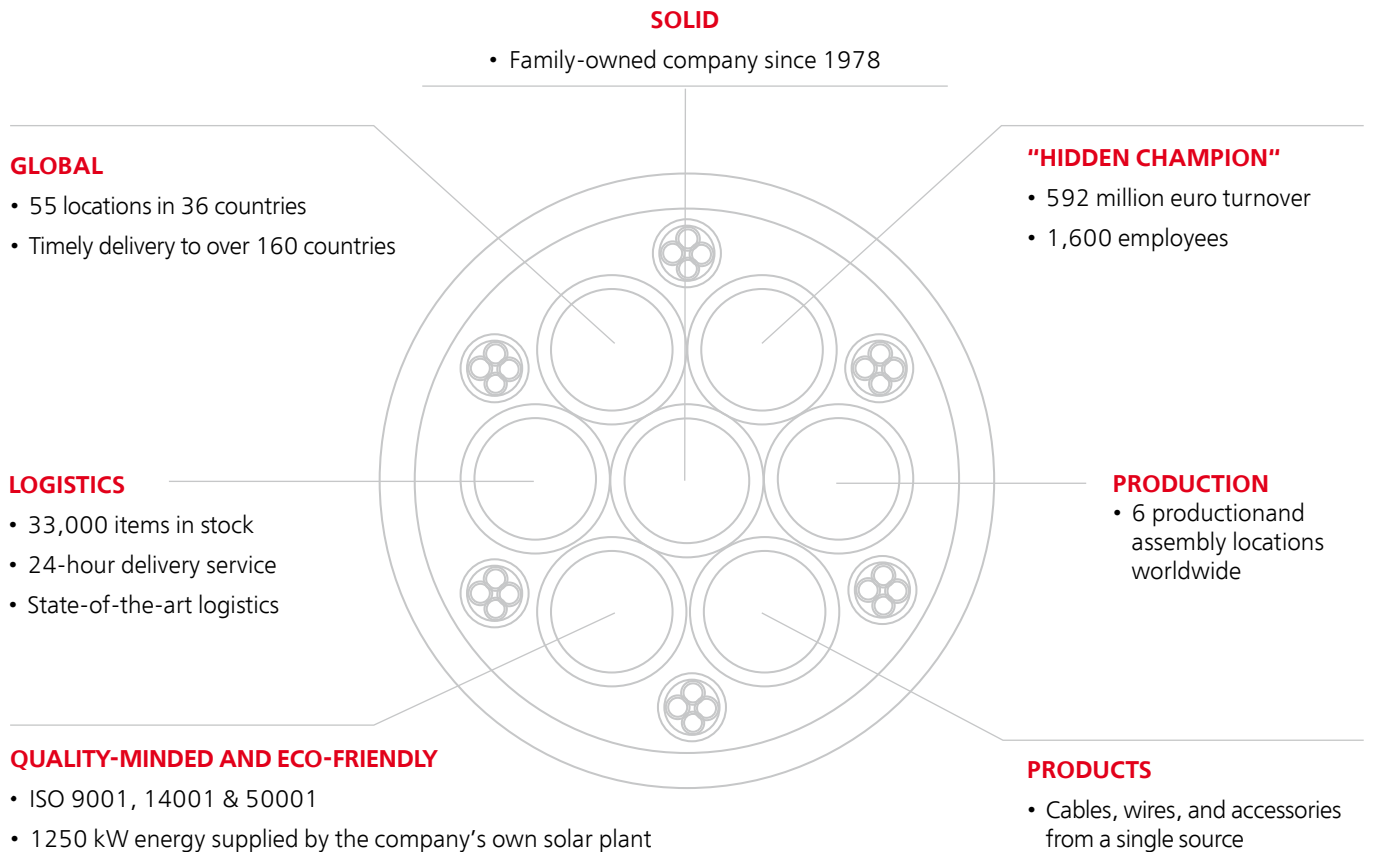
Different sheathing materials are used within each application class, for example:

- PVC for standard applications
- FRNC for holgen-free, low smoke, and low toxicity requirements
- PUR for drag chains and robotics, abrasion-resistant and oil-resistant
- PE for outside or direct burial
- FEP for high temperature applications

## ■ THE LATEST CABLE DESIGNS

SPE Standard:	1000BASE-T1 (1 Gbit to 40m)				10BASE-T1L (10 Mbit to 1 km)			
Application class:	Type C				Type R	Type A	Type A armoured	Type B
Application:	Suitable for drag chains				Robotics	for fixed installation		for flexible installation
Cable structure:	1x2x AWG26/19	1x2x AWG22/19	1x2xAWG26 + 2xAWG18	1x2xAWG22 + 2xAWG18	1x2x AWG26/19	1x2x AWG18/1	1x2x AWG18/1	1x2x AWG18/7
Inner conductor:	bare copper conductor				bare copper conductor			
Insulation:	Foam PO		PO	Foam PO + PO	PO	Foam PO		
Core colours:	white + blue				white + blue			
Stranding:	stranded in pairs				stranded in pairs			
Screening:	Al-foil + braid				Al-foil + braid			
Outer sheath:	PUR				PVC	PVC/PVC	PVC	
Colour:	green similar RAL 6018				black			
Approval acc. to CSA	AWM				AWM	still without	AWM	
Outer diameter:	5,0 ± 0,2 mm	6,4 ± 0,2 mm	7,3 ± 0,2 mm	9,0 ± 0,3 mm	5,4 ± 0,2 mm	7,0 ± 0,2 mm	9,8 ± 0,3 mm	7,9 ± 0,2 mm
Flame retardant:	yes				yes			
Halogen-free:	yes				no			
UV-resistant:	yes				yes			
Fixed temperature range	-40°C to +80°C				-30°C to +80°C			
Flexible temperature range:	-30°C to +60°C				-10°C to +70°C			
Bending radius	repeated: 12 x d				15 x d	15 x d		
	non-recurring: 5 x d				5 x d			
Weight	approx. 29 kg/km	approx. 50 kg/km	approx. 73 kg/km	approx. 93 kg/km	approx. 30 kg/km	approx. 76 kg/km	approx. 141 kg/km	approx. 93 kg/km
RoHS:	compliant 2011/65/EC				compliant 2011/65/EC			
Part no.	11018067	11018068	11019876	11019817	11019818	11017748	11019819	11019820

## WHAT SETS US APART



## CONTACTS

### Your contact at HELUKABEL:

**Horst Messerer**  
Product manager Data-, Network- & Bus technology  
Tel.: +49 7150 9209 129  
horst.messerer@helukabel.de

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