

Laying instruction:

speed•pipe® indoor



Publisher

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1. General

The speed•pipe® indoor must be protected against contamination and mechanical damage during transport, storage and processing.

Any damage and deformation of the speed•pipe® indoor (e.g. ovalisation) must be avoided and cause a decrease in the blowing distance of the micro cables.

The speed•pipe® indoor ends must be protected against the penetration of dirt and water by means of dust covers (protection against dust, dirt and splashing water, not pressure-tight), end plugs ES indoor (pressure-tight up to 0.5 bar) or sealing elements EZA-t indoor (pressure-tight up to 0.5 bar).

When storing them over a long period of time (several months) the speed•pipe® indoor must be protected against direct solar radiation. In principle avoid outdoor storage.

It is impossible to make a general statement about the functional integrity of the speed•pipe® indoor, because the dimension of the particular speed•pipe® indoor as well as the related cable must be individually checked in combination.

The laying instructions are significant for the realisation of the construction and installation work.

2. Utilisation of speed•pipe® indoor

In course of broadband expansion the fiber is continuously moved closer towards the client. FTTH (fiber-to-the-home) means that the fiber is laid into the apartment of apartment buildings or into single-family houses.

Furthermore the speed•pipe® indoor allows a smart home network cabling. In this case the installation in the building is a challenge due to a lack of infrastructure and to the fire protection requirements. Free spaces and shafts are usually very small so that's not possible to work with commercially available products.

With the new speed•pipe® indoor system, the solutions for the different local conditions and requirements in the buildings can be designed and installed.

The non-flame propagating, halogen-free and high-quality products are compliant with European directives. The speed•pipe® indoor are compliant with European standards EN 61386-22 (EC compliant according to EU Directive 2014/335 / EC), EN 13501-1, EN 60684-2 and EN 60332-1-2.



Term	Colour	D×s (mm)	Length (m)	Spool D×s (mm)	Item no.
speed•pipe® indoor 4×0.75	white	4×0.75	600	340×340×340 (box)	01702
			1600	600×360	01683
speed•pipe® indoor 5×0.75	white	5×0.75	400	340×340×340 (box)	01703
			1000	600×360	01684
speed•pipe® indoor 7×1.5	white	7×1.5	250	340×340×340 (box)	01715
			500	600×360	01685
			1250	700×370	01686
speed•pipe® indoor 10×1.0	white	10×1.0	500	700×370	01687
			2500	1200×370	01688
speed•pipe® indoor 12×2.0	white	12×2.0	350	700×370	01689
			2000	1200×370	01690
speed•pipe® indoor 14×2.0	white	14×2.0	250	700×370	01691
			1500	1200×370	01692
Additional dimensions on request					

3. Installation and instructions

3.1 Installation according to DIN VDE 0100-520 :2013-06 / IEC 60364-5-52 :2009-10

All dimensions of speed•pipe® indoor were tested in the VDE test institute according to DIN EN 61386-22. Here, the mechanical strength values are taken from the table F.52.1 under point 521.6, which the electrical installation pipes (speed•pipe® indoor) must correspond to.

Essentially are the first four digits of the code, which reflect the following values by means of defined tests:

- Compressive strength of the electrical installation pipes
- Impact strength of the electrical installation pipes
- Minimum operating temperature of the electrical installation pipes
- Maximum operating temperature of the electrical installation pipes

Further tests of the electrical installation pipes (speed•pipe® indoor) are, for example, the resistance to bending, the tensile strength, the load capacity, the electrical properties, resistance to external influences and resistance to flame spread.

The mechanical strengths are classified from positions 1 - 4 (5), whereby 1 is the lowest classification – for example “very low” - and 4 (5) is the highest classification – for example "very high".

The speed•pipe® indoor have the following classification code according to EN 61386-22 and thus the following use according to DIN VDE 0100-520: 2013-06 / IEC 60364-5-52:2009-10:

Use of the speed•pipe® indoor 4x0,75, 5x0,75 and 10x1,0:

Classification		
Classification code DIN EN 61386-22 (VDE 0605 Teil 22)	2-2-2-2-3-2-0-0-0-1-0	DIN EN 61386-22 (VDE 0605 Teil 22)

Use according to DIN VDE 0100-520:2013-06 / IEC 60364-5-52:2009-10			
		allowed	not allowed
Installation outdoors	Unprotected installation		x
Installation in the building	Unprotected installation (on plaster)	x	
	Underground installation (screed)		x
	Laid in concrete		x
	Laid in hollow wall / wood (flammable materials)	x	
	Laid in plaster	x	
	Laid in structural cavities	x	
	Laid in suspended ceilings	x	
	Ceiling installation (installation distance < 0.80m)	x	

Use of the speed•pipe® indoor 7x1,5, 12x2,0 and 14x2,0:

Classification		
Classification code DIN EN 61386-22 (VDE 0605 Teil 22)	3-3-2-2-2-2-0-0-0-1-0	

Use according to DIN VDE 0100-520:2013-06 / IEC 60364-5-52:2009-10			
		allowed	not allowed
Installation outdoors	Unprotected installation	x	
Installation in the building	Unprotected installation (on plaster)	x	
	Underground installation (screed)	x	
	Laid in concrete	x	
	Laid in hollow wall / wood (flammable materials)	x	
	Laid in plaster	x	
	Laid in structural cavities	x	
	Laid in suspended ceilings	x	
	Ceiling installation (installation distance < 0.80m)	x	

3.2 Bending radius

The minimum bending radius for speed•pipe® indoor is 10x the outer-Ø (e.g. speed•pipe® indoor 7x1.5 = 70mm minimum bending radius).

Note: In a bending radius, connection sleeves must be avoided, as these can lead to the stop of a blow-in operation, due to the inner edge of the open center stop.

Recommendation: Always use the largest possible bending radius, as the best possible blow-in performance is to be expected. Minimize the number of bending radius.

3.3 Tensile forces

Max. recommended tensile force and tensile load of the speed•pipe® indoor in N (at 20 ° C):

speed•pipe® indoor	Max. rec. tensile force	Tensile load
4x0.75	30	80
5x0.75	40	100
7x1.5	200	400
10x1.0	200	400
12x2.0	300	900
14x2.0	350	1.100

3.4 Cutting speed•pipe® indoor

For cutting the speed•pipe® indoor do not use a cutting tool such as a saw.

Cutting the speed•pipe® indoor for the connection with the connector (DSM indoor) must be done by means of a straight, right-angled cut to the pipe axis.

A cut-off speed•pipe® indoor, which is not subsequently connected to the DSM indoor connector, must be immediately closed against contamination and water penetration with the corresponding EZA-t or ES indoor. Please refer to the mounting instructions for the assembly of the connector.

Recommendation: separate speed•pipe® indoor with a speed•pipe® cutter.

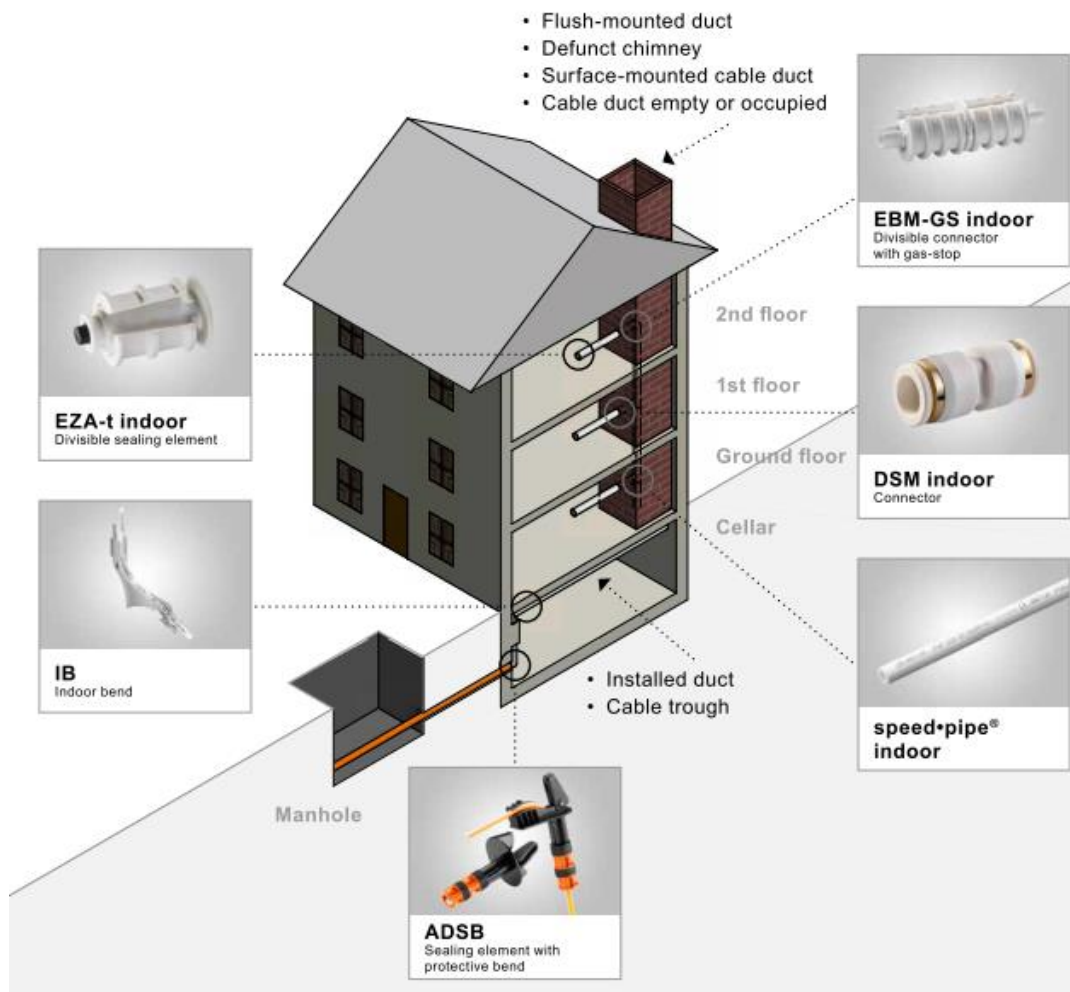


speed•pipe®-cutter

4. Firewall

Generally at the choice of the type of firewall please consider that the use of “pliable electrical installation pipes according to DIN EN 61386-22” or the direct use of speedpipe-indoor must be permitted in the respective AZB (General Technical Approval) or ETA (European Technical Assessment). Furthermore in the ABZ / ETA the compliance of the pipe material (synthetic/plastic) and the permitted pipe dimension must be observed.

For detailed information about the range of applications of the single firewalls, for example the possibility of the performance with bundled speed•pipe® indoor please contact the respective manufacturer of the firewall, your expert for fire protection or your technical expert.



manufacturer	name	license	valid time	fire resistance
FST	FST-Kabelbox-Kombi <i>optional: pistol-foam FST B1</i>	ABZ / Z-19.15-1042	01.03.2021	S 90
HILTI	Brandschutzstein CFS-BL P <i>optional: fire protection filling mass CFS-FIL</i>	ABZ / Z-19.15-2088 ABZ / Z-19.15-2083 ABZ / Z-19.15-2112	15.04.2018 11.12.2019 17.02.2019	S 30 S 90 S 90
Kaiser	KSS Kaiser firewall system DS 90	ETA-11/0188	no	till EI 90
Walraven	BIS Pacifyre IWS fire protection stone <i>optional: IWP fire protect sealant</i>	ETA-14/0307	no	EI 90 / EI 120
Wichmann	WD 90, system Wichmann <i>optional: fire protect foam / silicone</i>	ABZ / Z-19.15-202	02.12.2018	S 90
Würth	Würth cablebox short <i>optional: PURlogic EASY-foam / fire protect cement MG 3 / silicone transparent</i>	ABZ / Z-19.15-1428	19.03.2020	S 30 / S 90
Würth	Würth cablebox long <i>optional: PURlogic EASY-foam / fire protect cement MG 3 / silicone transparent</i>	ABZ / Z-19.15-1429	02.12.2020	S 90
Zapp-Zimmermann	Kombischott ZZ-stones 200 BDS-N <i>optional: fire protect sealant BDS-N</i>	ABZ / Z-19.15-1182	17.12.2020	S 90
Zapp-Zimmermann	System ZZ-Stopfen BDS <i>optional: fire protect sealant BDS-N</i>	ABZ / Z-19.15-1316	01.06.2020	S 30 / S 60 / S 90
Zapp-Zimmermann	ZZ-Brandschutzschaum 2K NE <i>optional: cartridge pistol 2K NE</i>	ETA-11/0206	27.06.2018	till EI 120

The examples at point are to show you various firewall manufacturers and their products. Thus is to point out a certain range of manufacturers and products.

The listed firewall-types were checked in consultation with the relative manufacturer of the firewalls for their applicability with speed[®] pipe indoor. There is no guarantee for the topicality of this compatibility, because the above mentioned products and their approvals are not subject to the responsibility of the company gabo Systemtechnik GmbH and furthermore also not to the modification status. Therefore it is necessary to check and determine the compatibility with the respective firewall manufacturers, with your fire safety engineer or your technical expert.

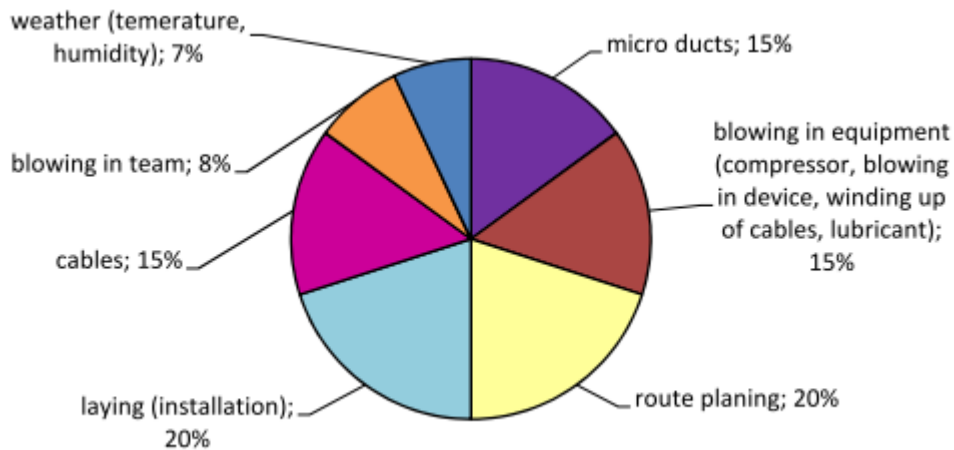
5. Blowing in of microcables / minicables / bundle fibers

Ideal blowing in values are achieved at a temperature range of 5 ° to 20 ° C. The cable may not be exposed to direct sunlight.

It is also helpful to use tested lubricants recommended by specialized companies.

The blowing in lengths to be achieved depends on several factors.

Influencing factors for the successful blowing in of cables in speed•pipe® indoor



Rules for the assignment of speed•pipe® indoor in buildings

The installation of speed•pipe® indoor in buildings generally is subject to different rules and parameters than in the outdoor area.

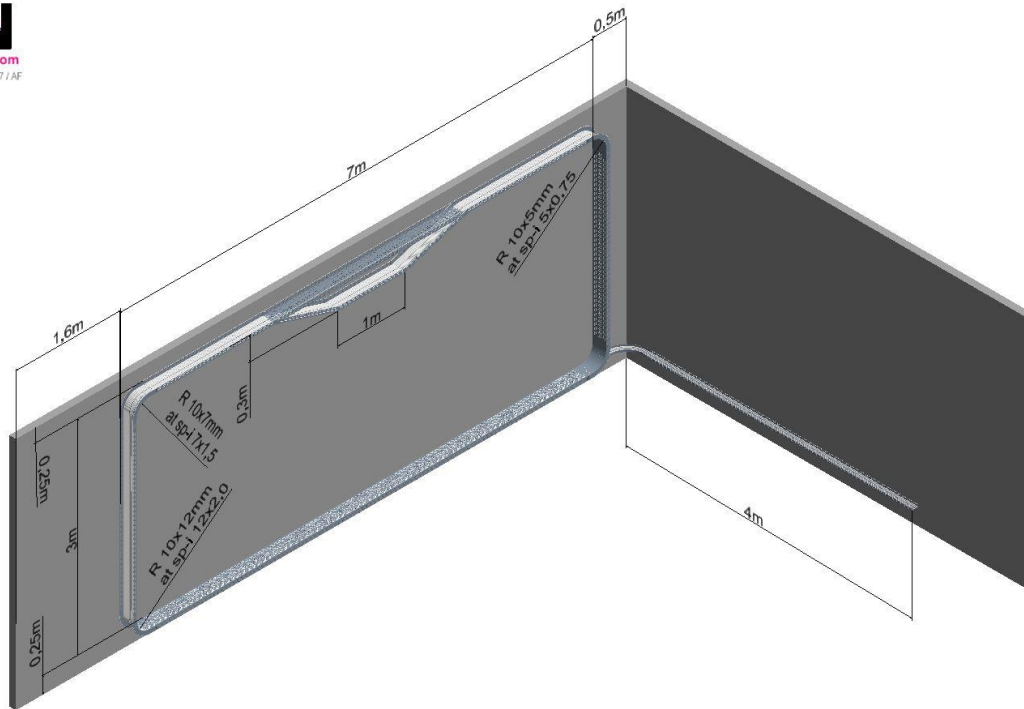
The adaptation to the local laying paths requires frequent bends of speed•pipe® indoor. These pipe bends require particular attention with regard to the bending radius, which should not fall below a radius of $10 \times$ of the pipe diameter in the case of free bending (no bending control element).

This ensures that the ovality of the speed•pipe® indoor in the bending area reduces the free internal diameter only within the limits specified.

Reference values for blowing in

The following values serve as a guideline as to which combinations of speed•pipe® indoor and fiber optic cables have already been tested in-house.

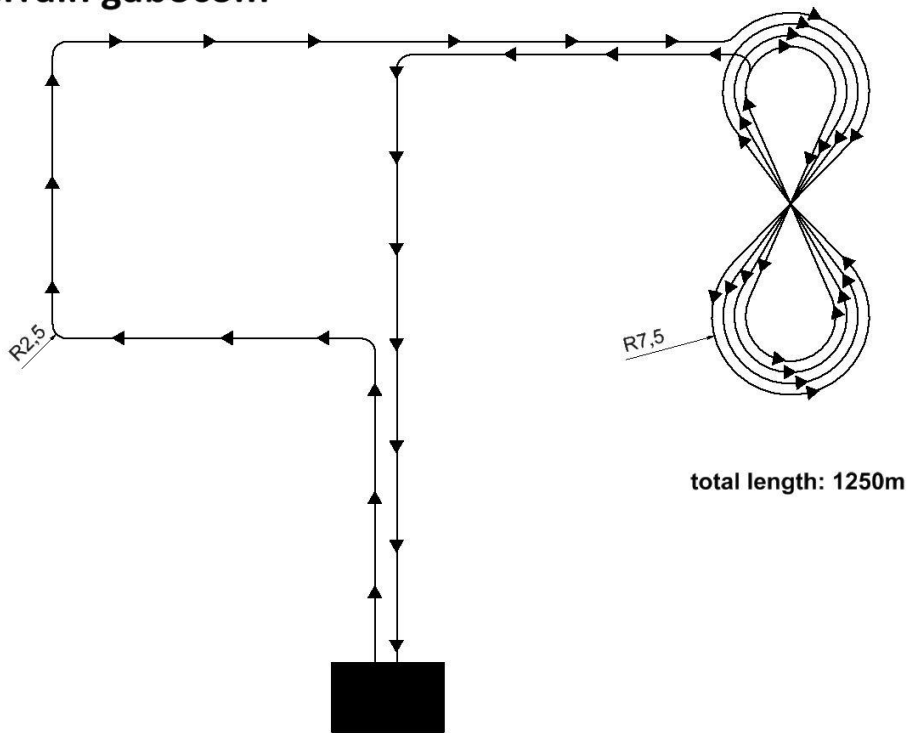
The "Indoor" test track measures 150m in length and includes 30x 90° bends, as well as a height offset which simulates four 45° arches.



Outer diameter fiber optic cable	Blowing in equipment	speed•pipe® indoor 5x0.75	speed•pipe® indoor 7x1.5	speed•pipe® indoor 12x2.0
∅ 1.2mm	Vetter ServoJet ES 60 Vetter VE 240	✓		
∅ 1.2mm	Vetter UltimaZ ULV 20 Vetter VE 100	✓		
∅ 2.2mm	Vetter UltimaZ ULV 20 Vetter VE 100		✓	
∅ 2.4mm	Vetter UltimaZ ULV 20 Vetter VE 100		✓	
∅ 2.5mm	Vetter MicroJet PRM 196 Vetter MK 17.2		✓	
∅ 2.6mm	Vetter MicroJet PRM 196 Vetter MK 17.2		✓	
∅ 4.5mm	Vetter MicroJet PRM 196 Vetter MK 17.2			✓
∅ 4.5mm	Vetter MiniJet P 02 Vetter MK 17.2			✓
∅ 6.0mm	Vetter MiniJet P 02 Vetter MK 17.2			✓
∅ 6.3mm	Vetter MiniJet P 02 Vetter MK 17.2			✓

The test track "Outdoor" for the tests measures 1.250m length and includes four 90° arches with R = 2.5m, as well as eight 180° arches with R = 7.5m.

Test terrain gabocom



Outer diameter fiber optic cable	Blowing in equipment	speed pipe® indoor 10x1.0	speed pipe® indoor 12x2.0
∅ 6.3mm	Vetter MiniJet P 02 Vetter MK 17.2	✓	✓

Requirements to achieve optimum injection lengths in speed•pipe® indoor

- the micro cable / mini cable / bundle fibers

- The cable diameter should be within the specified diameter ranges (see table)

speed•pipe® indoor	min. cable diameter*	recommended cable diameter*	max. cable diameter*
4x0.75	0.8 mm	1.0mm	1.2mm
5x0.75	0.8 mm	1.8 mm	2.0 mm
7x1.5	1 mm	2.3 mm	2.7 mm
10x1.0	2.5 mm	6.2 mm	6.5 mm
12x2.0	3 mm	6.2 mm	6.8 mm
14x2.0	3 mm	8 mm	8.7 mm

* inclusive tolerances

- The cable diameter has a considerable influence on the injection length

- Because of the various influencing factors during the installation of speed•pipe® indoor in buildings, the different cable constructions and the various methods of introducing the cables into the pipes, the following rules should be taken into account when planning pipe systems for fiber-optic networks in buildings:

- In the interior the cables should have a preferably small diameter
- The central support elements of the cables should have a preferably small diameter, to allow a greater flexibility
- The routing of several cables with a lower number of fibers is preferable

- When selecting the indoor cables take care that the cable has a longitudinal stiffness which can transmit the axial forces of the slide-in unit well. If the cable has a central support element, this is to be suitably made flexible on the first 50mm (e.g. breaking the fiber web)

- The cable diameter should be even and should not fluctuate by more than 0.3 mm

- The cable jacket should be as smooth as possible

- The outer surface of the cable should be dry and clean and should not exceed a temperature of 25 ° C (ideally 15° C)

- Ideally the cable is optimized for speed•pipe® indoor and certified on a test track

- The cable should not show any lateral run-out

- **Blowing in of micro cable / minicable / bundle fibers**

- The coil of the cable must be easily rotatable
- Ensure that the coil can be braked immediately in case of an unexpected stop
- Ensure the cable is clean
- Clean the speed•pipe® indoor (inside) with a clean cylindrical sponge
- Use a suitable blow-in device (for example, Vetter)
- Use a compressor with a strong airflow, with max. pressure of 15 bar (1 m³ air volume for speed•pipe® indoor to inside diameter 12mm)
- The air from the compressor should be clean, oil-free, dried and cooled down with an aftercooler to a temperature that is 8°C to 10°C higher than the ambient temperature
- The maximum blowing in speed should be limited to 80 m / min
- A cable guide head should be installed at the cable tip

- **Lubricant**

- Use suitable lubricant (e.g. Vetter)
- Pay attention to correct dosage according to manufacturer's instructions
- Spread the lubricant in the speed•pipe® by means of a cylindrical sponge before blowing in the cable

6. Pictures from building site





