



People nowadays expect higher standards of comfort, and that makes heavy demands on building systems – especially when it comes to climate management. pinta LINEAR Absorber combines the advantages of concrete core temperature control with good room acoustics.

## >> Service

- Call our telephone hotline for advice on your individual situation.
- Animated installation guides are available on the Internet.

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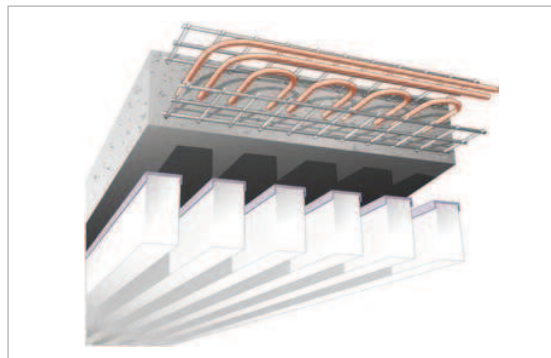
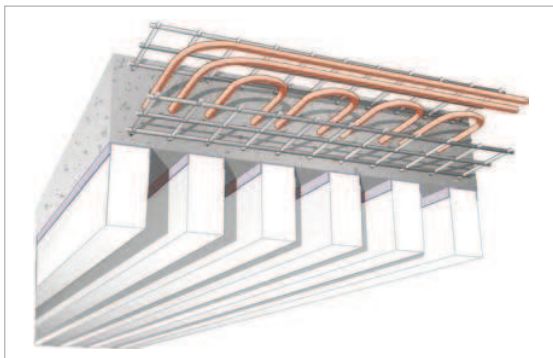
**LINEAR Absorber – because efficient climate control and good room acoustics go together**

For modern office and administration buildings, concrete core temperature control is a comfortable and environment-friendly alternative to air-conditioning. It utilizes the storage mass of building components: The heat loads occurring in the room are absorbed by the solid building elements. To fulfill the requirements for concrete core temperature controlled office premises, pinta has developed LINEAR Absorber. This offers greater thermal efficiency compared with a ceiling cloud: LINEAR Absorber can achieve the same acoustic properties with a smaller ceiling area, so that it has less influence on the radiation of the concrete core temperature controlled ceiling area. This results in a significantly lower temperature increase in the room.



**>> Choose from a range of alternatives:**

- pinta PLANO Absorber
- pinta RONDO Absorber



### Product advantages

- Minimal reduction of cooling capacity in rooms with concrete core activation
- Environment-friendly, being free from synthetic and natural fibers, halogens and CFCs
- Quick and easy installation
- Safe, thanks to functionally tested and fireproof pinta acoustic adhesives
- Customized color schemes possible
- Extensive design freedom

### Dimensions

1,250 x 100 x 50 mm

1,250 x 150 x 50 mm

1,250 x 200 x 50 mm

### Colors

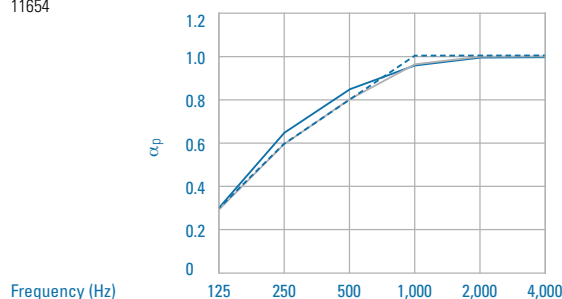


white



gray

Sound absorption coefficient  $\alpha_p$ , pinta LINEAR Absorber, according to DIN EN ISO 11654



Absorber LINEAR, RMA 100/0, absorber spacing 100 mm

—  $\alpha_p$  0.30 0.65 0.85 0.95 1.00 1.00

Absorber LINEAR, RMA 150/0, absorber spacing 100 mm

—  $\alpha_p$  0.30 0.60 0.80 0.95 1.00 1.00

Absorber LINEAR, RMA 200/0, absorber spacing 100 mm

- -  $\alpha_p$  0.30 0.60 0.80 1.00 1.00 1.00

### LINEAR Absorber product data

#### Support profile

Characteristic	Value
Base material	Extruded aluminum profile
Color	plate finish
Weight	1.36 kg each
Element length	4,000 mm

#### Requirement

Row center distance 200 mm	5 meters per m <sup>2</sup>
Row center distance 150 mm	7 meters per m <sup>2</sup>
Row center distance 100 mm	10 meters per m <sup>2</sup>

Status of manufacturer information: 06/07. Subject to technical changes.

### LINEAR Absorber product data

Characteristic	DIN	Value
Base material		Melamine resin foam
Colors*		white gray
Material density**	EN ISO 845	9.5 ± 1.5 kg/m³
Fire rating	DIN 4102	B1 (flame-retardant)
General test certificate issued by building authorities		P-NDS04-291
Absorber length		1,250 mm
Absorber height		Variable, see checklist
Absorber thickness		50 mm
Thermal conductivity (d = 50 mm)	DIN 52 612	$\lambda_{10,0r} < 0.035 \text{ W/mK}$
Sound absorption coefficient (d = 50 mm; 2,000 Hz)	DIN 52 215	> 90 %
Tensile strength	DIN EN ISO 179	120 to 180 kPa
Percentage elongation after fracture	DIN EN ISO 1798	15 to 29 %
Compression hardness	ISO 3386-1	6 to 11 kPa
Diffusion resistance coefficient	DIN 52615	approx. 1 to 2
Length-specific flow resistance	DIN EN 29053	8 to 20 kNs/m⁴
Long-term temperature stability		180 °C
Short-term temperature stability		220 °C
The foam may have pores of different sizes according to the texture.		

\* Colors may vary.

\*\* Pursuant to EN ISO 845 determined with samples having the following minimum dimensions:  
250 x 250 x 250 mm.

Requirement for rail length of 4,000 mm	
for pattern with a joint width of 125 mm	3 pieces

### Acoustic adhesive S product data

Characteristic	Value
Material basis	Polydimethylsiloxane-based adhesive
Components	Single-component
Weight	approx. 1.04 g/ml
Classification according to	
- Hazard Classification Code – Road (GGVS)	Not hazardous cargo
- Hazard Classification Code (GefStoffV)	No labeling requirement
Supplied in	310 ml cartridge
Shelf life	At least 12 months if stored in a dry place in sealed original packaging
Storage	Frost-free and not above +30 °C
Usage temperature	+5 °C to +40 °C
Consumption/yield	approx. half a cartridge per m²
Cement bed thickness	2 to 3 mm bead
Working time *	approx. 5 minutes
Hardening time (full strength) *	approx. 24 h

\* At 23 °C and 50 % r.h.

Requirement	
Consumption/yield	approx. 0.1 cartridge per meter

### >> Please note

- Light reflectance according to DIN 5036 T3 for willtec white: > 85 %
- Light reflectance according to DIN 5036 T3 for willtec gray: > 42 %
- Does not promote microbial metabolism according to DIN EN ISO 846

**System description**

pinta LINEAR Absorber is used in combination with pinta support profiles (extruded aluminum profiles) and pinta absorber elements made from willtec foam on a melamine resin basis in standard sizes of 1,250 mm x 50 mm thick in various heights.

The building material class is B1 according to DIN 4102.

The surfaces of the individual absorbers can be sprayed in the factory with fireproof paint conforming to the RAL color chart.

The support profile is supplied as standard with a plate finish, untreated aluminum surface available.

**How pinta LINEAR Absorber works**

The functioning of pinta LINEAR Absorber is explained on the basis of the following study. This investigation reveals the differences between possible acoustic measures using a ceiling with concrete core activation. The aerophysical simulation calculations were performed in collaboration with SCHMIDT REUTER PARTNER using the PHOENICS CFD program.

**Effect of acoustic measures on room climate**

The diagrams showing the sample room simulate and visually represent the interaction of acoustic measures with concrete core temperature controlled ceiling areas. Critical variables are: the equivalent ceiling areas, the room temperature and the selected acoustic measure at the ceiling.

In all office rooms, particularly rooms permanently containing several people, acoustic measures are essential (see page 7). In the case of single and combination of offices, acoustic requirements are not usually a problem. However, if the rooms are larger, or in the case of meeting rooms for example, additional acoustic measures are necessary.

An acoustically effective surface is needed in order to achieve the required reverberation times. This can be done for example by installing a ceiling cloud, which occupies 80% of the total ceiling area. The insulating properties of the ceiling cloud will basically cause the room temperature to rise beyond the comfort level (see page 8).

But if pinta LINEAR Absorber is used as an acoustic measure, far less ceiling needs to be covered in order to improve the acoustics. With an absorber height of 100 mm and a clearance of 100 mm, the thermally inactive area is only 33% compared with 80% for a ceiling cloud. For the sample room this results in an average temperature increase of 0.7 K instead of 2.8 K with window ventilation, or 0.6 K instead of 2.4 K with mechanical ventilation (see page 9).

**>> | Aim of the study**

This investigation reveals the differences between possible acoustic measures with a ceiling using concrete core activation based on the examples of a ceiling cloud and pinta LINEAR Absorber.

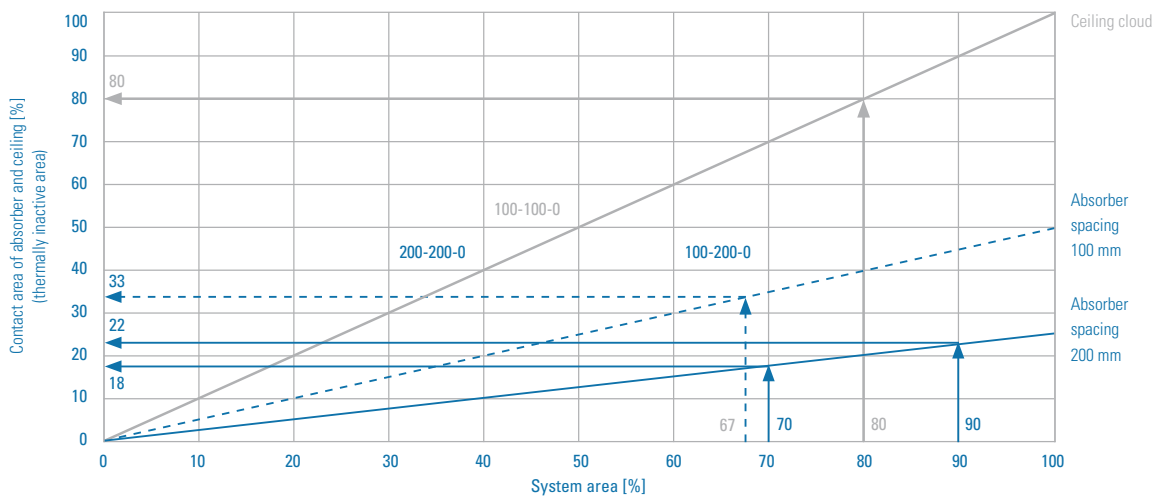
The aerophysical simulation calculations were performed in collaboration with SCHMIDT REUTER PARTNER using the PHOENICS CFD program.



### Analysis based on a sample room

CCTC / ceiling cloud / pinta LINEAR Absorber

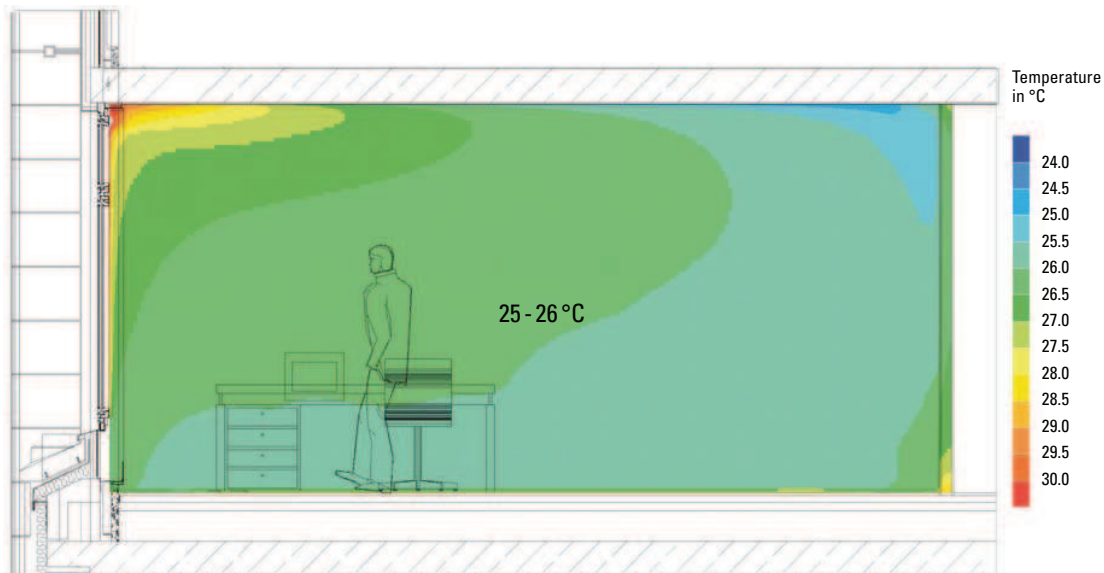
General data	
Sun protection	Fc = 0.25 active above 200 W/m <sup>2</sup> solar radiation on the facade 12 W/m <sup>2</sup>
Lighting	50 % base lighting 50 % with sun protection closed
max. operational room temperature	27 °C
Ventilation, fresh air temperature	the diagrams represent a situation with window ventilation
Area	160 m <sup>2</sup>
Volume	448 m <sup>3</sup>
Facade	South: external wall/parapet 15.5 m <sup>2</sup> ; window 8 m <sup>2</sup> North: external wall/parapet 18.0 m <sup>2</sup> ; window 40 m <sup>2</sup>
Cooling	concrete core temperature control 10 l/hm <sup>2</sup> ; 75 % active area, inlet temperature 18 °C Operating time: all day
Number of persons	20
PC, printer, fax machine	3,000 W (PCs + printers)
Facade	Ug = 1.3 W/m <sup>2</sup> K, Uf = 1.7 W/m <sup>2</sup> , g = 0.57
Parapet	Concrete / mineral wool
Pillar	Concrete / mineral wool
Floor	Wood / screed / air gap / concrete
Ceiling	Concrete / air gap / screed / wood floor
Interior wall 1	Plasterboard / mineral wool / plasterboard
Interior wall 2	Concrete



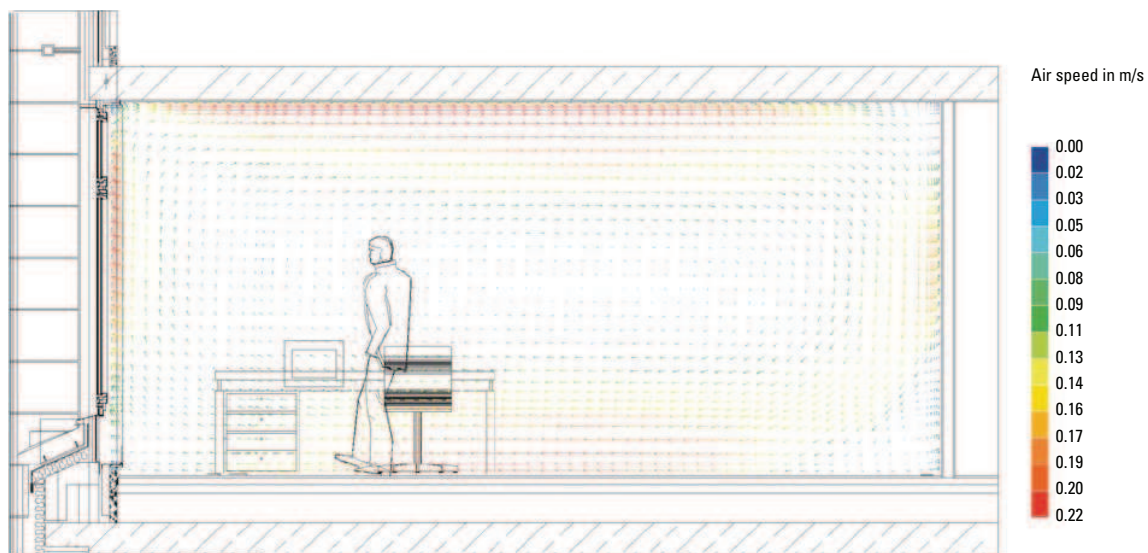
### >> Key data

- Sun protection: Fc = 0.25 active above 200 W/m<sup>2</sup> solar radiation on the facade
- South facade: external wall/parapet 15.5 m<sup>2</sup>; window 8 m<sup>2</sup>; north facade: external wall/parapet 18 m<sup>2</sup>; window 40 m<sup>2</sup>
- Cooling: concrete core temperature control  
10 l/hm<sup>2</sup>; 75 % active area; inlet temperature 18 °C  
Operating time: all day
- Volume: 448 m<sup>3</sup>
- Number of persons: 20

### Ceiling with concrete core activation without acoustic measures



Temperatures in room

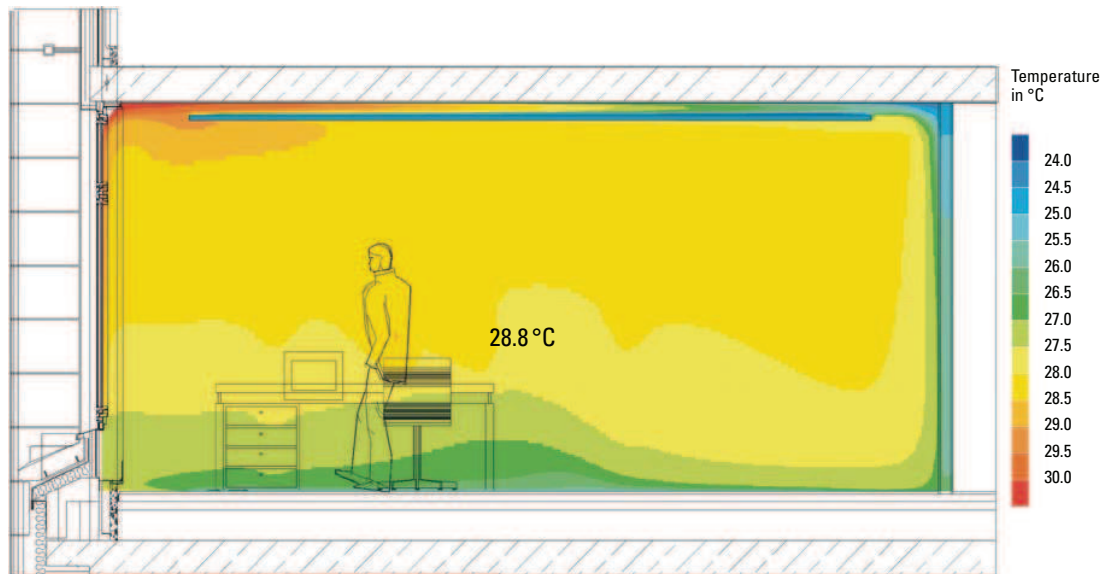


Air speeds in room

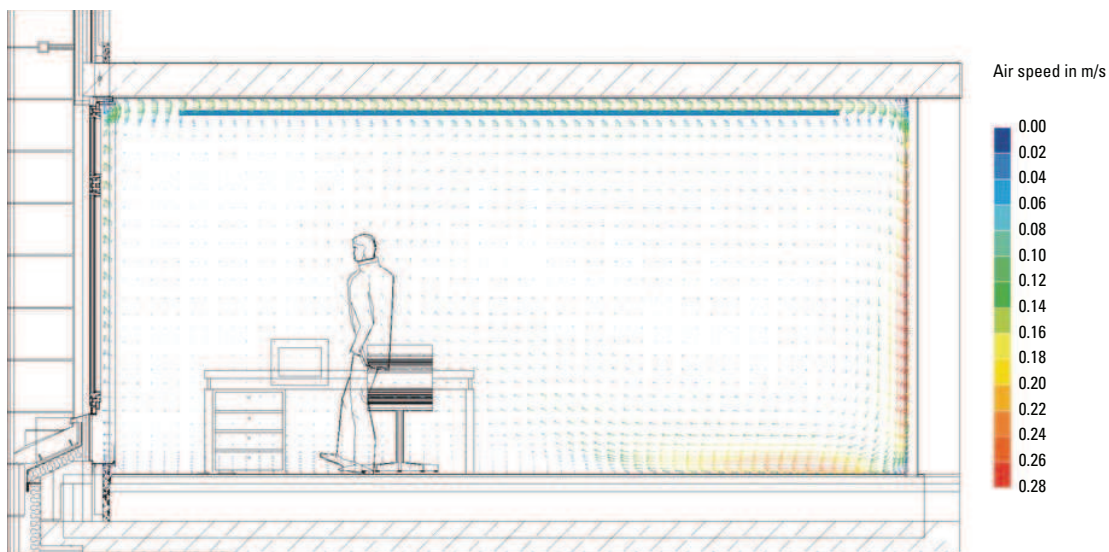
### >> Cooling through concrete core activation without acoustic measures

- Room temperature: 25.0 to 26.0 °C
- Cooling of room by concrete core temperature control achieved 100%
- Uniform air distribution in room
- Poor room acoustics due to absence of sound-absorbing surfaces

### Ceiling with concrete core activation and ceiling cloud



Temperatures in room



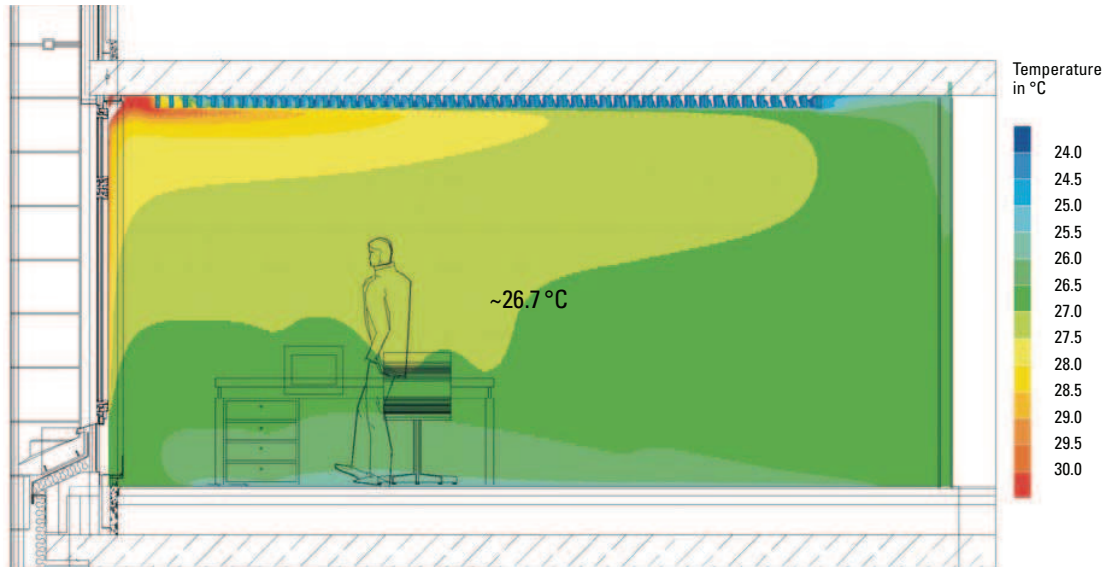
Air speeds in room

### >> Acoustic solution with ceiling cloud

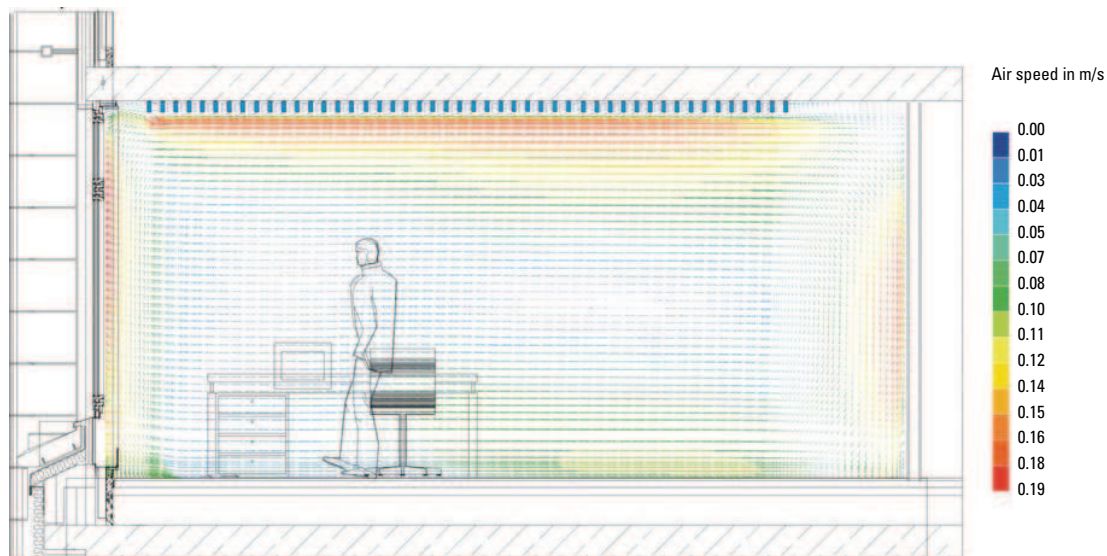
- Room temperature increased by 2.4 to 2.8 K. This corresponds to a temperature rise from approx. 26.0 to as high as 28.8°C, above the limit of DIN 1946.
- Concrete core temperature control hardly cools the room at all because the ceiling cloud occupies approx. 80% of the ceiling area and so acts as an insulator.
- Uneven air distribution in room
- Good room acoustics, as the sound absorbing area is sufficient



### Ceiling with concrete core activation with pinta LINEAR Absorber



Temperatures in room



Air speeds in room

### >> Acoustic solution with pinta LINEAR Absorber

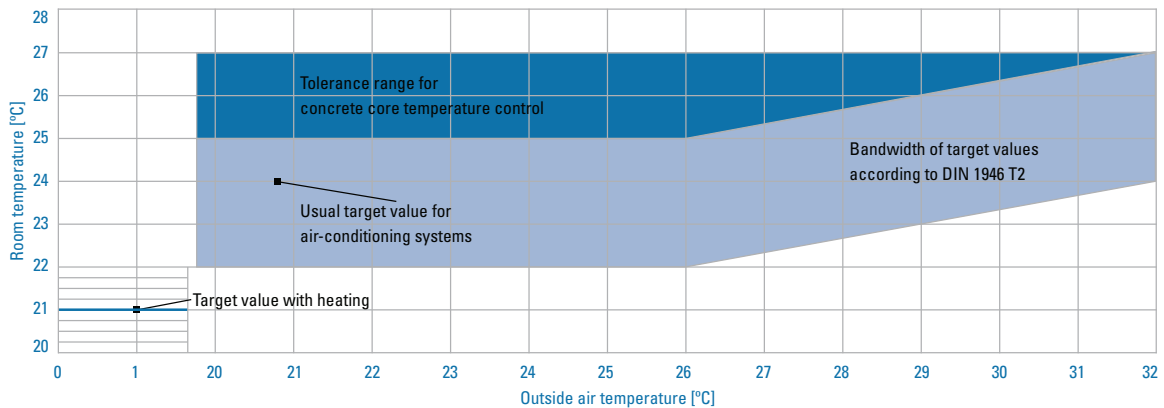
- Increase in room temperature compared with test 1 of 0.6 to 0.7 K. This corresponds to an increase in room temperature from approx. 26 to 26.7 °C (see test on page 6)
- Cooling of room by concrete core temperature control almost wholly achieved, because pinta LINEAR Absorber occupies only about 33% of the ceiling area
- Uniform air distribution in room
- Good room acoustics, as the sound absorbing area is sufficient

### Operational room temperatures according to DIN 1946 T2

A maximum operational room temperature of 27°C was adopted for the calculation; the normal outside temperature is 32°C. The operational, perceived temperature represents a value which, as well as air temperature, also takes into account the temperature of the surfaces enclosing the room and hence the exchange of radiation between skin surface and the cooling surfaces enclosing the room. Its value is dependent on the room temperature and fluctuates according to DIN 1946 between 22°C and 27°C. With concrete core temperature controlled systems, contrary to what is stated in the DIN standard, values above the target value can occur even with low outside temperatures due to system inertia (see table).

pinta LINEAR Absorber was developed to accommodate variable office concepts with constantly changing requirements, to give users a wide range of options. Different absorber intervals and absorber heights make it possible to create a flexible office environment, guaranteeing uniform and comfortable room acoustics without reducing the effectiveness of the concrete core temperature controlled ceiling areas.

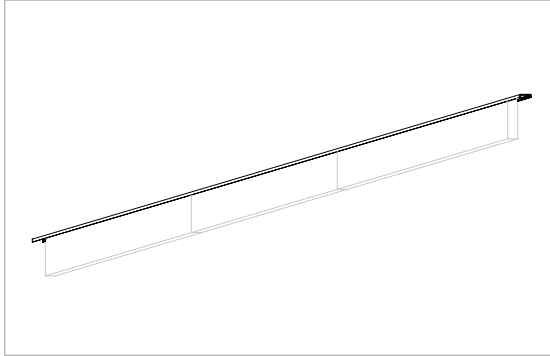
### Operational room temperature areas based on DIN 1946 T2



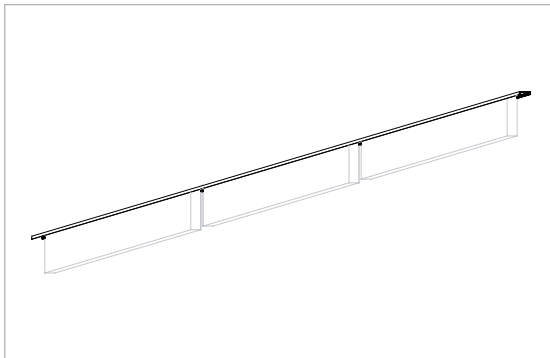
### >> Please note

Product details are based on our current knowledge and experience. In view of the wide range of possible applications, all information is provided without obligation and does not constitute a guarantee of prop-

erties. This also applies to any proprietary rights of third parties. We reserve the right to make technical changes in line with progress.



Laid continuously (butt jointed)



Laid with defined joint

#### Installation advice

Before mounting the support profiles, mark out the intervals according to the required row center distances. Each aluminum support profile is mounted mechanically on the rough ceiling with 3 conventional fixing accessories that are approved by the building authorities (e.g. hammer dowel or magazine nail for use with nail gun).

It is vital to pay attention to the position of the climate control installation under the surface of the concrete. The permitted drilling depth is usually less than 40 mm. After the support profiles have been installed, the absorber elements are inserted. A bead of pinta acoustic adhesive S is applied to the upper longitudinal edge of the pinta LINEAR Absorber element. The absorber is then inserted in the support profile and aligned.

The absorber elements can be mounted with joints or continuously (butt jointed). With continuous mounting the abutting edges must likewise be cemented to ensure neat butt jointing (see installation example).

Wear clean cotton gloves when installing pinta LINEAR Absorber and support profiles.

## >> Installation tips for builders and site managers

- Coordinate the installation of the aluminum support profiles with the construction schedule and other works.
- Only complete the installation works (insertion and alignment of pinta LINEAR Absorber) once the lighting has been installed and final site cleaning has been carried out, to avoid getting dirt on the elements.

## Checklist

### Material

willtec is a soft foam on a melamine resin basis with a density of  $9.5 \pm 1.5 \text{ kg/m}^3$ .

Building material class B1 (flame-retardant) according to DIN 4102.

General test certificate issued by building authorities: P-NDS04-291.

☐ Extruded aluminum profile 4,000 mm

### Color of support rail

- ☐ plate finish
- ☐ white (RAL 9016), powder-coated
- ☐ chrome-brilliant, powder-coated

### Absorber variants

- ☐ Format: 1,250 x 100 x 50 mm
- ☐ Format: 1,250 x 150 x 50 mm
- ☐ Format: 1,250 x 200 x 50 mm

General test certificate issued by building authorities: P-NDS04-291.

### Color of absorber

- ☐ white
- ☐ gray

### Acoustic adhesive S

- ☐ 310 ml cartridge (2-pack)
- ☐ 310 ml cartridge (12-pack)

## >> Contact / Enquiries

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