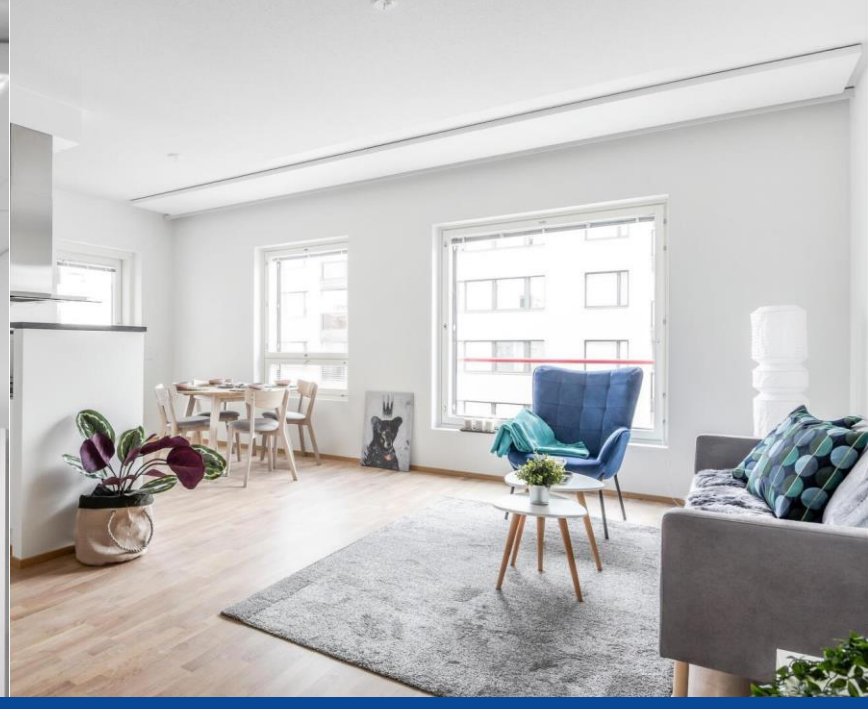
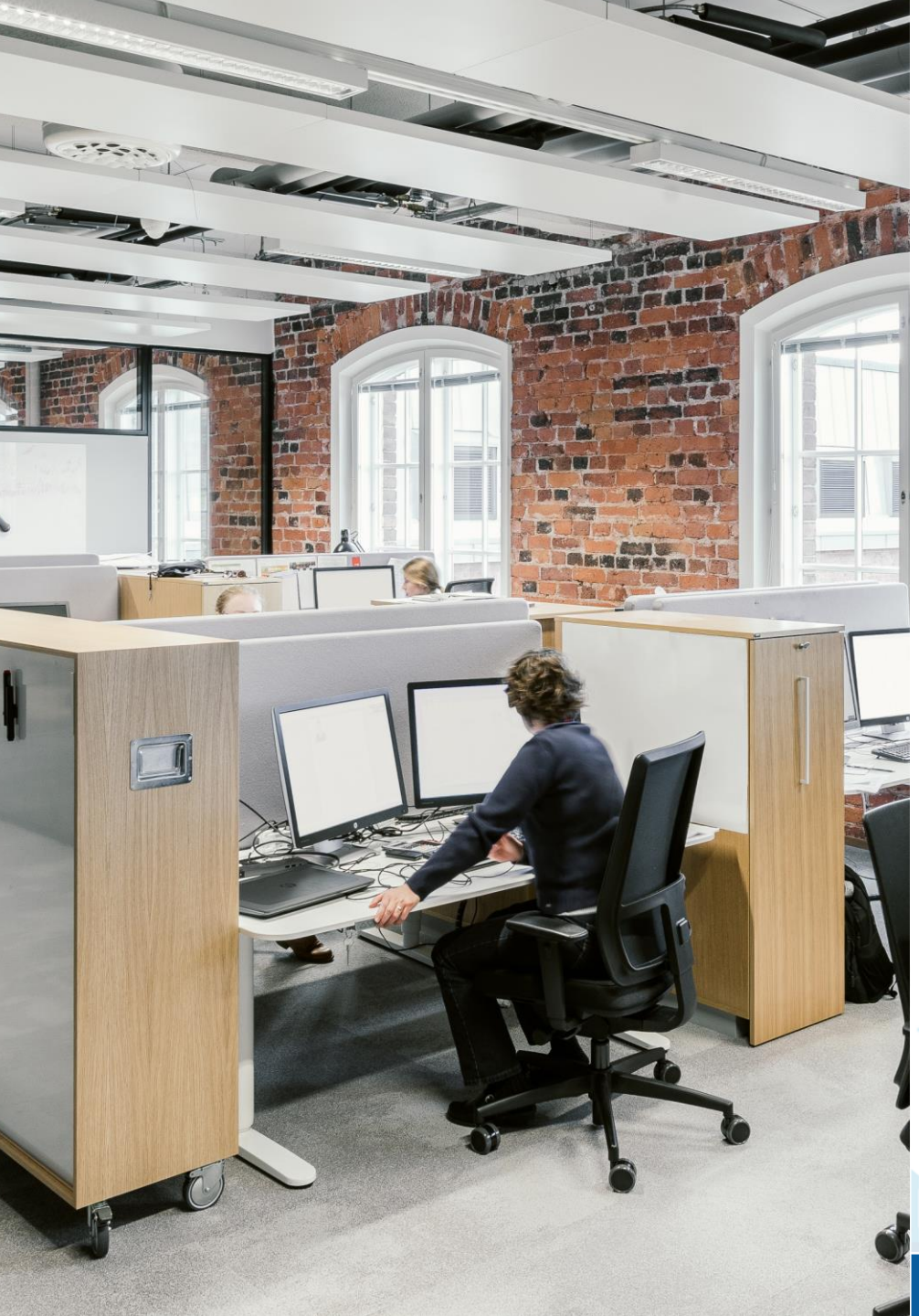


ENERGY-EFFICIENT HEATING AND COOLING WITH RADIANT CEILING SYSTEMS

itula

Quality Heating - www.itula.com



Itula Oy

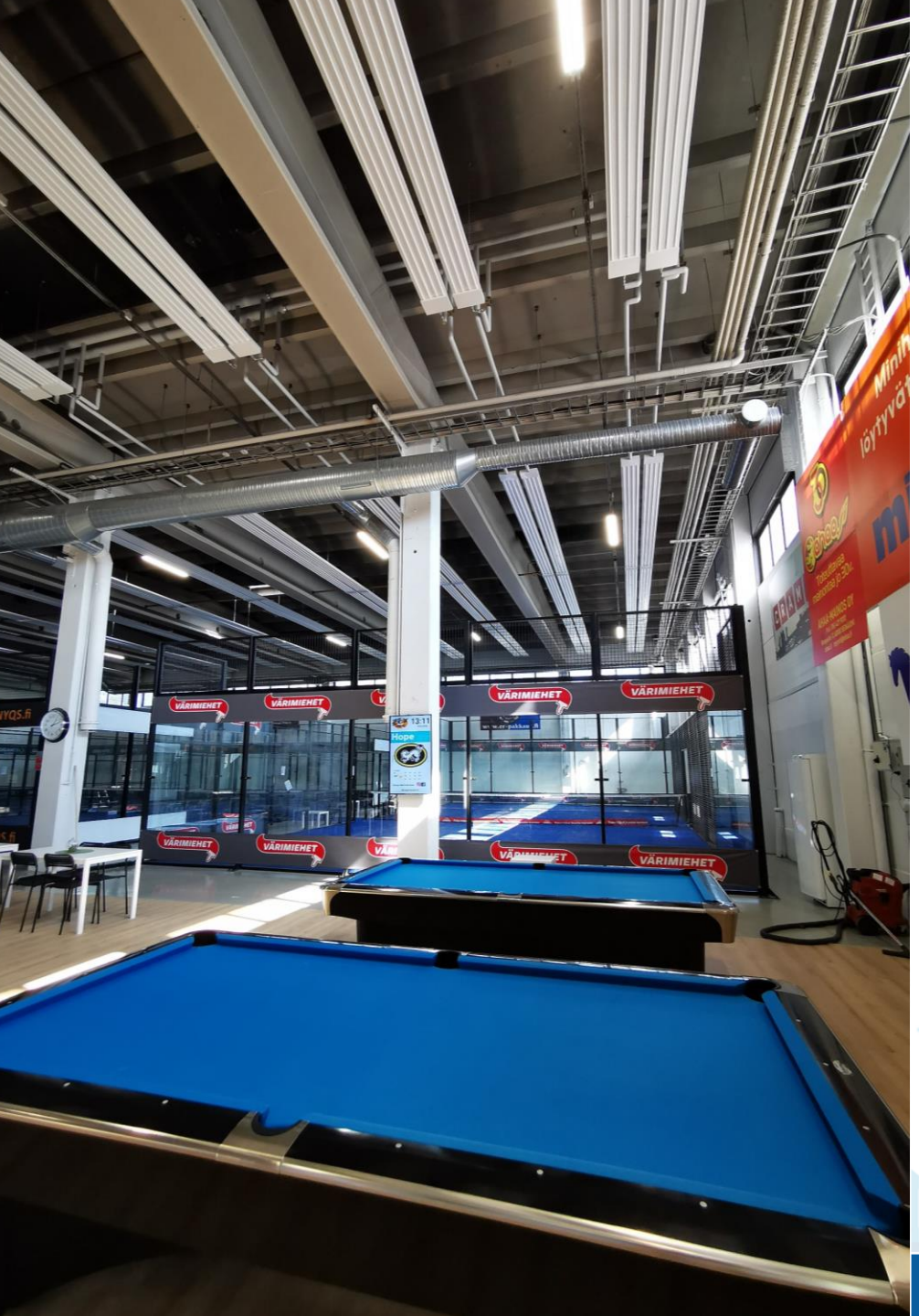
- Established: 1990
- Business premises:
  - Puntala H.Q. and Factory
  - Helsinki//Vantaa Sales Office
  - Turku Sales Office
- A Family owned Company

FINLAND'S LEADING SUPPLIER OF RADIANT HEATING AND COOLING SYSTEMS

Why radiant heating and cooling now?

Megatrend in the heating and cooling market in Europe

- Demand for low temperature systems
- Housing business opened in Finland → we have moved from apartments delivered to whole house blocks with ItuGraf -panels
- Hospital sector brake through with panels in Finland → all private hospitals deliver by Itula and several public hospitals
- Construction methods are changing from building site to factories, pre-fab modul constructing. Itula does have facilities to answer that kind of customer demands.
- Delivery limits are changing - there are already demand to integrate lights, sensors, sprinklers, electric and data sockets to the panel systems – ItuGraf Modul Panels

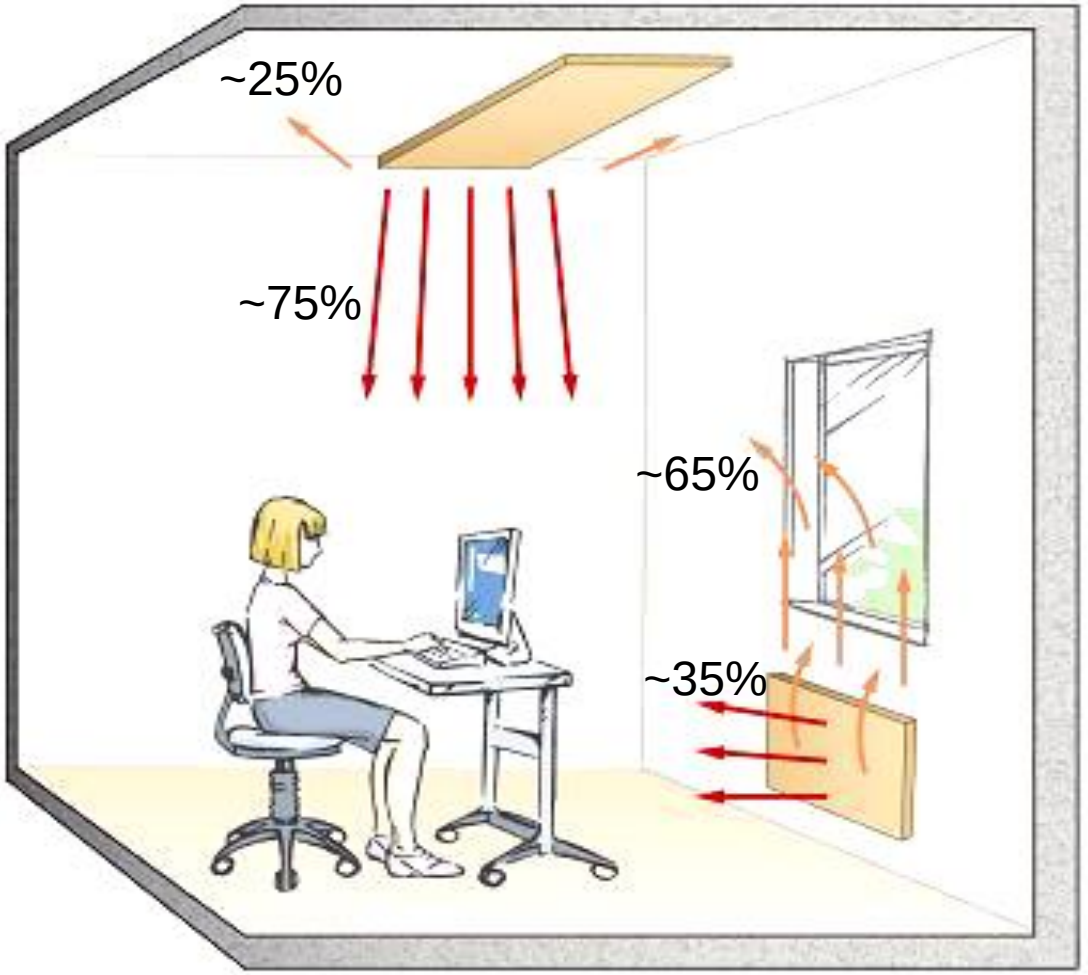


Why radiant heating and cooling now?

Megatrend in the heating and cooling market in Europe

- Panels are widely accepted by leading HVAC specifier companies
- Panels are easy to integrate with other building technology systems
- By our experience the panels are more and more popular in central Europe because of the Green building trend
- Global need for Energy Savings in Buildings to lower the Climate Change!

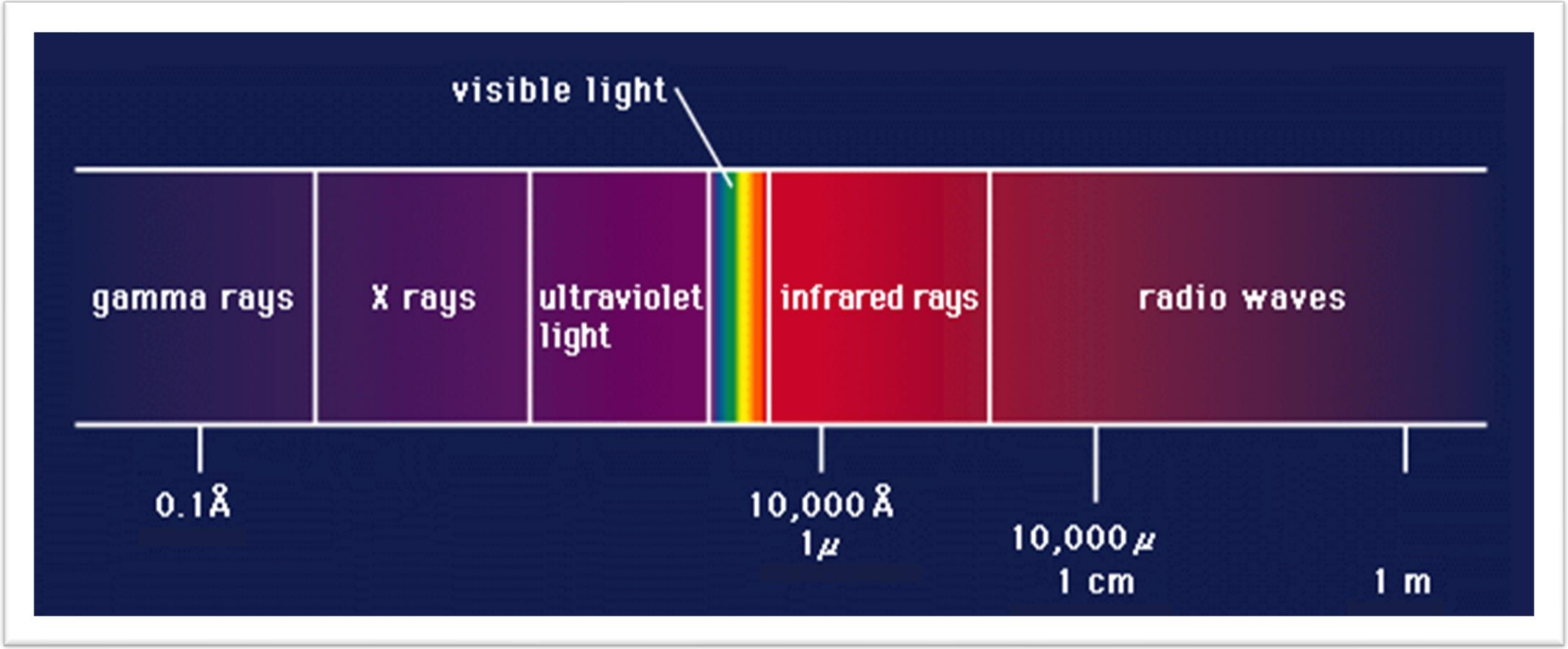
Thermal output differences between radiators and RHC Panels



Radiant Ceiling Panels
EN 14037

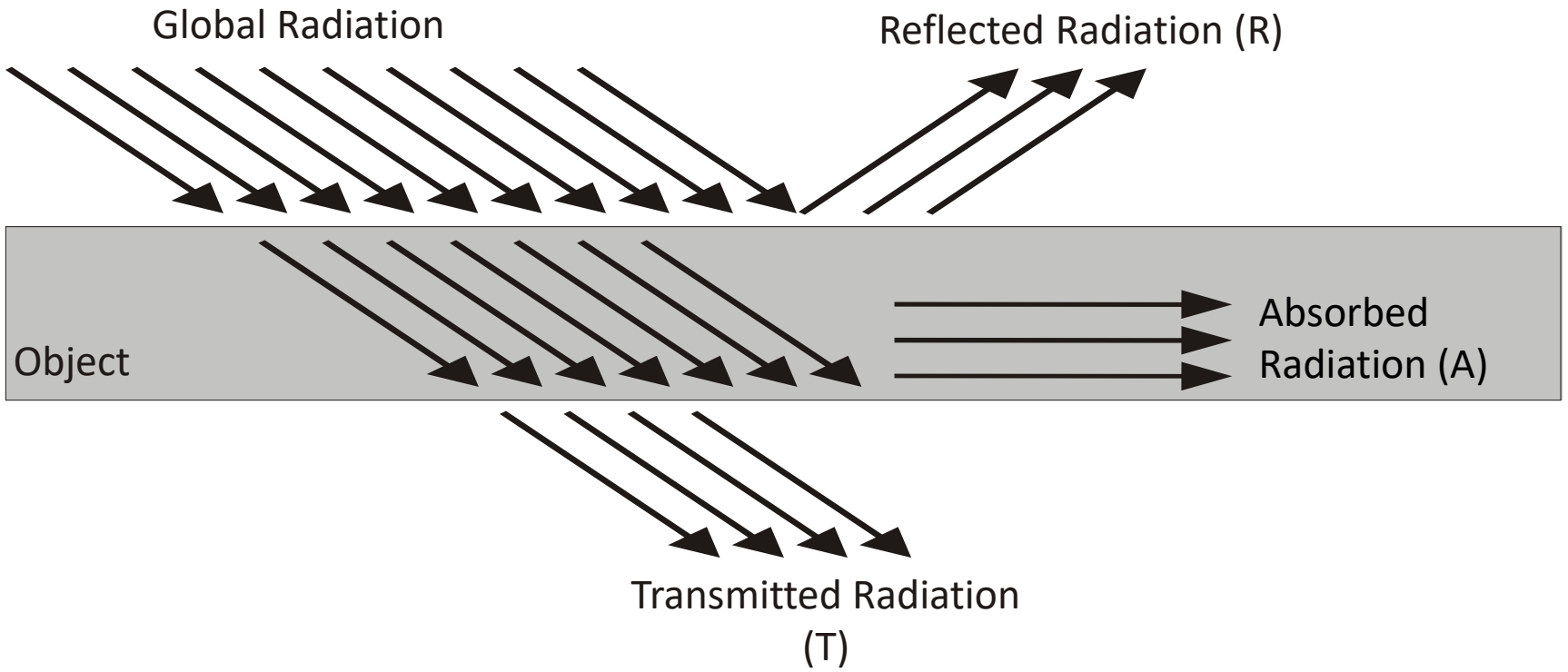
Radiators
EN 442

The range of electromagnetic waves



Energy conservation

Global Radiation =
R + A + T = 1



Theoretical radiant output

$$\dot{Q} = A \cdot C \cdot \varphi \cdot \left(\left(\frac{T_1}{100} \right)^4 - \left(\frac{T_2}{100} \right)^4 \right)$$

$\dot{Q}$ = Heat flux from thermal radiation
A = Radiation surface (m^2)
C = Radiation factor $\left(\frac{W}{m^2 K^4} \right)$
φ = Angle factor
T_1 = Medium surface temperature of the radiative body (K)
T_2 = Room temperature ($K = t°C + 273.15$)

Comfort conditions DIN 1946 part 2

Thermal comfort is achieved if a human perceives the:

- air temperature
- air humidity
- movement of the air
- heat radiation

in the surrounding as ideal

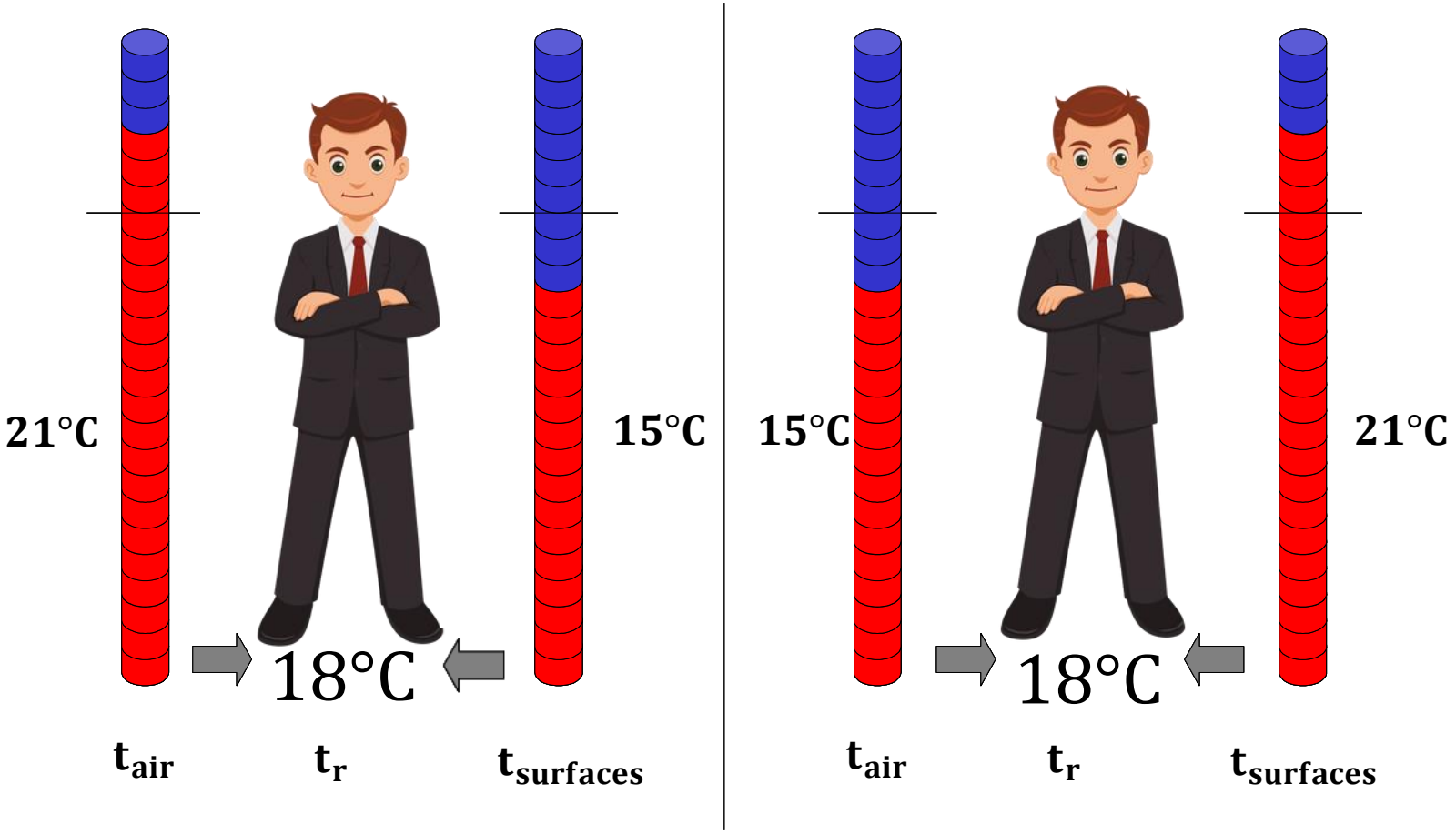
Our comfort depends on the temperature of the air and the surrounding surfaces

$$T_{resulting} = \frac{\left(T_{air} + T_{surrounding\ surfaces}\right)}{2} \qquad (= T_i)$$

Perceived temperature equals:

- resulting temperature
- operative temperature
- globe temperature

Perceived temperature heating



Perceived temperature heating

Ceiling panels

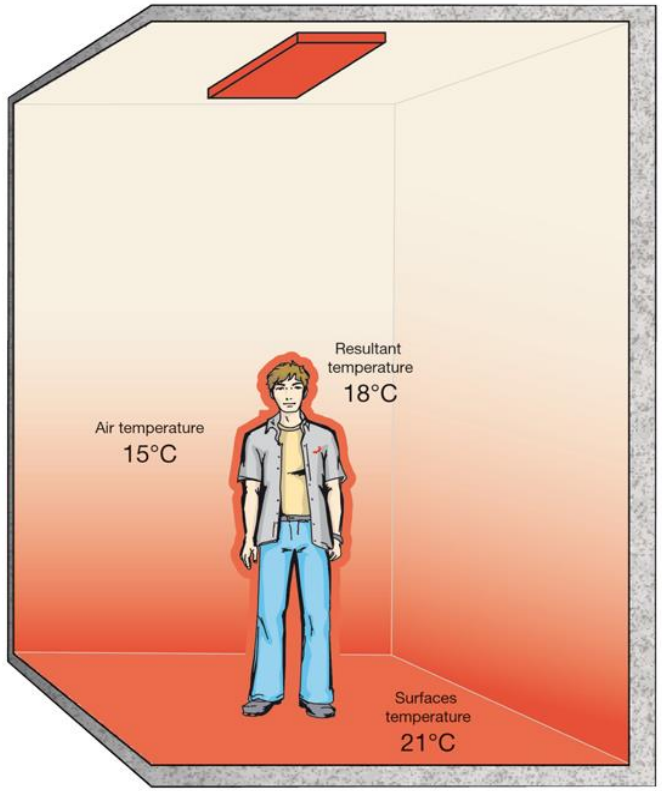


Fig. 4a: Radiant ceiling panels

Warm Air System

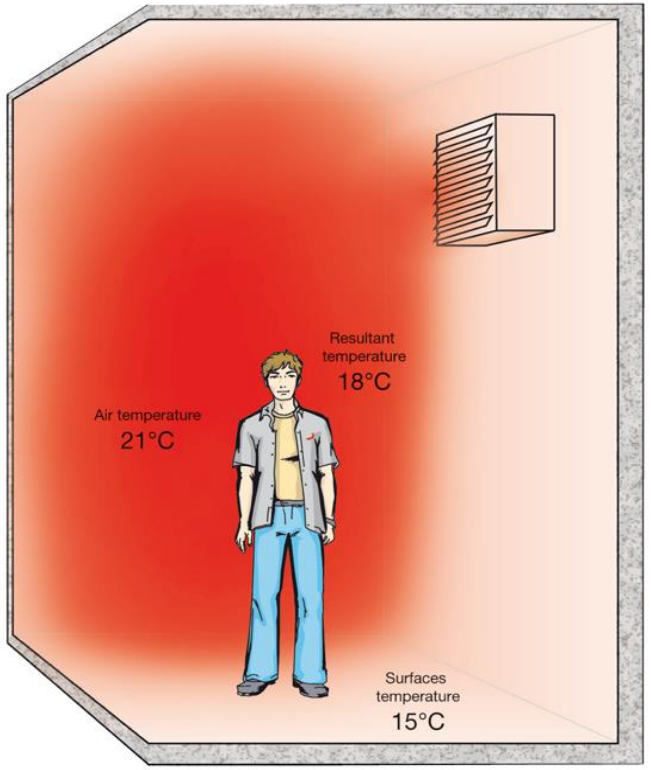


Fig. 4: Air heating

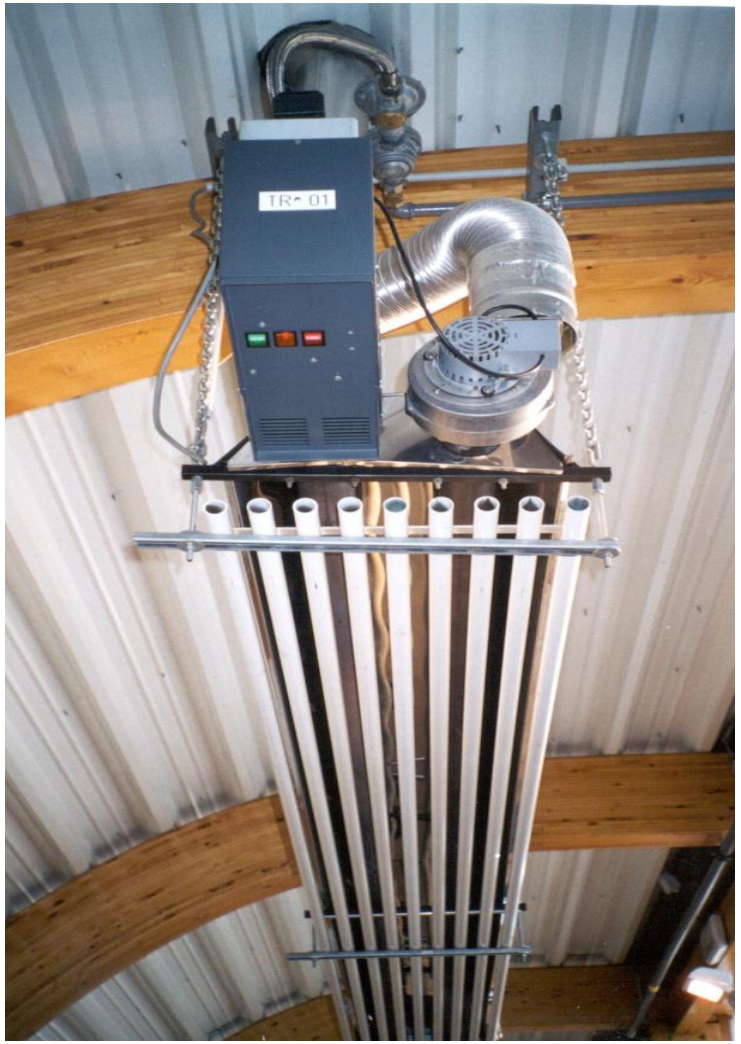
Different types of radiant heaters

Radiant ceiling panels:
According to EN 14037
Flow temperatures: **14℃ - 120 ℃**

Luminous gas radiant heaters – ceramic:
Open flame
According to DIN 3372 – 1
Surface temperatures: **500 ℃– 900 ℃**

Hot radiant tubes – infrared tubes:
Hot air or gas
According to DIN 3372 - 2
Surface temperatures: **150 ℃ - 400 ℃**

Gas radiant heater in Brussels (B)



High temperature /discomfort

High energy consumption

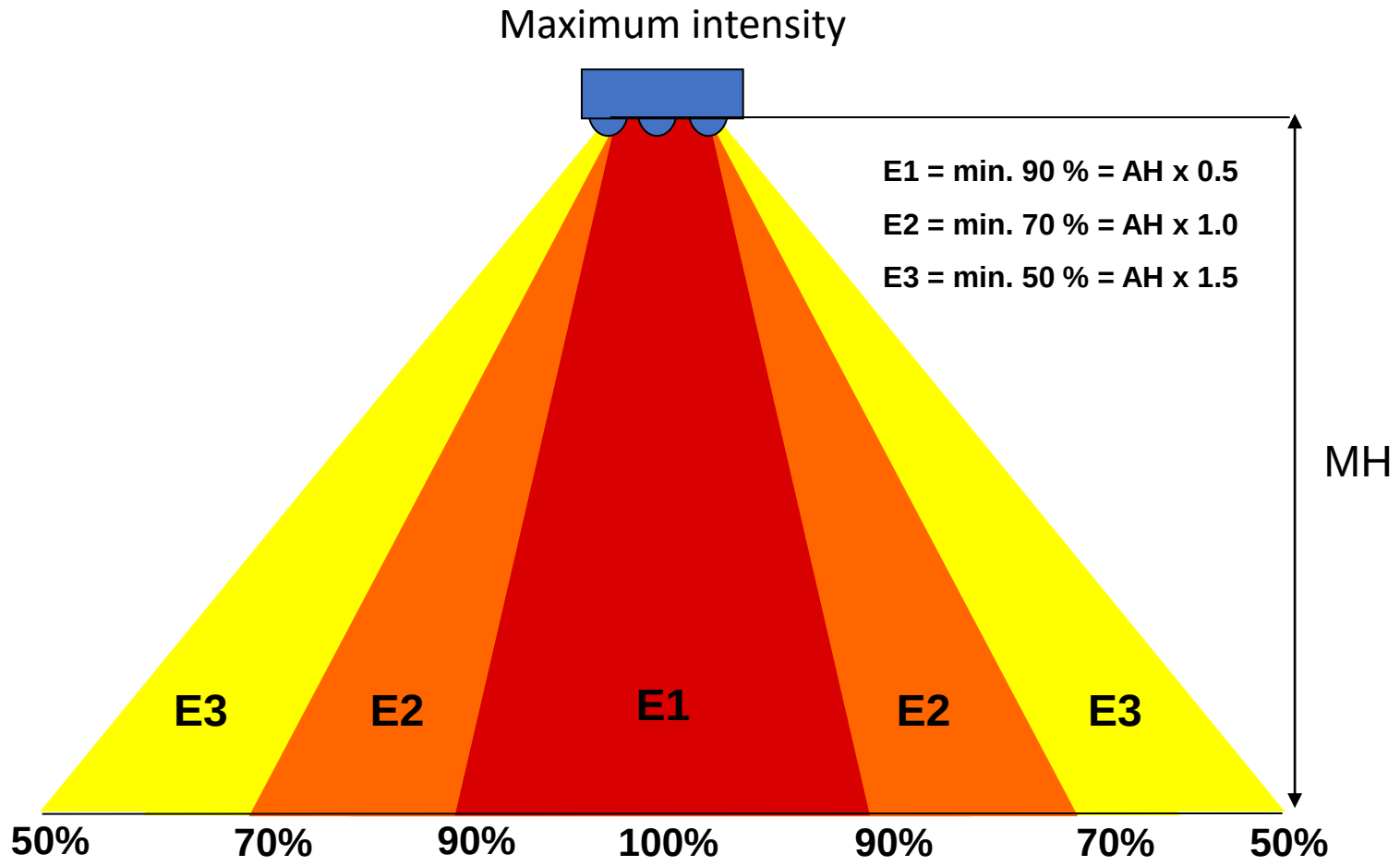
High maintenance costs

Risk of explosion

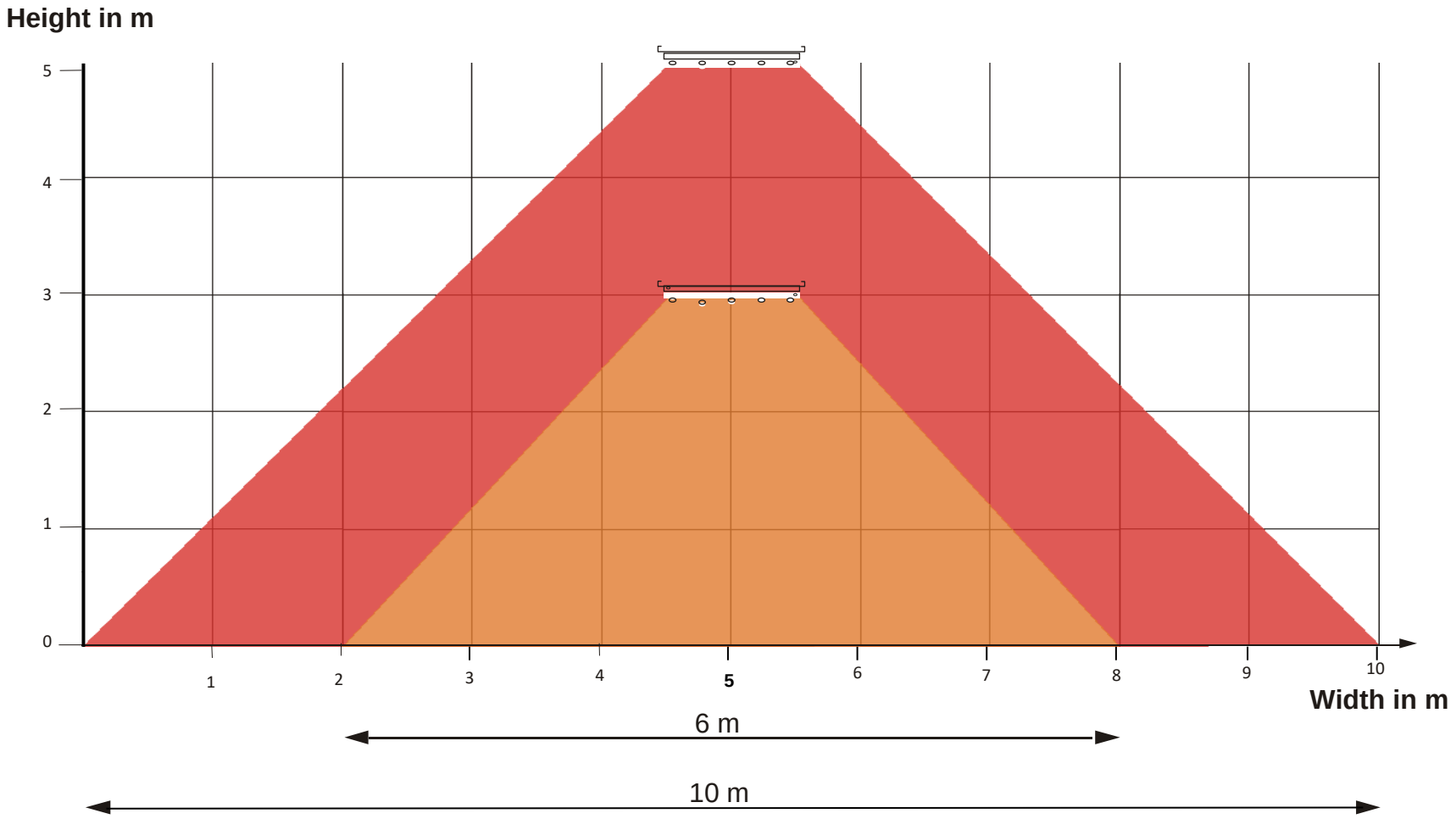
Uneven temperature profile

Short life cycle

The intensity of Ceiling Panels

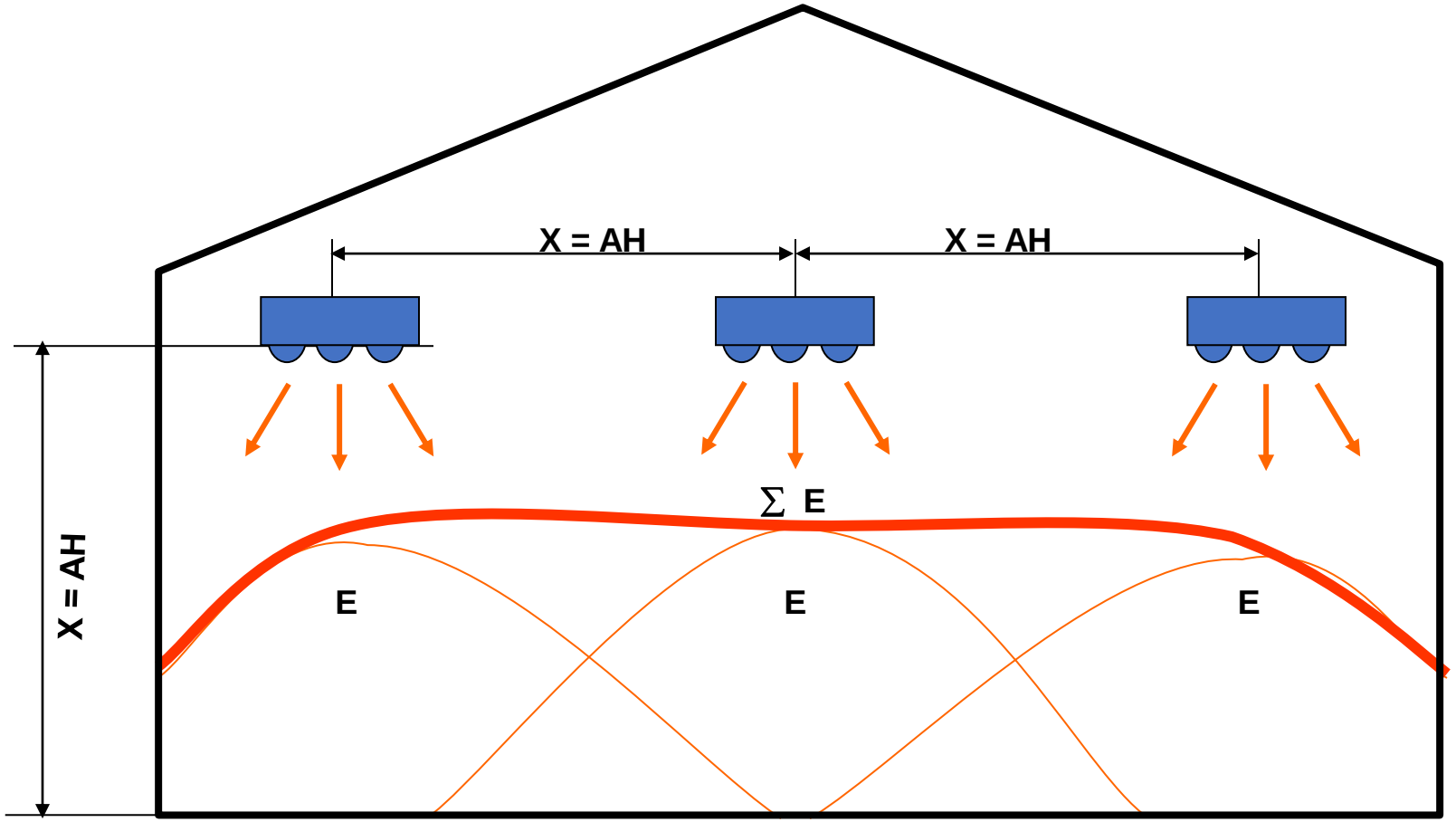


The action field of ceiling panels



Optimum spread of ceiling panels

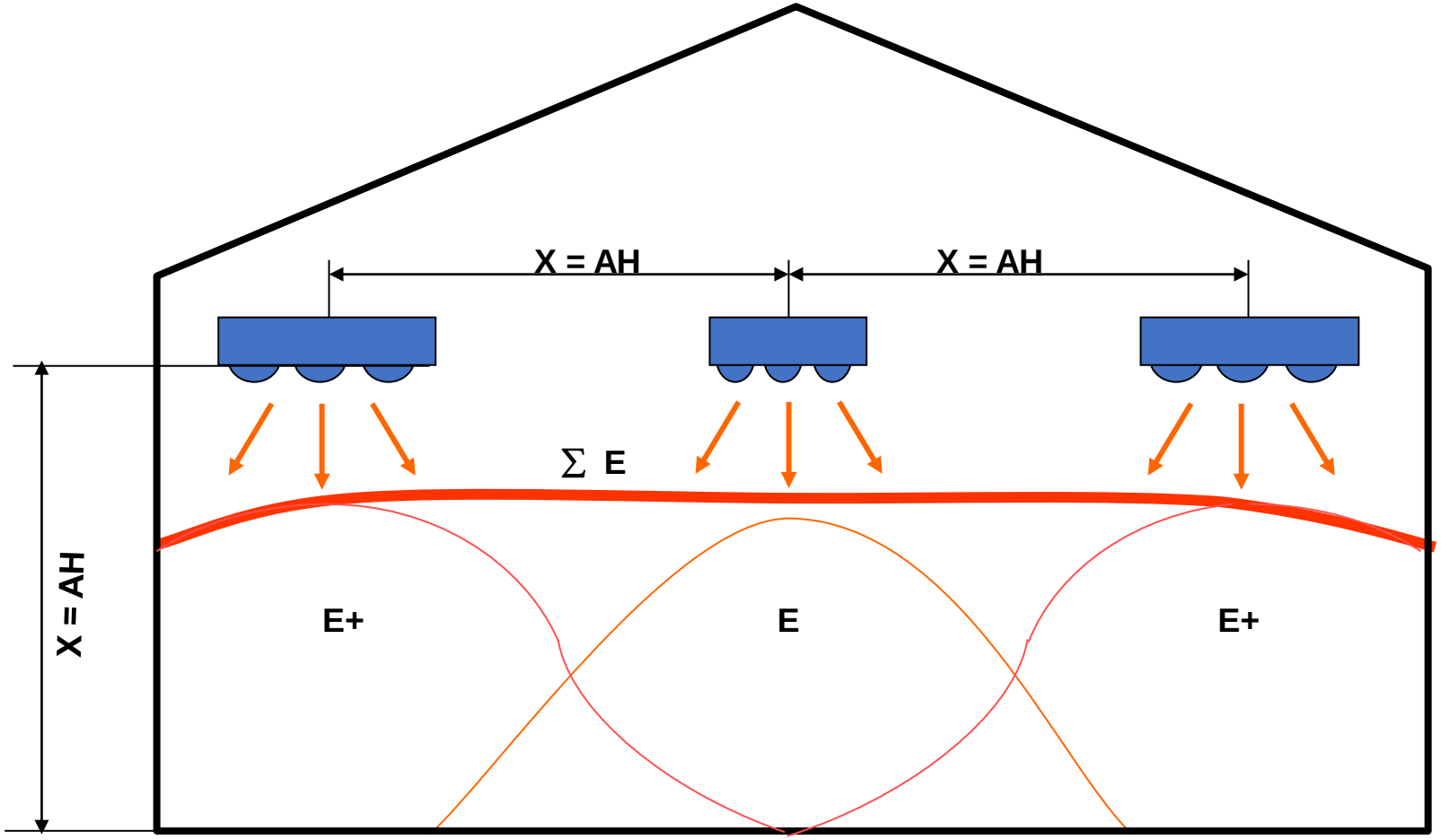
Panels center distance = mounting height



Building without outside wall compensation

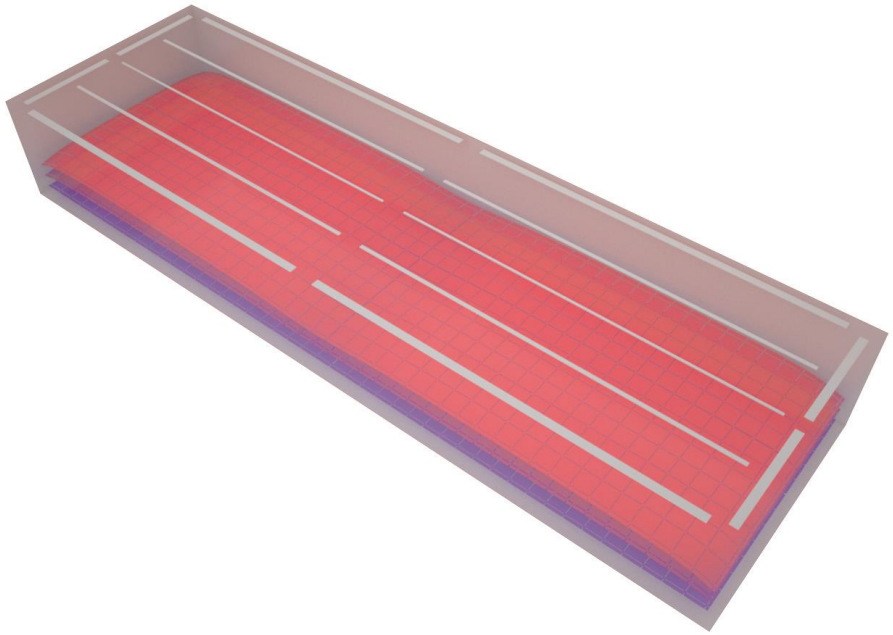
Optimum spread of ceiling panels

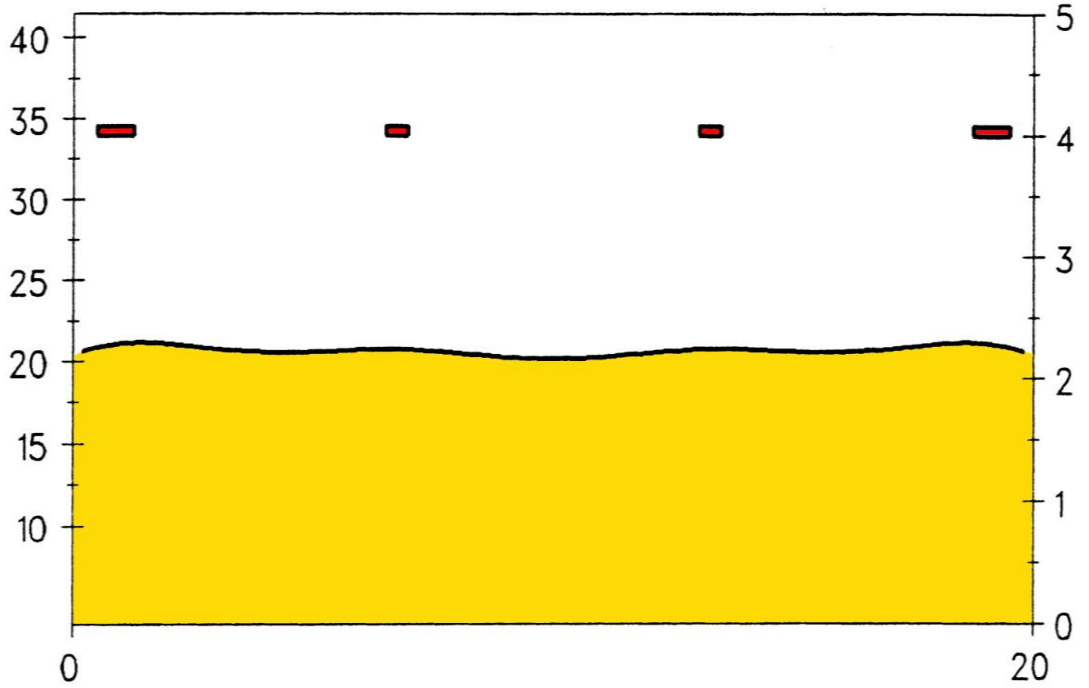
Panels center distance = mounting height



Building with outside wall compensation

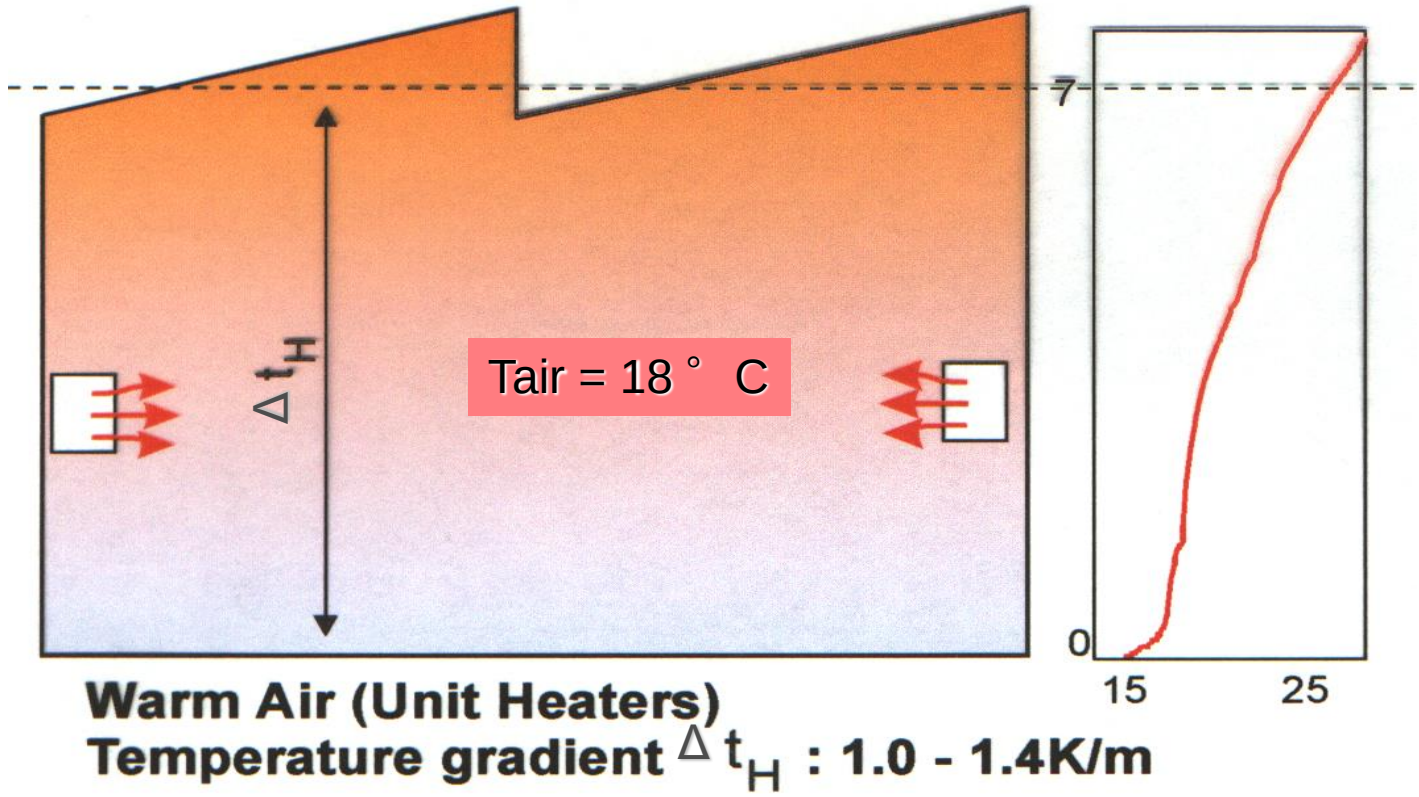
Optimum spread of ceiling panels





Comparison RCP to warm air system: air stratification

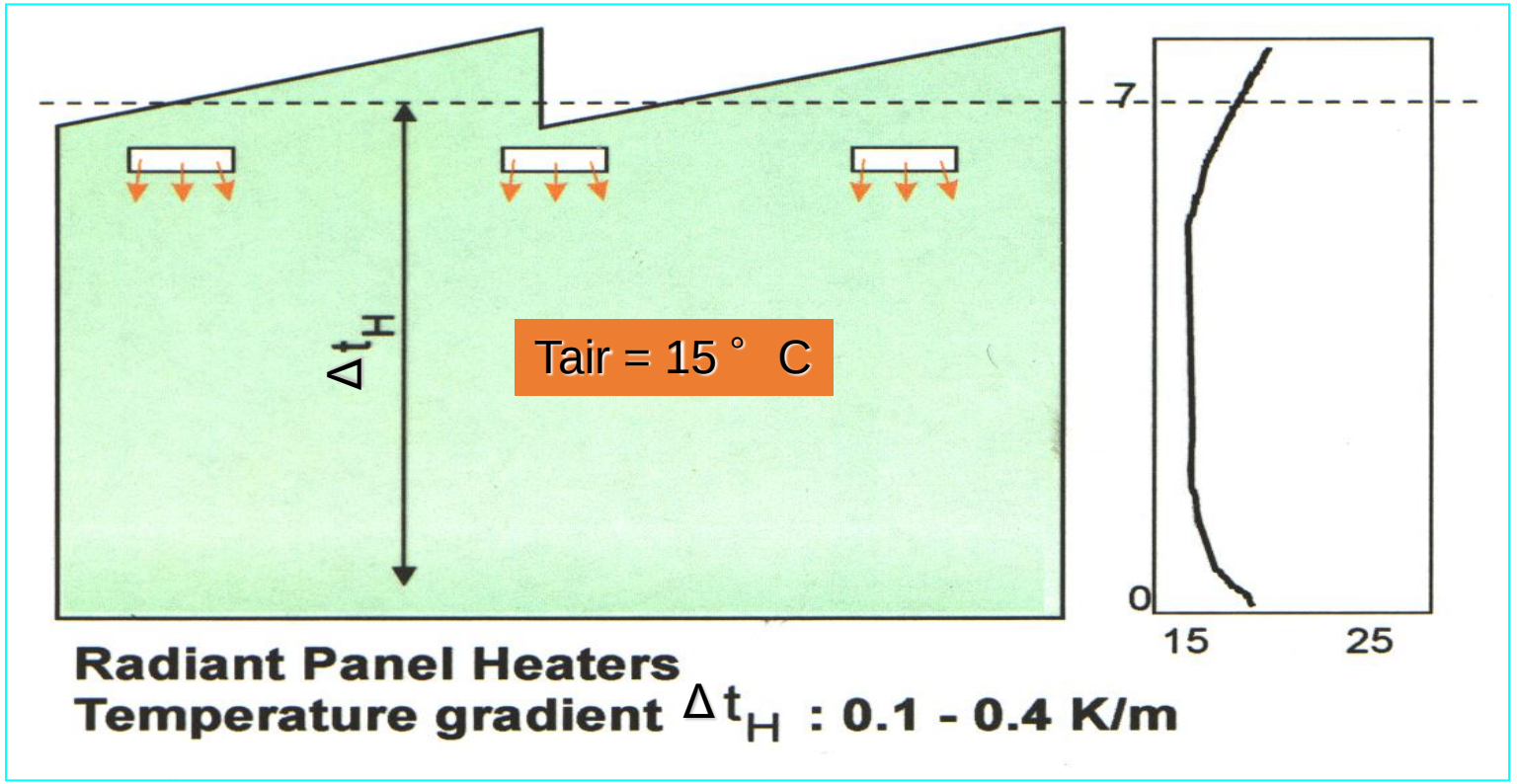
(vertical air temperature gradient: RCP 0,3 K/m WAS mini 1,0 K/m)



Hot Head Cold Feet!

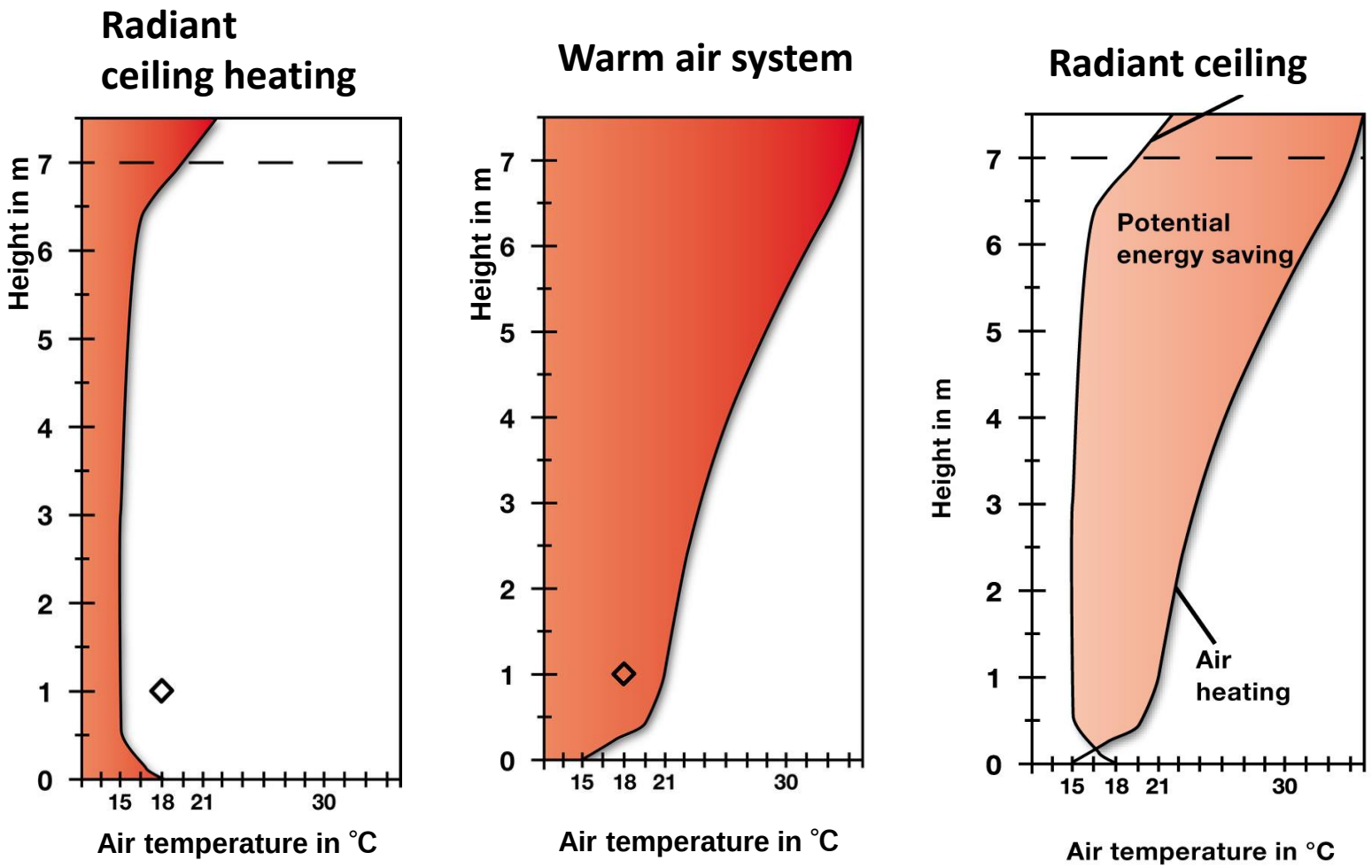
Comparison RCP to warm air system: air stratification

(vertical air temperature gradient: RCP 0,3 K/m WAS mini 1,0 K/m)

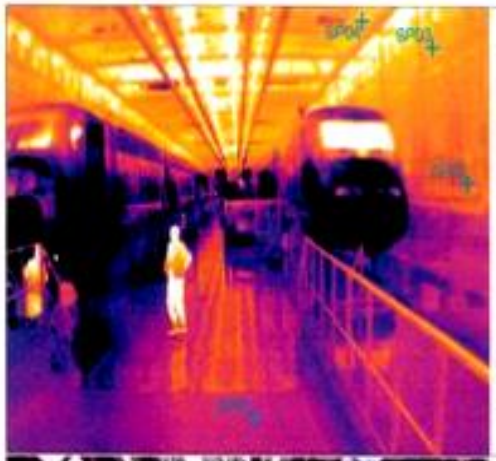


Even Temperature!

Comparison RCP to WAS

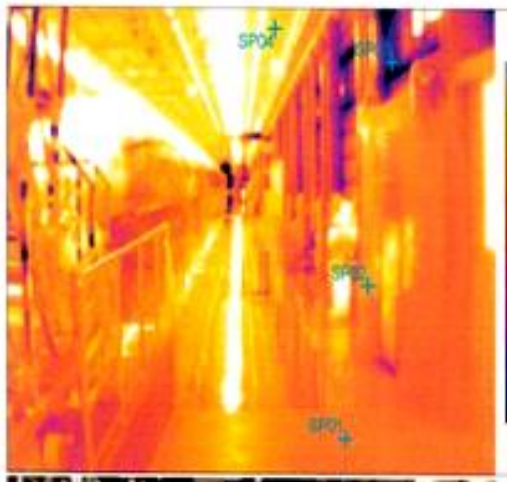


The proof



IR-Daten	Wert
Erstellungsdatum	10.12.2002
Erstellungszeit	10:51:54
Objekt-Parameter	**Wert**
Emissionsgrad	0,98
Bezeichnung	**Wert**
SP01	11,1°C
SP02	12,2°C
SP03	14,3°C
SP04	15,1°C

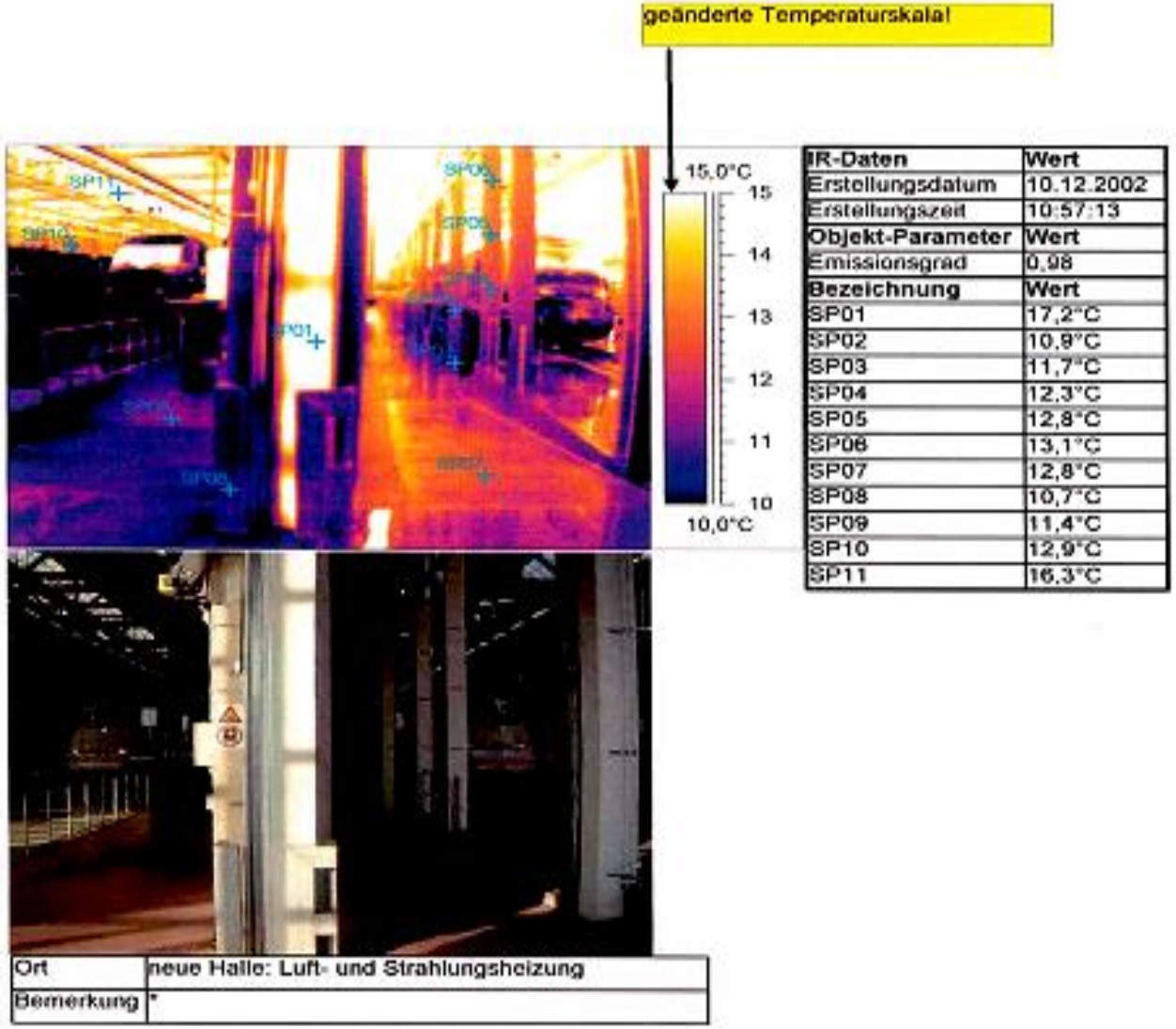
Ort	neue Halle; Luftheizung
Bemerkung	*



IR-Daten	Wert
Erstellungsdatum	10.12.2002
Erstellungszeit	10:42:15
Objekt-Parameter	**Wert**
Emissionsgrad	0,98
Bezeichnung	**Wert**
SP01	13,2°C
SP02	14,2°C
SP03	9,0°C
SP04	15,2°C

Ort	neue Halle; Strahlungsheizung
Bemerkung	*

The proof



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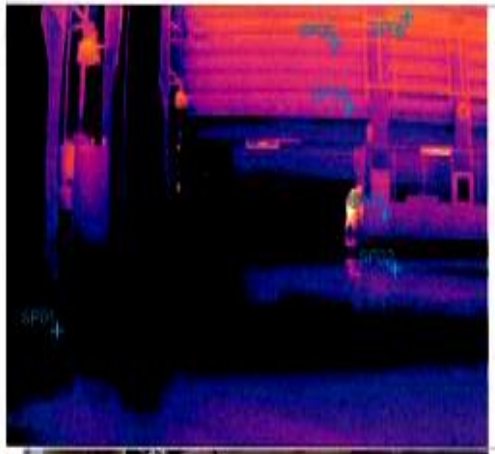
Erstellungszeit	10:57:13
Objekt-Parameter	**Wert**
Emissionsgrad	0,98
Bezeichnung	**Wert**
SP01	17,2°C
SP02	10,9°C
SP03	11,7°C
SP04	12,3°C
SP05	12,8°C
SP06	13,1°C
SP07	12,8°C
SP08	10,7°C
SP09	11,4°C
SP10	12,9°C
SP11	16,3°C

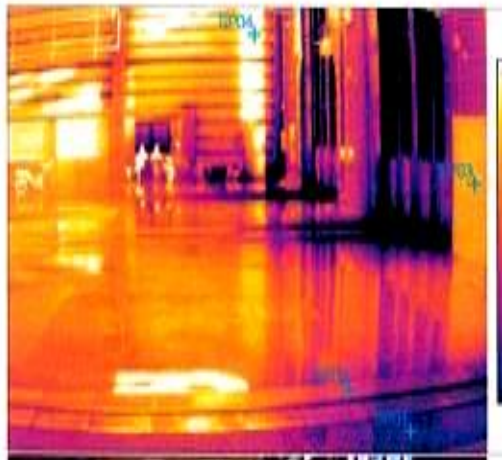
Ort	neue Halle: Luft- und Strahlungsheizung
Bemerkung	*

The proof



IR-Daten	Wert
Erstellungsdatum	10.12.2002
Erstellungszeit	11:11:40
Objekt-Parameter	**Wert**
Emissionsgrad	0,98
Bezeichnung	**Wert**
SP01	1,5°C
SP02	7,6°C
SP03	9,6°C
SP04	10,7°C
SP05	11,6°C
SP06	12,5°C

Ort	neue Halle; Luftheizung
Bemerkung	*



IR-Daten	Wert
Erstellungsdatum	10.12.2002
Erstellungszeit	11:11:23
Objekt-Parameter	**Wert**
Emissionsgrad	0,98
Bezeichnung	**Wert**
SP01	8,3°C
SP02	11,3°C
SP03	14,8°C
SP04	18,0°C

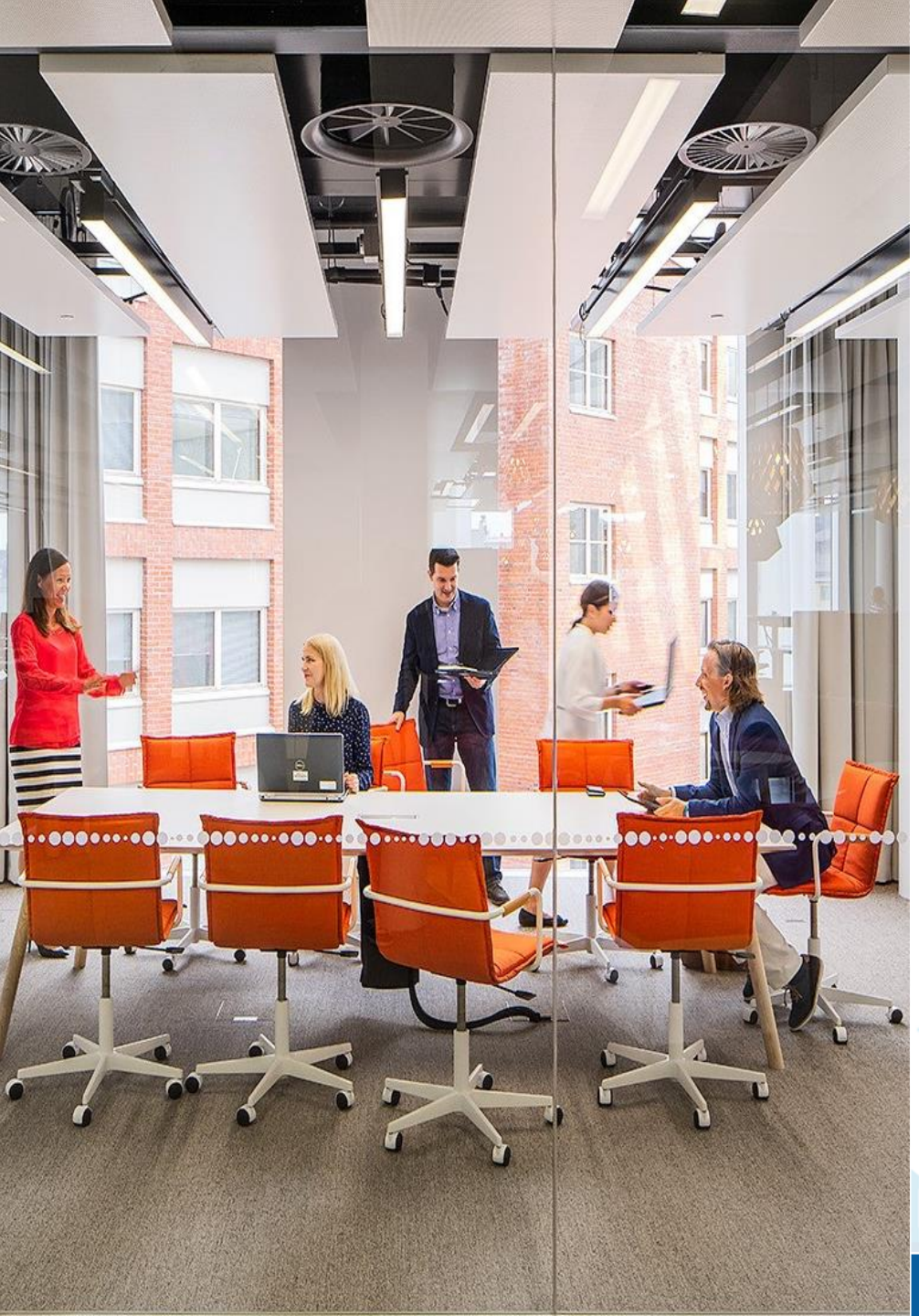
Ort	neue Halle; Strahlungsheizung
Bemerkung	*

Basic principles of radiant heating and cooling

- **In heating mode** panels are heated by warm water. They will emit energy into the room space.
- Energy is distributed mainly with low intensity infrared waves, which will heat surfaces not air.
- Heating feeling is very natural - similar to sunshine with lower intensity.

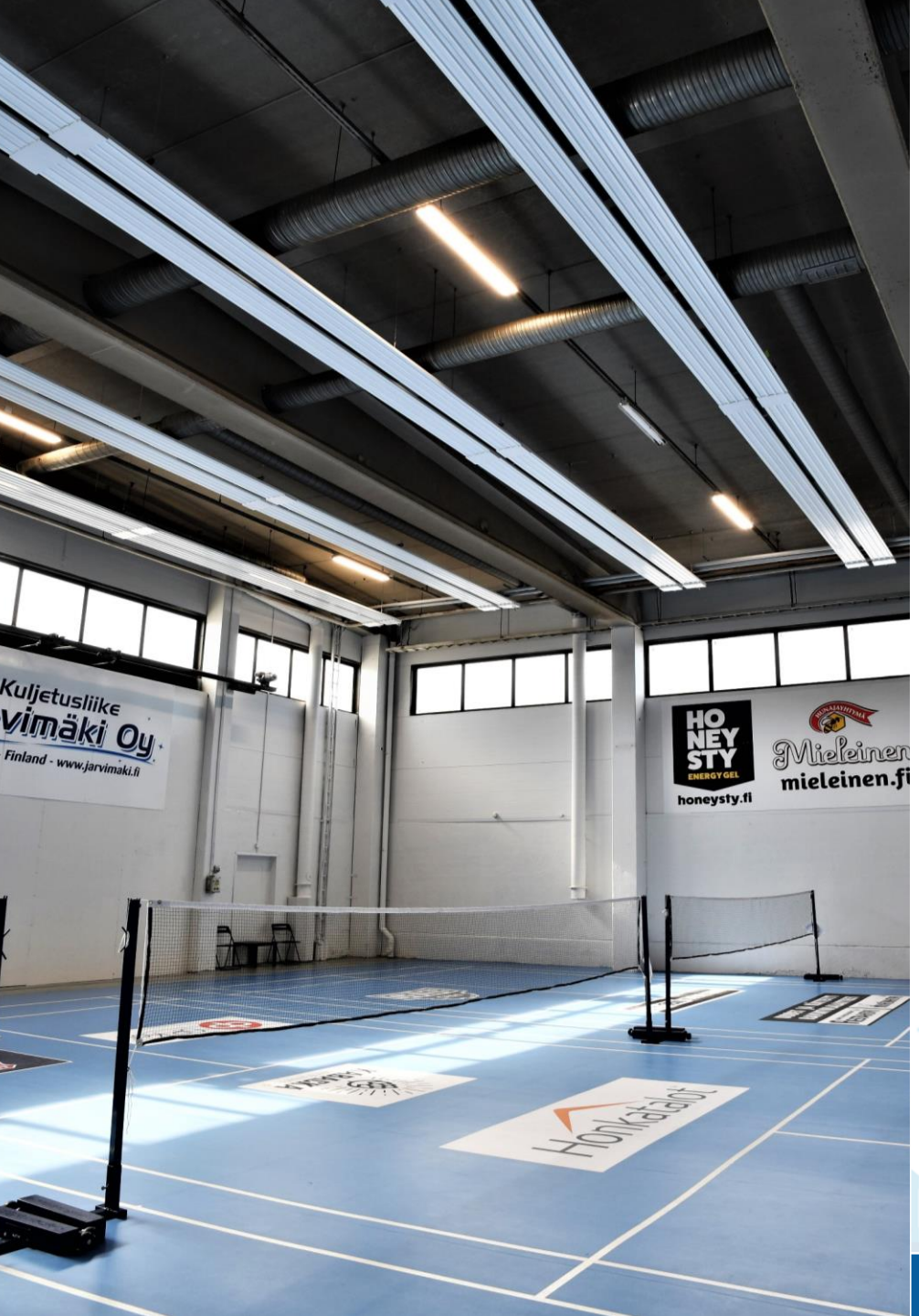
Basic principles of radiant heating and cooling

- **In cooling mode** cooled water flows through the panels.
- People and objects in the room exchange their surplus of heat with the cooler panel via radiant heat transfer. Additionally, warm air will rise up to the ceiling and hit the cooling panel.
- Heat energy transfers into the panel. Cooled air will flow down with very slow air speed. This is the natural cooling convection part.



Always the best indoor climate

- Create a comfortable room temperature and significantly improve indoor climate
- The presence of the radiant ceiling system is hardly noticeable:
  - Noiseless
  - Draught-free
  - No dust dispersal
  - Constant heat distribution ↔ ↕
  - Hygienic
- Ceiling installation creates more space on the floor and walls



Always the right temperature means energy and environmental savings

- High heating and cooling output
- Extremely short reaction time
- Minimal maintenance costs:
  - No fans or filters that require cleaning and replacement
  - No need for condensate drainage
- Suitable to use with all energy sources
- Ideal for the buildings of all sizes, for both new buildings and renovation projects
- Finnish quality products with long life cycle
- Materials can be recycled

ituGraf®

For residential and commercial buildings

ituString+®

For sport halls, show rooms, industrial and logistic buildings

ituGraf®

ItuGraf heating and cooling panel

- The most effective heating and cooling panel on the market!
- Graphite filling ensures efficient thermal conductivity
- Applications
  - Offices and business premises
  - Hotels
  - Hospitals
  - Apartments
  - Schools and other public buildings

- CE-marked ItuGraf panels are tested in accordance with the EN14037 standard

ituGraf®

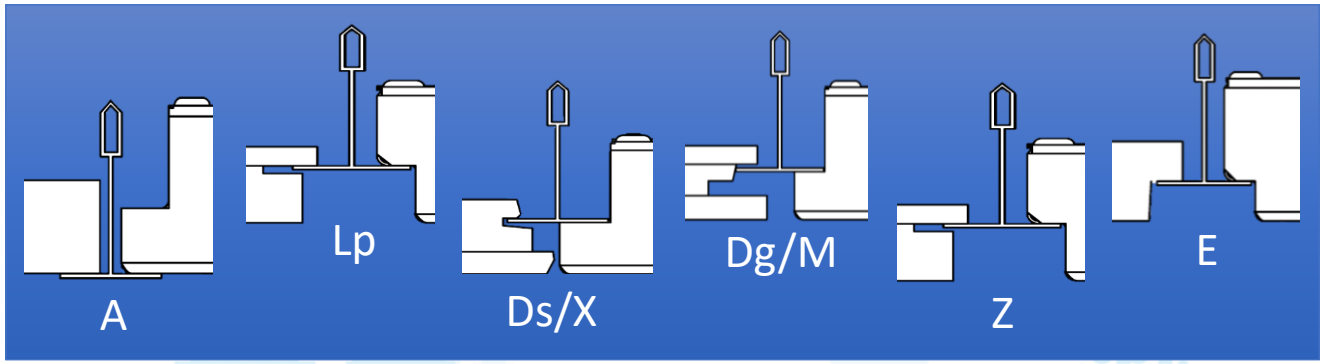
ItuGraf heating and cooling panel

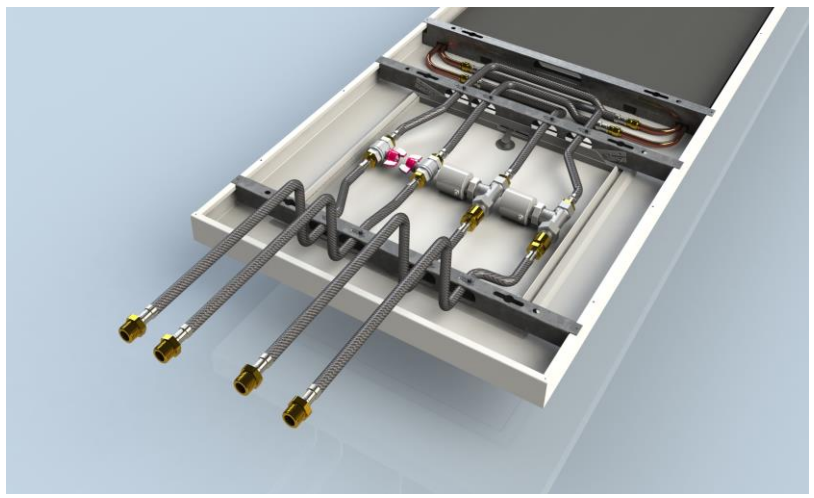
- Standard models
  - Width 600 - 1200 mm,
  - Lengths 600 - 3600 mm
  - Standard white RAL9016 (all RAL-colors available)
  - Standard surface smooth (perforated surface for better acoustics available)
- Installation options
  - Free hanging
  - Integrated in the suspended ceiling
  - Surface bracket

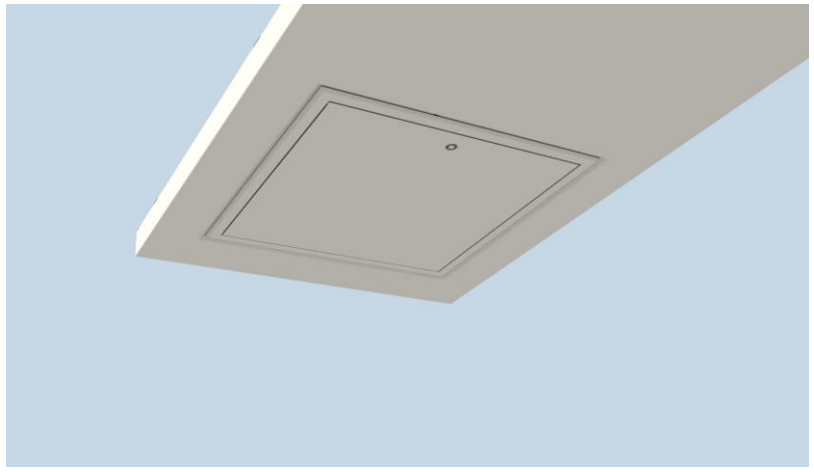
ituGraf®

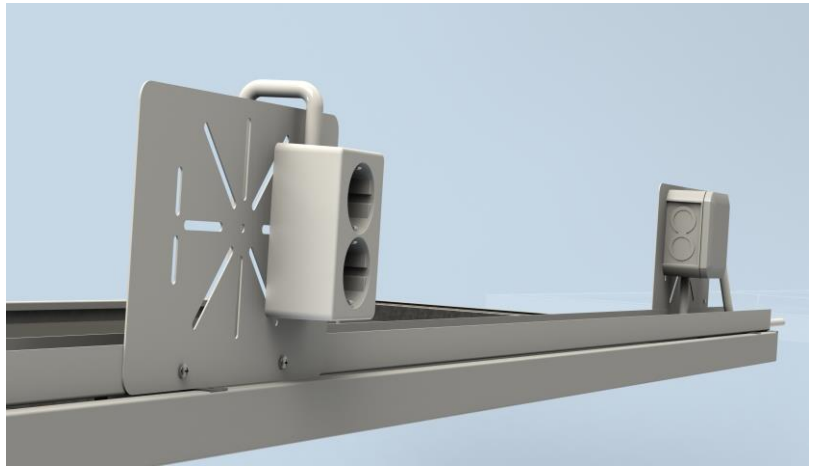
ItuGraf ceiling models

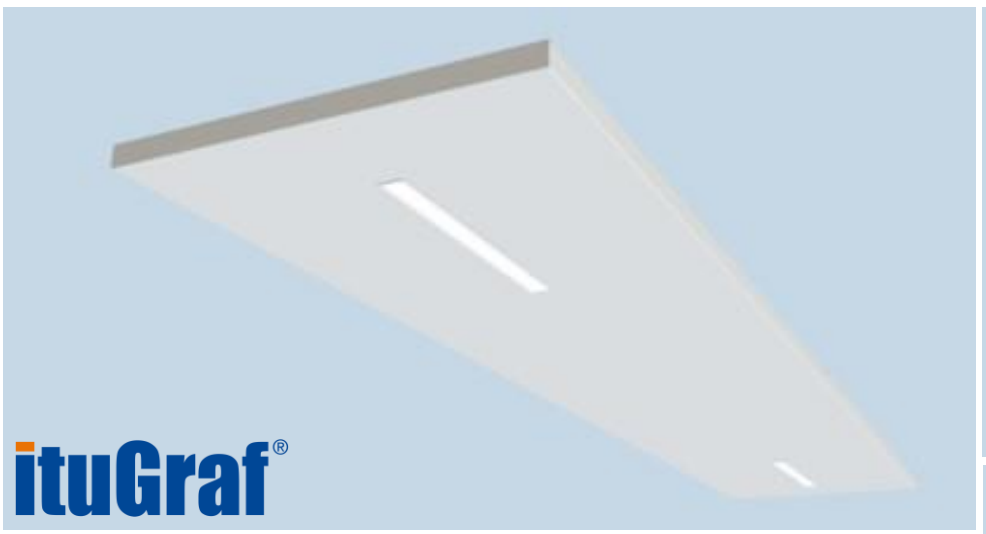
- ItuGraf ceiling models ensure a consistent look and color scheme with the desired suspended ceiling
- Combatible with St.Gobain's Ecophon Focus/Master and with Rockfon acoustic ceiling system







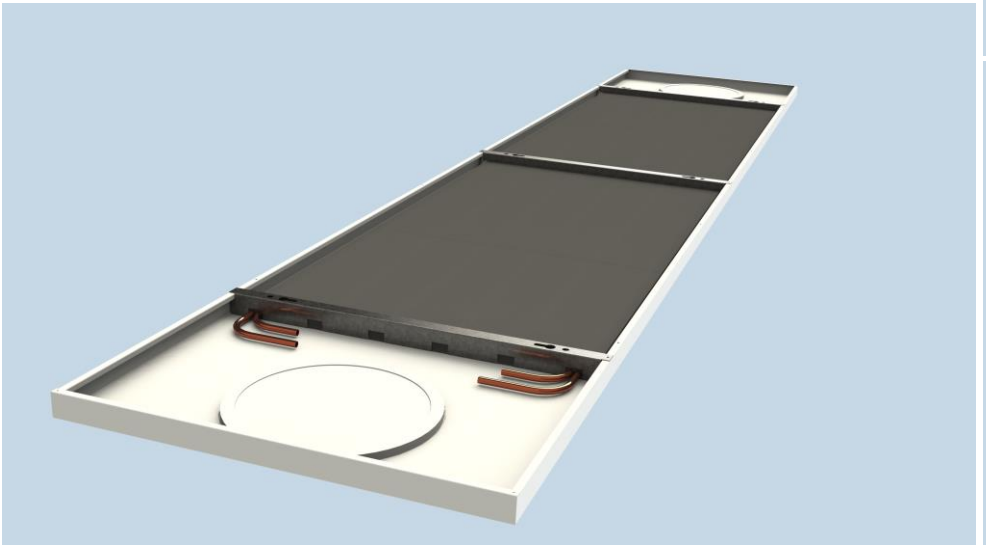


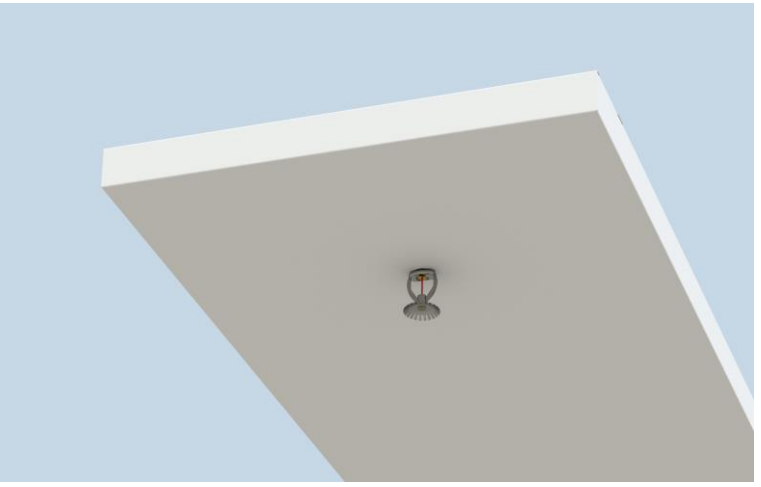


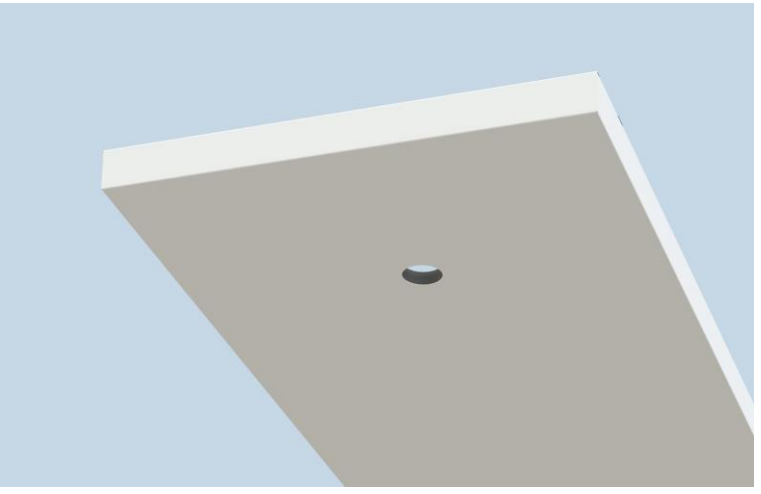
ituGraf®

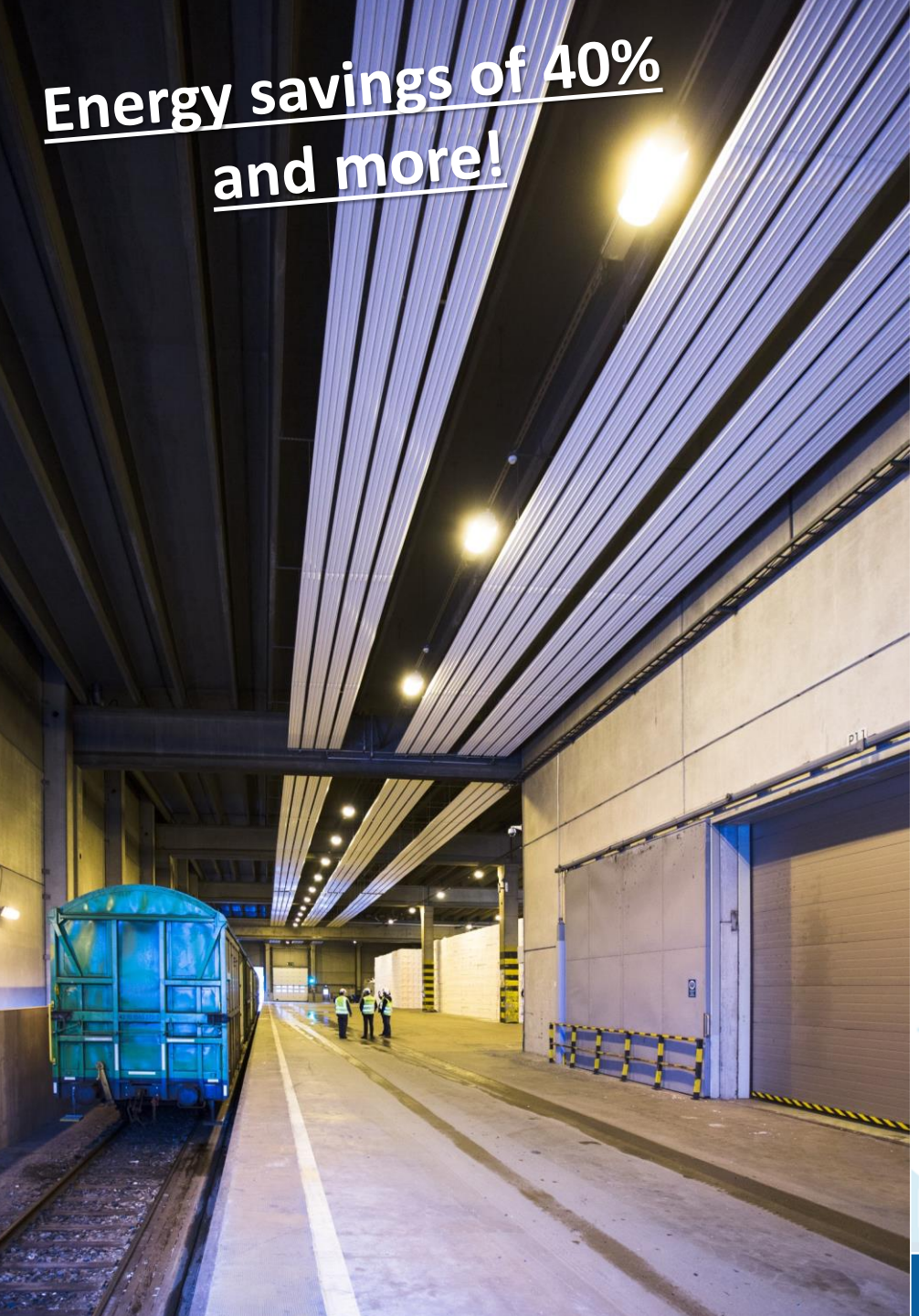
ITUGRAF AS A BUILDING TECHNOLOGY INSTALLATION PLATFORM

Lighting sensors • Fire and smoke detectors
Electric sockets • Data sockets • Ventilation valves
Access panels • Valves • Actuators





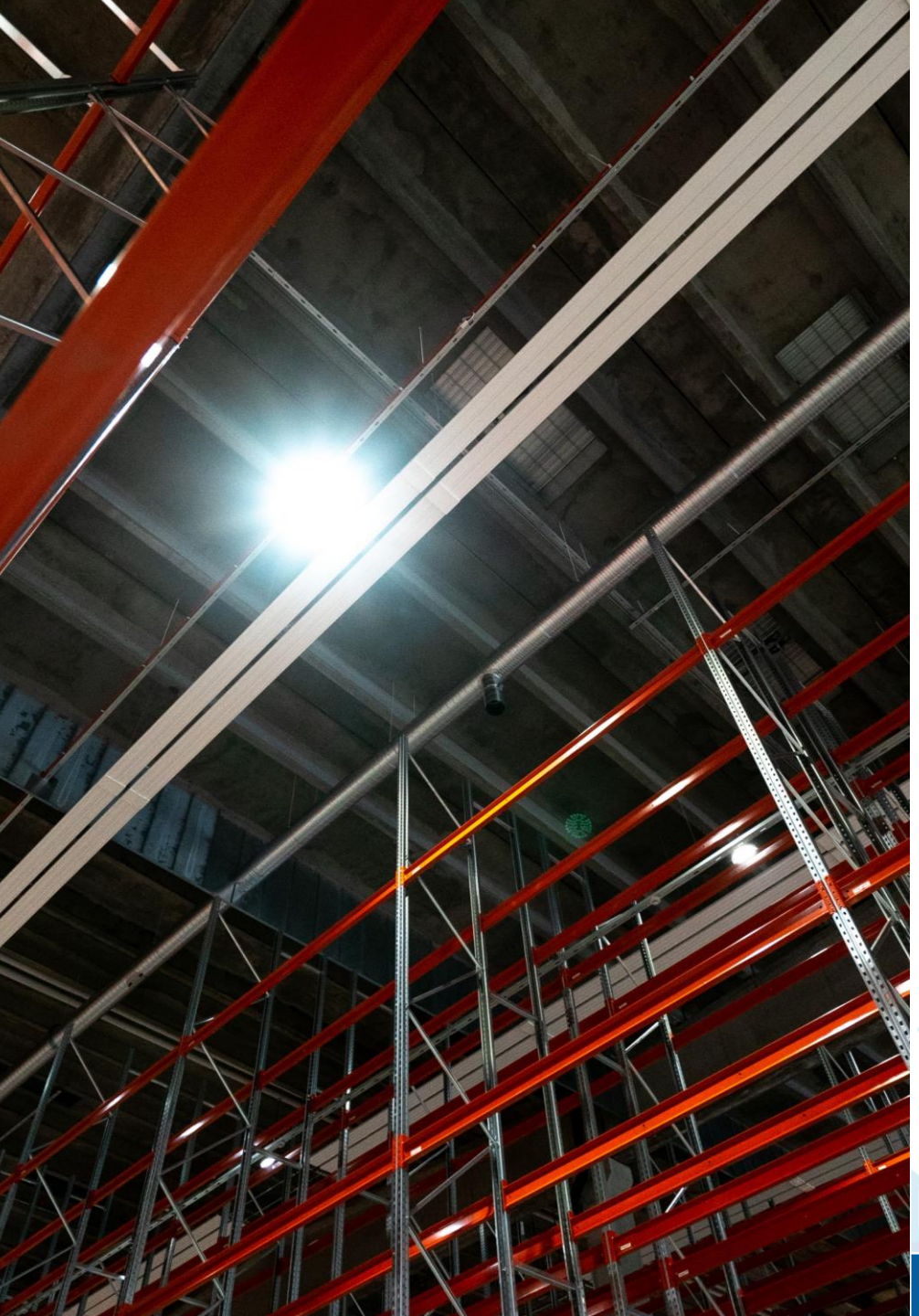




ituString+®

New model - ItuString+

- Guarantees optimal indoor climate conditions and lower energy consumption in sites even with 30 metres in height
- Applications
  - Sport halls
  - Logistic centers
  - Production halls and warehouses
  - Shopping malls
  - Showrooms
  - Wet rooms
- CE-marked ItuString+ panels are tested in accordance with the EN14037 standard



ituString+

Hassle-free installations on all sites

- Modular design, can be combined freely in terms of both length and width, length 3, 4, 5 and 6 m, width 320 mm
- Modular structure enables installations on all sites, and its light weight makes installation easy
- Connecting ceiling panels with crimp connections, it is possible to put panels together over strip lengths of 70 meters

Itula's Partner in Estonia

S.F.P. Group OÜ

Contact: Janek Teder, tel. +372 511 6800
or Egert Laas, tel. +372 517 1019
www.sfp.ee

ItuCalc selection tool is a reliable partner for the designer!

Register for the calculation tool
free of charge at www.itula.com