



**Erasmus+**



**Erasmus+ program Partnership for Digital Education Readiness  
“Smart School in restoration and construction industry” No. 2020-  
1-LV01-KA226-VET-094520**

**O2 Virtual Learning Materials**

# Floor heating



# PRACTICAL EDUCATION

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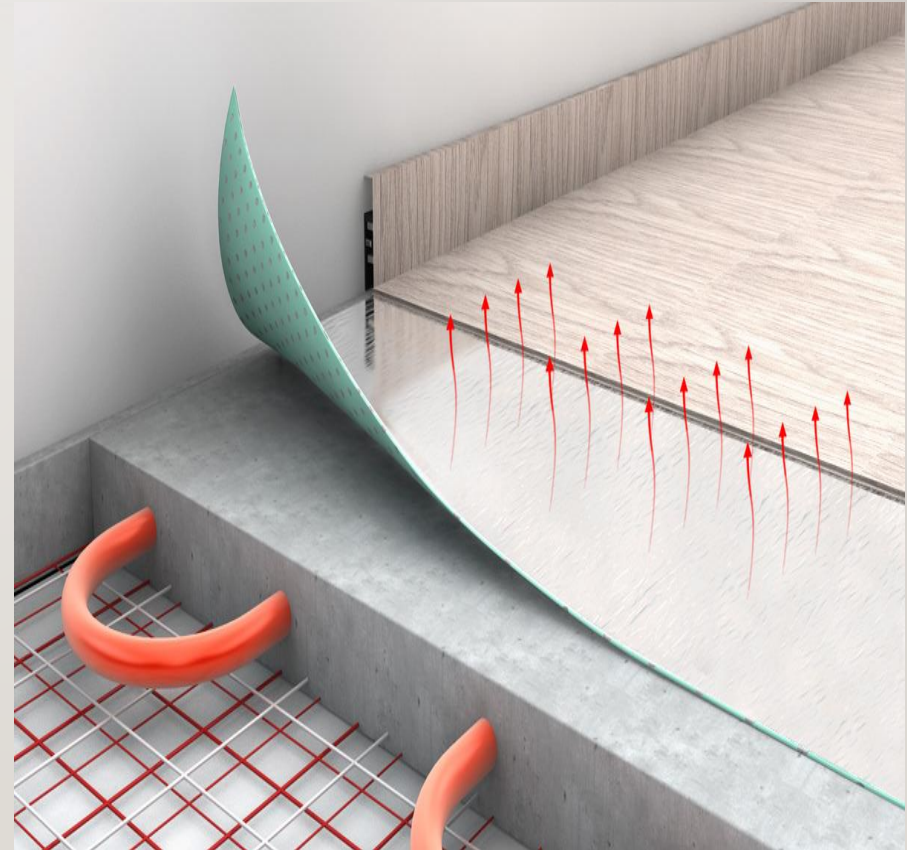
- We give classes in this topic for the students of:
- 3693 K – technician of energetic appliances of buildings, 3rd year, 77 lessons, 10 days;
- 3678 H - plumber, 3rd year., 42 lessons, 6 days;
- 3658 K – mechanic of building and installation technologies, 4th year, 56 lessons, 8 days.



# CHARAKTERISTICS

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- It is a full-surface heating.
- It consists of pipes in the floor.
- It transfers thermal energy and heats the upper layer of concrete.
- Then it radiates heat upwards into the room.
- System is hidden in the floor
- and is maintenance-free.



# THERMAL COMFORT

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- a feeling of satisfaction
- a state in which a person feels **neither cold nor heat**
- a subjective feeling





# OPTIMAL TEMPERATURES IN THE ROOMS

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- in the living room - 20 to 22 °C;
- the children's room - around 20 °C;
- the bedroom - 16 to 18 °C;
- the bathroom - 24 °C;
- the hall - 15 °C;
- the kitchen - 17 °C.



# HISTORY

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- The Romans – fathers and spreaders of floor heating.
- Invention of **hypocausts** – a system of cavities under the floor.
- This heating system was used in Diocletian's baths.





# THE USE

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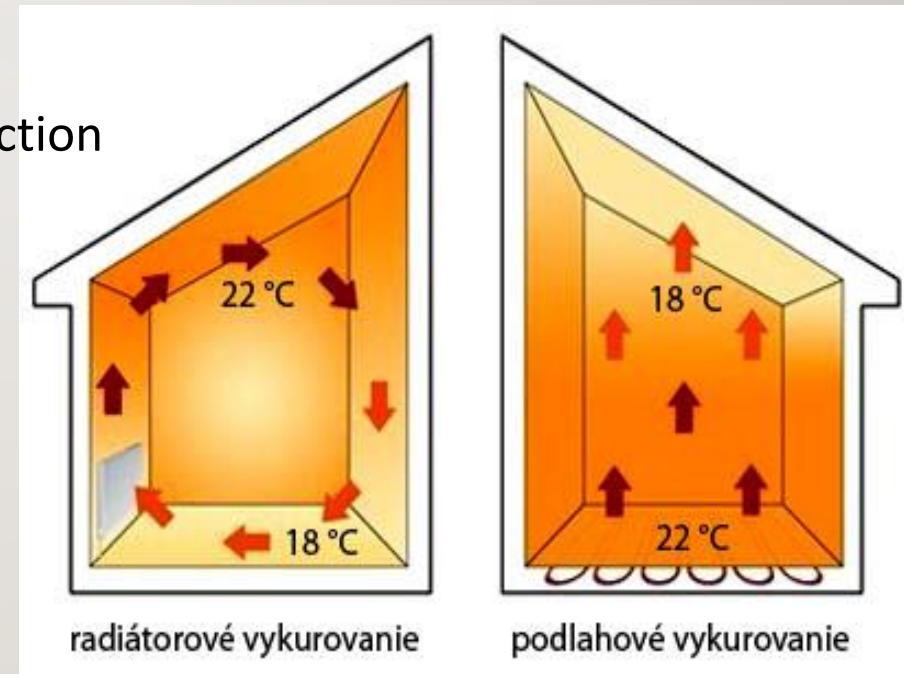
- Family houses;
- Housing units;
- Offices;
- Commercial and industrial premises;
- New buildings and renovations;
- There is no heat flow – suitable for allergic person.





# ADVANTAGES

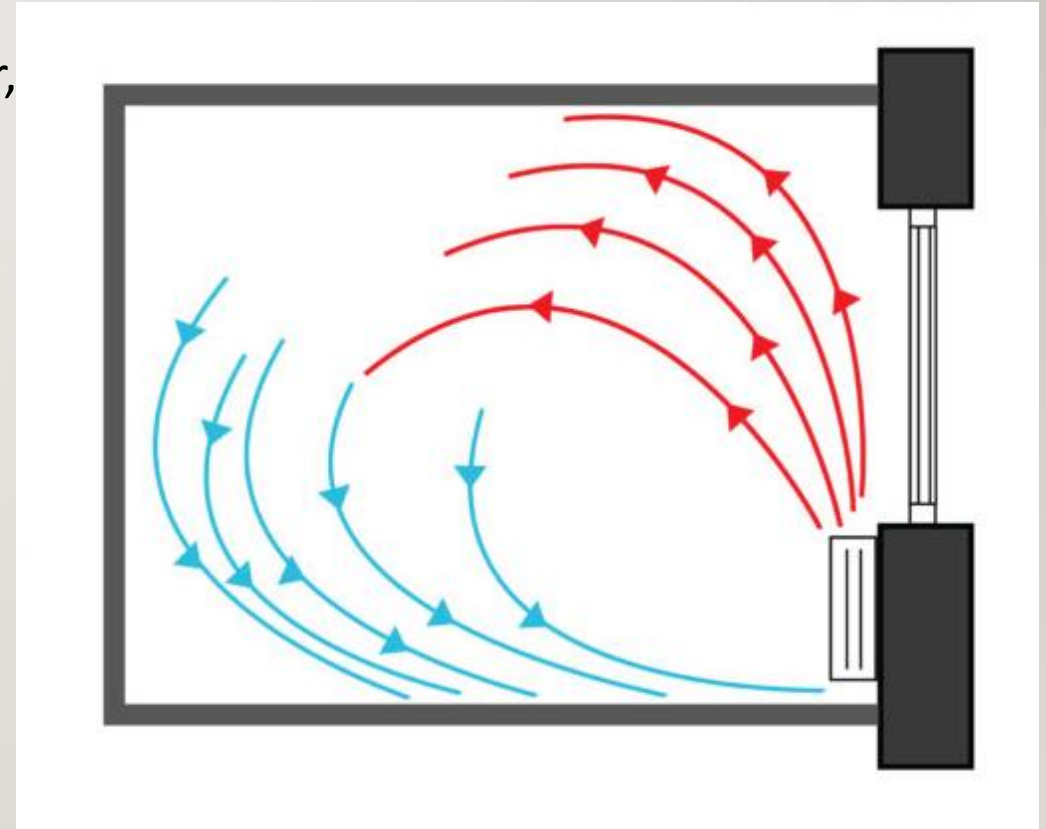
- Low temperature gradient
- Lower energy consumption for RES heat production
- Higher thermal comfort
- Low dust = healthier environment
- Aesthetic heating without heating elements
- Longer radiation inertia
- Long life
- Possibility of floor heating and cooling
- Quick return on investment



# FLOORING VS. RADIATORS

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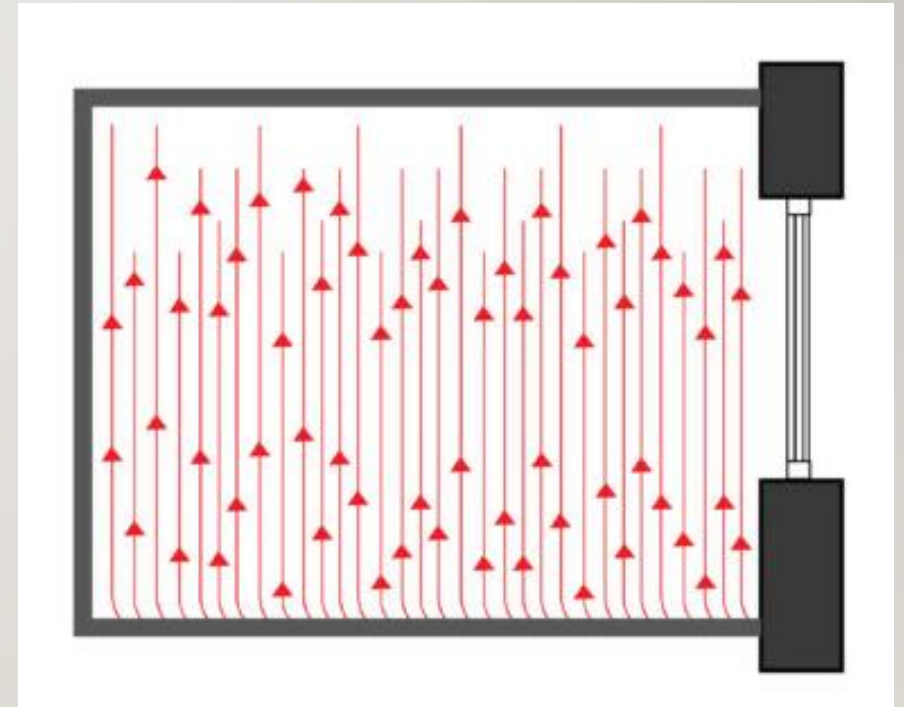
- Radiators – it transmits heat to the surrounding air, which transfers heat to the walls.
- The temperature of air in the room is higher than that of the walls.
- The flow causes dustiness.
- Large temperature difference of air under the ceiling and near the floor.



# FLOORING VS. RADIATORS

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- Flooring – equal distribution of temperature and less air flow (lower dust).
- The surrounding air is heated from the floor and walls.
- The relative humidity of the air is maintained.
- Favorable effect on the respiratory system.

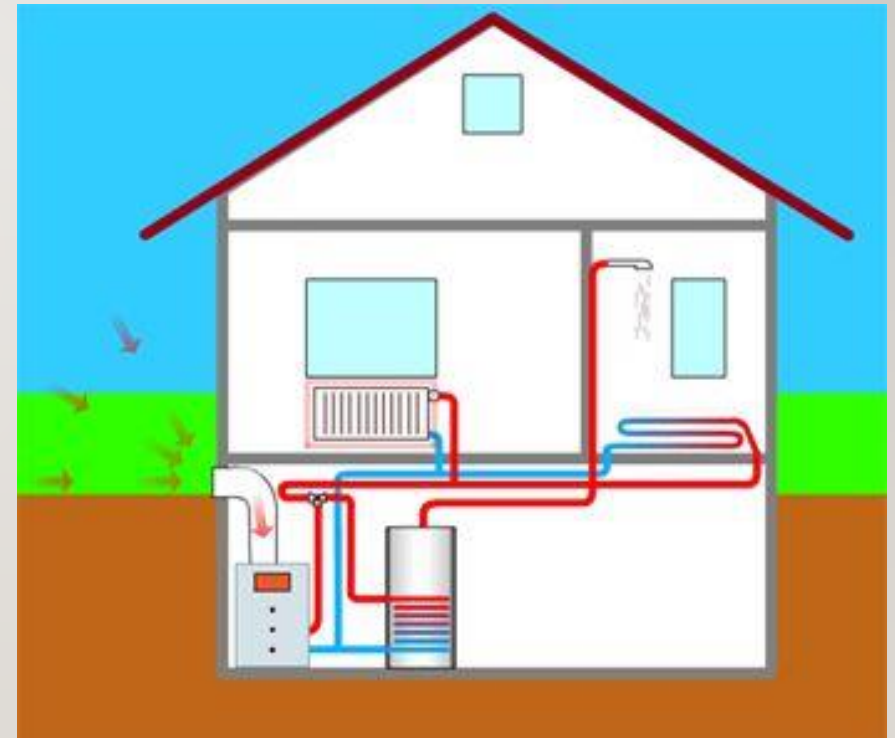




# FLOORING VS. RADIATORS

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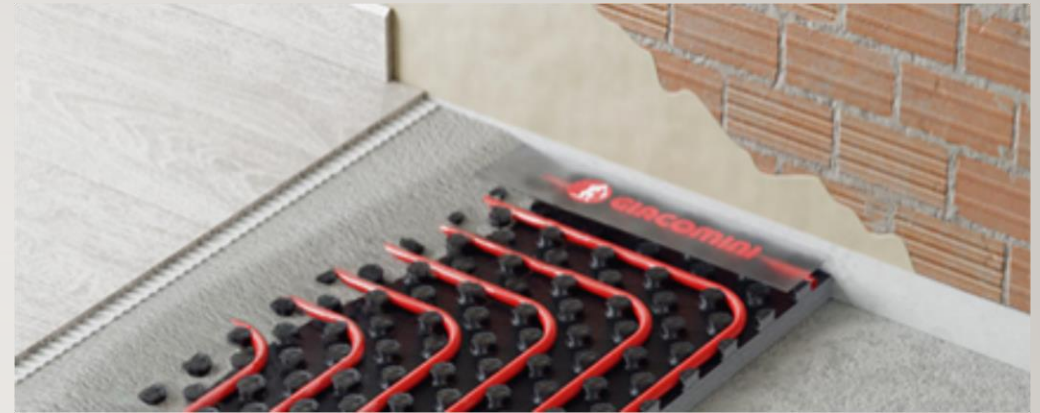
- Flooring - is economical, it can save up to 15% of energy compared to radiators.
- Reaches the same temperature in the room when setting a lower temperature of the heating medium.
- It is a large heat source, so the heating medium is only heated to 30 – 40 °C.



# HOT WATER FLOOR HEATING SYSTEMS

**Wet system** – accumulation and transfer of heat using a layer of floor screed materials, concrete, anhydride...

- It is suitable for all types of buildings.
- The basic components – a system insulation board with a thickness of 321 or 52 mm.
- The equal distribution of heat over the floor.

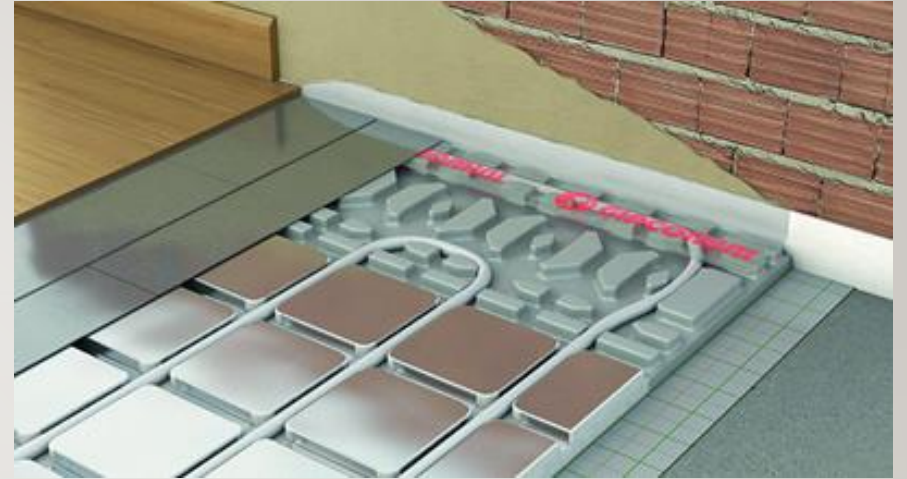




**Dry system** - used in **wooden houses** or for floors where it is not possible to use a heavy cement screed due to **the static load** of the supporting structures.

The system consists of special panels with **aluminum foil** for better heat conduction.

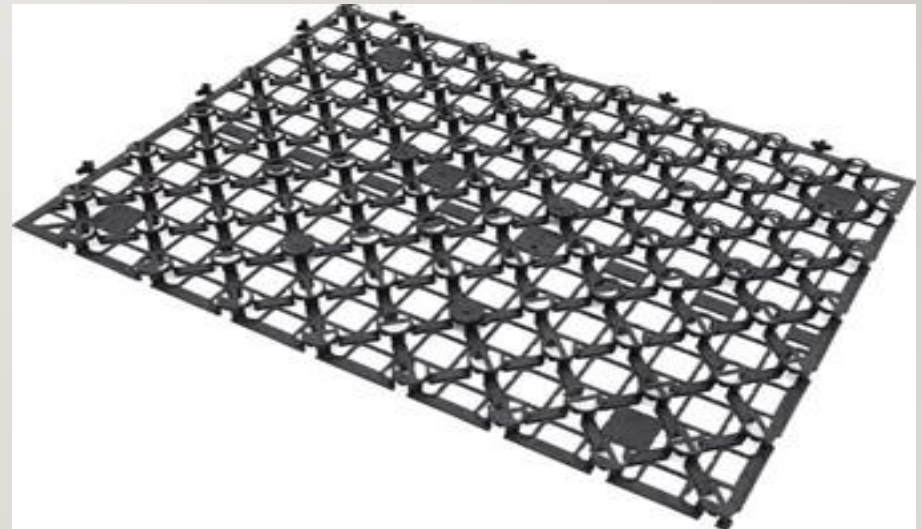
Laying the tube is possible only in the in a meandering way.  
**Galvanized sheets** are laid in two layers on the system board with the tube, and only the floor itself is assembled.





**System for reconstructions** - very low height, consists of plastic panels which have the form of a 3D network resembling a spider's web – SPIDER.

The „net“ form of the panels allows easy attachment of the tube to the panel. The panels can also be laid on an existing floor. With SPIDER system the max. floor height is only 2.5 cm (including screed). **With the SPIDER SLIM system only 2cm (including screed).**



# LAYING METHODS

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## Spiral

- The supply tube with warmer water alternates regularly with the return tube with colder water.
- More uniform floor temperature than with the meandering method.

## Meander

The rooms with **an irregular shape can be solved easily**. The heating circuit is first run parallel to the most cooled wall, so **the temperature of the heating water decreases from the outer wall to the inner one**.





## Tube density

## Tube consumption

## The use

10 cm

10m / m<sup>2</sup>

- Bathrooms for a higher interior temperature of around 24 °C.
- Family houses where the floor is also used for cooling.
- Where the floor covering has a high thermal resistance.
- Suitable for older buildings with a very high heat demand.

15 cm

6,6m/ m<sup>2</sup>

- Higher , but still usual tube density in rooms with an average heat demand.
- Ideal for a heat pump, it will work more efficiently.
- Suitable for floating floors with higher thermal resistance.

20 cm

5m/m<sup>2</sup>

- Usual density of pipes in ordinary rooms with average heat demand..
- Modern low-energy houses increasingly allow this density of pipes..
- Ideal for a gas boiler that does not have a problem with a higher heating water temperature.
- Suitable for well conductive floor coverings.

30 cm

3,3m/m<sup>2</sup>

- Industrial or warehouse premises.
- Other spaces where lower interior temperatures of 15-18 °C are sufficient.



# PIPE MATERIALS FOR FLOOR HEATING

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- **Pex-Al-Pex**
- **PB** (polybutene),
- **PE-X** (crosslinked polyethylene), divided into PE-Xa, PE-Xb and PE-Xc,
- **PE-RT** (polyethylene resistant temperature)



# DISTRIBUTOR

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- Distributes the hot water heated in the source (boiler) into individual heating circuits and transfers the heat to the storage layer via pipes.
- The distributor box is installed in the corridor, boiler room, closet, etc., so that approximately equal circuit lengths are created.





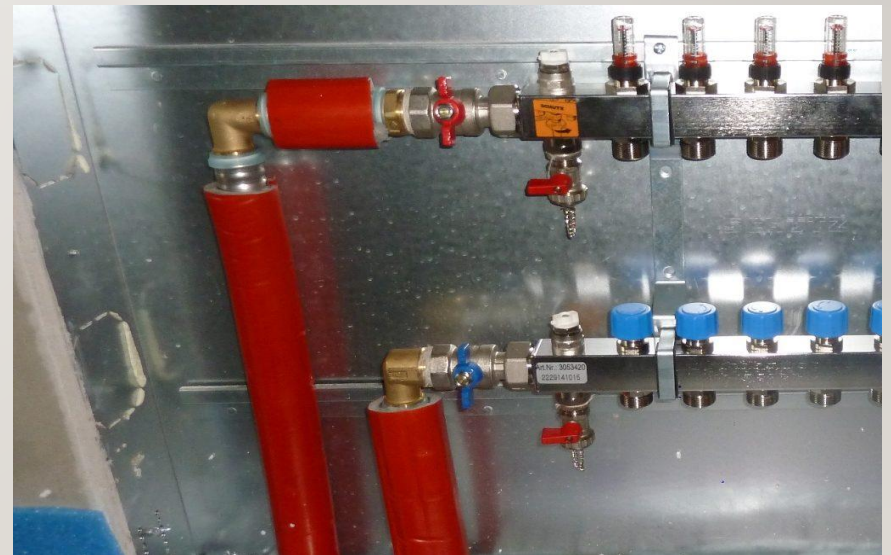
# PHOTO INSTRUCTIONS

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1. Installation of the distributor box

2. Connecting the distributor to the supply and return pipes from the heat source (boiler)



# PHOTO INSTRUCTIONS

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3. Layout of the system board / polystyrene

4. Attaching the dilatation belt





# PHOTO INSTRUCTIONS

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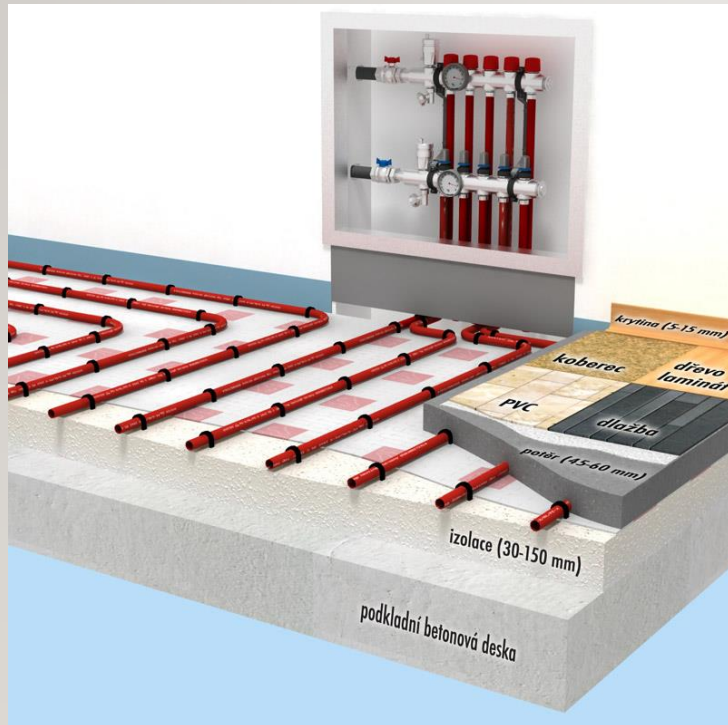
5. Forming a heating snake with connection to a distributor

6. Pressure test





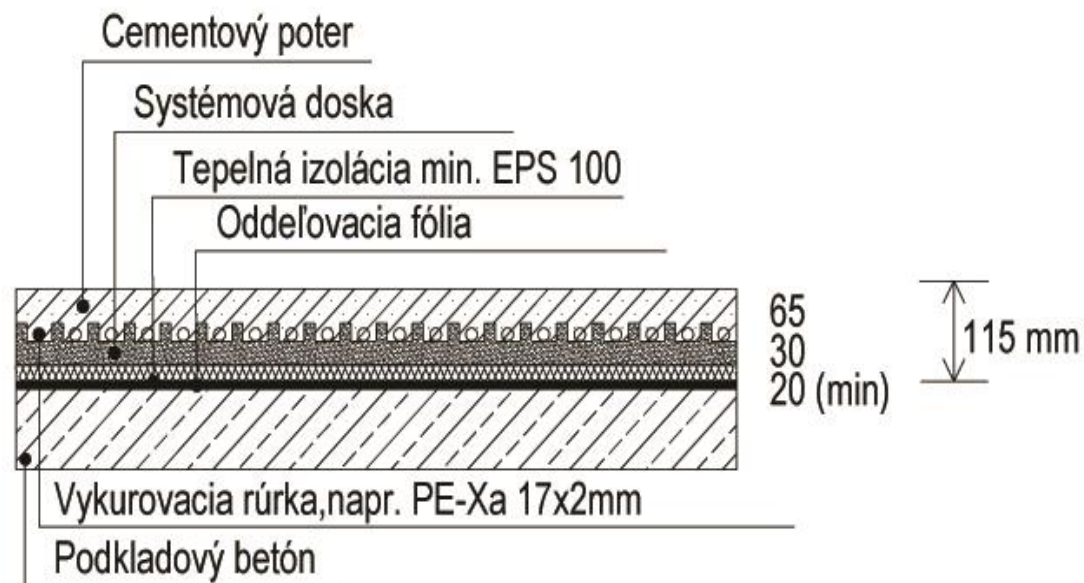
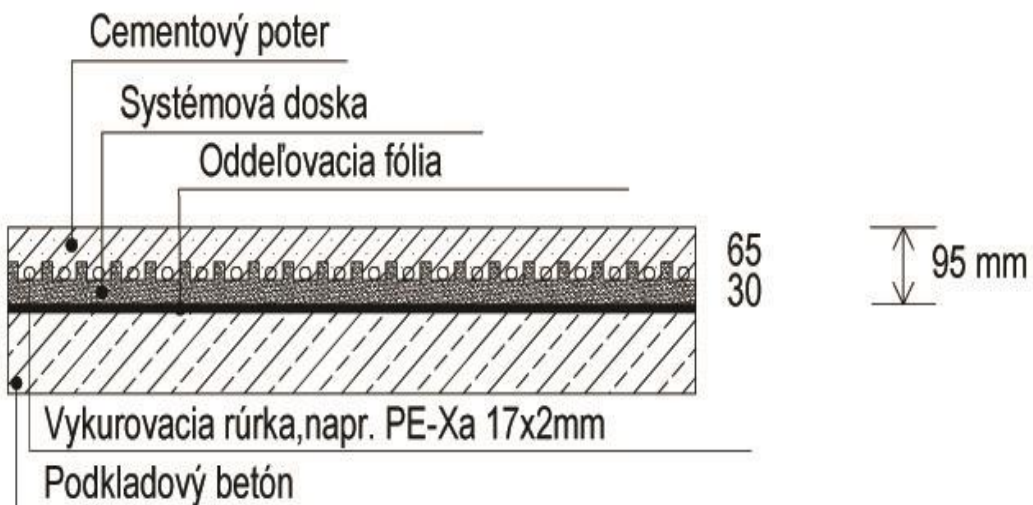
# PHOTO INSTRUCTIONS



7- Laying the upper layers of the floor

# COMPOSITION OF THE FLOOR IN FLOOR HEATING

Rez podlahou medzi vykurovanými priestormi    Rez podlahou pri styku so zeminou (prízemie)





# Erasmus+

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Ďakujeme za pozornosť

