

**PRACTICE EXERCISES****ENG-445**  
**Building Energetics**

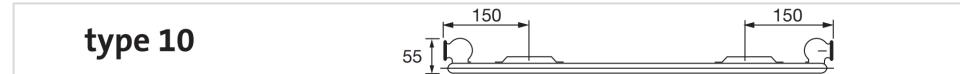
**Heating in  
Buildings –  
Emission Systems and  
Thermal Comfort**

**Dr. Jaafar YOUNES,  
Assist. Professor  
Dolaana KHOVALYG**

21 November 2024

# EPFL Exercise 1: Radiators

- The heating demand of a **4x4 m<sup>2</sup>** room to maintain operative temperature of **20°C** is **80 W/m<sup>2</sup>**.
- What should be the **inlet water temperature ( $T_{wi}$ )** of the single-wall radiator Type 10 when it is **undersized** vs. **oversized**?
- Use a table provided from a manufacturer's catalogue.



type 10		hauteur						
longueur	watt	300	400	450	500	600	750	900
450	ΔT 50	145	186	206	225	263	318	370
600	ΔT 50	193	248	275	301	351	424	493
750	ΔT 50	242	310	344	376	439	530	617
900	ΔT 50	290	372	412	451	527	635	740
1050	ΔT 50	338	434	481	526	614	741	863
1200	ΔT 50	386	496	550	601	702	847	986
1350	ΔT 50	435	558	618	676	790	953	1110
1500	ΔT 50	483	620	687	752	878	1059	1233
1650	ΔT 50	531	681	756	827	965	1165	1356
1800	ΔT 50	580	743	824	902	1053	1271	1480
EN 442 - 75/65/20°C		322	413	458	501	585	706	822
EN 442 - 90/70/20°C		411	526	584	638	745	899	1046
valeur n		1,3325	1,3307	1,3297	1,3288	1,3270	1,3242	1,3215

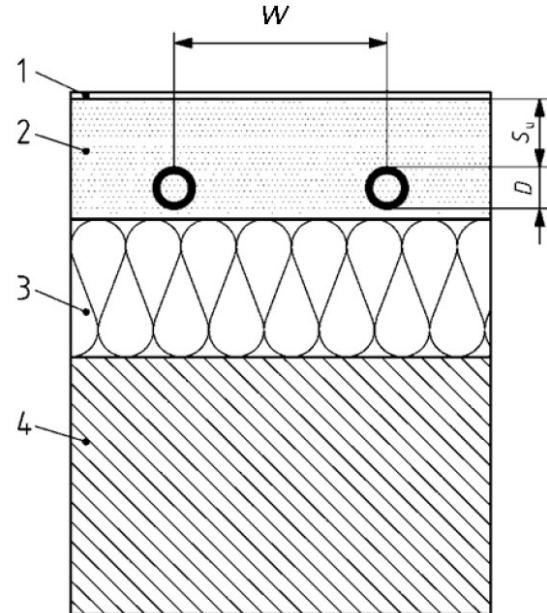
# EPFL Exercise 2: Radiant Embedded System (Type A)

- Indoor temperature:  $T_{op} = 20^\circ\text{C}$
- System Type: **type A**
- Pipe spacing:  $W = 15 \text{ cm}$
- Pipe diameter:  $D = 25 \text{ mm}$
- Thermal resistance of the floor covering:  $R_{\lambda,B} = 0.15 \text{ m}^2\text{K/W}$
- Thickness  $s_u = 10 \text{ mm}$
- Design heat load:  $q = 80 \text{ W/m}^2$
- Parameters of the system are provided (see next slide)

## Determine:

- Difference between average temperature and room ( $\Delta T_h$ )
- Supply water temperature ( $T_{wi}$ ) \*
- Compare the supply temperature of the embedded system with the temperature of the radiator

\* *Water temperature difference between supply and outlet of embedded systems is typically limited to  $T_{wi} - T_{wo} = 5\text{K}$*



- 1 – floor covering
- 2 – weight bearing and thermal diffusion layer (cement screed)
- 3 – thermal insulation
- 4 - structural base