



ENG-445

Building Energetics


Heating in Buildings – Emission Systems and Thermal Comfort

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EPFL Exercise 1: Radiators

- The heating demand of a **4x4 m²** room to maintain operative temperature of **20°C** is **80 W/m²**.
- 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	$\Delta T 50$	145	186	206	225	263	318	370
600	$\Delta T 50$	193	248	275	301	351	424	493
750	$\Delta T 50$	242	310	344	376	439	530	617
900	$\Delta T 50$	290	372	412	451	527	635	740
1050	$\Delta T 50$	338	434	481	526	614	741	863
1200	$\Delta T 50$	386	496	550	601	702	847	986
1350	$\Delta T 50$	435	558	618	676	790	953	1110
1500	$\Delta T 50$	483	620	687	752	878	1059	1233
1650	$\Delta T 50$	531	681	756	827	965	1165	1356
1800	$\Delta T 50$	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

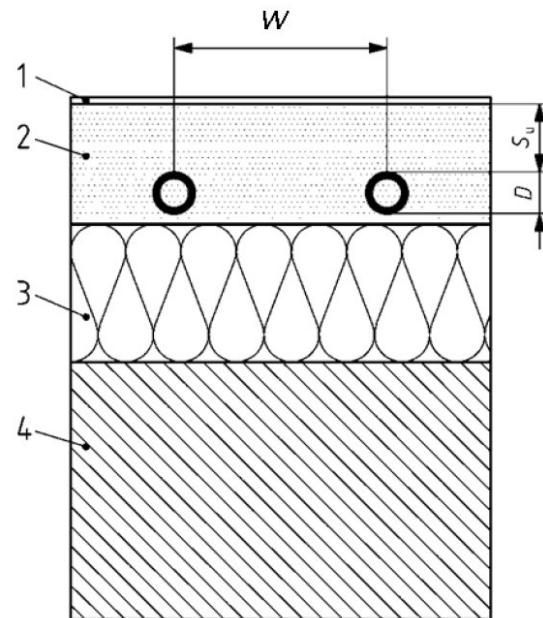
EPFL Exercise 2: Radiant Embedded System (Type A)

- 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 (ΔT_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