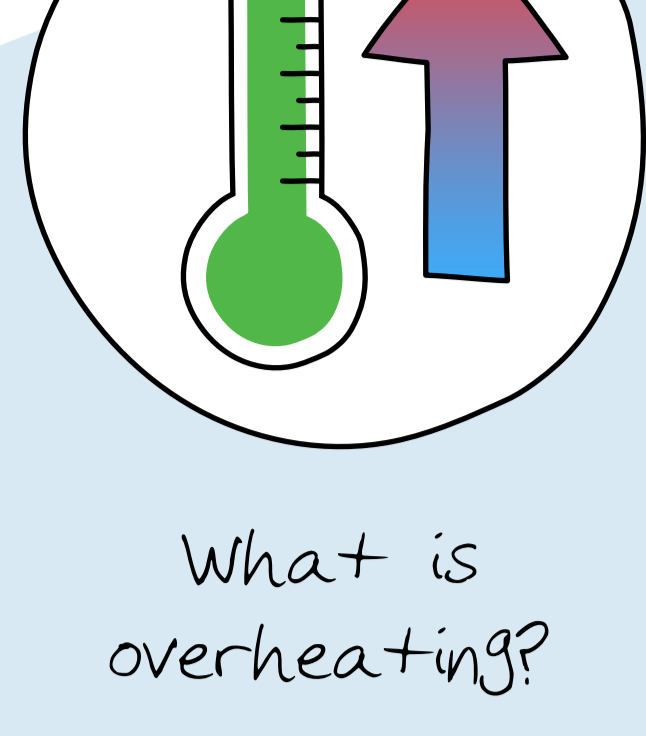
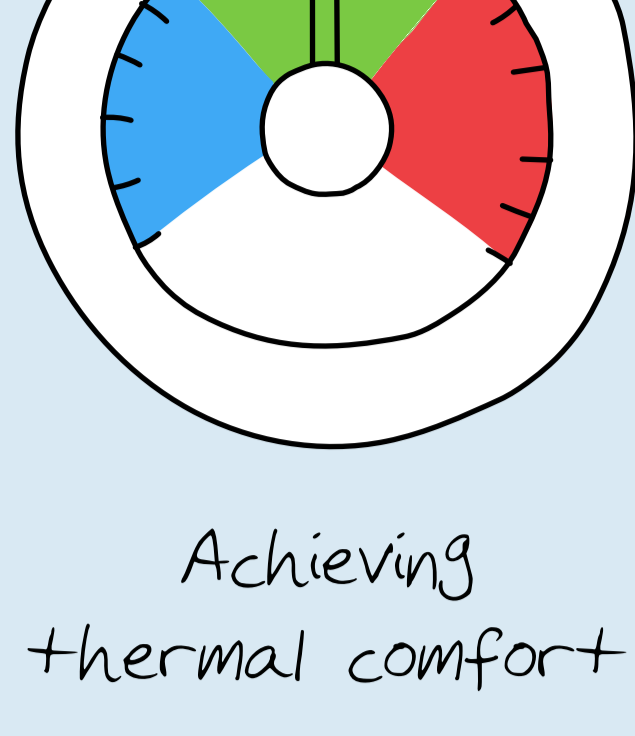


Overheating and Thermal Comfort Criteria

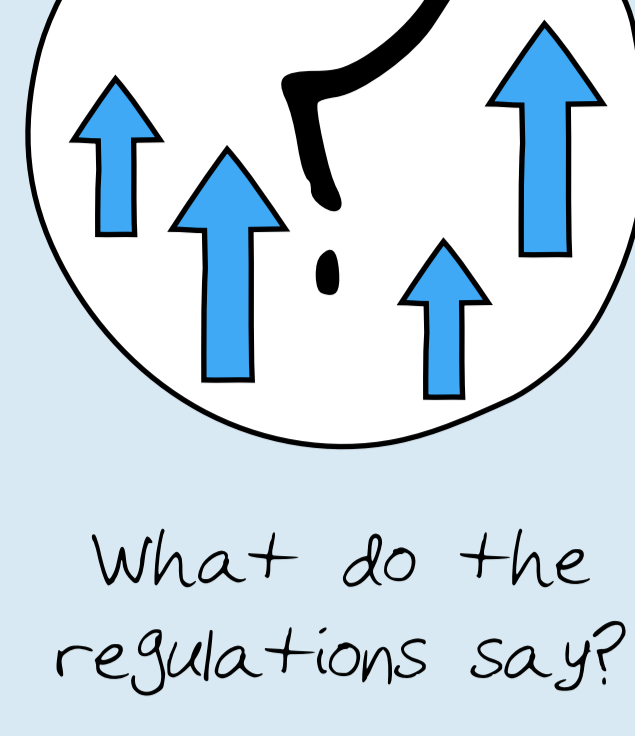
A Breathing Buildings guide to environmental design for buildings including offices and schools



What is overheating?

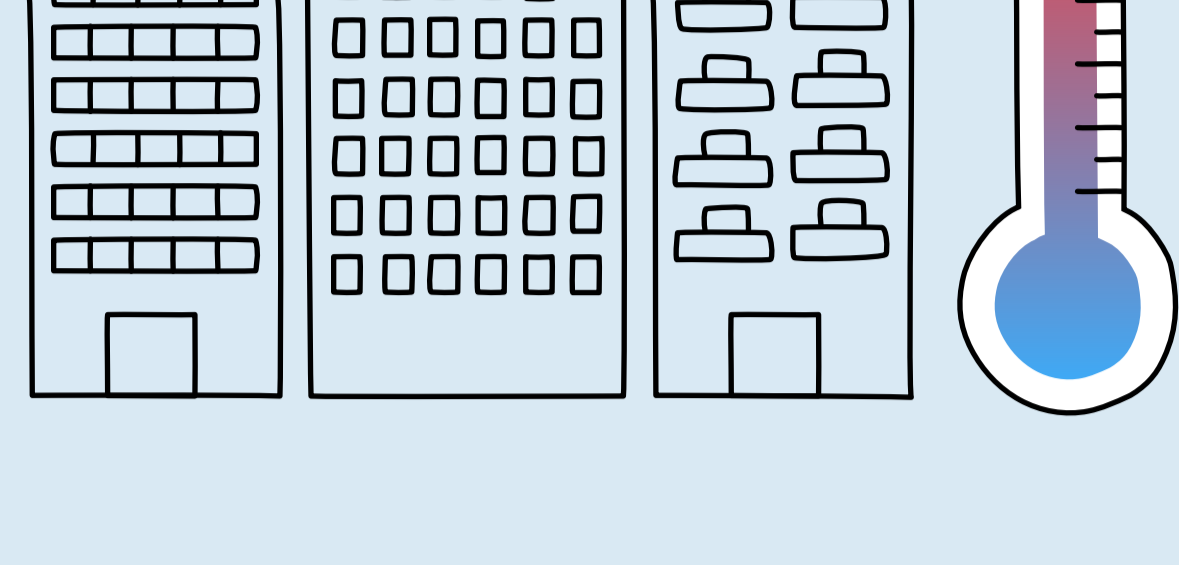


Achieving thermal comfort



What do the regulations say?

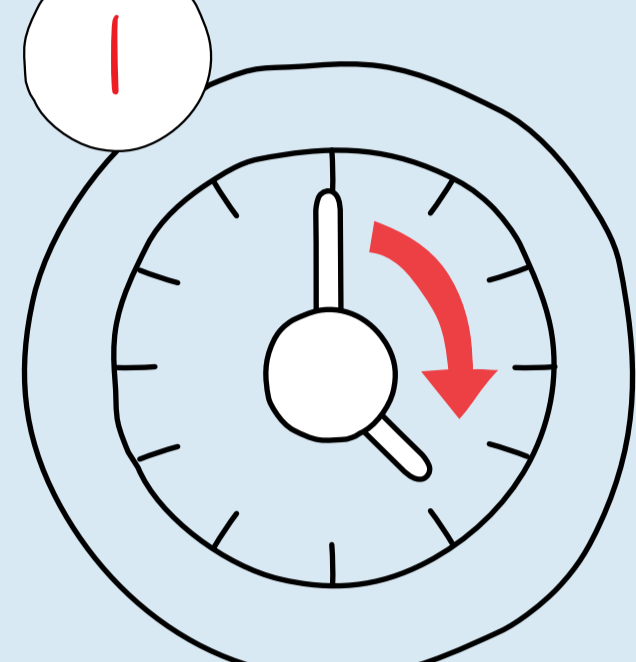
CIBSE Guide A (2006)



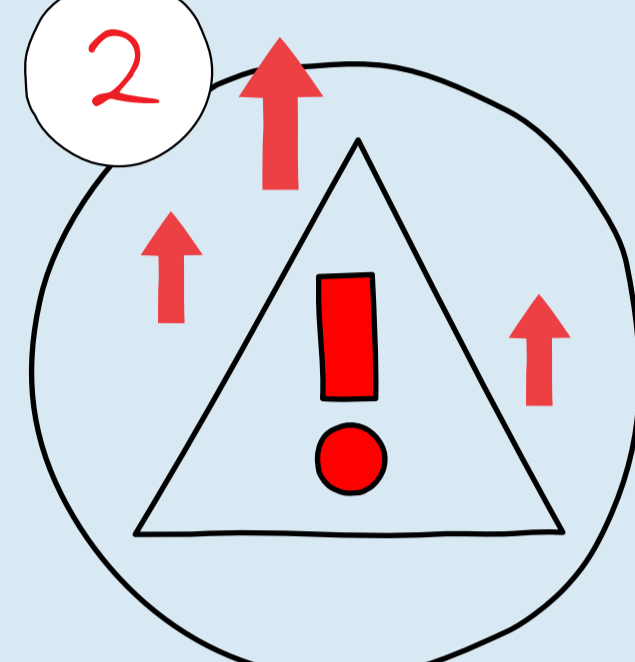
Single threshold temperature to assess overheating of a building

Regulation	Weather File	Overheating Criteria		
			Measure	Limit
CIBSE Guide A (2006)	Design Summer Year	Indoor comfort Temperature (air temperature) (°C)	25	Indoor air temperature > 28°C for no more than 1% of occupied hours
		Max Temperature (°C)	28	

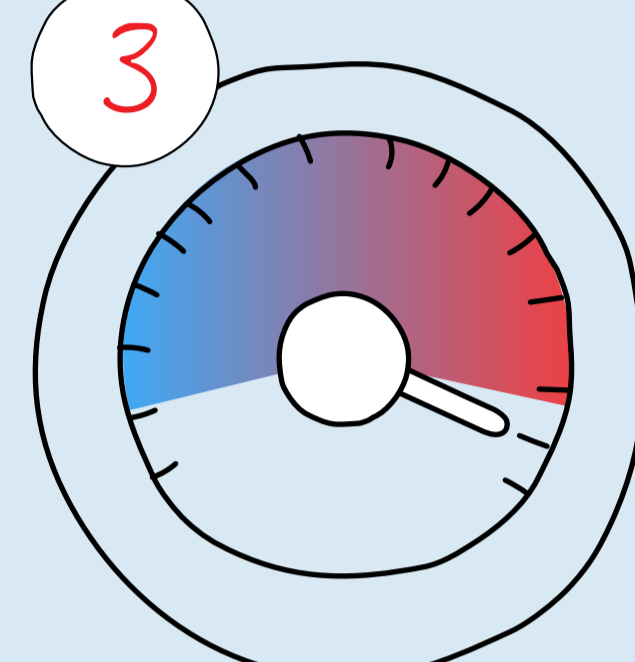
Following the single overheating measure of Guide A (2006), BS101 pioneered the use of 3 criteria for evaluating overheating...



Duration of overheating



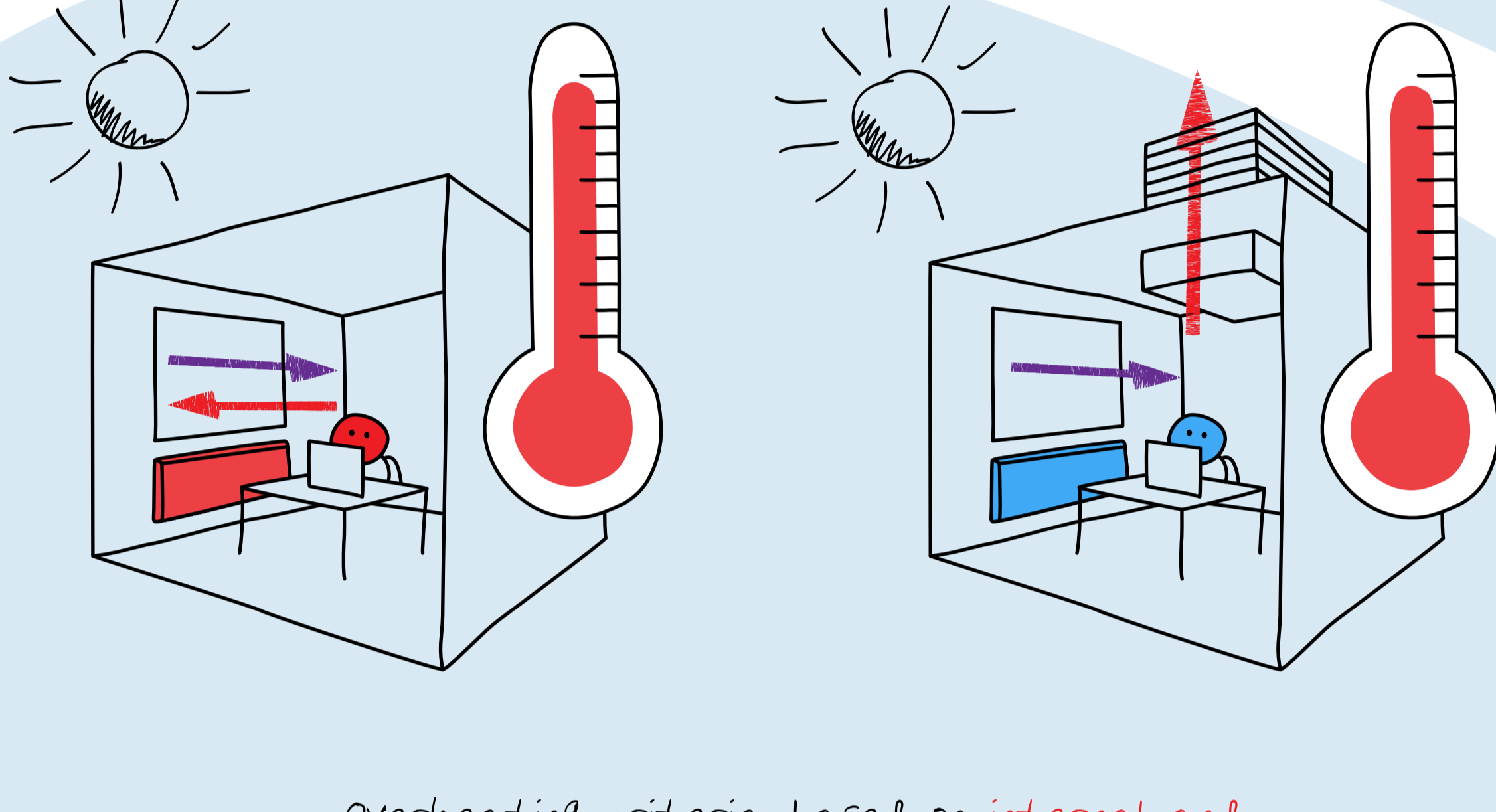
Severity of overheating



Upper limit temperature

BB101 (2006)

Provides the framework for the design of adequate ventilation and the avoidance of overheating, intended specifically for schools.



Overheating criteria based on internal and external air temperature

BB101 (2006) - For schools	Test Reference Year	1	Duration of overheating (air temperature) (°C)	28	Indoor air temperature > 28°C for no more than 120 hours per year
		2	Severity of overheating	Internal air temperature - External air temperature	Average difference (T _{int} - T _{ext}) > 5°C per day
		3	Upper limit temperature (°C)	32	Should not exceed upper limit temperature

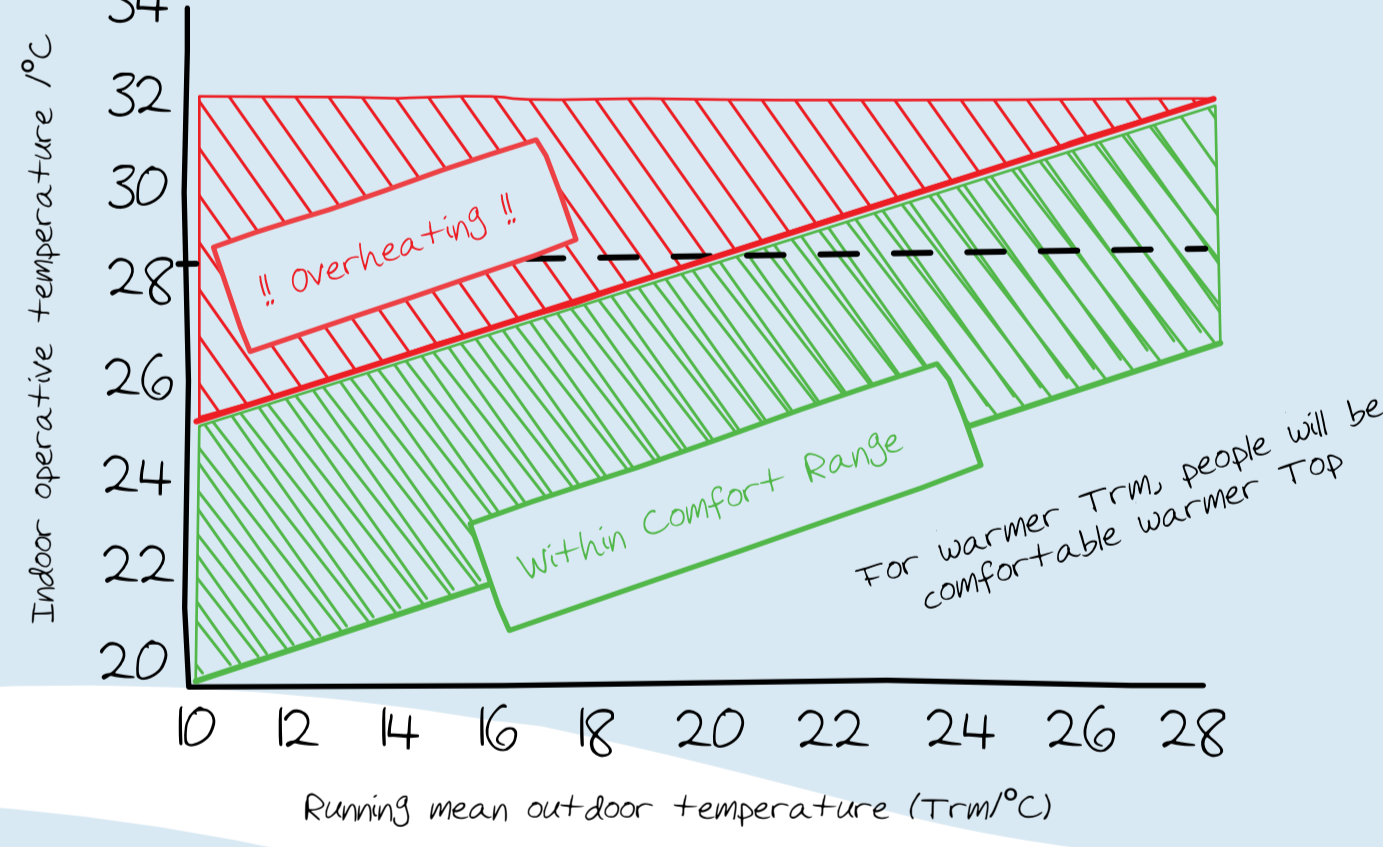
TM52 (2013)

CIBSE guide created to inform designers of how to assess thermal comfort and to define/limit overheating with the application of the 'adaptive thermal comfort' model.

Running mean temperature (T_{rm}): a rolling average of the outdoor air temperature, weighted according to their distance in the past.

Operative temperature (T_{op}): a combination of the air temperature and the mean radiant temperature.

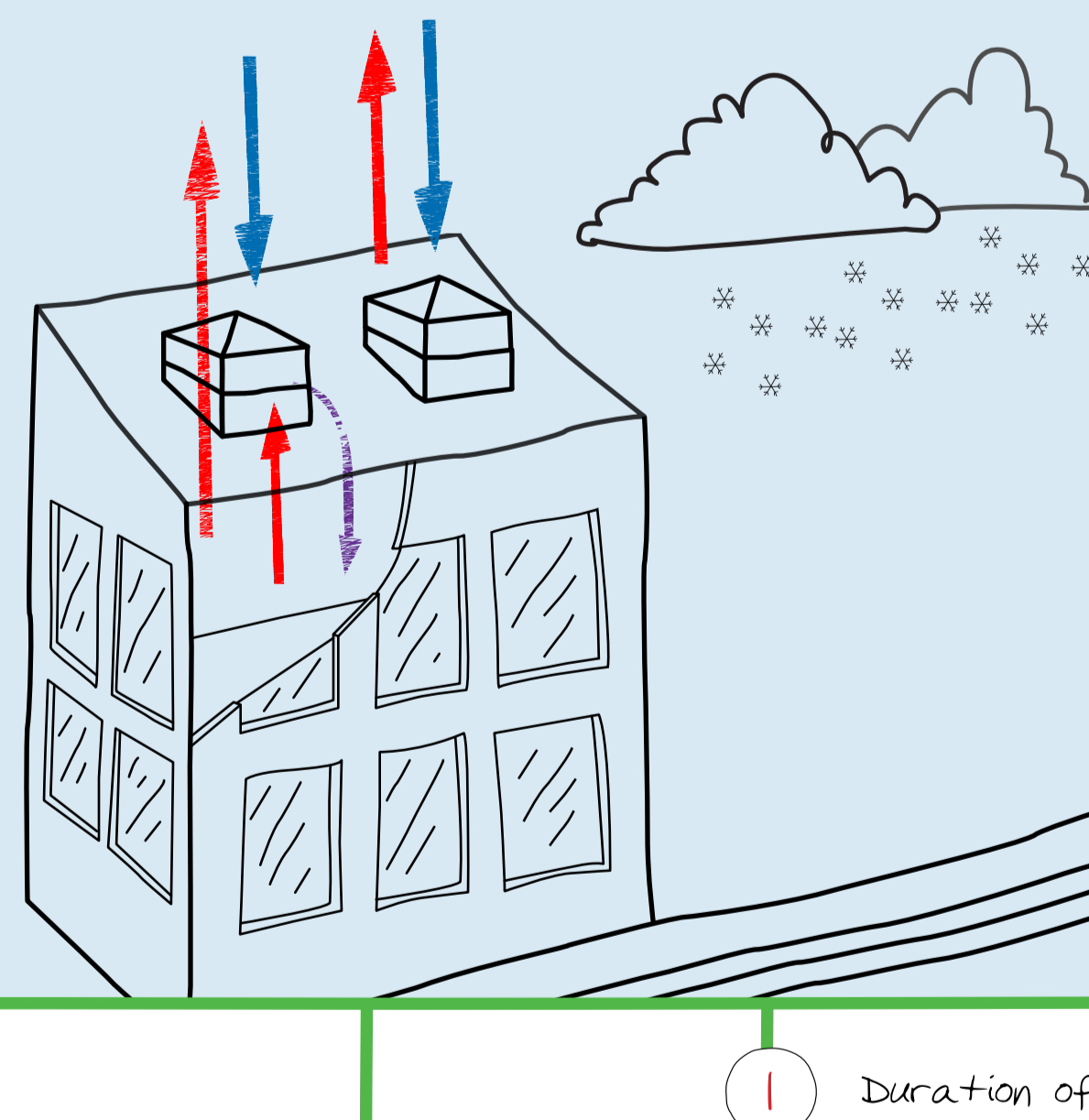
TM52 (2013)	Design Summer Year	1	Duration of overheating (operative temperature) (°C)	$T_{max} = 0.33T_{rm} + 21.8$	Hours of exceedance (H _e) $\Delta T \geq 1$, for no more than 3% of occupied hours
		2	Severity of overheating	Weighted exceedance (W _e)	$W_e \leq 6$
		3	Upper limit temperature (°C)	Absolute max for operative temperature	$\Delta T > 4^\circ C$



Adaptive thermal comfort

PSBP - FOS

An adaptation of TM52 specifically for schools, with the added requirement of cold draught mitigation.



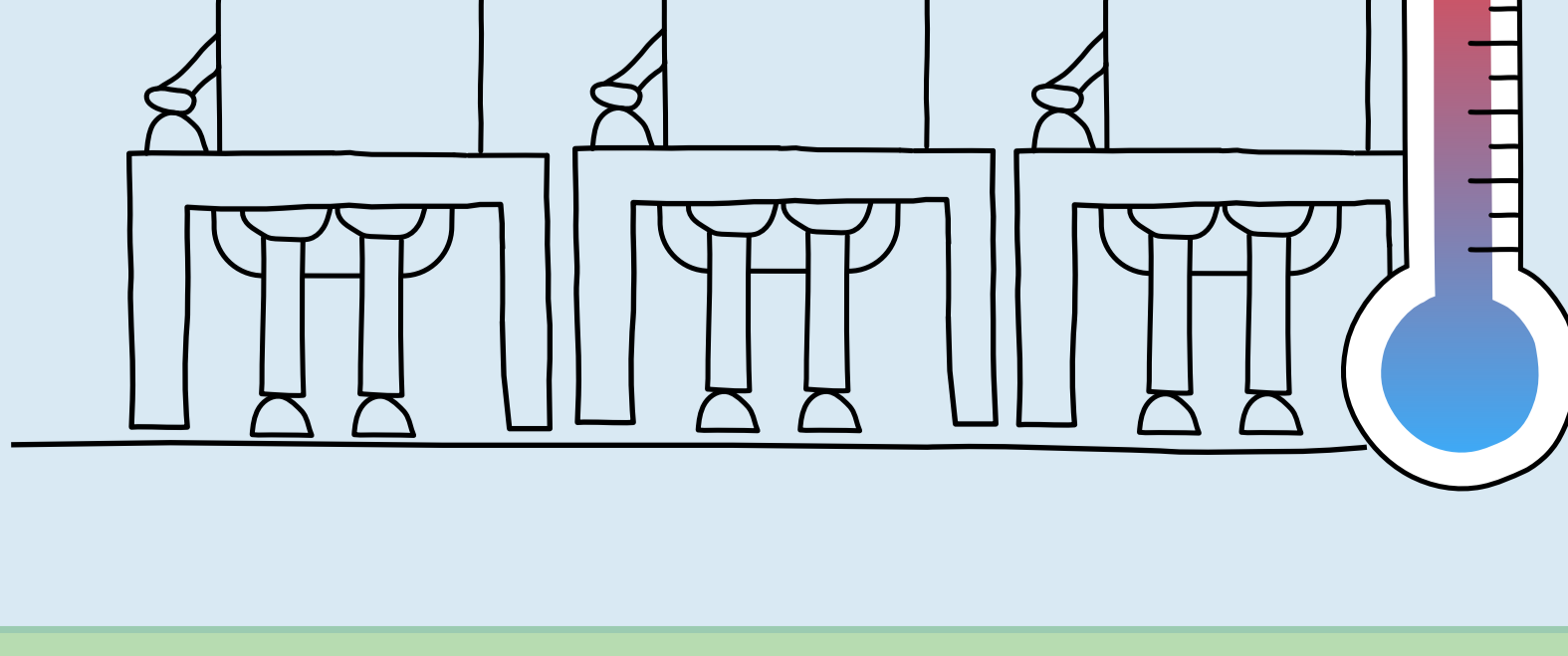
For Natural ventilation, contractor must provide mixing of ventilated air and room air to avoid cold draughts in winter

PSBP (FOS) - For schools	Design Summer Year	1	Duration of overheating (operative temperature) (°C)	Absolute max for operative temperature	Hours of exceedance (H _e) $\Delta T \geq 1$, should not exceed 40 occupied hours
		2	Severity of overheating	$T_{max} = 0.33T_{rm} + 21.8$	$W_e \leq 6$
		3	Upper limit temperature (°C)	Weighted exceedance (W _e)	$\Delta T > 4^\circ C$

CIBSE Guide A (2015)

A reworking of CIBSE Guide A (2006) using the adaptive thermal comfort model.

CIBSE Guide A (2015)	Design Summer Year	Indoor Comfort Temperature (operative temperature) (°C)	$0.33T_{rm} + 18.8$	Operative temperature > Max temperature for no more than 3% of occupied hour
		Max Temperature (°C)	Comfort Temperature +3	



To speak to a specialist about natural ventilation in your office, call us on 01223 450 060, or email info@breathingbuildings.com