

1.10 - INDOOR ENVIRONMENTAL CONDITIONS & NATURAL VENTILATION BUILDING GUIDELINES

As part of

Technical Requirements & Scope of Services All Framework Lots
and all Projects > €1.0million

For	Design Team Services.
For	HSE National Design Team Services Frameworks 2024.
For	Health Service Executive (HSE) or other tendering body as defined as HSE Group or Tusla.
Version Nr.	v.1.00-2024

All Framework Lots and all Projects > €1.0million

TR for use with:

- PW-CF1: Public Works Contract for Building Works Designed by Employer and
- PW-CF5: Public Works Contract for Minor Building & Civil Engineering Works Designed by Employer)

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1.0 Introduction:

The design brief is to design and develop **naturally ventilated buildings** and minimise the need for air conditioning (except for clinical purposes).

When designing for natural ventilation, the design must comply with CIBSE TM52 & 37 and “Overheating and Solar Shading” section of TGD Part L. A Dynamic Simulation Model (CDSM) model needs to be completed to ascertain compliance with the above.

This document sets out the indoor environmental criteria and DSM model parameters required to demonstrate compliance. The document must also be read in conjunction with the Project Brief and other Guidance documents including HTM 03-01: Specialised Ventilation for Healthcare Premises.

2.0 Fundamental Design Principles:

The Design Team shall use all reasonable endeavours to achieve an optimum level of energy and utility conservation without detriment to achieving the required internal environmental conditions. This shall include (but not limited to) the following list:

- 1 Comply with CIBSE TM 52 & TM37 & TGD Part L.
- 2 Minimise direct solar gain to reduce requirement (if any) for air conditioning / comfort cooling in accordance with CIBSE TM37 & TGD Part L.
- 3 Optimise daylight factors in staff and public areas.
- 4 Maximise control and flexibility of the Mechanical and electrical installations.
- 5 Maximise facilities for monitoring of plant & equipment and indoor environmental conditions and temperatures through the BEMS and Modbus room temperature controllers to quickly identify failures, maintenance requirements, wasteful or inefficient running of plant, and energy wastage, through incorporation of comprehensive building management systems.
- 6 Utilise plant and equipment in the most efficient manner, such as consideration of sizing and using those fitted with electronic variable speed controllers; and
- 7 Provide building services systems, plant and equipment specifically designed to operate at full and part load associated with all projected occupancies, modes, zone and sub-zones of operation.
- 8 Indoor air quality is of paramount importance and Design Team must familiarise themselves and address local and site-specific challenges to ensure air quality standards are maintained.

3.0 Environmental & Design Conditions:

Indoor and external environmental design conditions are set out below:

3.1 Indoor Environmental Conditions:

Winter minimum Internal air temperature: 21°C – 23°C.

Summer target Internal air temperature: 21°C – 23°C (subject to compliance with Section 4 – Natural Ventilation & Overheating Criteria).

3.2 External Design Conditions:

Winter external air temperature: +5°C i.e. average air temperature in Ireland during the heating season.

3.3 Weather File:

External air temperatures - use recently published Met Eireann weather files using “Design Summary Year 2” (DSY2), RCP 8.5 2021 (covering the period 2021-2050), high sensitivity. The Design Team shall use the file for the location closest in proximity to the project location in question.

4.0 Natural Ventilation & Overheating Design Criteria:

The accuracy of the overheating analysis requires detailed and precise modelling of all building fabric and services elements. In particular, all gains including but not limited to solar, thermal, equipment, lighting and building services shall be accurately modelled.

Naturally ventilated rooms shall not exceed 25°C (Dry Resultant Temperature) for more than 3% of the core solar gain hours for both summer and winter periods combined in compliance with CIBSE TM 52. Summertime and Wintertime hours are set out below:

1. Winter 10am – 4pm from Oct – April (1272 hours).
2. Summer 10am to – 6pm May – September (1224 hours).

Internal room temperature for naturally ventilated rooms shall not exceed a temperature difference of +2k when compared with outdoor temperatures for the same period.

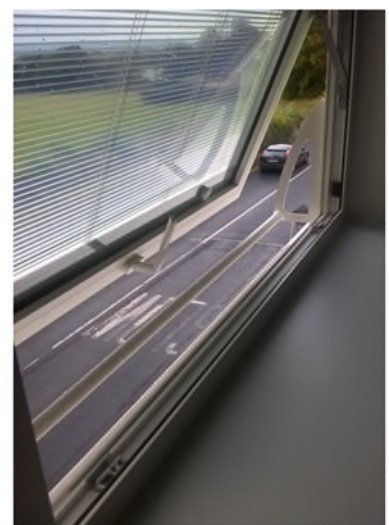
The percentage of overheating shall be calculated separately for summertime and wintertime.

The Design Team shall outline the basis of the overheating report as well as the outputs along with the split between the gains from the equipment and solar gains. Solar gains must be limited in accordance with CIBSE TM 37 and TGD Part L and include a Solar Gain Check as defined in TGD Part L (Section 1.3.5.3).

The Design Team shall develop mechanical ventilation and/or air conditioning solutions if they cannot meet the overheating requirements. Due consideration should be given to achieve the most energy efficient solution to ensure compliance with TGD Part L. For example, Geothermal or air source heat pumps tend to operate efficiently with AHU and FCU systems due to the low grade heat requirement.

4.1 Health & Safety – Window Restrictions:

The Design Team shall note the restrictions on the size of window openings as 100mm clear opening. The Design Team shall take into account the effect of such restrictors when calculating the effect on efficient and effective natural ventilation requirements for the room. All windows below 1.8 meters must not open any further than 100mm. It should be noted that there are ways of designing around this issue such as in the examples below.



TR AND SoS for Design Team Services (Building Works designed by Employer)
Overheating & DSM Modelling.

5.0 Results:

The Design Team shall provide the following information to demonstrate their inputs on their DSM modelling as well as the output table requirements as set out below as a minimum.

Element	Value	Comment
Weather Conditions	Local Weather File (Design Summary Year)	Software file
Building Geometry	Design proposal	
Envelope u values	Design proposal	
Thermal Bridging	Design proposal	Calculations by NSAI certified assessor
HVAC & DHW Systems	Design proposal	
Renewables	Design proposal	
Infiltration	0.15 ACH	
Room Data:		
Number of occupants	Refer to room Data Sheet	
Room occupancy profile	Refer to room Data Sheet	
Occupant gains	Refer to room Data Sheet	CIBSE Guide A
Equipment Gains	Refer to room Data Sheet	
Equipment gains profile	Refer to room Data Sheet	
Lighting Gains	Design proposal	
Lighting gains profile	Refer to room Data Sheet	
Ventilation Strategy	Natural Ventilation / Design proposal	
Window specifications:		
Visible light transmission	Proposed window	
Outdoor reflectance	Proposed window	
Indoor reflectance	Proposed window	
G value	Proposed window	
Window Opening Stroke	100mm maximum below 1.8metres	
Window Opening Type	Top or side hung. High and low-level opening sections	
Blinds & Curtains	Include	
Simulation Settings	Include: The settings within the CFD modelling shall include solar gain simulation, window opening simulation, auxiliary Ventilation simulation (running heat recovery ventilation) and natural ventilation simulation (general openings as well as window openings).	
Simulation Period	10am – 4pm from Oct – April and 10am to – 6pm May – Sept	
Simulation time step	10 minutes	
Simulation reporting interval	60 minutes	
Preconditioning period	10 days	
Output Requirements	1. Number & percentage of hours over 28⁰C 2. Number & percentage of hours over 25⁰C 3. Number & percentage of hours over 24⁰C 4. Number & percentage of hours over 23⁰C 5. Number & percentage of hours over 22⁰C 6. Natural ventilation air in and out volumes 7. Window open number of hours 8. Heating plant hours run 9. A split of all Equipment Gains 10. Solar Gains to be presented as Nett and Gross. 11. Peak temperature on peak date. 12. External Temperature at Room Temperatures for each iteration above ie from 22⁰C to 28⁰C.	