



An Roinn Oideachais  
agus Scileanna  
Department of  
Education and Skills

# Technical Guidance Document 021-7

## Minimum Performance Standards of Roof Materials and Finishes

1<sup>st</sup> Edition, April 2018

Planning & Building Unit  
Department of  
Education and Skills  
Tullamore, Co. Offaly.  
R35 Y2N5

Telephone: (057) 9324300  
Fax: (057) 9351119

Web: <http://www.education.ie>  
[www.energyineducation.ie](http://www.energyineducation.ie)

**PLANNING and BUILDING UNIT**

# Minimum Performance Standards of Roof Finishes

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## 1. INTRODUCTION

### 1.1 Application

- (a) These Guidelines state the minimum standards to be used in the design and specification of new or replacement roof finishes for use in educational facilities and should be read in conjunction with other relevant design guidance, available at [www.education.ie](http://www.education.ie) under Technical Guidance and in particular TGD-021 Construction Standards for Schools Section 10 Roofs.
- (b) These standards apply to all Primary and Post-primary construction projects, including special schools, funded in part or in whole by the Department of Education and Skills including Summer Works, Devolved Grant, Emergency Works and other similar schemes.
- (c) The performance criteria within these guidelines has been updated to reflect TGD Part L of the Building Regulations 2017 Buildings, other than Dwellings, and the Department of Education and Skills TGD-033 requirements to achieve Nearly Zero Energy Buildings.
- (d) Notwithstanding the above, the design and construction of all roofs shall comply with the relevant I.S., EN and B.S. Standards and meet the requirements of the current Building Regulations parts A to M.

### 1.2 Technical Reference

- (a) The provision of Technical References in this document is for guidance purposes only. The list of Technical References is not exhaustive and the onus shall be on all the members of the Design Team acting collectively to ensure that all the relevant standards are applied in all instances. The Design Team must ensure that the Construction Standards used in the design of educational facilities will achieve build quality; value for money; energy efficiency; safety in design, construction and use; appropriate consideration of life cycle costing and timely completion of the project. The design must also facilitate the effective management and operation of the building.
- (b) All references to Acts and Regulations shall be deemed to mean the current Acts and Regulations.
- (c) The Design Team shall also apply, where necessary, any new standards or Acts (and their associated Regulations), relevant to the design and construction process, which may also come into force after the publication of this document.

### 1.3 Further information

- (a) If further information or assistance is required in relation to this Document please contact:

School Planning and Building Unit,  
Department of Education & Skills,  
Portlaoise Road,  
Tullamore,  
Co. Offaly,  
R35 Y2N5  
Telephone: (057) 9324300;  
Fax: (057) 9351119  
Website: [www.education.ie](http://www.education.ie)  
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## 2. DESIGN AND CONSTRUCTION

### 2.1 General Performance Requirements

- (a) Metal pitched roof finishes must have a service life span of a minimum of 40 years under normal conditions.
- (b) Flexible waterproof membranes must have a 30 year manufacturer durability statement, along with a minimum of a 20 year manufacturer insurance backed guarantee for materials, workmanship and the entire installation on site for the specific project.
- (c) The design of roofs, roof systems and selection of roofing materials and finishes must consider the geographic location, siting and exposure of the building, along with any particular or extreme conditions it may be exposed to, eg, marine or coastal environments, wind velocities, unauthorised roof access/anti-social behaviour etc
- (d) Roof penetrations shall be kept to minimum. Where such penetrations occur all associated flashings and ancillary weathering components shall be of a similar performance and durability to the roof weathering material. In particular site applied liquid membranes and exposed mastics are not considered acceptable in conjunction with metal cladding sheets. Any sealants used must conform to the manufacturer's certification and approved details.
- (e) Only suitably qualified and trained personnel shall undertake installation of roofing systems on school projects. The Design Team shall seek evidence of suitability and training directly from the roofing material manufacturer of such personnel.
- (f) The roofing manufacturer shall undertake periodic inspections during the installation. Upon completion of all roof construction elements, a mandatory final inspection and written report, with confirmations on the adequacy of construction, materials, finishes etc., must be undertaken and completed by the roofing manufacturer. This written report shall be submitted for approval of to the DT leader and included in the handover documentation upon completion of the project.
- (g) Rain Noise: It is essential that rain noise is considered in the design of light weight roofs and roof glazing as it can significantly increase the ambient noise levels in spaces below. The mitigation of noise is especially relevant in special schools where excessive or unnecessary noise can have a negative impact for certain pupils with sensory impairment.

As part of the design process the Design Team should demonstrate to the Client and end user that the roof and roof glazing have been designed to minimise rain noise as provided in *Technical Guidance Document TGD-021-5 Acoustic Performance in New Primary & Post Primary School Buildings, Revision 1, November 2015* (extract below).

*2.2 Rain Noise: Due to the fluctuating nature of rainfall; laboratory test data on the roof element is required. The standard ISO 10140-1:2010/Amd 2:2014 details the test method for determining rainfall noise on building elements including a definition for rain in terms of rainfall rate, drop diameter and fall velocity. The Indoor Ambient Noise Levels (IANL) must not exceed a 30dB limit above Table 1.0 levels at the standardised heavy rainfall rate of 40mm/hr. This 30dB allowance above the Table 1.0 levels is a relaxation on the previously recommended allowance of 20dB to take cognisance of the more typical rainfall rate in Ireland (~20mm/hr)"t*

- (h) The Design Team Structural Engineer shall ensure the building and roof structure is designed to accommodate all imposed and wind loadings.
- (i) Where roofs are designed to support the installation of Photovoltaic (PV) panels the roof finish should be of a suitable material to accept the additional associated footfall, access and maintenance requirements. The Design Team shall obtain confirmation of the

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compatibility of the PV installation from the roof manufacturer, ensuring that the required performance, warranties and guarantees are not compromised in any way. Furthermore any associated implications for the mounting of PV on roof to achieve compliance with TGD Part B will need to be fully addressed

In the case of existing buildings, a full structural assessment of the roof structure and its physical capacity to accommodate PV panels, should be made at the outset for final consideration by the Design Team leader.

- (j) There is an increased risk of surface condensation where the steel liner sheets penetrates the thermal fabric at the external wall/roof junction and also where point thermal bridging occurs due to fixings, halter clips etc. All such details will need to be modelled and assessed in compliance with the requirements of TGD Part L and certified by a member of the NSAI approved thermal modellers scheme or equivalent.
- (k) Roof systems shall incorporate a suitable vapour control layer (VCL) to the underside of the thermal insulation in accordance with TGD Part F. For built up roof systems, in school environments a steel liner sheet is not suitable for this purpose and a separate VCL is required.
- (l) Consideration should be given to the selection of insulation materials used in roof construction particularly with regard to fire performance, toxicity and hygrothermal properties.
- (m) The design and installation of roofing materials should not place an undue burden on the school authority with respect to maintenance and inspection regimes. All such requirements shall be clearly outlined to the school authority at the handover stage of the project.
- (n) For roof refurbishment projects, the Design Team shall fully assess the suitability of the existing roof materials and substrates. Furthermore the Design Team shall obtain from the roof manufacturer confirmation of the compatibility of the proposed roofing material with the existing roof finish in accordance with the required manufacturers certification and guarantees.

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## 3. COMPLIANCE REQUIREMENTS

### 3.1 General

- (a) All proposed designs for roofs for use in educational facilities must conform to the minimum performance criteria contained within this TGD and as set out in Table 1 below.
- (b) The entire roof system build up and associated components must have current NSAI or BBA certification.
- (c) All associated flashing, upstands and ancillary weathering components shall be of a similar performance as the roof weathering sheet and shall be included in the required roof certification, guarantees and warranties. The use of third party materials not covered by such certification, guarantees and warranties is not acceptable

### 3.2 Independent Accreditation

- (a) The Design Team shall obtain evidence of independent test reports and certification for each of the following performance criteria contained in Table 1.

(Note: The below *Table 1* is not considered an exhaustive list of required performance criteria for all roof systems or materials and it is the responsibility of the individual Design Teams to ensure the designed roof system for the particular project adheres to the Building Regulations and relevant standards including but not limited to structural performance, fire performance, wind resistance, impact resistance etc. and obtain the associated certification from the roofing manufacturer)

- (b) Table 1 – Performance Criteria

Reference	DOES Requirements
Air Permeability (m/h/m <sup>2</sup> @ 50pa)	≤3
Watertightness BS EN 14509:2013  BS EN 1928:2000 BS EN 13956:2012	Class A: Demanding applications with heavy rain and wind. The assembly shall be watertight up to 1,200 Pa (composite panel system)  Class B : 150 kPa (roofing membranes)
Thermal Movement BS5427:2016+A1:2017	Code of practice for the use of profiled sheet for roof and wall cladding on buildings provides guidance on allowable tolerances
Durability	Metal pitched roof finishes: 40 years under normal service conditions  Flexible waterproof membranes: 30 year manufacturer durability statement with 20 year manufacturer insurance backed guarantee for materials, workmanship and installation.
Acoustic Performance ISO 10140-1:2010/ 2:2014	The Indoor Ambient Noise Levels (IANL) must not exceed a 30dB limit above Table 1.0 levels contained in TGD-021-5 at the standardised heavy rainfall rate of 40mm/hr.
Thermal Transmittance EN ISO 6946: 2017 & BR 443	0.15W/m <sup>2</sup> K*

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Thermal Bridging & surface condensation. IS EN ISO 13788:2012; IS EN ISO 10211:2007 Part 1 & 2; BRE Report BR 497 (2nd Edition).	The critical temperature factor (fCRsi) for avoiding mould growth in School Buildings is 0.75; Sports Halls, Kitchens & Canteens is 0.8 (TGD Part L D.2 & BRE IP1-06).
Interstitial Condensation Risk Analysis IS EN ISO 13788:2012 & BS 5250:2011+A1:2016. IS EN ISO 15026:2007	Humidity Class 4 buildings should be used for analysis under IS EN ISO 13788. In addition to the "Glaser method" (IS EN ISO 13788) transient hygrothermal simulation should be undertaken (IS EN ISO 15026) to assess condensation risks.

\*  $0.16Wm^2K$  is acceptable for roofs already in architectural design, ref TGD 033



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## Bibliography and Standards referenced

BS EN 14509:2013	Self-supporting double skin metal faced insulating panels. Factory made products. Specifications
BS EN 1928:2000	Flexible sheets for waterproofing. Bitumen, plastic and rubber sheets for roof waterproofing. Determination of watertightness
13956:2012	Flexible sheets for waterproofing. Plastic and rubber sheets for roof waterproofing. Definitions and characteristics
BS5427:2016+A1:2017	Code of practice for the use of profiled sheet for roof and wall cladding on buildings
ISO 10140-1:2010/ 2:2014	Rainfall sound
ISO 10140-1:2016	Acoustics. Laboratory measurement of sound insulation of building elements. Part 1: Application rules for specific products
EN ISO 6946:2017	Building components and building elements. Thermal resistance and thermal transmittance. Calculation methods
BR 443	U-value conventions in practice: Worked examples using BR 443
IS EN ISO 13788:2012	Hygrothermal performance of building components and building elements. Internal surface temperature to avoid critical surface humidity and interstitial condensation. Calculation methods.
IS EN ISO 10211:2007 Part 1 & 2;	Thermal bridges in building construction. Heat flows and surface temperatures. Detailed calculations
BRE Report BR 497 (2nd Edition)	Conventions for calculating linear thermal transmittance and temperature factors
TGD Part L	Conservation of Fuel and Energy – Buildings other than Dwellings
TGD Part B	Fire Safety
TGD Part F	Ventilation
BRE IP1-06	Assessing the effects of thermal bridging at junctions and around openings
IS EN ISO 15026:2007	Hygrothermal performance of building components and building elements. Assessment of moisture transfer by numerical simulation