BASIX® THERMAL PERFORMANCE PROTOCOL

07 June 2024

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1   Introduction

1.1   What is BASIX?

BASIX is the Building Sustainability Index. It is a web-based planning tool designed to assess the potential performance of new homes against a range of sustainability indices: potable water use, thermal performance, emissions associated with operational energy use and embodied emissions of the building materials. BASIX aims to reduce the environmental impact of new residential development and to produce homes that are more comfortable and cheaper to run than most existing homes.

BASIX was introduced into the development approval process in NSW on 1 July 2004 under the *Environmental Planning and Assessment Act 1979*.

More information about BASIX, including the requirements for completing a BASIX assessment, is available on the BASIX website, https://www.planningportal.nsw.gov.au/development-and-assessment/basix.

1.2   About the Thermal Performance Index of the BASIX tool

The Thermal Performance Index of the BASIX tool assesses the heating and cooling loads placed on a new dwelling by its fabric. It does not assess heating and cooling appliances (except ceiling fans) or fuel type – these are assessed in the Energy Index. The Thermal Performance section of BASIX aims to:

- ensure thermal comfort for a dwelling's occupants appropriate to the climate and season

- reduce greenhouse gas emissions from artificial cooling and heating through good building design and use of appropriate construction materials

- reduce the demand for new, or upgraded, energy infrastructure by managing peak demand for energy required for cooling and heating.

1.3   About this Protocol

To complete the Thermal Performance Index of a BASIX assessment, applicants can choose between:

- the DIY method, which can be completed entirely within the BASIX tool, and which specifies minimum insulation requirements has a flexible glazing assessment
- the 'Simulation' method, which involves the assessment of the thermal performance by an Accredited Assessor using Approved Software, or
- the Passive House standard method, which involves the simulation with the Passive House Planning Package (PHPP) software by a Certified Passive House Designer, provided the design satisfies the requirements to use this method.

This Protocol applies to the Simulation method under the Thermal Performance Index of BASIX for new dwellings. It ensures that thermal performance assessments under the Simulation method are carried out consistently and accurately. This Protocol establishes requirements for:

- the accreditation of organisations that may accredit assessors to conduct Simulations, and the accreditation of assessors by such organisations

- the software which can be used by Accredited Assessors to conduct Simulations

- the manner in which Simulations are to be conducted by Accredited Assessors.

This Protocol is mainly intended for organisations seeking accreditation from the Department of Planning, Housing and Infrastructure to accredit assessors to conduct thermal performance Simulations for BASIX, and for assessors already accredited by Accrediting Organisations. Consent authorities (or certifying authorities) can refer to Section 3.6 of this Protocol on the Approved Software for the Simulation method.

1.4   Definitions

Terms used in this document have the meaning given to them below.

Accredited Assessor means a person accredited by an Accrediting Organisation to conduct Simulations for the Thermal Performance Index of BASIX.

Accrediting Organisation means an organisation approved by the department to accredit assessors for the purposes of conducting Simulations.

Approved Software means software that has been approved by the department for conducting Simulations.

Assessor Certificate means the Nationwide House Energy Rating Scheme Certificate issued from the online generation system by the software provider, with the first page showing the NatHERS logo with the total heating and cooling loads and the unique QR-code.

Assessor Certificate Number means the unique Certificate Number shown on the Assessor Certificate.

BASIX means Building Sustainability Index

Conditioned floor area, in relation to a dwelling, means the total floor area of the dwelling, excluding:

   a)   floor area that is not fully enclosed;

   b)   bathrooms (but not ensuites) and laundries, with a ventilation opening; and

   c)   voids, store rooms, garages and carparks.

Multi-dwelling development means a development with more than one new dwelling on a single lot.

NatHERS means the Nationwide House Energy Rating Scheme, a framework that allows approved software tools to rate the heating and cooling loads of Australian homes based on their building fabric and location.

NCC means the current version of the National Construction Code.

QR Code means the unique scannable code which links to the Assessor Certificate and drawings.

Simulation means the modelling of a new dwelling using Approved Software for the purposes of demonstrating compliance with the BASIX Thermal Performance Index.

Software Provider means a provider and/or distributor of thermal modelling software.

Unconditioned floor area, in relation to a dwelling, means the total floor area of all bathrooms (not including ensuites) and laundries with a ventilation opening.

2 Accreditation of organisations and Assessors

2.1 Aim

The aim of this section of the Protocol is to establish requirements for the accreditation of organisations that may accredit assessors to conduct Simulations, and the accreditation of assessors by such organisations.

2.2 Scope

This section only applies to activities of Accrediting Organisations and Accredited Assessors that relate to conducting Simulations for the purposes of compliance with the Thermal Performance Index of BASIX.

2.3 Application to be an Accrediting Organisation

Organisations accredited by NatHERS as Assessor Accrediting Organisations (AAOs) must apply to the department for accreditation to accredit assessors to conduct thermal performance Simulations for BASIX. The department will not directly accredit individual assessors, or an organisation that has not been accredited by NatHERS as an AAO.

Applications to the department must include the following information (additional information may be requested):

- proof of the organisation's current accreditation by NatHERS as an AAO

- a copy of the organisation's application to NatHERS for accreditation as an AAO together with the supporting information submitted with that application

- a publicly accessible website from the organisation listing the names and contact details of all of its assessors to conduct Simulations. The list of assessors must be up to date at the time of application and must be updated regularly. Assessors with partial or limited accreditation must be identified to the department

- explanatory material to be provided to Accredited Assessors such as guidelines and procedures for conducting Simulations

- the criteria by which accreditation of assessors may be withdrawn

- details of the proposed format of Accredited Assessor numbers (a maximum of 12 letters or numbers) to be entered into the BASIX on-line tool.

The department will assess applications and determine whether an organisation will be accredited. The department may rely on expert advice when assessing applications. Following determination, the department will notify the applying organisation in writing of the outcome of the application.

As at the date of this Protocol, the Australian Building Sustainability Association (ABSA), Design Matters National (DMN) and the House Energy Raters Association (HERA) are recognised as Accrediting Organisations.

2.4 Accreditation of assessors by Accrediting Organisations

An Accrediting Organisation may accredit qualified individuals as Accredited Assessors for the purposes of conducting Simulations to determine the heating and cooling loads of buildings for use in BASIX assessments.

Individuals to be accredited as Accredited Assessors must already hold the qualifications as required by NatHERS.

2.5 Quality assurance

As required by the NatHERS Protocol for Assessor Accrediting Organisations, an Accrediting Organisation must have a quality assurance system in place (such as a code of practice and/or standardised procedures) to ensure Simulations are conducted in a uniform manner.

2.6   Quality assurance review

An Accrediting Organisation must conduct reviews in accordance with the quality assurance system and the requirements from the NatHERS Protocol for Assessor Accrediting Organisations. A review report that includes (but is not limited to) the monitoring of conformity of assessor outputs in NSW to the assessor accreditation criteria must be provided to the department at suitable intervals. Accrediting Organisations must take steps to resolve serious and recurring issues that arise as a result of the review.

2.7   Periodic reporting

In addition to the auditing report required in Section 2.6 of this Protocol, an Accrediting Organisation must provide to the department a copy of the annual report to the NatHERS Administrator when available. The department may request information specific to NSW or other states as need arises.

2.8   Accredited Assessor support

Software support is not provided by an Accrediting Organisation, but an Accrediting Organisation must provide Accredited Assessors with sufficient technical support in relation to their role of conducting Simulations and obligations under this Protocol. Accrediting Organisations must provide assistance to Accredited Assessors in their role of advising clients on compliance with the BASIX Thermal Performance requirements.

2.9   Other Rules and Guidelines

An Accrediting Organisation may have other rules and guidelines relating to the conduct and activities of its Accredited Assessors. The Accrediting Organisation is responsible for ensuring these rules and guidelines are consistent with this Protocol.

2.10 Notification of operational changes

An Accrediting Organisation must inform the department of changes to its operations that may affect its status as an Accrediting Organisation.

3 Software used to conduct Simulations

3.1 Aim

The aim of this section of the Protocol is to establish a common and appropriate benchmark for all software used to conduct Simulations to demonstrate compliance with the Thermal Performance Index of BASIX.

3.2 Approved software

For the purpose of conducting thermal performance Simulations for the Thermal Performance Index of BASIX, software providers must have their software accredited by the NatHERS administrator in accordance with the requirements in the NatHERS Software Accreditation Protocol (SAP).

3.3 Support for Approved Software

Software providers must satisfy the requirements in the NatHERS SAP to provide sufficient support for Accredited Assessors to conduct Simulations using Approved Software.

3.4 Updates to Approved Software

Software providers must abide by the procedures outlined in the NatHERS SAP when updating software. Depending on the changes involved in the updates, a suitable transition period to the updated version may be required.

3.5 Criteria for Approved Software

Software must meet the criteria outlined in the NatHERS SAP before it can be used for conducting Simulations.

3.6 Current list of Approved Software

Software accredited under NatHERS (see https://www.nathers.gov.au/nathers-accredited-software) using Chenath engine version 3.22 or later is approved by this Protocol for the Thermal Performance Index available from 1 October 2023.

The appliances component of Approved Software (or whole of home assessment), using Chenath engine version 3.22, cannot be used for Simulations for the BASIX Thermal Performance Index, or to satisfy the BASIX energy standards.

Accredited Assessors must use software version using CheNath engine version 3.21 if the new dwelling is eligible to the BASIX Thermal Comfort Index before 1 October 2023. Default values and settings in the BASIX Thermal Comfort Protocol dated 27/11/2020 and the relevant version of the NatHERS Technical Note will apply.

3.7 Revisions to Simulated Ratings

In the event that a simulated rating needs to be revised, Accredited Assessors should:

- use the software version of the original rating (if that software version is available)
- refer to the versions of the Protocol and the NatHERS Technical Note applicable to that software version, and
- request access to the older software version from the software provider.

Accredited Assessors do not need a written request from the department to the software provider to use an older software version, provided they comply with the conditions above.

Accredited Assessors can contact the BASIX help desk at 1300 650 908 (or email info@service.nsw.gov.au) if they need to check which version of the Protocol applies to the software version. They can contact the NatHERS administrator to check the applicable version of the NatHERS Technical Note.

4   Conducting Simulations

4.1   Aim

The aim of this section of the Protocol is to establish procedures to be followed by Accredited Assessors when conducting Simulations of dwellings using Approved Software to demonstrate compliance with the Thermal Performance Index of BASIX.

4.2   Simulation procedures

When conducting Simulations, Accredited Assessors may only use Approved Software under this Protocol.

Accredited Assessors must abide by the following procedures provided in subsections 4.4 to 4.21.

4.3   Software use

Software must be operated in accordance with:
   a.   Assessment Procedures set out in this Protocol (**which prevail over other procedures, including items (b) to (e) below, in the event of inconsistency**)
   b.   the current NatHERS Technical Note
   c.   the user manual or help files provided with the software
   d.   any training material received while completing the required qualification
   e.   other procedures issued by an Accrediting Organisation.

4.4   Limitations on dwellings to be modelled by software

Software must be used to rate new dwellings for the purposes of demonstrating compliance with the BASIX Thermal Performance Index. Without written approval from the department, the software must not be used to demonstrate BASIX compliance for only a part of a dwelling, or alterations or additions of existing dwellings.

4.5   Spaces to be included in conditioned and unconditioned zones

The definitions for conditioned and unconditioned zones in Approved Software and the NatHERS Technical Note may differ from the BASIX definitions for conditioned and unconditioned floor areas. When conducting Simulations:

• All spaces that fall under the **BASIX definition** of conditioned floor area must be included in a conditioned zone. Ensuites must be included in a conditioned zone, regardless of whether they have a ventilation opening.

• All spaces that fall under the **BASIX definition** of unconditioned floor area must be included in an unconditioned zone.

Outdoor living spaces such as balconies, or rooms with mesh or open screens should not be included in either a conditioned or unconditioned zone.

BASIX definitions of conditioned and unconditioned floor areas have the following effects:

• Separate bathrooms and toilets and laundries with a ventilation opening (e.g. an operable window) must be included in an unconditioned zone.

• Separate bathrooms and toilets and laundries **without** a ventilation opening must be included in a conditioned zone, as they will be required to have mechanical ventilation, which will generally draw conditioned air in from an adjacent conditioned zone.

4.6   Modification of Approved Software outputs

Modifications to the loads calculated by the Approved Software are only permitted where directed to do so through the process described in section 5.2 of the Thermal Performance Protocol.

4.7   Climate zone

Accredited Assessors must use the correct postcode for the site as required by the NatHERS Technical Note.

4.8   Dwellings in a Multi-dwelling development

Individual dwellings in a multi-dwelling development must each have their own individual rating even if they are of similar design, as required by the NatHERS Technical Note.

4.9   Ground reflectance

The default value of 0.2 must be used regardless of the surfaces surrounding of the building.

4.10 Construction

4.10.1   General

Construction of the assessed building must be modelled as indicated on the drawings and specifications intended for lodgement with the consent authority (or certifying authority). Unusual construction systems must be clearly described with details.

Where information is not provided on the drawings and specifications, the Accredited Assessor should make a written request to the client for the information. That request should state that where information is not detailed the default values specified in this Protocol will be applied.

4.10.2   Sub-floor ventilation

Sub-floor spaces must be modelled as shown on the drawings. Enclosed sub-floor spaces include those with enclosing walls with not more than the minimum ventilation openings required by the National Construction Code (NCC).

4.10.3   Floor coverings

Floor coverings must be modelled as shown on the drawings and specifications. Where a floor covering is nominated on the drawings and specifications, the floor covering must be nominated. If no floor covering or finish is specified on the drawings and specifications, it must be modelled in accordance with the NatHERS Technical Note.

4.10.4   Waffle pods

Waffle pods must be modelled in accordance with the NatHERS Technical Note.

4.10.5   Curtains, pelmets and other internal window/glazed door treatments

Regardless of the internal window or glazed door treatments nominated on the drawings and specifications, all windows must be modelled as having low performance Holland blinds. No other internal window coverings must be modelled.

Insect screens must be modelled on all windows and glazed sliding doors regardless of whether shown on the plans or specifications.

4.10.6   External shading

External shading devices must not be modelled unless they are shown on the plan and are of exterior grade construction materials.

4.11 Colours

4.11.1   Roof colours

Accredited Assessors must model the dwelling as per the rules set out in the NatHERS Technical Note.

4.11.2 Wall colours

The external wall colour or shade must be modelled as nominated on the drawings and specifications or set to 'medium' if not specified.

The internal wall colour must be set to 'medium' if the Approved Software allows it to be specified and it is not nominated on the drawings and specifications.

4.11.3 External window and door frames

The colour of external window and door frames must be set to 'medium' if the Approved Software allows it to be specified and it is not nominated on the drawings and specifications.

4.12 Insulation

The type and R-value of insulation must be clearly nominated in accordance with the following options:

a. Specifically nominate bulk insulation as being used and state the material R-value (of the insulation only) on the Assessor Certificate and on the drawings and specifications;

b. Specifically nominate foil insulation:

   I.   in walls and state either the total system R-value of the wall including the product, or a clear description that identifies product or type including emissivities of foil surfaces and air gaps;

   II. in ceilings and state the total system R-value in both directions of heat flow, or a clear description that identifies product or type including emissivities of foil surfaces and air gaps;

   III. In roofs and state the total system R-value in both directions of heat flow, or a clear description that identifies the product or type including emissivities of foil surfaces and air gaps.

Where the information regarding foil insulation is not available the Assessor should make a written request to the client for the information.

Note that insulation installation must comply with the relevant requirements from the NCC. Accredited Assessors must ensure that the insulation type and thickness specified is appropriate for installation with the specified wall type. In some climate zones, insulation should be installed with due consideration of condensation and associated interaction with adjoining building materials. Assessors need to be mindful for condensation reasons that reflective foil in some climate zones may not be appropriate to install in some construction arrangements.

4.12.1 Loss of ceiling insulation from ceiling penetrations

Accredited Assessors must model the dwelling as per the rules set out in the NatHERS Technical Note.

4.13 Thermal bridging

Thermal bridging must be applied in accordance with the NatHERS Technical Note.

Thermal breaks can be modelled only after thermal bridging is applied. They must be modelled in accordance with the NatHERS Technical Note, depending on whether they are specified on the drawings and specifications.as shown on the drawings.

4.14 Glazing

4.14.1 General

Windows, glazed doors, skylights and glazed roofs must be modelled according to the drawings and specifications. The drawings and specifications must have the detail required by Table 1.

4.14.2 Openable proportion of windows

The openable proportion of windows, doors and other openings and the openable percentages of window units must be calculated and entered into the Approved Software in accordance with the NatHERS Technical Note.

4.15 Zoning

Accredited Assessors must follow the software zone types set out in the NatHERS Technical Note.

Please note that the term "Conditioned" or "Unconditioned" in the NatHERS Technical Note may differ from the BASIX definitions for conditioned and unconditioned floor areas (Section 4.5). Garages should be zoned as per NatHERS Technical Note.

4.16 Walls, floors and ceilings shared with common areas and public spaces

Accredited Assessors must model the walls, floors and ceilings of dwellings adjacent to common areas and public spaces in accordance with the rules set out in the NatHERS Technical Note.

4.17 Adjacent buildings

Accredited Assessors must model the shading effects from adjacent buildings and their surrounding features (such as fences) in accordance with the rules set out in the NatHERS Technical Note.

4.18 Trees and vegetation

Accredited Assessors must model the shading effects from trees and vegetation in accordance to the rules set out in the NatHERS Technical Note.

4.19 Building sealing

Accredited Assessors must model the dwelling in accordance with the NCC NSW Additions for building sealing.

4.20 Heating and cooling appliances

Ceiling fans can be considered in Simulations for the BASIX Thermal Performance Index. Systems that form part of the building fabric and provide some heating and cooling benefit (e.g. trombe walls and the like) may be considered through the process detailed in section 5.2 of this Protocol.

Other mechanical heating and cooling appliances or systems such as air-conditioning systems and electrical resistance heating systems cannot be considered in Simulations for the BASIX Thermal Performance Index. The appliances component of Approved Software cannot be used to satisfy the BASIX energy standards either.

4.21 National Construction Code Energy Efficiency requirements

Accredited Assessors should note that BASIX Thermal Performance (Simulation) does not replace all of the energy efficiency provisions in the National Construction Code.

Accredited Assessors must ensure that the simulated dwelling design allows for insulation to be installed in compliance with the National Construction Code.

Accredited Assessors must ensure that the simulated dwelling design allows requirements of the National Construction Code for the design, location and insulation of services to be met.

5   Limitations of Approved Software

5.1   General

Accredited Assessors must conduct Assessments within any published limitations of the Approved Software used.

5.2   Circumstances outside software limitations

For dwellings, design strategies, construction systems or materials that are beyond the capabilities of the Approved Software, Accredited Assessors must seek the advice from the user support provided by the software provider, or experts nominated by the Accrediting Organisation. Accredited Assessors can apply for a BASIX Alternative Assessment that allows The department to consider the circumstances outside

software limitations on an individual basis. A written advice from the user support provided by the software or experts nominated by the Accrediting Organisation must be provided with the application.

Please refer to the BASIX Help note (available on the BASIX website at https://www.planningportal.nsw.gov.au/development-and-assessment/basix) for more information on the Alternative Assessment process.

6 Documentation required for Assessments

The Assessor Certificate must include the minimum reporting requirements for single and multi-dwellings set out in the NatHERS Technical Note, except those related to Whole of Home rating. Accredited Assessors can generate Assessor Certificates that include the thermal performance star rating only for the Thermal Performance Index of BASIX. Refer to the Definition section of this Protocol on what the Assessor Certificate comprises of.

For Class 1a buildings on a single lot where individual certificate numbers of the buildings are available, a summary sheet issued from the same online generation system as the Assessor Certificate must be attached alongside the BASIX certificate.

Accredited Assessors must not issue an Assessor Certificate unless:

- The Assessor Certificate and the plans accompanying the DA or application for a CDC have been endorsed by the Accredited Assessor.

- The information on the Assessor Certificate (with the exception of window frame material) is consistent with information on the drawings and/or specifications, and with the details of the DA or application for a CDC.

Only one Assessor Certificate per DA or CDC is to be issued. For DA or CDC that includes multiple stages of a residential development, the Accredited Assessor can issue one Assessor Certificate specific to the stage or stages corresponding to the BASIX certificate.

The information on zone types relating to each dwelling must be clearly identified in the records kept by the Accredited Assessor.

Completed Assessments must be accompanied with drawings and specifications, which define all features of the building that the Assessment was based on.

The information in Table 1 is required on drawings and/or specifications for the purpose of conducting thermal performance Simulations for the Thermal Performance Index of BASIX.

Where the information in Table 1 is not provided on the drawings and/or specifications, the Assessor should make a written request to the client for the information. If no further information is received, the default values specified in this Protocol will be applied. If no default values are available from this Protocol, the worst-case values specific to the location of the assessed building will be applied. Multiple simulations may be required to identify the worst-case defaults.

Table 1: Information required on drawings and specifications to conduct Simulations for the BASIX Thermal Performance Index

Element	Detail required on drawings and/or specifications
General drawing quality	a. Must be to scale b. Must clearly show intended construction with labels or industry standard drawing conventions
Specification quality	Must clearly identify relevant material types and any relevant standards
Project details	Yes
Orientation	a. True north b. Relationship of building to true north
Overshadowing	Location and height of forms which may be either part of the assessed building or adjoining the assessed building. These may include: a. existing buildings b. approved buildings c. fences and screens d. landforms e. protected trees.
Room identification	a. Names of rooms or spaces shown on drawings to identify use, e.g. living, kitchen, bath, etc. b. Connecting doors, openings, stair voids, etc.
Typical construction	May be indicated with industry standard
Unusual construction	Must be specifically detailed
External walls	a. Drawing to scale b. Material c. Insulation type, R-value and location d. Colour and/or solar absorptance where a specific colour is modelled
Internal walls	a. Drawing to scale b. Material c. Insulation type, R-value and location
Windows (and other glazed elements)	Window schedule that includes: a. Location and orientation b. Drawing to scale c. Shading d. Glass type (including films) e. Frame material and type f. Type (e.g. sliding, double hung) or openable panes clearly drawn to determine openable proportions g. NFRC Solar Heat Gain Coefficient (SHGC) and U-value of complete glazing unit (glass and frame combined) – regardless of whether the glass is single clear or not. The unit should match the description of Window type (with the exception of frame material) on the Assessor Certificate.

Element	Detail required on drawings and/or specifications
	U-value of the unit should not exceed the maximum value specified on the Assessor Certificate. SHGC value of the unit should be within the range specified on the Assessor Certificate.
Window internal covering	n/a
Fixed or adjustable external shading (eaves, pergolas, verandahs, awnings, skylight shading devices)	a. Location, type and dimensions shown on drawings b. Sufficient detail to enable sun blocking factor of all external shading structures to be assessed c. A detail for pergolas including structure and any battens if they are to be considered as a shading device d. Whether the device is fixed or adjustable e. Material properties such as shading coefficient for polycarbonate sheeting or shading factor for sail cloth
Skylights, glazed roofs and polycarbonate roofs above an enclosed space.	Skylight and/or roof window schedule that includes: a. Location, type and dimensions shown on drawings b. Where constructed of moulded plastic – description of the construction c. Where glass is single clear – description of glass and frame d. NFRC Solar Heat Gain Coefficient (SHGC) and U-value of complete glazing unit (glass and frame combined) – regardless of whether the glass is single clear or not. These may be based on default values of Approved Software e. Shaft type, insulation and length f. Sufficient information or detail to determine openable proportions
Roof	a. Pitch b. Ventilation openings (passive and mechanical) c. Material d. Insulation type, location and thermal properties e. Specific external colour or shade (light, medium or dark) and solar absorptance
Ceilings	a. Material Insulation type, location and thermal properties b. Ceiling penetrations
Floors	a. Material b. Covering (optional) c. Insulation type, location and thermal properties d. Sub-floor ventilation openings

07/06/2024

7   Appendix: Maximum Loads as at date of this Protocol

Schedule 1 Part 2 of the State Environmental Planning Policy (Sustainable Buildings) specifies the maximum loads for single dwellings. It also specifies the maximum average loads allowed in the BASIX multi-dwelling tool, as well as the maximum individual loads for each dwelling in a multi-dwelling development.

Notes:

- While zones 19 (Charleville), 50 (Oakey) and 66 (Ballarat) are available for selection in the Simulation method under the Thermal Performance Index of BASIX, they are not primarily located in NSW. They are applicable to a number of postcodes near the NSW border. Maximum loads in these zones are the same as zones 9 (Amberley), 46 (Cobar) and 24 (Canberra) respectively.
- There is no floor type delineation for units. The mud brick values may be used for any dwelling with primarily (at least 50%) mud brick or rammed earth walls, regardless of the floor type.