



# Insulation solutions for healthcare

A holistic approach to designing and specifying for patient comfort, health and wellbeing, sustainably



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## Introduction

Given the rising healthcare demand, which is being driven by Australia's aging population, it is critical to understand how comfort and health are affected by the physical environment in hospital settings.<sup>1</sup> The hospital is a structure that needs to be designed and constructed for the welfare of staff, patients, and visitors as much as possible.<sup>2</sup> The goal in any healthcare setting is to create an environment that promotes healing rather than one that serves as a hindrance to it.

Considering its significant impact on building occupants, indoor environmental quality (IEQ) is one of the building design elements that has received a lot of attention in recent years. According to studies, poor IEQ has a negative impact on building occupants' psychological as well as physical health,<sup>3</sup> creating feelings of stress on the occupants' perception of their environment and impeding their recovery.

What comprises IEQ in a hospital setting? IEQ refers to the quality of a building's environment as it relates to the health of occupants within it. It is determined by a range of environmental factors, including indoor air quality (IAQ), thermal comfort, acoustics, lighting, and more. Many of these variables can be improved through thoughtful building design, including specifying long-lasting, sustainable insulation materials.

In this whitepaper, we consider a holistic approach to designing and specifying for healthcare environments that focuses on the comfort, health and wellbeing of its occupants. We take a close look at the key parameters that contribute to better patient outcomes, namely thermal comfort, indoor air quality and acoustics, as well as fire safety and sustainability considerations.



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## Towards a holistic approach to healthcare design

As we have seen, the environment of healthcare facilities has a direct impact on the health of patients and their families. Increased awareness of this fact has prompted a change in how hospitals are being designed with a focus on patient-centred features. The key characteristics of this new approach include:

- addressing acoustics, thermal comfort and IAQ through better building envelope design;
- compliance with relevant building codes, standards and industry design guidelines; and
- designing spaces that are beneficial to the environment as well as people.

### Better acoustics for better health

Background noise is usually a constant in healthcare settings. It is produced by a number of sources, including air conditioners, alarms, medical equipment like respirators, televisions, and human conversations. It can come from noise sources in adjoining rooms, or from outside environmental sources such as traffic and sirens, airplanes, and building and construction activities.

Noise levels are getting worse in today's hospitals. According to a recent study, researchers from King's College London and the University of the Arts London contend that noise levels in hospitals routinely exceed international recommendations.<sup>11</sup> John Hopkins University acoustical engineers have also discovered that, since 1960, the typical hospital sound levels have increased from 57 decibels to 72 decibels during the day and from 42 decibels to 60 decibels during the night.<sup>12</sup>

## Linking hospital design with patient outcomes

A growing number of studies have concluded that the built environment has a significant impact on patient outcomes.<sup>4</sup> For example, research indicates that appropriately designed heating, ventilation and air conditioning can not only enhance the patient recovery process and reduce length of stay, but also lessen medical errors and reduce infection rates.<sup>5</sup> Lighting is another factor that has been shown to decrease patients' stress and improve their physical working capacity.<sup>6</sup>

Although there are many variables that can affect a patient's perception of their overall comfort, thermal comfort and indoor air quality are two of the most important. Studies show that a comfortable thermal environment helps maintain patients' moods and improves their healing.<sup>7</sup> Furthermore, temperature and humidity play a significant role in determining the survival and transmission of potential airborne pathogens like bacteria, viruses, and fungi, which can be extremely dangerous in a healthcare setting.<sup>8</sup>

Research indicates that excess noise has some of the most negative effects on patients during hospital stays. Patients who are exposed to noise pollution may experience sleep disturbances, such as a reduction in sleep depth, consistency, or duration, as well as problems with their cardiovascular system, wound healing, and pain control.<sup>5</sup> Excessive noise can impact patients' ability to rest and heal, and thus severely hinder a patient recovering from an illness or operation.

The working environment also has an effect on the effectiveness, productivity, and satisfaction of hospital staff. According to a series of surveys, IAQ, noise and thermal comfort are three of the top five factors (out of a total of 16 physical features investigated) affecting healthcare providers.<sup>9</sup> Hospital noise levels, in particular, have grown steadily over recent decades, with consequences including increased levels of stress and fatigue, poor job performance, hearing damage from loud noises, general annoyance, and a higher rate of job burnout.<sup>10</sup>

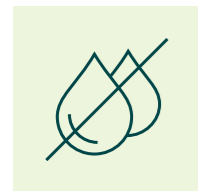


To create a comfortable acoustic environment, acoustical performance criteria must be met relating to background noise, which includes both external noise intrusion and sound insulation, and reverberation time. Part F5 of the National Construction Code (NCC) defines specific requirements for reducing sound transmission through walls and floors. The Association of Australasian Acoustic Consultants' (AAAC) Guideline for Healthcare Facilities outlines minimum objective noise and vibration standards for the design and commissioning of future hospitals and health care facilities. Standards such as AS/NZS 2107:2016 "Acoustics - Recommended design sound levels and reverberation times for building interiors" should also be referenced.

It is essential to engage with an acoustic consultant during the earliest stages of design of the project. Building envelope and interior fitout solutions must be incorporated into the healthcare facility's walls, roofs, ceilings, and services in order to improve acoustics. It will be more difficult and costly to retrofit acoustic solutions after an issue has been identified rather than when the structure is being built. To reduce background noise, sound insulation is required, as are sound-absorbing materials to shorten reverberation times. These products absorb sound, which prevent it from reverberating back into the space or passing through a wall into an adjacent space.



*Healthcare environments need to control humidity and condensation to protect patients from moldy or damp conditions and stop the spread of airborne diseases.*



## Improving thermal comfort and indoor air quality

Insulation is the most effective long-term measure to guarantee thermal comfort, improving both the ambient temperature and the radiant temperature of surfaces such as external walls, floors and ceilings. It blocks the path of heat transfer so that, in winter, the insulated building provides high-quality thermal comfort due to improved heat retention and improved wall and ceiling surface temperatures. In summer, insulation acts as a barrier to external heat, keeping interiors cooler.

Make sure your design works whether in the extreme heat, the extreme cold, or somewhere in between, given the variety of climate zones found throughout Australia. Note that thermal requirements may vary across the different sections of a hospital building. Insulation should be complemented by other design elements, such as ventilation, glazing and air-conditioning to create optimal thermal conditions all year round.

Healthcare environments need to control humidity and condensation to protect patients from moldy or damp conditions and stop the spread of airborne diseases. The use of exterior wall insulation correctly installed can reduce the risk of condensation build-up. Insulation helps moderate temperatures throughout the building so humidity and moisture will be less likely to develop. It is important to specify the right material layers that allow the building to remain airtight but also allow excess humidity to escape the envelope at a controlled speed to prevent any risk of condensation.

### Good for people, good for the environment

Insulating the exterior walls of the building is necessary to improve the energy efficiency of buildings. By increasing the thermal resistance of the building envelope, insulation material in the building envelope can lower energy consumption for heating and/or cooling. This can help the building meet the requirements in Section J of the NCC relating to energy use.

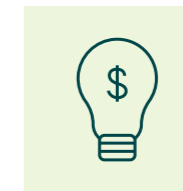
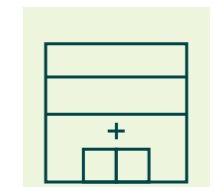
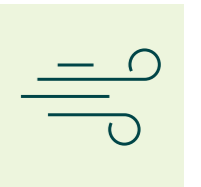
Beyond energy efficiency, it is important to choose sustainable, non-toxic insulation materials to create a healthy indoor environment. Look for insulation with zero Ozone Depletion Potential, which refers to products that have no substances that contribute to stratospheric ozone depletion. To maintain indoor air quality, specify products that contain no volatile organic compounds. Several products offer these properties, while also incorporating recycled materials to minimise waste and reduce their environmental impact.



## Protecting people and buildings from fire

To adhere to the strict fire safety regulations set forth by Section C of the NCC, it is essential for designers to specify insulation that is made of non-combustible, fire-resistant materials. Non-combustibility is assessed through the small-scale test AS 1530.1:1994 "Methods for fire tests on building materials, components and structures, Part 1: Combustibility test for materials". Building systems are assessed through standard testing methods for determining fire resistance level (AS 1530.4:2014 "Methods for fire tests on building materials, components and structures, Part 4: Fire-resistance tests for elements of construction") and lining material fire hazard or spread (AS 5637.1:2015 "Determination of fire hazard properties, Part 1: Wall and ceiling linings").

Passive systems aid in limiting the spread of a fire to the room where it started, giving firefighters time to enter the building and allow occupants to leave. Fire containment is especially important in medical facilities because oxygen and other highly-flammable materials are frequently stored therein, and because residents may be sedated, connected to machinery, or otherwise unable to leave on their own. Non-combustible, fire-resistant insulation options help prevent the spread of fire, preserve structural integrity, and restrict the movement of smoke and fire from one area to another, creating safe structures for occupants and giving specifiers more peace of mind.



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# Insulation for better healthcare environments

## FLETCHER INSULATION

Fletcher Insulation specialises in developing industry-leading insulation solutions, created using sustainable manufacturing methods and supported by expert technical and service teams. Their solutions contribute to creating a healthier indoor environment for patients, visitors and staff, and reduced energy solutions to control costs and environmental impact.

Fletcher Insulation's holistic approach to developing the best insulation solutions for hospitals and other medical facilities means they consider a range of performance indicators. These include energy efficiency, thermal bridging, fire resistance, internal comfort, acoustics, moisture, air tightness, and durability.



*In a busy hospital, insulation in internal walls, floors, and ceilings helps manage the acoustic environment, energy efficiency, and thermal comfort of patients, staff, and visitors.*

## Roofing

Fletcher Insulation's Permastop® range of building blankets have thermal and acoustic properties to effectively reduce heat transfer and minimise the internal reverberation and flow of distracting noise, such as rain on a metal roof. The Permastop® range also enables architects and specifiers to optimise building space. Exclusive to Fletcher Insulation, the R3.6 Permastop® Building Blanket, for example, offers the highest thermal performance for a 130mm blanket on the market.

To reduce thermal bridging, use Roof Razor combined with Permastop®. Roof Razor allows full recovery of the insulation blanket between the safety wire mesh and metal cladding. By combining these products, not only will you achieve optimum thermal performance, but your building will also meet or exceed NCC requirements.



## External walls

As well as addressing acoustic requirements, external wall insulation has an integral role in managing energy efficiency, regulating thermal conditions within the building, and meeting fire performance regulations. Fletcher Insulation's Pink® Partition range of glasswool insulation has outstanding, high-performance capabilities that meet all these requirements. With proven non-combustibility and acoustic performance, the product also features a comprehensive range of R-values, densities and thicknesses.



## Fitout applications

In a busy hospital, insulation in internal walls, floors, and ceilings helps manage the acoustic environment, energy efficiency, and thermal comfort of patients, staff, and visitors. Fletcher Insulation's range of fitout solutions are designed to deliver long-lasting, exceptional performance under varying environmental conditions.

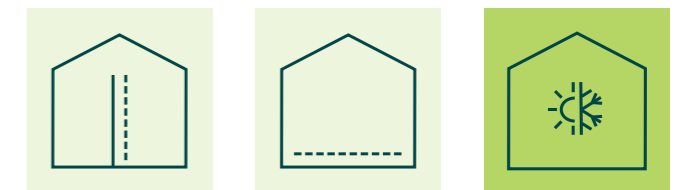
For ceiling and partition wall applications, Fletcher Insulation's Pink® Partition range is ideal for all types of healthcare environments. Like all Fletcher Insulation glasswool insulation products, Pink® Partition is non-combustible. It also provides excellent thermal insulation properties, with R-values ranging from R1.2 to R3.0, keeping buildings cooler in summer and warmer in winter.

The Pink® Partition range provides architects and specifiers with the products to help deliver optimised acoustic separation and performance within a healthcare building envelope. Australian-made and using up to 80% recycled content, the Pink® Partition range offers excellent acoustic performance and is designed to meet AAC recommendations – from low to high ratings.

## HVAC

The Heating, Ventilation and Air Conditioning (HVAC) systems within a hospital are not only vital in creating a comfortable indoor environment for patients and staff, but they also help maintain the right indoor air quality conditions to prevent the harbouring of harmful pathogens and protect valuable medical equipment from potentially damaging humidity and varying temperatures.

The thermal properties of Fletcher Insulation's HVAC products offer both efficient temperature control and safe indoor air quality. Their sound attenuation products complete the holistic systems approach by minimising noise when the HVAC is operating. Non-combustible and safe to use, the HVAC range is flexible, lightweight and strong, making it ideal for specifying in hospitals, medical centres, and for other healthcare settings.



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