Integrating Performance & Care

Tailoring Internal Wall & Ceiling Systems for Healthcare Environments

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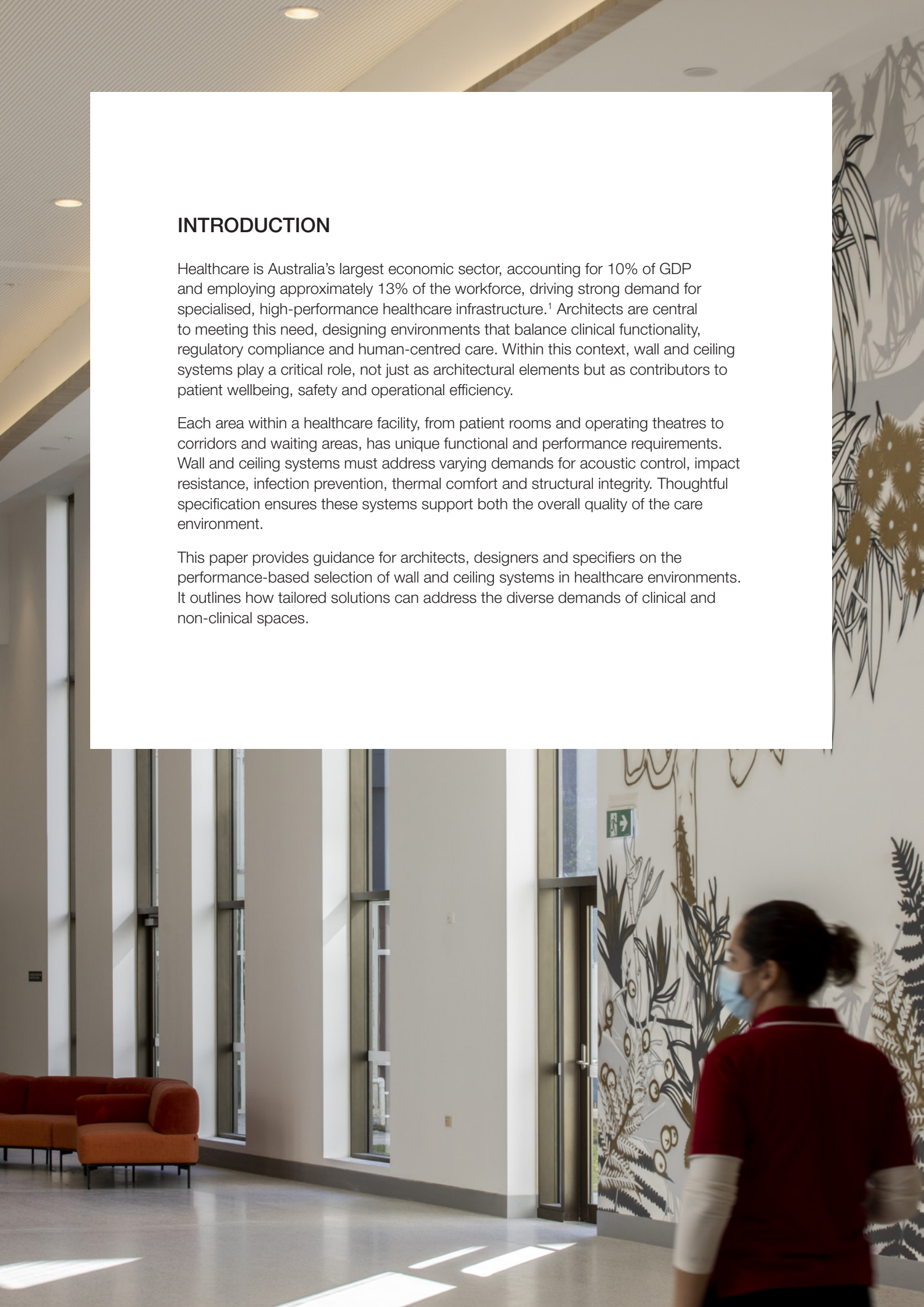

INTRODUCTION

Healthcare is Australia's largest economic sector, accounting for 10% of GDP and employing approximately 13% of the workforce, driving strong demand for specialised, high-performance healthcare infrastructure.[1] Architects are central to meeting this need, designing environments that balance clinical functionality, regulatory compliance and human-centred care. Within this context, wall and ceiling systems play a critical role, not just as architectural elements but as contributors to patient wellbeing, safety and operational efficiency.

Each area within a healthcare facility, from patient rooms and operating theatres to corridors and waiting areas, has unique functional and performance requirements. Wall and ceiling systems must address varying demands for acoustic control, impact resistance, infection prevention, thermal comfort and structural integrity. Thoughtful specification ensures these systems support both the overall quality of the care environment.

This paper provides guidance for architects, designers and specifiers on the performance-based selection of wall and ceiling systems in healthcare environments. It outlines how tailored solutions can address the diverse demands of clinical and non-clinical spaces.

HEALTH FACILITY DESIGN PRINCIPLES

Healthcare facilities comprise diverse functional zones, each with distinct requirements. ICUs and operating theatres, for example, demand hygienic finishes and acoustic isolation, while waiting areas benefit from sound-absorptive materials that promote calm. High-traffic spaces like corridors and emergency departments require impact-resistant, low-maintenance systems that can withstand regular disinfection. Wall and ceiling assemblies must increasingly accommodate integrated services such as lighting, HVAC, digital displays and medical equipment. At the same time, they must meet the requirements of the NCC and relevant Australian standards, especially in relation to seismic design.

To meet these standards across these diverse zones, wall and ceiling assemblies must be designed as integrated systems, combining compliant lining materials, steel framing, acoustic treatments and hygienic finishes. Specification should be guided not only by regulatory compliance but also by the functional demands of each space.

When specifying wall and ceiling systems in healthcare environments, architects must consider a range of national, state and sector-specific guidelines. Key references include:

- National Construction Code (NCC);
- relevant Australian Standards, including AS/NZS 1170.2 for wind actions, AS/NZS 1170.4 for seismic actions, AS 1530 Parts 1, 3 and 4 for fire testing of building materials and systems and AS/NZS 2785 for suspended ceilings;
- Australasian Health Facility Guidelines (AHFG); and
- state and territory design guidelines (e.g. NSW Health's Engineering Services Guidelines, Victorian Health Building Authority's Design Guidelines for Health Facilities).

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SYSTEM COMPONENTS

Wall systems

Walls serve multiple functions, such as providing enclosure, acoustic separation, fire compartmentation and mechanical service integration. A well-specified wall system typically includes the following elements:

- **Linings:** Standard and specialty plasterboard (e.g. fire- or moisture-resistant) form the primary lining. Impact-resistant plasterboard is designed to resist dents and abrasions.
- **Acoustic Treatments:** Perforated panels or acoustic wall panels made from materials like mineral fibre or polyester enhance sound absorption and reduce reverberation.
- **Framing:** Cold-formed steel studs and tracks provide a non-combustible, stable structure, designed to resist structural actions imposed on the walls.
- **Insulation:** High-density, non-combustible batts (glasswool) within cavities improve acoustic and thermal performance.
- **Sealing:** Acoustic and fire-rated sealants are used to seal gaps, joints and penetrations.

Ceiling systems

Ceilings in healthcare buildings must deliver acoustic performance, integrate services and comply with structural bracing requirements. A standard healthcare ceiling system includes:

- **Framework:** Steel or aluminum suspended grid or concealed ceiling systems.
- **Tiles:** Mineral fibre (most common), metal or treated plasterboard with acoustic and antimicrobial properties.
- **Integrated services:** Recessed lighting and HVAC components must be supported without compromising performance.
- **Insulation:** Placed over tiles or in plenum spaces for thermal/acoustic benefits.
- **Seismic bracing:** Lateral struts, compression posts and perimeter fixings are required for all hospital ceilings in accordance with AS/NZS 1170.4 and AS/NZS 2785 to ensure seismic compliance.

SPECIFICATION STRATEGIES FOR HEALTHCARE WALL AND CEILING SYSTEMS

Durability and longevity

In high-traffic areas such as corridors, emergency departments and operating rooms, wall and ceiling systems must be designed for long-term performance. Impact resistance and structural reliability are essential to minimise maintenance and extend service life.

Recommended strategies include:

- Use high-density, impact-resistant plasterboard for walls exposed to frequent contact (e.g., Gyprock EC08™ Extreme).
- Heavier gauge steel studs.
- Specify corrosion-resistant steel framing to prevent degradation in humid or high-use environments.
- Ensure systems are tested to meet NCC fire resistance provisions.
- Select materials with manufacturer-backed durability ratings (e.g. plasterboard impact testing in accordance with ASTM C1629).

Surfaces and finishes

Ceiling systems in healthcare facilities must meet high standards for hygiene, durability, and environmental control, particularly in clinical and food-related areas. Some key considerations include:[2]

- **Cleanability:** All exposed ceilings in patient areas, staff workspaces and food preparation or storage zones must be finished to allow regular cleaning.
- **Monolithic construction:** Ceilings should be monolithic from wall to wall, with no fissures, joints or crevices that could trap dust or permit the passage of contaminants in some areas such as operating theatres, cleanrooms, laboratories and isolation rooms.
- **Food preparation areas:** Use set plasterboard construction to enclose and conceal all conduits, piping and ductwork.
- **Lighting Integration:** Light fittings should be recessed, flush-mounted and designed to prevent dust accumulation and block dust ingress.

Wall systems should be selected based on their ability to support infection control and perform under varied environmental conditions. General requirements include:[3]

- **Smooth, impervious surfaces:** Wall finishes must be smooth, free of texture and easily cleanable using standard hospital cleaning procedures.
- **Water-resistant materials:** In areas adjacent to plumbing fixtures or classified as wet zones, use moisture-resistant finishes to prevent damage and microbial growth.
- **Mould-resistant materials:** Specify products with antimicrobial properties or coatings that inhibit mould growth, particularly in high-humidity or low-ventilation areas, to maintain hygiene and protect building occupants.

- **Feature finishes:** Decorative or feature wall finishes may be used in non-clinical zones such as public lobbies and staff recreation areas but must be excluded from all clinical or hygiene-critical spaces.

Acoustic performance

Two key acoustic performance metrics should guide product specification:

- **Rw (Weighted Sound Reduction Index)** measures a system's ability to block airborne sound between adjacent spaces.
- **NRC (Noise Reduction Coefficient)** quantifies a surface's ability to absorb sound within a room, thereby reducing reverberation and echo.

Sound Insulation

For healthcare applications, target Rw ratings of 45–55 for walls between patient rooms, consulting spaces, and service areas, depending on the required level of speech privacy and noise control. In some cases, Rw + Ctr values may be used to address low-frequency noise from mechanical services.

Recommended strategies include:

- Acoustic-rated plasterboard, such as Gyprock EC08™ Complete.
- Acoustic wall systems, such as Rondo Quiet Stud®, which use asymmetric studs to minimise sound transmission paths.
- Acoustic ceiling systems, such as Rondo KEY-LOCK® Ceiling System, with acoustic mounts to improve airborne sound and impact sound transmitted between floors.
- High-density insulation within wall cavities to improve system performance.
- Acoustic sealants at all perimeters and penetrations to eliminate flanking paths.

Sound absorption

In open-plan areas, waiting rooms and staff zones, controlling internal reverberation is key to reducing background noise and improving comfort. Aim for materials with NRC values of 0.70 or higher in these zones to support clear communication and reduce cognitive load.

Recommendations include:

- Acoustic ceiling tiles or panels with high NRC ratings.
- Perforated plasterboard ceiling with a high NRC rating.
- Wall-mounted acoustic panels.
- Soft finishes and room treatments that reduce echo in large or hard-surfaced environments.

Thermal performance

Maintaining stable indoor temperatures also supports staff performance, patient wellbeing and infection control, particularly in facilities that operate 24/7. To achieve this, healthcare buildings must incorporate well-designed wall and ceiling systems with effective thermal insulation.

Recommendations include:

- Select high-performance insulation products, such as Bradford Glasswool, with an appropriate R-value, typically R2.0 to R4.0 for external walls and R3.0 to R6.0 for ceilings, to reduce heat transfer and support indoor climate stability.
- Ensure systems comply with the relevant fire performance requirements, including fire hazard property and combustibility, where appropriate.
- Use insulation products that also support indoor air quality goals, with low VOC emissions and resistance to moisture, mould and microbial growth.

Sustainability

Products should comply with indoor air quality standards, such as low-VOC emissions, and support long-term durability to reduce resource use over time. Where possible, specify materials with recycled content, third-party environmental certifications or take-back schemes to align with broader sustainability targets and green building frameworks.

Seismic design for hospitals

Hospitals are classified as Importance Level 4 structures under NCC, meaning they are considered essential to post-disaster recovery efforts and must remain operational during and after events such as earthquakes. As a result, higher levels of structural resilience and movement allowances are required for both primary building systems and non-structural elements, including building services, internal walls and ceilings.

Seismic design requirements for non-structural components are detailed in AS 1170.4, which outlines how to assess and account for seismic actions within a building. For suspended ceilings, AS/NZS 2785 specifies design and installation practices to minimise the risk of collapse, damage or service disruption during seismic events. This includes requirements for seismic bracing, perimeter support and connection detailing. Architects must coordinate closely with structural engineers to ensure wall and ceiling systems are adequately braced and integrated into the building's overall seismic load path.

FINDING THE RIGHT COMBINATION

Tailored wall and ceiling systems for key hospital environments

Designing wall and ceiling systems for hospitals involves more than selecting compliant products; it requires tailoring solutions to the specific operational, environmental and spatial needs of each area. **CSR Gyprock** and **Rondo** systems offer a coordinated suite of wall and ceiling solutions to support these goals.

Patient rooms: Quiet, comfortable and private

In patient rooms, acoustic privacy and comfort are paramount. Walls must reduce sound transmission to ensure rest and confidentiality, while ceilings should help dampen ambient noise and provide access to services without disrupting the environment.

- **Walls:** Gyprock EC08™ Complete plasterboard offers high-density sound insulation for improved room-to-room acoustic separation.
- **Framing:** The Rondo Quiet Stud® Acoustic Wall System reduces noise transmission via asymmetric stud geometry and allows for thinner wall profiles.
- **Ceilings:** The Rondo KEY-LOCK® Concealed Suspended Ceiling System offers acoustic control and fire compliance.

High-impact corridors and common areas: Durable and easy to maintain

Corridors are among the most heavily trafficked spaces in a hospital. They require durable linings that can resist mechanical impact from trolleys, beds and equipment, while still contributing to a coherent interior aesthetic.

- **Walls:** Gyprock Impactchek™ and EC08™ Extreme plasterboard deliver enhanced surface hardness and impact resistance.
- **Framing:** The Rondo Steel Stud & Track System offers robust support and integrates seamlessly with impact-resistant plasterboard.
- **Additional safety features:** Bumper rails, corner guards and chair rails can be installed without compromising wall integrity.

Clinical spaces: Moisture resistant and hygiene critical

Clinical spaces and operating rooms require moisture-resistant systems to maintain performance in damp or hygiene-critical environments. Material selection in these areas must also account for corrosion protection and infection control.

- **Walls:** In addition to moisture resistance, Gyprock EC08™ Complete and EC08™ Extreme feature a gentle but powerful antifungal agent to resist mould growth.
- **Framing:** The Rondo steel systems are made with Z275 zinc-coated steel that resists corrosion in humid environments.
- **Ceilings:** The Rondo DONN® Exposed Healthcare Ceiling Grid incorporates antimicrobial finishes for mould resistance and hygienic performance.

Enabling complex architectural forms

Modern healthcare architecture increasingly incorporates complex spatial forms, such as high ceilings, wide corridors and curved walls. Achieving these designs requires internal wall and ceiling systems that offer the flexibility to support non-standard geometries. For example, higher gauge steel studs within the Rondo Steel Stud & Track System enable tall partitions, while extended KEY-LOCK® ceiling systems can span greater distances without compromising stability or service integration.

To accommodate wide openings, such as large windows and doorways in lobbies or ward corridors, the Rondo MAXIframe® External Wall Framing System provides a rigid yet lightweight solution capable of supporting broader spans with minimal deflection. For curved architectural elements, Rondo Flexible Track combined with bendable plasterboard (e.g. Gyprock Flexible) allows the formation of smooth, curved walls often used in paediatric, maternity or mental health units.

Additionally, in areas requiring narrow or irregular ceiling layouts, Rondo's engineered ceiling systems can be custom-designed to maintain seismic compliance while accommodating lighting, HVAC and service penetrations.

Seismic and structural design: Built for resilience

Systems must be designed in accordance with AS 1170.4 (seismic actions) and AS/NZS 2785 (suspended ceilings). This includes the specification of engineered seismic bracing, compression struts, and perimeter restraint systems to resist lateral forces and absorb structural movement. Rondo provides a suite of seismically engineered systems, including:

- Rondo KEY-LOCK® Seismic Ceiling System, which incorporates bracing struts, seismic perimeter fixings, and compression posts to maintain ceiling integrity during earthquake events. Rondo DONN® and DUO® exposed grid ceiling systems are also engineered for compliance with seismic performance requirements.

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- Rondo Steel Stud and Track Wall Framing System, which can be engineered with seismic wall bracing and head-track deflection detailing to accommodate hospital FF&E and building movement requirements.

To meet the seismic performance and structural fastening requirements in healthcare settings:

- Use AS 5216-compliant post-installed concrete anchors where ceiling or wall systems are required to connect to concrete substrates, ensuring compliance with seismic restraint principles and load transfer paths. For detailed guidance, refer to Rondo's G1: Cert-R-FIX® Professional Series Manual.
- Select CSR Gyprock linings that are compatible with seismic-rated fasteners and bracing layouts, and apply recommended joint reinforcement systems to prevent lining damage under movement.
- Account for live load and impact conditions, such as crowd loading in public corridors or repeated trolley impact in treatment areas, by reinforcing lower wall zones with impact-resistant linings (e.g. Gyprock EC08™ Extreme) and dense stud configurations.
- Include seismic separation joints and control joints at defined intervals to manage structural movement, deflection and promote independent movement of structural to non-structural element interaction such as internal lightweight steel systems.

CSR and Rondo pre approved hospital design details provide immediate access to the vast majority of hospital-specific, compliant systems drawings, to quickly and confidently complete winning hospital tender documents to secure hospital projects.

REFERENCES

1 Melbourne Institute. “Health and Healthcare.” University of Melbourne. https://melbourneinstitute.unimelb.edu.au/research/health (accessed 16 July 2025).

2 Australasian Health Infrastructure Alliance. “Australasian Health Facility Guidelines Part D - Infection Prevention and Control D.0003 - Physical Environment.” AHIA. https://aushfg-prod-com-au.s3.amazonaws.com/download/Part%20D%2003%20Physical%20Environment_7_0.pdf (accessed 16 July 2025).

3 Ibid.

All information provided correct as of August 2025

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