hebel®

The better way to build

Commercial & Industrial Wall Systems

Design Guide

CSR

Contents

1.0 Introduction

CSR Panel Systems is a division of CSR Building Products Limited, one of Australia's leading building products companies.

CSR Panel Systems manufactures Hebel® Autoclaved Aerated Concrete (AAC). The AAC in Hebel® products is manufactured from sand, lime and cement to which a gas-forming agent is added. The liberated gas expands the mixture, forming extremely small, finely dispersed air pockets, resulting in lightweight aerated concrete.

CSR Panel Systems has manufactured Hebel® products that have won wide acceptance as innovative and environmentally preferable building materials. This is due to their lightweight nature, excellent thermal, fire and acoustic properties and design versatility. These inherent properties of Hebel® products help achieve quick and cost efficient construction practices as well as providing for comfortable operating environments inside the buildings all year round.

2.0 Hebel® Commercial & Industrial Wall Systems (CIWS)

CSR Panel Systems has developed systems for commercial and industrial applications that harness the benefits of lightweight construction where thermal, acoustic and fire properties are desired.

The systems can be installed to either steel frame or concrete structure where a strong, durable, yet quick to install, non load bearing cladding is required

The key benefits of using Hebel® CIWS include:

- Lighter loads on the structure compared to traditional masonry products reduces the size of structural components and craneage requirements.
- Speed of installation and reduced structural sizes mean cost savings compared to traditional masonry construction.
- Fast installation and assembly speeds with smaller construction crew requirements.
- Excellent thermal resistance performance and effective sound transmission barrier between external and internal environments of the building.
- Excellent fire rating properties with fire resistance level (FRL) up to -/240/240.

For further information on Installation elements refer to the Commercial and Industrial Walls Installation Guide available from www.hebel.com.au

Image.2.1 East Gardens Shopping Centre, NSW

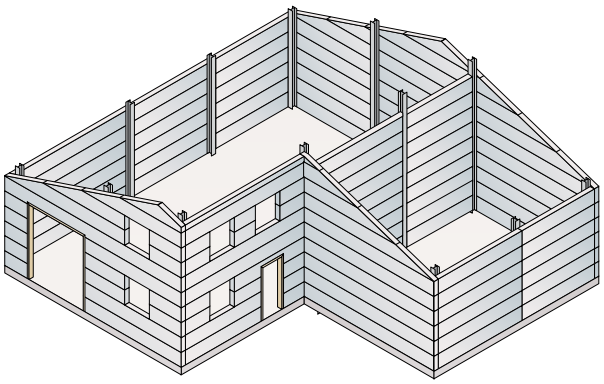
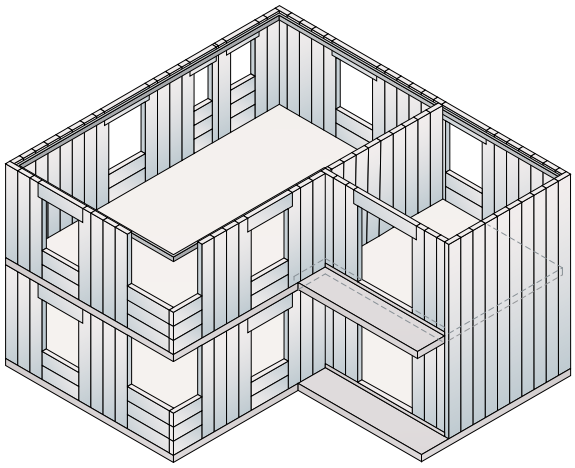
3.0 Typical Applications

Hebel® CIWS is designed for application in buildings that have a commercial/ industrial type of business activity purpose. These buildings can be; shopping centres, school sport or assembly halls, factories or factory units, clubs, plant or generator rooms, sheds, produce storage facilities, etc. The Building Code of Australia (BCA) generally classifies these buildings into class 5, 6d, 7b, 8, 9a and 9b.

Structurally, the CIWS walls are non-load bearing, external and internal walls made out of Hebel® wall panels. The panels are steel reinforced and secured to the structural support frame. The structural support frame is typically steel or portal frame, but it can also be concrete framed. The CIWS wall can be finished off with various combinations of external coatings and internal linings to suit project requirements.

There are two types of CIWS walls. The first of these is the CIWS-HZ (See Table 3.1) in which the panels are assembled horizontally. The second is the CIWS-VT in which the panels are assembled vertically.

Table 3.1 System Selection Table for Hebel® CIWS

CIWS Type	System Characteristics
CIWS-HZ 	• Column support spacing is ≤6m. • Maximum wall height is ≤12m. • Low cost solution. • High speed construction. • Simple construction techniques. • High thermal insulation. • Lightweight construction. • Easy access to control joints for maintenance. • High fire resistance level (FRL) rating characteristics. • Accurate construction tolerances.
CIWS-VT 	• Column support spacing is >6m. • Maximum wall height is ≤ 6m. • Low cost solution. • High speed construction. • Simple construction techniques. • High thermal insulation. • Lightweight construction. • Easy access to control joints for maintenance. • High fire resistance level (FRL) rating characteristics. • Accurate construction tolerances.

4.0 System Design

4.1 How to Design a Hebel® CIWS

STEP 1. Determine the panel orientation to suit support frame location and overall wall geometry. The maximum panel length is 6m. Hebel® recommends the following:

- The horizontal panel orientation requires structural supports (columns) at 6m maximum spacings. The panel length does not limit the overall wall height.
- The vertical panel orientation is limited to wall with an overall wall height ≤ 6m. The spacings of the main building structure can be at distances greater than 6m.

STEP 2. Determine the location of secondary structural steelwork to support the panels, such as mullions or eaves beams between the main structural framing, and for openings (windows).

STEP 3. Design Criteria. Identify the Wall Performance Requirements.

- Purpose of structure (Class and importance).
- Imposed design actions (wind, local pressure regions).
- Deflection criteria.
- Thermal Efficiency (R-Value).
- Fire Resistance Level (FRL).
- Acoustic insulation performance (R_w, C_{tr} values).

STEP 4. Select a panel thickness and connection type to satisfy performance requirements.

STEP 5. Specify connection requirements to building structure ensuring suitable fire protection where required.

STEP 6. Specify adequate coating system to meet project weather tightness and aesthetic requirements.

IMPORTANT

Earthquake loading has not been considered in this design guide.

4.2 Coastal Areas

The Hebel® CIWS can be used in coastal areas with additional precautions to ensure salt does not build up on the surface of the wall. For buildings which are 200m to 1000m from a shoreline or large expanse of salt water, such as, Swan River (west of the Narrows Bridge), Sydney Harbour (east of the Harbour Bridge or Spit Bridge), one of the following is required:

- All horizontal and vertical control joints must be appropriately caulked; or
- All walls must be sufficiently exposed from above so that rain can perform natural wash-down of the wall; or
- Walls which are protected by soffits above must be washed down twice per year, to remove salt and debris build-up, particularly at the joints.
- In all cases, for steel components ensure appropriate corrosion protection is provided and suitable grade fasteners are selected.

For buildings less than 200m from the shoreline as defined above, CSR Panel Systems does not recommend that Hebel® CIWS be used without project specific consultation with Hebel® Engineering Services.

4.3 Building Tolerances

During the construction of the building, there are tolerances to control the accuracy of the building dimensions and locations to an acceptable standard. Additionally, control joints are required in the walls to tolerate and accommodate the movement of the structure (see 'Control joints', Section 5.1). These tolerances are nominated in the appropriate specification of the project.

Hebel® recommends that tolerances be specified in the project documents to ensure that support elements, such as steel and concrete columns and slab edges, are fabricated within the surface plane. This will minimise on site trimming of panels and other unnecessary work.

5.0 Design and Detailing Considerations

5.1 Control Joints

Control joints are necessary to accommodate building movements and to relieve any induced stresses due to thermal expansion and contraction, differential movements between differing materials and support structure movements (i.e. lateral sway or vertical deflection).

Control Joint Placement

Vertical control joints should coincide with control joints in the supporting structure and anywhere that significant structural movement is expected, where the wall abuts a vertical structure, such as a column, or adjacent to large openings.

Horizontal control joints should be placed between the top of the wall and slab soffits/angles or roof structures. The horizontal joints should accommodate any expected vertical deflection from the structure.

Control Joint Width

The designer shall determine the joint width so that the sealant configuration can accommodate the calculated movements.

Typically the control joint widths are as follows:

- 10mm minimum for vertical control joints.
- 15mm minimum for horizontal control joints.

All control joints must be filled with an appropriate flexible sealant.

IMPORTANT

- Minimum specification for control joint details must include:
  - 6m maximum distance between control joints on straight wall runs.
  - At all corners in walls where movement and/or expansion and contraction is possible.
  - At all junctions where Hebel® wall panels abut a structure of different material.
- Control joint locations and geometry must be confirmed by the building designer.
- The building designer must confirm all control joint widths as the magnitudes of expected horizontal and vertical movements (deflections) might vary from project-to-project.

5.2 Sealants

All control joints and gaps between the panels and infill or penetration framing must be filled with an appropriate flexible sealant. The sealant should be designed and installed in accordance with the sealant manufacturer's specifications. The specifications will provide information regarding priming the surface, geometry of sealant (width/depth ratio), sealant surface profile (i.e. concave), substrate preparation, etc. Typically a backing rod is used to control the depth of sealant and that the sealant is bonded on two sides only.

5.3 Condensation

Condensation is a complex problem, and can occur under a variety of conditions, not just cold conditions. Literature on this subject is available from CSIRO/BRANZ/ASHRAE and must be consulted when building in areas where condensation is likely to occur.

NOTE

- Where different types of sealant come in contact, the designer must ensure the sealants are compatible.
- Depending on the type of sealant used the surface of Hebel® wall panels might require some preparation and/or priming.

5.4 Panel Layout

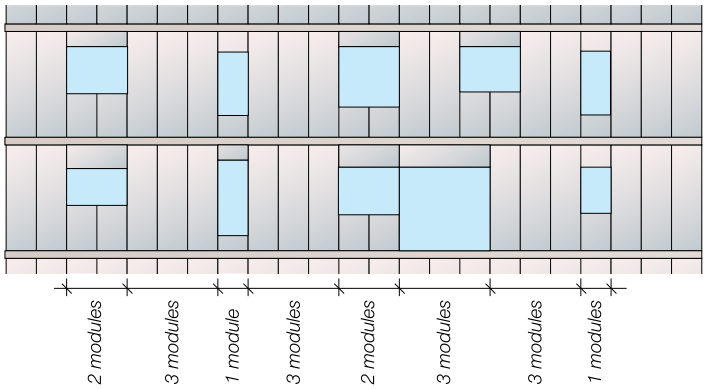
Hebel® CIWS is essentially a flexible modular construction system. By adopting a few simple rules, significant savings can be gained in time and cost, as well as reducing waste and panel handling time.

This is achieved by:

- Planning the panel layout with special attention given to the location of openings and penetrations.
- Adjacent to openings (windows and doors), we recommend a 600mm wide panel be installed. For large openings, it may be necessary to provide additional structural steel to support the loads shed from the opening.

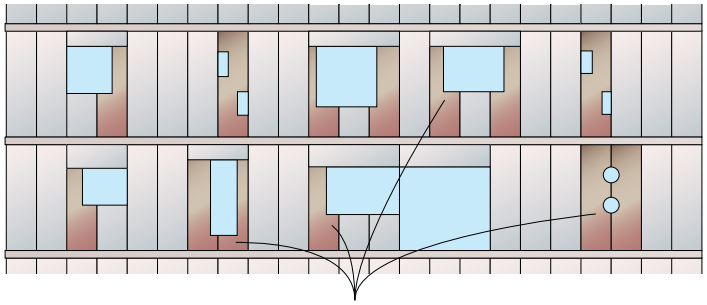
'Good Practice' and 'Bad Practice' layouts for vertically installed panels with various penetrations are illustrated in Figures 5.1 and 5.2. This mindset should be adopted for horizontally installed panels as well.

Detail 5.1 Good practice panel/penetration layout.



Good panel layout makes best use of 'module' size and location for all openings to reduce on-site panel cutting

Detail 5.2 Poor practice panel/penetration layout.



Poor panel layout results in complex on-site cutting of panels

5.5 Penetrations

Small service penetrations through the panel of the Hebel® CIWS wall should allow for differential movement between the panel and the service. All penetrations are a potential source of water ingress and should be sealed with an appropriate flexible sealant.

5.6 Wet Area Wall Construction

All wet area walls should be lined and waterproofed in accordance with Australian Standards and to BCA requirements. Gyprock™ Aquachek or CSR Cemintel Wallboard are suitable lining materials for wet area applications.

5.7 Non Hebel® Components

Components, which are not manufactured by Hebel®, such as the structural support elements, Gyprock™ plasterboard, sealants, coatings and others must be designed, installed and handled in accordance with their manufacture's guidelines and recommendations.

5.8 Deflection Limits of Supports

The Hebel® CIWS walls shall be considered masonry when selecting the deflection limits for the supporting structure. These deflection limits should include building movements such as:

- Base support, the concrete foundation or steel beam support.
- Top of wall, this should include the lateral deflection of the main structure of the building.
- Sway movements. Lateral sway of the main structure of the building, so that excessive stress is not induced.

5.9 Additional Steel Supports

For large openings or to allow connection of Hebel® wall panels to the main support structure additional structural steelwork will be required. The project engineer shall design this steelwork.

Hebel® wall panels can be installed to a height equivalent to 10 full panel widths before additional bearing plates are required for higher up panels.

6.0 Structural Performance

6.1 Overview

The span tables presented in 6.1 and 6.2 show the maximum panel lengths and connection types of the standard Hebel® panels for a range of applications. Panel lengths are denoted by colour code and connection types by letter code.

Table 6.3 shows the connection types for securing the Hebel® wall panels to the structural framing and connection capacities.

End Bearing

The wall panels must have a minimum of 50mm end bearing onto the support. Hebel® recommends detailing >50mm minimum end bearing as a construction tolerance to provide for support misalignment. The maximum design bearing stress of the autoclaved aerated concrete (AAC) is 0.5 MPa.

Hebel® panels that form the base of the wall need a minimum bearing length of 300mm between steel/ concrete supports.

Cantilevered Panels

Contact Hebel® Engineering Services for advice on cantilevered limitations of the Hebel® wall panels.

Cut Panels

All exposed reinforcement to be painted with a liberal coating of the protection paint – Fentak dipcoat.

Internal Walls

For internal walls, a lateral load of 0.37kPa has been assumed.

Edge loading

Where vertical loadings are imposed on the edge of Hebel® panels, a structural engineer must be consulted.

Table 6.1 Horizontal Panels

Panel Span (m)	Ultimate Wind Load (kPa)								
	0.375	0.75	1	1.25	1.5	1.75	2	2.5	3
5.89	A	A	A	C	C	C	C	C	2C
5.75	A	A	A	C	C	C	C	C	2C
5.5	A	A	A	A	C	C	C	C	2C
5.25	A	A	A	A	A	C	C	C	C
5	A	A	A	A	A	C	C	C	C
4.75	A	A	A	A	A	C	C	C	C
4.5	A	A	A	A	A	C	C	C	C
4.25	A	A	A	A	A	C	C	C	C
4	A	A	A	C	A	C	C	C	C
3.75	A	A	A	C	C	C	C	C	C
3.5	A	A	A	A	C	C	C	C	C
3.25	A	A	A	A	C	C	C	C	C
3	A	A	A	A	A	C	C	C	C

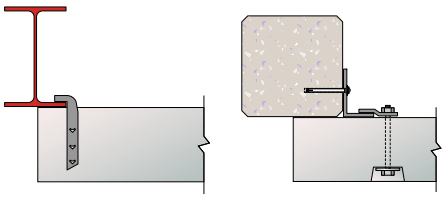
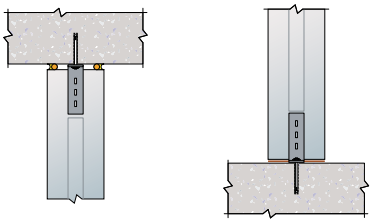
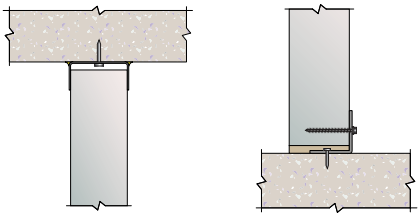
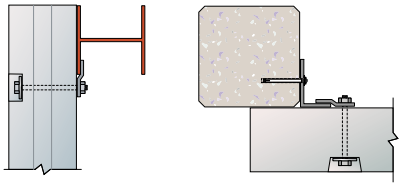
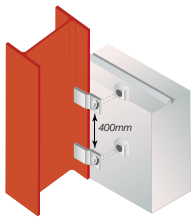
Table 6.2 Vertical Panels

Panel Span (m)	UltimateWind Load (kPa)								
	0.375	0.75	1	1.25	1.5	1.75	2	2.5	3
5.89	B	C	C	C	C	C	C	C	2C
5.75	B	C	C	C	C	C	C	C	2C
5.5	B	C	C	C	C	C	C	C	2C
5.25	B	C	C	C	C	C	C	C	C
5	B	C	C	C	C	C	C	C	C
4.75	B	C	C	C	C	C	C	C	C
4.5	B	C	C	C	C	C	C	C	C
4.25	B	C	C	C	C	C	C	C	C
4	B	C	C	C	C	C	C	C	C
3.75	B	C	C	C	C	C	C	C	C
3.5	B	C	C	C	C	C	C	C	C
3.25	B	C	C	C	C	C	C	C	C
3	B	C	C	C	C	C	C	C	C

Colour	Panel Thickness
	100mm
	125mm
	150mm
	175mm
	200mm
	225mm

- For projects with higher wind loads it may be neccessary to specify custom panels with an increase in reinforcing steel and/or panels in 250mm or 300mm thickness.

Table 6.3 Connection Definition and Capcities in wall panels with AAC characteristic compression strength, $f'c$=4.0 MPa

Connection Number	Connection Detail	Design Ultimate Load (kN)	Panel Orientation	Remarks
A		• For 125mm thick panel 1.40kN • For ≥150mm thick panel 2.70kN	Horizontal panel only	• Hebel Tension Tie suitable for both concrete and steel structures • Minimum edge/end distance 80mm
B (option 1)		• For 125mm thick panel 0.68kN • For ≥150mm thick panel 1kN	Vertical panel only	• Hebel Slotted Angle Bracket with V nails suitable for concrete structure
B (option 2)		For ≥100mm thick panel 0.8kN	Vertical panel only	• Top connection - Deflection head 1.15BMT • 75x50x1.5 BMT steel angle with 3 screws per panel
C		For ≥125mm thick panel 4.75kN	Horizontal and Vertical panels	• 100x100x6 angle 12mm Z clip suitable for both concrete and steel structures • Minimum edge/end distance 80mm for horizontal panel
2C		For ≥125mm thick panel 9.50kN	Horizontal and Vertical panels	• As per C above - 2 per panel end, 400mm apart • Minimum edge/end distance 80mm for horizontal panel

* For concrete frame structures, angle brackets to be fixed structure using appropriate mechanical fixing.

7.0 Thermal Performance

7.1 Overview

BCA 2008 Section J requires minimum thermal performance for external walls on conditioned buildings.

The Performance Requirements for energy efficiency ratings are dependent upon the form of construction (i.e., walls or floors), Class of Building, and the type of areas being separated. The performance requirement is a value that is the Total R-Value, which is the cumulative total of the individual R-Values of the building system components.

The level of insulation provided in a wall is determined by the required Total R-value. The higher the required Total R-value the greater the insulation provided.

7.2 Thermal Insulation

It is recommended that insulation materials be installed to enhance thermal insulation properties and occupant comfort. Insulation also improves the acoustic performance of the wall against outside noise.

The following R-Values for the individual components were assumed in the calculation of the Total R-Value of the wall systems:

- Outside air film (4m/s), R_{so} = 0.04 m^2.K/W
- Indoor air film (still air) R_{si} = 0.12 m^2.K/W
- Coating system R=0.02 m^2 k/w (texture coat and paint)
- Hebel® wall panel :
  - 100mm thick: 0.63 m^2.K/W
  - 125mm thick: 0.78 m^2.K/W
  - 150mm thick: 0.94 m^2.K/W
  - 175mm thick: 1.10 m^2.K/W
  - 200mm thick: 1.25 m^2.K/W
  - 300mm thick: 1.88 m^2.K/W

Source: AIRAH Handbook 2007 and 2008, and AS4859

Table 7.1 Thermal Performance

System R-Value (m^2K/W)						
Wall panel thickness	**1. Wall panel only***	**2. Wall panel + 25mm cavity**	**3. Wall panel + 25mm cavity + sarking**	**4. Wall panel + 25mm cavity + 75mm PowerPanel™**	**5. Wall panel + 40mm cavity + R1.0 insulation**	**6. Wall panel + 90mm cavity + R2.0 insulation**
100	0.81	1.03	1.36	1.50	1.87	2.87
125	0.96	1.18	1.51	1.65	2.02	3.02
150	1.12	1.34	1.67	1.81	2.18	3.18
175	1.28	1.50	1.83	1.97	2.34	3.34
200	1.43	1.65	1.98	2.12	2.49	3.49
300	2.06	2.26	2.61	2.75	3.12	4.12

Meets BCA requirements for building fabric (walls) for Class 5-9b buildings in Climate Zones 1 to 7.

Meets BCA requirements for building fabric (walls) for Class 5-9b buildings in Climate Zone 8.

*Wall panel only includes outside air film, coating, Hebel® panel, inside air film.

Notes: 1. Cavities are unventilated. 2. Sarking = Bradford EnviroSeal (polymer weave) with e_1 = 0.9, e_2 = 0.05. 3. R1.0 insulation = Bradford R1.0 Specitel: thickness - 40mm, density-12kg/m^3. 4. R2.0 insulation = Bradford R2.0 Gold Wall Batts; thickness - 90mm, density -10kg/m^3.

8.0 Fire Performance

The Hebel® CIWS can be subjected to a fire loading as the result of either an external fire source, or an internal fire source. When the wall requires a fire resistance level (FRL) rating, Hebel® provides the following guidance.

Hebel® wall panels are primarily designed as non-load bearding wall elements therefore the structural fire performance of a wall system must be achieved by the building structure.

8.1 External Walls

As shown in the table below all external wall system details (minimum 125mm panel thickness) can achieve a FRL of -/240/240 from an external fire source when constructed in accordance with this design guide.

Where necessary, the designer should ensure the structural support framing and its connections are adequate when subjected to fire conditions. The Building Code of Australia Volume 1 outlines a Functional Statement (CP5) for external walls in fire for a building with two storeys or less:

"Where an external concrete wall could collapse as a complete panel, it must be designed so that in the event of fire within the building, the likelihood of outward collapse is avoided."

8.2 Internal Walls

If the Hebel® CIWS requires protection from an internal fire source, for example buildings of two storeys or less as described below, the connection system will require additional fire protection and/or the connection fixed to the support by welding. Where an internal lining is provided, this can be designed as the fire protection system for the connections.

The steel frame manufacturer or project engineer shall approve the connection arrangements for any fire rated lightweight steel support framing.

8.3 Fire Certificates & Reports

Copies of the fire test reports and/or opinions can be obtained by contacting Hebel® Engineering Services.

8.4 Design Considerations

Fire Stop Penetrations

Penetrations through a Hebel® CIWS to accommodate pipework, electrical cabling or ductwork will have to be protected (fire stop), to prevent the spread of fire through the penetration. The penetration can be protected with proprietary products, such as:

- fire rated sealants;
- fire collars and intumescent wraps;
- fire rated mortars;
- fire rated pillows;
- fire rated switch boxes.

Hebel® recommends contacting the manufacturer to obtain the appropriate product/solution and installation method for the application and wall configuration.

NOTE

The FRL rating of the wall can be affected by the penetrations and the method adopted to protect these penetrations. A fire collar with a –/120/120 FRL rating will govern the FRL of the wall, even if the wall configuration has a FRL rating of –/240/240.

Table 8.1 External Walls - FRL Detail

Maximum Height	100mm thick panel	≥125mm thick panel
Joint Profile	Tongue and Groove	Tongue and Groove
3600	-/120/120	-/240/240
4200	-/90/90	-/240/240
4500	-/60/60	-/240/240
6000	-	-/240/240

NOTE: The fire performance, FRL = -/240/240 for ≥ 125mm thick panels is limited to horizontally installed panels only for a maximum wall height of 6000mm.

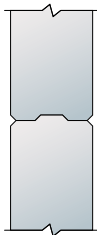
9.0 Acoustic Performance

9.1 Overview

Table 9.1 is a summary of acoustic performances of the Hebel® CIWS walls consisting of bare panels only. These panels vary in thicknesses from 100mm to 300mm.

If other variations to the walls are made such as lining the wall panels with plasterboard or coatings than contact your acoustic consultant or Hebel® Engineering Services for more information on acoustic performance of these walls.

Table 9.1 Acoustic Performance of Hebel® CIWS.

Hebel® Wall Panel	R_w (dB)	R_w+C_{tr} (dB)	Construction
100mm thick panel	35	31	
125mm thick panel	37	33	
150mm thick panel	39	35	
175mm thick panel	41	37	
200mm thick panel	43	39	
300mm think panel	51	45	

10.0 Coatings

10.1 Internal Finishes

Typically in commercial applications, the internal surface of the Hebel® CIWS panels is determined according to project specifications and the intended use of the building.

10.2 External Finishes

The Hebel® CIWS is a face-sealed cladding system and requires an appropriate external coating system and sealant detailing to ensure a water resistant and vapour permeable building envelope is achieved. The coating system should be specified in accordance with the Hebel® High Performance Coating Systems brochure.

The following are items to be considered when selecting a coating system:

- **Manufacturer approved:**
  - All coating systems applied to Hebel® external wall systems should be approved by the coating manufacturer as being appropriate for coating an AAC substrate.
- **Surface adhesion:**
  - The substrate preparation and coating application should be in accordance with the coating manufacturer's instructions.
  - Before applying finishes in coastal areas (refer to definition in system design), all panels must be thoroughly washed with fresh water to remove any salt residue. Refer to coating manufacturer's instructions for any additional requirements.
- **Water resistance:**

Refer to Hebel® High Performance Coating Systems brochure.

- **Vapour Permeability:**

Refer to Hebel® High Performance Coating Systems brochure.

10.3 Durability

The durability of the Hebel® CIWS can be enhanced by periodic inspection and maintenance. Inspections should include examination of the coatings, flashings and seals. Paint finishes must be maintained in accordance with the manufacturer's recommendations. Any cracked and damaged finish or sealants, which would allow water ingress, must be repaired immediately by recoating or resealing the effected area. Any damaged flashings or panels must be replaced as for new work.

The durability of the system can also be increased by additional treatment of steelwork, and by painting all exposed sealants to the sealant manufacturer's recommendations.

- **Minimum Requirements:**
  - The coating must be durable and not deteriorate with exposure to light (UV) and weather.
  - The coating must be able to bridge a 1mm minimum crack width.
  - The coating manufacturer can specify the minimum design specification (thickness), so that the coating is serviceable.

NOTE

This list of performance requirements indicates that a specific fit-for-purpose coating system should be adopted, and that a simple paint coating would most likely be an inadequate coating system. Variations to the coating system should be approved by the coating system manufacturer or representative.

10.4 Coating Systems

Hebel® Wall Panel

For Commercial and Industrial applications Hebel® have a number of recommended coating systems including Monolithic and Express (Economical) options.

For detailed specifications please refer to the 'Hebel® High Performance Coatings Brochure.

NOTE

Hebel® does not recommend cement based on-site renders be applied to Hebel® wall panels.

Concrete Edge Beam

Rendering may also be required to fill the misalignment between the in-situ concrete elements, such as slab edges and columns and the finished wall plane. To exploit the accuracy of the installed wall system and minimise the amount of rendering, Hebel® recommends establishing concrete tolerances that result in the unrendered concrete edge beam being located behind the finished wall plane. This will eliminate the need for scabbling of the edge beam and/or building out the wall surface.

10.5 Sealants

All control joints and gaps between the panels and framing around windows must be caulked with an appropriate flexible sealant. Refer to Section 5.2 for more information on sealants.

Silicone base sealants may not be compatible with coating systems, refer to coating manufacturers for approved sealants.

10.6 Wall Flashings

In general, flashings shall be designed and installed in accordance with SAA – HB39 1997 - Installation Code for Metal Roofing and Wall Cladding. Stop ends shall be incorporated with all flashings.

11.0 System Components

11.1 General System Components

A summary of the components or their equivalents that Hebel® recommends for use in the CIWS is shown in Table 11.1

Table 11.1 System components summary.

System component	CIWS Type		Supplied by CSR Panel Systems
	CIWS-HZ	CIWS-VT	
Hebel® Wall Panel	✓	✓	✓
Hebel® Adhesive	✓	✓[1]	✓
Hebel® Mortar	✓[2]	✓[2]	✓
Hebel® Patch	✓[2]	✓[2]	✓
Anticorrosion Coating Agent	✓[2]	✓[2]	✓
DPC or Bond Breaker	✓[2]	✓[2]	
Steel Base Angle	✓[2]	✓[2]	
Fasteners/Fixings	✓	✓	✓[3]
Fire/Acoustic Sealants	✓	✓	
Gyprock™ Plasterboard	✓[1]	✓[1]	
Coating Systems	✓[1]	✓[1]	
Hebel® HighBuild	✓[1]	✓[1]	✓

Note:

[1] Optional use as specified by project consultants.
[2] Use as required.
[3] Some fixings can be supplied by CSR Panel Systems.

11.2 Hebel® Wall Panel

The core component of Hebel® CIWS walls is the Hebel® wall panel. The panel is manufactured in a range of stock sizes as detailed in the Table 11.2.

Fig. 11.1 Hebel® wall panel x-Section.

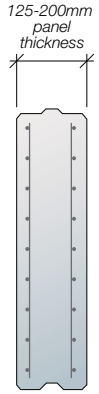


Table 11.2 Standard & Custom manufactured panel sizes.

Panel type	Thickness (mm)	Length (mm)	Width (mm)	Wt (kg/m^2)
Standard	100	4500	600	71
	125	4500 & 5990	600	89
	150	4500 & 5990	600	107
Custom	100	Up to 4500	300 to 600	71
	125	Up to 5990	300 to 600	89
	150	Up to 5990	300 to 600	107
	175	Up to 5990	300 to 600	125
	200	Up to 5990	300 to 600	143
	225*	Up to 5990	300 to 600	160
	250*	Up to 5990	300 to 600	179
	300	Up to 5990	300 to 600	214

* No Tongue & Groove profiles, only available in straight edge

Custom panel length and width sizes are available upon request. These are usually designed to suit wind loads and panel spans to suit project specifications, thus reducing installation time and off-cut waste. Custom panel lengths and widths can be produced to the nearest 5mm. Custom panels are subject to minimum order quantity.

11.3 Hebel® Mortar

Fig. 11.2 Hebel Mortar

Hebel® Mortar (supplied in 20kg bags) is used as thick bed mortar base to provide a level base for panel installation as well as providing acoustic and fire protection at the base of the panels.

11.4 Hebel® Adhesive

Fig. 11.3 Hebel® Adhesive

Hebel® Adhesive (supplied in 20kg bag) is used for gluing the panels together at vertical and horizontal joints.

11.5 Anti-corrosion Coating Agent

Steel reinforcing exposed on cut panels is to be coated with a liberal application of Fentak Dipcoat, anti-corrosion agent.

11.6 Hebel® Patch

Fig. 11.4 Hebel® Patch.

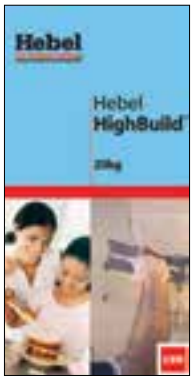
Minor Chips or damage to panels are to be repaired using Hebel® Patch (supplied in10kg bags).

11.7 Gyprock™ Plasterboard

Hebel® CIWS walls can be lined with Gyprock™ Plasterboard on the internal side of the wall if constructing office space or other such areas of the building. The type, thickness and densities of plasterboard will be as per project specifications. Additional information on the Gyprock™ Plasterboard is available through Gyprock™.

11.8 External Finishes

Fig. 11.5 Hebel® HighBuild™



External finishes can be rendered systems or different type of coating systems. The manufacturer of the external finishes must confirm its suitability for application on AAC products. For more information on external finishes refer to the External Finishes section 10.2 of this guide.

Hebel® HighBuild render is the recommended product.

11.9 Sealant

All gaps in internal and external junctions and control joints must be filled with appropriate sealants. For further information refer to sections 5.2 and 10.0 of this guide.

11.10 Brackets, Fasteners & Fixings

Hebel® Panel Brackets & Fixings

For securing Hebel® wall panels to various support structures a number of different brackets and fixings are available. These brackets & fixings are shown in Fig. 11.6 and they are:

1. Hebel® tension tie
2. Hebel® slotted angle bracket
3. Hebel® V-nails

For more information on how those brackets and fixings are used in various conection assemblies, please refer to connection details as shown in this guide.

Fig. 11.6 Hebel® brackets and fixings.

Other Fixings

Fixings such as those required for securing cupboards and other furnishings to Hebel® wall panels are to be specified and installed in accordance with the fixing manufacturer's instructions.

Appendix A: Hebel® Wall Panel Material Properties

A.1 Manufacturing Tolerances

Length	+0 to –1.5mm
Width	+0 to –1.5mm
Thickness	+1.5 to –1.5mm
Diagonals (max.)	1.5mm
Edge straightness deviation (max.)	1.5mm

A.2 Hebel® Wall Panel Physical Properties

- For standard and custom Hebel® wall panel dimensions see Section 11.2.
- Standard panel profile is tongue and groove (T&G).
- Panel is reinforced with a double layer of steel mesh.
- Nominal Dry density of AAC = 550kg /m^3
- Average working density of AAC = 715kg/m^3 at 30% moisture content.
- Average working density of panel (AAC + reinforcement) = 751kg/m^3 at 30% moisture content.
- Average service life density of AAC = 605kg/m^3 at 10% moisture content.

A.3 Hebel® Wall Panel Strength Properties

- Characteristic Compressive Strength of AAC, f'_m = 4.0MPa
- Mean Compressive Strength of AAC = 4.5MPa
- Characteristic Modulus of Rupture of AAC, f'_{ut} = 0.60 MPa

A.4 Hebel® Wall Panel Fire Resistance Level (FRL) Rating

1) For fire performance ratings of Hebel® wall panel and CIWS walls refer to Section 8.0 of this publication.

A.5 Fire Hazard Indices

Hebel® AAC products have the following early fire hazard indices, determined in accordance with AS1530.3:1990:

Ignitability Index	0
Spread of Flame Index	0
Heat Development Index	0
Smoke Development Index	0-1

A.6 Hebel® Wall Panel Acoustic Ratings

- 150mm thick wall panel only with no plasterboard or other lining R_w = 39dB, R_w+C_{tr} = 35dB. For detailed information of acoustic properties for other wall panel thicknesses and CIWS variations please refer to Section 9.0 of this design guide.

A.7 Hebel® Wall Panel Thermal Ratings

- R-Value of 150mm thick Hebel® wall panel only with no plasterboard or other lining = 0.94 (m^2.K/W). For detailed information of thermal properties for other wall panel thicknesses and CIWS variations please refer to Section 7.0 of this design guide.

Appendix B: Architectural Specification

This specification should be adopted as a guide only, and shall be superseded by the contract specifications of the project.

* Insert or select appropriate specifications.

Scope

The contractor shall furnish all material and equipment required to satisfactorily complete the installation and jointing of the non-load bearing Hebel® CIWS walls where indicated in the contract specification and/or on the layout drawings.

Materials

All AAC material shall be Hebel® wall panels, as manufactured by Hebel®.

All accompanying fixings shall be those supplied by Hebel® or approved by the project engineer.

All internal lining materials if required including fixings and finishing products shall be those manufactured or supplied by Gyprock™ (or products of equivalent or better performance). Plasterboard shall be manufactured to meet the dimensional requirements of AS/NZS2588 `Gypsum Plasterboard'.

CIWS Type

The contractor shall supply and install non-load bearing Hebel® ***CIWS-….. wall,*** in accordance with CSR Hebel Commercial & Industrial Wall Systems Design and Installation Guides, HELIT035 and HELIT036.

CIWS Wall Panel Type

The contractor shall install ***……..mm*** thick Hebel® standard wall panel, as shown on the `Layout' drawings and in accordance with Hebel® Commercial & Industrial Wall Systems Design and Installation Guides, HELIT035 and HELIT036.

Internal Lightweight Steel Framing

Internal Lightweight steel framing ***is/is not required.*** The lightweight steel framing should consist of the following:

……mm offset from the face of Hebel® wall panels.

……..mm steel stud/furring channel of ……..mm BMT.

Internal Linings

Internal lining ***is/is not*** required. All internal lining material to be installed in accordance with the manufacturer's literature.

Hebel® wall panel/lightweight steel frame shall be lined ***with ….. layer/s of ……mm*** Gyprock™ plasterboard (or products of equivalent or better performance).

All internal lining, jointing and finishing shall be carried out to ***……Level*** of Finish, in accordance with Gyprock™ Steel Frame Wall System Installation Guide, NoGYP544 and other relevant Gyprock™ Technical Literature.

CIWS Walls Acoustic Field Performance Requirements

Installation of the CIWS walls including; wall panel installation, internal lightweight steel framing, external finishes, internal finishes linings and all other components should be carried out to the level specified for a field acoustic performance of:

R_w of……..dB and/or $R_w + C_{tr}$ of……dB.

CIWS Walls Fire Performance Requirements

Hebel® CIWS walls ***are/are not*** required to have a Fire Resistance Level (FRL) rating.

The wall shall have a Fire Resistance Level rating of ***FRL …../……/….. for an external fire source, and/or *FRL …../……/…..*** for an internal fire source, in accordance with the requirements of AS1530.4.

External Coatings and Finishes

Prior to application of external coatings, the contractor shall ensure that:

i) The panels are installed within the tolerances of the project specifications.

ii) All panel-to-panel joints are completely filled with Hebel® Adhesive.

iii) Minor chipping of panels is patched with Hebel® Patch, in accordance with Hebel® Panel Patching Procedure, Technical Bulletin No. HTB794.

iv) All sealants are installed as per manufacturer's specifications.

Hebel® CIWS walls shall be externally coated with ***…… …… …….. coating system***, which shall be installed to the manufacturer's specifications.

Internal Coatings and Finishes

Internal coatings and finishes shall be applied on the *Hebel® wall panels/linings.

Hebel® CIWS walls shall be internally coated with ***…… …… …….. coating system***, which shall be installed to the manufacturer's specifications.

Sealing and Caulking

All control, control and abutment joints shall be caulked with ***……backing rod and *…… sealant*** installed in accordance with the sealant manufacturer's recommendations.

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The better way to build

Hebel is a quality building product, and is backed by CSR Building Products Limited.

For more information visit our website.

www.hebel.com.au

For sales enquiries or further information, please telephone us from anywhere in Australia:

1300 369 448

Health and safety

Information on any known health risks of our products and how to handle them safely is on product packaging and / or the accompanying documentation.

Additional information is listed in the Material Safety Data Sheet (MSDS). To obtain a copy of a MSDS, download from www.hebel.com.au. Contractors are required by law to perform their own risk assessments before undertaking work.

Performance and certification

Hebel® products and systems are developed in Australia by CSR Building Products. ABN. 55 008 631 356. It is a manufacturer and supplier of Hebel Autoclaved Aerated Concrete (AAC) products. Because it is a manufacturer and supplier only, CSR does not employ people qualified as Accredited or Principal Certifiers.

CSR is therefore unable to provide Construction Compliance Certificates or Statements of Compliance. CSR conducts appropriate testing of its products and systems to determine performance levels. These include structural, fire and acoustic tests. Testing is conducted and certified by appropriate specialists in these fields. When using Hebel products and systems in specific projects, such specialists should be consulted to ensure compliance with the Building Code of Australia and relevant Australian Standards.

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Other

The design of a wall, floor or fence system requires the services of professional consultants. This document has been prepared as a source of information to provide general guidance to those consultants – and in no way replaces the services of the professional consultant and relevant engineers designing the project.

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Hebel systems are constantly reviewed so as to reflect any changes in legislative building requirements and or general developments in common building practice, due to our commitment to continual development and improving our building systems.

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HELIT035 Sept16

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