WOQIN AEROGEL IWI SYSTEMS: TECHNICAL MASTER GUIDE Heavy-Duty Internal Wall Insulation for Professional Stud Frameworks

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Manufacturer: Hebei Woqin Trading Co., Ltd.

Website: www.cn-aerogel.com

Technical Support: an@cn-aerogel.com

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1. SYSTEM ARCHITECTURE & PRODUCT MATRIX

The Woqin IWI (Internal Wall Insulation) matrix is a high-performance, mechanical-fix system designed for timber or metal stud frameworks. It eliminates the risks associated with adhesive failure on aged masonry while providing a superior substrate for interior finishing.

1.1 Aero-Plaster (Standard Residential)

Composition: 12mm Premium Plasterboard + Silica Aerogel Core.

Board Dimensions: 2400mm x 1200mm (Standard).

Reaction to Fire: Class **A2-s1, d0 (Limited Combustibility)** as per EN 13501-1.

Thermal Performance: Available in 0.020 W/mK (Standard) or 0.017 W/mK (S-Class).

1.2 Heavy-Duty Aero-OSB & Aero-Mag (Heavy-Duty MgO) (Institutional Grade)

Composition: 12mm High-Strength Gypsum-OSB or 10mm-15mm MgO Board + Silica Aerogel Core.

Standard Board Size: 2000mm x 1200mm (Other custom sizes available upon request).

Reaction to Fire:

MgO System: The MgO facing and Aerogel core are individually Class A1 (Non-Combustible). The composite assembly is engineered to meet A1 requirements (Full assembly report available upon request).

Gypsum-OSB System: Class A2-s1, d0.

Design Intent: Engineered for MoD barracks, schools, and social housing.

1.3 Advanced Sub-Surface Components

Woqin Aero-Tape: 5mm thick Aerogel thermal break tape (Thermal Conductivity: 0.018 - 0.022 W/mK). **Applied strictly to stud faces** to eliminate linear thermal bridging.

Woqin Aluminum Foil Tape: 50mm wide tape used exclusively for **Edge Sealing** of cut panels to prevent dust release and maintain the integrity of the vapor barrier.

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2. VERIFIED TECHNICAL SPECIFICATIONS

All performance data is derived from independent third-party laboratory testing under standard conditions.

2.1 Mechanical Integrity & Anchoring

Screw Pull-out Strength (Gypsum-OSB): 1650N (Tested per GB/T 17657-2022, Report No. XJ2025C03C03714). *Note: For MgO facing, screw pull-out values may vary; consult technical support or use specialized mechanical anchors for heavy eccentric loads.*

Impact Resistance (Gypsum-OSB): Passes 500mm steel ball drop test with zero rear-face cracking or structural rupture (Ref: XJ2025C03C03714, Item 11).

Surface Hardness: Enhanced resistance to abrasion and accidental impact, ideal for high-traffic corridors (anti-vandalism).

2.2 Hygrothermal Properties

Hydrophobicity: 99.7% (Core remains stable in high-humidity environments).

Vapor Regulation: The integrated vapor control layer (VCL), combined with the 5mm Aero-Tape on the studs, creates a **micro-ventilated air gap** behind the board. This allows for natural vapor equalization, preventing interstitial condensation while maintaining a dry building fabric.

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3. ELITE APPLICATION SCENARIOS

3.1 Social Housing & Military Housing (Durability First): The Gypsum-OSB variant provides the "impact-proof" walls required for high-density living, allowing tenants to securely mount heavy fixtures directly to the board.

3.2 Heritage Building Retrofits (Maximum Floor Area): Radically upgrades U-values within a 20mm-32mm profile, preserving original architectural details and maximizing "Carpet Area."

3.3 Marine & Offshore (Fire & Moisture): The Aero-Mag (Heavy-Duty MgO) system delivers non-combustibility and salt-spray resistance for cabin bulkheads and offshore living modules.

4. THERMAL PERFORMANCE & "SPACE ROI"

The Woqin mechanically fixed IWI system provides an uncompromising thermal envelope while salvaging critical interior floor space.

4.1 Comparative Baseline (Targeting ~0.30 W/m²K)

To achieve a target U-Value of 0.30 W/m²K on a standard 225mm uninsulated solid brick wall (Baseline U=2.10 W/m²K):

Mineral Wool System: Requires ~120mm to 140mm total thickness.

Standard PIR System: Requires **87mm** total thickness (comprising 75mm PIR + 12mm Plasterboard).

Woqin Aerogel System: Requires only **32mm** total board thickness (comprising our 0.017 W/mK Premium S-Class core).

4.2 U-Value Ready Reckoner

(Note: Calculation includes Woqin board + standard timber stud cavity. Performance is compared against an 87mm PIR system baseline.)

Woqin System Config.	Total Board Thickness	Upgraded U-Value (W/m²K)	Space Saved vs. 87mm PIR System
Aero-Board 22	22mm (12mm + 10mm)	**~ 0.55**	**87mm → 22mm (65mm saved)**
Aero-Board 27	27mm (12mm + 15mm)	**~ 0.40**	**87mm → 27mm (60mm saved)**
Aero-Board 32	32mm (12mm + 20mm)	**~ 0.30**	**87mm → 32mm (55mm saved)**

**Note: 87mm PIR system refers to a standard 75mm PIR foil-faced board plus a 12mm plasterboard finish.*

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5. STEP-BY-STEP INSTALLATION PROTOCOL

CRITICAL INSTALLATION ADVISORY: Woqin Heavy-Duty panels are strictly for mechanical fixing. Ambient temperature during installation must be >5°C.

Step 1: Substrate & Framework

Old Wall Treatment: If the existing wall shows signs of rising damp or hygroscopic salts, install a Damp-Proof Membrane (DPM) behind the framework or treat with a liquid DPM before stud installation.

Framework: Construct studs at 400mm or 600mm centers. **Tolerance: ±5mm**. Studs must be plumb to within 3mm over a 2m span.

Core Tool List: Fine-toothed circular saw with HEPA vacuum, laser level, screw gun with depth-stop, and a 3.4mm drill bit (specifically for MgO boards). *(Note: No adhesive trowels are required as this is a 100% mechanical-fix system).*

Step 2: Cutting & Edge Sealing (Anti-Dust)

Cutting: Use a fine-toothed circular saw with active HEPA vacuum extraction.

Edge Sealing: Before mounting, wrap all exposed aerogel cut edges with **Woqin Aluminum Foil Tape (Min. 50mm wide)**. This contains silica dust and maintains the vapor barrier. Ensure tape does not overlap onto the decorative face to avoid plaster adhesion issues.

Step 3: Aero-Tape Thermal Break

Apply **5mm Woqin Aero-Tape** directly to the face of every stud. Overlap tape at all junctions and corners by at least 25mm. This severs the conductive pathway through the studs.

Step 4: Mechanical Fixing & Screw Specs

Screw Selection: For **Timber Studs**: Use premium coarse-thread drywall screws.

For **Metal Studs**: Use fine-thread self-tapping drywall screws.

Screw Length Formula: Min. Length = Panel Thickness + 5mm (Aero-Tape) + 25mm (Penetration).

Example: For a 22mm board, the calculated minimum length is 52mm. **Use 55mm screws** (as 52mm is not a standard industry length).

Fixing Technique: Drive screws at 300mm vertical intervals.

For Gypsum-OSB: Screw heads should be slightly countersunk without breaking the paper face.

For MgO Boards: Using a torque-limited driver, sink the screw head **0.5-1mm** below the surface so it can be concealed by joint compound. **Stop immediately if surface cracking occurs.**

Step 5: Jointing & Decoration

Apply fiberglass scrim tape over joints and finish with two coats of high-quality gypsum jointing compound. The OSB/MgO surface is then ready for skimming or surface-mounted infrared heating systems.

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6. QA/QC & LOGISTICS

6.1 Storage & Site Management

Storage: Store panels perfectly flat on a level pallet. **Maximum stack height: 1.2 meters**. Protect from direct moisture.

Handling: DO NOT STEP on unsupported panels. Clean site dust using a HEPA vacuum; do not use brooms.

6.2 Quality Acceptance (Thermal Imaging)

A thermographic inspection is recommended post-installation. The maximum surface temperature variation across the insulated area shall be < 1.5°C.

Diagnostic Note: Hot spots exceeding 2.0°C specifically at stud locations indicate a failure by the contractor to correctly install the sub-surface Aero-Tape.

6.3 Bill of Materials (BOM) Estimator (Based on 10m² Wall Area)

Item Description	Estimated Quantity	Application Notes
Woqin Aero-Composite Panels	10.5 m²	Includes 5% cutting waste
Aero-Tape (5mm x 50mm)	~18 linear meters	Based on 2.5m ceiling & 600mm spacing
Aluminum Foil Tape (50mm)	1 roll (50m)	For cut-edge sealing ONLY
Premium Drywall Screws	~150 pcs	Select length based on formula in Step 4
Fiberglass Scrim Tape	~10 linear meters	For surface joints

LEGAL DISCLAIMER: All performance data specified in this manual is based on independent laboratory testing under controlled conditions. Actual on-site results may vary depending on existing wall structures and installation quality. Installers must adhere to all local building regulations, structural codes, and HSE guidelines.

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