HEBEI WOQIN TRADING CO., LTD.

VACUUM INSULATION PANEL (VIP) MASTER DATA SHEET

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Focus: Zero-Limit Thermal Mastery

1. HIGH-PERFORMANCE VACUUM INSULATION MATRIX

At Hebei Woqin, we believe that fundamental thermodynamics should never be restricted by industry boundaries. Whether you are engineering a 50-year Passivhaus facade, extending the range of an EV battery, or designing ultra-lightweight cold chain logistics, our vacuum insulation panels (VIP) deliver the absolute physical limit of thermal resistance.

Backed by proprietary anchoring patents (Application Pending) and rigorous international testing, the Hebei Woqin VIP Matrix is categorized into three specialized product lines:

1.1 Core Specifications Overview

Product Brand & Series	Encapsulation Barrier	Limit Thermal Conductivity (λ)	Thickness Range	Fire Safety Rating
Vacu-Armor™ (Stainless Steel)	304 Stainless Steel (0.1mm)	**0.002 W/(m·K)**	10mm - 30mm	**Class A1** (Non-Combustible)
Vacu-Slim™ (Ultra-Thin)	High-Barrier Metallized Film	**≤ 0.003 W/(m·K)**	**1mm - 5mm**	Class A / Flame Retardant
Vacu-Core™ (Standard STP)	High-Barrier Aluminum Foil	**0.002 W/(m·K)**	5mm - 50mm	Class A (A2)

**Typical values based on 20mm thickness; other configurations available upon request.*

1.2 Engineering Features & "No Limits" Applications

Vacu-Armor™ | The Ultimate Shield

Engineering Features: Features an unparalleled 50-year design lifespan, 118 kPa compressive strength, and 79N puncture resistance. It is structurally supported by our exclusive Woqin proprietary system: *"Breathable Micro-channel & Cap Thermal Break"* (China Patent Application No.: 202610285364.1 & 202620288388.8, Under Review).

Cross-Industry Applications: Thermally broken balconies, high-rise building facades, explosion-proof industrial cabins, and premium heavy-duty thermal equipment.

Vacu-Slim™ | The Ultra-Profile Solution

Engineering Features: Engineered for extreme space constraints where every millimeter counts. Capable of surviving 1000 hours in harsh "Double 85" (85°C/85% RH) conditions with zero thermal degradation. Delivers extreme high-voltage insulation (withstanding 3800V DC).

Cross-Industry Applications: New Energy Vehicle (EV) battery packs, aerospace insulation, medical/vaccine cold chain logistics, and high-precision portable coolers.

Vacu-Core™ | The Value Champion

Engineering Features: Delivers massive thermal resistance at a highly competitive cost-to-performance ratio. Engineered with integrated getters to maintain internal vacuum pressure for a guaranteed 60-year lifespan.

Cross-Industry Applications: Passivhaus / NZEB exterior walls, large-scale commercial cold storage facilities, refrigerated truck bodies (reefers), and standard domestic appliances.

2. HARDCORE TECHNICAL SPECIFICATIONS & RELIABILITY

In this section, we present the verified physical and thermodynamic properties of the Woqin Vacu-Series™. All data is derived from rigorous testing conducted by internationally recognized institutions (CNAS/CMA/Tsinghua University certified).

2.1 Vacu-Armor™ | Stainless Steel Encapsulated VIP (Heavy Duty)

Engineered for structural integrity, A1 fire safety, and a 50-year extreme service life.

Property	Unit	Value / Result	Test Standard / Method
Limit Thermal Conductivity (λ)	W/(m·K)	**0.002** (@ 25°C)	ASTM C177 / GB/T 10295
Compressive Strength	kPa	**118** *	EN 826 / GB/T 13480
Puncture Strength	N	**79**	ASTM D4833 / GB/T 10004
Tensile Strength (Perpendicular)	kPa	**116**	JGJ 144 / GB/T 20631
Weighted Sound Insulation (Rw)	dB	**20** (at 20mm thickness)	ISO 717-1 / Tsinghua Lab
Fire Safety Rating	-	**Class A1** (Non-combustible)	EN 13501-1 / GB 8624
Dimensional Stability	%	≤ 0.5 (Length/Width)	GB/T 8811
Design Service Life	Years	**≥ 50**	Accelerated Aging Test

2.2 Vacu-Slim™ | Ultra-Thin VIP (Space Assassin)

Optimized for New Energy Vehicle (EV) battery packs and precision space constraints.

Property	Unit	Value / Result	Engineering Context
Nominal Thickness	mm	**1.0 to 5.0**	Ultra-low profile
Initial Thermal Conductivity (λ)	W/(m·K)	**≤ 0.003**	At Room Temp
Double 85 Reliability Test	W/(m·K)	**≤ 0.003**	85°C / 85% RH (@ 1000h)
Dielectric Strength (Withstand)	V DC	**3800**	@ 1mm, Leakage < 1mA
Insulation Resistance	MΩ	**≥ 500**	@ 5000V DC

Property	Unit	Value / Result	Engineering Context
Temperature Application Range	°C	**-40 to +90**	Battery Pack Standards
Core Density	kg/m³	400 - 550	High-density Nano-matrix

2.3 Vacu-Core™ | Standard High-Performance VIP

The industry standard for Passivhaus, cold storage, and energy-efficient appliances.

Property	Unit	Value / Result	Performance Level
Limit Thermal Conductivity (λ)	W/(m·K)	**0.002**	Industry-Leading Limit
Compressive Strength	kPa	**171** *	High Structural Loading
Tensile Strength (Internal)	kPa	**103**	Delamination Resistance
Surface Water Absorption	g/m²	**79**	Moisture Barrier Efficiency
Fire Safety Rating	-	**Class A (A2)**	Building Code Compliant
Vacuum Pressure Retention	mbar	≤ 1.0 (After 60 years)	With Integrated Getters

2.4 Standard Dimensions & Structural Weight (Dead Load)

To assist architects and engineers in structural load calculations and panel layout.

Standard Dimensions (mm)	Thickness (mm)	Areal Density (kg/m2)	Weight per Panel (kg)
306 x 606	20	5.9 - 9.2	1.10 - 1.70
406 x 606	20	5.9 - 9.2	1.45 - 2.26
806 x 606	20	5.9 - 9.2	2.88 - 4.49
Custom Size	10 - 50	*Varies by thickness*	*Contact Engineering*

Engineering Notes & Quality Assurance

Note on Compressive Strength (*): The **Vacu-Core™ (171 kPa)** utilizes a high-density fiber-glass matrix optimized for uniform static loads in cold storage flooring. The **Vacu-Armor™ (118 kPa)** is specifically designed for building envelopes, balancing structural rigidity with a high **Puncture Strength (79N)** and laser-welded flexibility to accommodate wind pressure and thermal expansion without vacuum failure.

Thermal Conductivity Data: Typical values verified for 20mm thickness at a mean temperature of 25°C. Performance may vary slightly based on specific edge-to-area ratios.

3. PROPRIETARY INSTALLATION SYSTEM & COMMERCIAL VALUE

To unlock the full potential of Vacuum Insulation Panels (VIP), the installation method is just as critical as the core material. Traditional VIP installations suffer from two fatal flaws: interstitial condensation (mold) and severe thermal bridging at the panel joints.

Hebei Woqin has engineered and patented the ultimate solution to permanently eliminate these risks, ensuring maximum thermal performance and structural safety for the entire lifecycle of the building.

3.1 The Woqin Proprietary Anchoring System

Our exclusively developed installation system is currently under the protection process of the China National Intellectual Property Administration (CNIPA):

Technology: "Breathable Micro-channel & Cap Thermal Break" Anchoring System

Patent Status: China Invention & Utility Model Patents – **Under Review / Application Pending** *(Application numbers available upon request for project audits).*

Lead Inventor: Ruibin An (CEO of Hebei Woqin)

3.2 Solving the Fatal Flaws of VIP Installation

The Mold Killer: Breathable Micro-Channel Technology

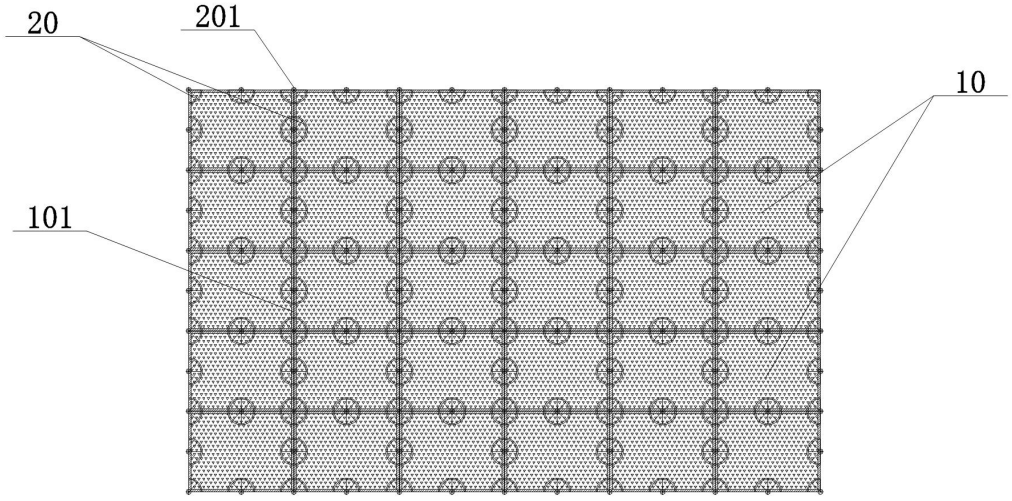
The Problem: Traditional full-adhesion methods trap moisture inside the building envelope, leading to devastating structural mold and insulation failure.

The Woqin Solution: By utilizing precisely engineered structural adhesive beads/strips on the back of the VIP, we create a continuous 3mm to 5mm micro-cavity between the panel and the substrate wall. This micro-channel acts as an active vapor venting system, allowing trapped moisture to escape and keeping the structural wall permanently dry.

The Leakage Blocker: Cap Thermal Break Technology

The Problem: The metal flanges of Stainless Steel VIPs and traditional mechanical fasteners create massive thermal bridges, leaking heat and reducing the overall system R-value.

The Woqin Solution: We utilize a specialized cross-shaped thermal insulation anchor plate to secure the flanged edges of the VIPs. Once anchored, an advanced flexible thermal break strip (**Aerogel / VIP hybrid material**) is capped directly over the metal flanges and the anchor points. This completely isolates the conductive edges from the exterior environment, achieving a true 100% thermal break.



3.3 Installation Prerequisites (Substrate Preparation)

To ensure the 50-year structural integrity of the Vacu-Armor™ system, the substrate must meet the following criteria before panel application:

Compatibility: Suitable for reinforced concrete, CMU block, structural steel, and engineered timber framing.

Surface Tolerance: The substrate must be clean, dry, and structurally sound. Flatness tolerance must not exceed **±3mm over a 2-meter straight edge**. Uneven surfaces must be leveled with an appropriate cementitious render prior to VIP installation.

3.4 The Core Business Value: "Space is Money"

Beyond simply meeting extreme energy codes, Hebei Woqin's High-Performance VIP matrix fundamentally transforms the economics of your project:

Real Estate & High-Rise Facades (Increase Sellable Area): By replacing 200mm of traditional mineral wool with just 20mm of Vacu-Armor™, architects can reclaim massive amounts of usable interior floor space. In premium real estate markets, this extra space translates directly to millions in added property value.

Cold Chain & Logistics (Light-Asset Operations): Vacu-Slim™ and Vacu-Core™ drastically reduce the wall thickness of refrigerated trucks and vaccine transport boxes. This allows standard delivery vehicles to achieve deep-freeze capabilities while maximizing internal cargo volume.

Disclaimer & Legal Notice

All data provided in this document are typical values obtained from third-party CNAS/CMA certified laboratory reports under standard testing conditions. Specifications may vary slightly by production batch and specific panel configurations. This document is for technical reference only and does not constitute a legally binding warranty. For project-specific performance guarantees, structural layout calculations, and customized thermal simulations, please contact the Hebei Woqin engineering team.

HEBEI WOQIN TRADING CO., LTD. | Redefining the Limits of Thermodynamics.

URL: www.cn-aerogel.com

Email: an@cn-aerogel.com

www.cn-aerogel.com