

# IVIS 2021



Brunel  
University  
London

15<sup>th</sup> International Vacuum Insulation Symposium

15th International  
Vacuum Insulation Symposium  
Brunel University London, UK  
11-12 April, 2022

## IVIS Information Brochure



WE SOLVE THERMAL CHALLENGES



南通远顺耐纤有限公司  
Nantong Yuanshun Refractory Fiber Co.,Ltd

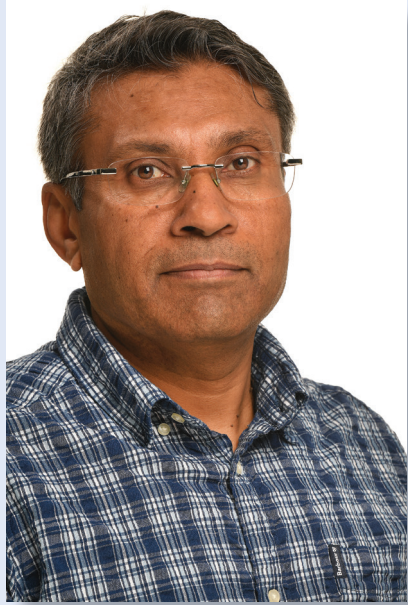


VACUUM INSULATION  
PANEL ASSOCIATION



SANYOU

## Message from the Chair



**I would like to extend my warmest welcome to the participants, speakers and delegates at the 15th International Vacuum Insulation Symposium (IVIS2021) at Brunel University London (UK).**

It's an immense honour and pleasure to host you at Brunel. Myself, the organising committee and scores of other members of the vacuum insulation community are now eagerly looking to meet with you in-person or online and network with you. I can assure you on behalf of the organising committee that all efforts possible have been done to ensure that IVIS2021 will be the most knowledgeable and informative IVIS of all those gone before and also the safest one despite the ongoing Covid-19 pandemic challenges.

The realisation of the global climate change phenomena and their impacts has grown significantly in last few years and is now clearly reflecting in the national and international legislations and agreements. If the world community is to deliver 2100 targets about restricting the global temperature rise to within 2°C, it is critical that advanced thermal insulation systems are adopted at an accelerated pace in sectors such as industry, buildings and transport among many others. Several such applications and challenges faced by the vacuum insulation panels will be discussed and deliberated in this edition of the IVIS.

I hope that participants will be able to take maximum benefit of the networking and listening opportunities as well as enjoy the hospitality of the Brunel team.

Last but not least, I will like to thank the members of the Organising Committee and other Brunel colleagues who have worked tirelessly in making it possible for the IVIS2021 to be organised seamlessly in the hybrid mode.

Welcome to IVIS2021 at Brunel University London!

Dr Harjit Singh  
Chair of the IVIS2021

## Keynote Speakers

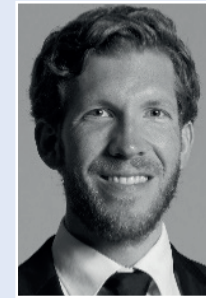


**Dr. Roland Caps, Co-founder, va-Q-tec AG**  
*'Review of 40 years of vacuum insulation research in Würzburg, Germany'*

Dr. Roland Caps completed his diploma (1982) and doctoral research (1985) in Physics from University of Würzburg, Germany. The topic of his thesis was thermal radiation in evacuated thermal insulation. He held research positions at University of Würzburg (1988) and at the research institute Hohenstein on heat and moisture transfer in clothing (1992) after which he was appointed the head of department "Thermal Insulation and Heat Transfer" of the Bavarian Institute of Applied Energy Research in Würzburg (1992 - 2001). Dr. Caps co-founded va-Q-tec AG in Würzburg in 2001 where he served as the Chief Research Officer until 2017.

**Prof Phil Eames, Professor of Renewable Energy, Loughborough University**  
*'Opportunities for VIPs in the UK building stock'*

Prof Phil Eames is the Lead for LU's Global Energy Challenge and the Director of the Centre for Renewable Energy Systems Technology (CREST) at LU. He has an h-index of 42 and, over 30 years, has established an internationally recognised track record for undertaking high quality research in fields including thermal energy storage systems, advanced low heat loss glazing, concentrating solar energy systems and energy saving building fabric components. He has been awarded over 40 grants and contracts to support his research activities. In 2018, he was awarded the Harry Leck Memorial Medal for distinguished contributions to British scientific research in the field of Vacuum Science and Technology.



**Sebastian Baars, CEO, Vaku-Isotherm GmbH**  
*'Update on VIPA International'*

Sebastian Baars is the CEO of Vaku-Isotherm since more than 6 years. He is also the President of VIPA International since 2020. Prior to his role at Vaku-Isotherm he worked for several medical device manufacturers where he managed the Industrial Engineering and Maintenance team. Sebastian graduated at the Technical University in Munich with a Masters of Science degree.

**Prof. Dr. Zhaofeng, Professor, Nanjing University of Aeronautics and Astronautics**  
*'The Latest Developments of VIP in China in Last 2 Years'*

Prof. Chen has been engaged in the research of super insulation materials and technologies. He has undertaken more than 20 projects funded by the National Natural Science Foundation of China, international science and technology Cooperation projects of the Ministry of Science and Technology and provincial and provincial projects, and has trained more than 20 doctoral students, more than 80 master students and 6 bachelor students. He has published more than 300 papers, more than 200 authorized patents, published two books including VIP 150 questions & answers in building in 2012 and VIP 300 questions & answers in 2022, compiled VIP national standards, and won 6 provincial and ministerial science and technology progress awards in China.



**Prof. Bernard Yrieix, Research Engineer (retd.), EDF R&D**  
*'Super insulation: some R&D contributions to solving industrial problems'*

Prof. Yrieix began his work on thermal insulation materials in a collaborative manner at EDF R&D in 1998 with the infrared opacification of traditional porous materials and then the evaluation of "green" insulating materials. In 2000, the theme of super insulation by VIPs, initiated in Munich and Zurich, emerged in France with a modest participation in Annex 39. Prof. Yrieix's first attendance at IVIS dates back to 2005, the beginning of 20 years devoted to the technical, economic and environmental performance of superinsulation, VIPs followed by aerogels, where the issue of their durability is central. During this period, he led the French community on super insulation and directed a dedicated laboratory as well as numerous thesis on the subject. It is with Annex 65 and its aftermaths that he ended a rich career in multiple and fruitful collaborations.

## International Vacuum Insulation Symposium 2021 | 11th April 2022

<b>Welcome address by Brunel team and local experts</b>	<b>09:00 – 09:30</b>
Opportunities for VIPs in the UK building stock <b>Prof Phil Eames</b>	<b>09:30 – 09:50</b>
Update on VIPA International <b>Sebastian Baars</b>	<b>09:50 – 10:10</b>
Review of 40 years of vacuum insulation research in Würzburg, Germany <b>Roland Caps</b>	<b>10:10 – 10:30</b>

### Break + Posters + Exhibition 10:30 – 10:45

### Presentation session 1 Chair: Roland Caps 10:45 – 12:30

Determination of the coupling effect and the thermal accommodation coefficient to describe heat transfer in nanoporous silica for vacuum insulation panels <b>Sebastian Sonnack</b>	<b>10:45 – 11:05</b>
Mechanical optimization of super-insulating silica aerogel composites <b>Genevieve Foray</b>	<b>11:05 – 11:25</b>
Life Cycle Assessment of Vacuum Insulation Panels: Which Core Material Offers the Lowest Environmental Impact? <b>Shahaboddin Resalati</b>	<b>11:25 – 11:45</b>
Novel Low-Cost High-Barrier Laminates for Vacuum Insulation Panels (VIPs) <b>Esra Kucukpinar</b>	<b>11:45 – 12:05</b>
Improving energy efficiency of heritage buildings owned and managed by the Kurukshetra Development Board <b>Kurukshetra Development Board, Haryana Government (India)</b>	<b>12:05-12:20</b>

### Lunch + Posters + Exhibition 12:20 – 13:00

### Presentation session 2 Chair: Shahaboddin Resalati 13:00 – 15:20

Comparative energy and cost assessment of Vacuum Insulation Panels (VIPs) for energy retrofitting of office buildings in different climatic conditions <b>Mahmood Alam</b>	<b>13:00 – 13:20</b>
Controllable thermal insulation <b>Jonina Felbinger</b>	<b>13:20 – 13:40</b>

### Presentation session 2 continued

Impact of aeration and deaeration of switchable vacuum insulations on the overall heat conductivity using different core materials and filling gases <b>Lars Erlbeck</b>	<b>13:40 – 14:00</b>
Nanocellular polymers: fabrication techniques and characterization of the thermal conductivity <b>Victoria Bernardo</b>	<b>14:00 – 14:20</b>
Development of Vacuum Insulation Panels based on Date Palm Fibre as core material <b>Tarek Raad</b>	<b>14:20 – 14:40</b>
Energy consumption analysis of thermal insulation walls based on vacuum insulation panels <b>Zongjin Du</b>	<b>14:40 – 15:00</b>
Numerical calculation on thermal performance of glass fibers fumed silica composite core materials vacuum insulation panels <b>Qiong Wu</b>	<b>15:00 – 15:20</b>

### Break + Posters + Exhibition 15:20 – 15:45

### Life Time Achievement Awards Presentation 15:45 – 16:00

### VIPA International Session 16:00 – 17:30

VIPs as super insulation in urban spaces using the example of the "Grand Tower" in Frankfurt/Germany <b>Ronald Ellebrecht</b>
Development of a new Vacuum Insulated Case for temperature-controlled transportation of pharmaceuticals <b>Hideji Kawarazaki</b>
VIPs for terrace insulation - Marina Apartments – Regensburg <b>Sebastian Baars</b>
<b>Discussion among VIPA panel and audience</b>

### Symposium Dinner 19:00

## International Vacuum Insulation Symposium 2021 | 12th April 2022

Opportunities for VIPs in the UK building stock **Prof. Zhaofeng Chen** 09:00 – 09:20

Opportunities for VIPs in the UK building stock **Prof. Bernard Yrieix** 09:20 – 09:40

### Presentation session 3 Chair: Anshul Paneri 09:40 – 10:20

Simulation of the thermal conductivity  $\lambda$  vs moisture content  $X_w$  of VIPs with silica core using an Excel recursion tool  
**Özgür Düdükçü** 09:40 – 10:00

Long-term hygrothermal monitoring of glass fiber Vacuum Insulation Panels for roof application **Stefano Fantucci** 10:00 – 10:20

### Break + Posters + Exhibition 10:20 – 10:45

#### Presentation session 4A Presentation session 4B 10:45 – 12:00

Thermal performance of nanostructured insulation materials – a comparison  
**Akos Lakatos** 10:45 – 11:05

Long-term performance of hydrophobic silica-based advanced porous materials in building applications  
**Gabriele Gartner** 10:45 – 11:05

Switchable Thermal Insulation for Energy Efficient Building Façades **Bastian Buettner** 11:05 – 11:25

Integrated Vacuum Insulation Panels in Aircraft Industry  
**Vakhtang Latsuzbaya** 11:05 – 11:25

Experimental testing of the hygrothermal performance of an ETICS with vacuum insulation panels **Marcio Paulo Ferreira Goncalves** 11:25 – 11:45

Opacifying properties of carbon black on perlites tested at 10-70 °C  
**Antony Sara** 11:25 – 11:45

Long term performance of vacuum insulation panels integrated into building components  
**Antonio J Aldykiewicz Jr** 11:45 – 12:05

Mechanical properties and thermal conductivity of Nextel™ 720 reinforced porous Al<sub>2</sub>O<sub>3</sub> composite prepared by sol-gel method **Fei Wang** 11:45 – 12:05

### Lunch + Posters + Exhibition 12:05 – 13:00

#### Presentation session 5A Chair: Stefano Fantucci Presentation session 5B Chair: Genevieve Foray 13:00 – 15:00

High temperature thermal insulation aerogels combined with inorganic fibers and aerogels  
**Le Lu** 13:00 – 13:20

The Critical Impact of Desiccants on the Ageing Rate of Fiberglass VIPs  
**Yoash Carmi** 13:00 – 13:20

### Presentation session 5A and 5B continued

Thermal conductivity of unidirectional laminated hybrid SiC-Nextel™ 720 fiber-reinforced oxide matrix composites **Lixia Yang** 13:20 – 13:40

Retrofitting balcony doors from the 1950s: feasibility study of VIPs  
**Pär Johansson** 13:20 – 13:40

Novel barrier technology of VM-EVOH  
**Hisahi Ishihara** 13:40 – 14:00

Development of an opacified core material by pyrolysis and investigation of the radiation thermal conductivity by infrared spectroscopy **Gamze Unsal-Peter** 13:40 – 14:00

Evaluation of condensation characteristics of detached house using Vacuum insulation Panel for building **Shohei Sato** 14:00 – 14:20

Analysis of the suitability of using powdered micro and nanocellular polymers as core materials for VIP  
**Ismael Sanchez-Calderon** 14:00 – 14:20

Application of vacuum insulation panel for thermal management of electronics under harsh environment  
**Midhun V. C** 14:20 – 14:40

Short-term thermal performance evaluation of sawdust based vacuum insulation panel core material **Mahmood Alam** 14:20 – 14:40

Next generation of pressure sensor transponders for quality control in vacuum insulation panel  
**Christian Walk** 14:40 – 15:00

TRNSYS modelling of vacuum insulated cold storage for bananas  
**Anshul Paneri** 14:40 – 15:00

### Break + Posters + Exhibition 15:00 – 15:15

#### Presentation session 6 Chair: Harjit Singh 15:15 – 16:25

Impacts of Air and/or Vapor Diffusion on Aging of Vacuum Insulation Panel (VIP) **Phalguni Mukhopadhyaya** 15:15 – 15:35

The effect of barrier films and exposure on the aging of vacuum insulation panels with fumed silica cores  
**Antonio J Aldykiewicz Jr** 15:35 – 15:55

Lifetime assessment of VIP at high temperatures **Pär Johansson** 15:55 – 16:05

VIPs in a cooling application and their monitoring over 14 years with the va-Q-perm method **Samuel Brunner** 16:05 – 16:25

### 15th IVIS closing ceremony 16:25 – 17:00



## Organising Committee

Dr. Harjit Singh	Brunel University London, UK
Prof. Savvas Tassou	Brunel University London, UK
Dr. Mayo Adetoro	Brunel University London, UK
Dr. Tze Pei Chong	Brunel University London, UK
Dr. Jan Wissink	Brunel University London, UK
Dr. Mahmood Alam	University of Brighton, UK
Sankarshan Verma	Brunel University London, UK
Dr. David Redpath	Brunel University London, UK
Dr. Anshul Paneri	Brunel University London, UK
Tarek Raad	Brunel University London, UK
Ranga Vihari Parupudi	Brunel University London, UK

## Scientific Committee

Dr. Harjit Singh	Brunel University London, UK
Dr. Bijan Adl-Zarrabi	Chalmers University of Technology, Sweden
Dr. Mahmood Alam	University of Brighton, UK
Dr. Flávia A. Almeida	Va-Q-tec AG, Germany
Dr. Kaushik Biswas	GTI, USA
Dr. Samuel Brunner	EMPA, Switzerland
Dr. Yoash Carmi	Avery Dennison, Israel
Dr. Zhaofeng Chen	Nanjing University of Aeronautics and Astronautics, China
Mr. Andre Desjarlais	Oak Ridge National Laboratory, USA
Hans-Frieder Eberhardt	Morgan Advanced Materials – Thermal Ceramics Porextherm Dämmstoffe GmbH, Germany
Dr. Ulrich Heinemann	ZAE Bayern, Germany
Prof. Atsushi Iwamae	Kindai University, Japan
Dr. Pär Johansson	Chalmers University of Technology, Sweden
Prof. Jun-Tae Kim	Kongju National University, Korea (South)
Dr. Esra Kucukpinar	Fraunhofer Institute for Process Engineering and Packaging, Germany
Dr. Phalguni Mukhopadhyaya	University of Victoria, Canada
Mr. Masakazu “Mack” Nakaya	EVAL R&D Department, Kuraray Co., Ltd., Japan
Prof. Marco Perino	Politecnico di Torino - DENERG, Italy
Christoph Sprengard	FIW Munich, Germany
Dr. S. Suresh	National Institute of Technology Trichy, India
Dr. Karim Ghazi Wakili	IABP. Institute for Applied Building Physics, Switzerland



## Nantong Yuanshun Refractory Fibre Co., Ltd

### Nantong Yuanshun Introduction

Nantong Yuanshun Refractory Fiber Co, Ltd(China) was established in 2005. Nantong Yuanshun is committed to the development and application of advanced thermal insulation materials. The company is building an annual output of 100,000 tons of ultra-fine glass wool core materials. The company's current products include glass wool core material for vacuum insulation panels, ceramic fiber wool, refractory fiberboard and its derivatives, which are widely used in construction, cold chain, pipeline and kiln fields.

#### Major product

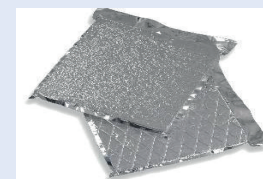
Major product of Nantong Yuanshun is glass fiber core materials, including Yuanshun V Series and Yuanshun S Series.

Yuanshun V Series: V-15, V-17

Yuanshun S Series: S-20

#### Glass fibers core material VIP

- ✓Excellent thermal insulation performance
- ✓Non-ignitable
- ✓High economic value



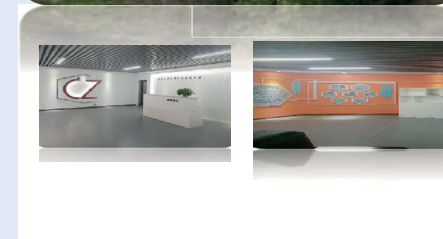
### Nantong Yuanshun Product

#### Yuanshun V-15

- VIP thermal conductivity: 1.6-1.7mW/(m · K)
- Density:  $\leq 115\text{kg/m}^3$
- Size: 200×200mm, 300×300mm, 400×400mm

#### Yuanshun V-17

- VIP thermal conductivity: 1.7~1.8mW/(m · K)
- Density:  $\leq 120\text{kg/m}^3$
- Size: 200×200mm, 300×300mm, 400×400mm



### Nantong Yuanshun Product Advantages



**Light** Density  $\leq 115\text{kg/m}^3$

**Insulated** After vacuum sealing, thermal conductivity is 1.6mW/(m · K)

**Durable** 2μm fibers diameter, tiny pore, long service life

**Stable** Standardized manufacture

#### Yuanshun S-20

- VIP thermal conductivity: 1.8~1.9mW/(m · K)
- Density:  $\leq 130\text{kg/m}^3$
- Size: 200×200mm, 300×300mm, 400×400mm



### Nantong Yuanshun Contact

Manager: Yijin Miao

Tel: 86-13301478063

E-mail: ys-nq@163.com

Location: 8 Fumin Road, Baidian Town, Jiangsu Province, China

## 江苏山由帝奥节能新材股份有限公司 Jiangsu Sanyou Dior Energy-saving New Materials Co.,Ltd

Founded in 2003, Jiangsu Sanyou Dior Energy-saving New Materials Co., Ltd(SANYOU DIOR) is located in West Tai Lake Science and Technology Industrial Park, Changzhou, China.

Sanyou Dior focused on provide High Temperature and Low Temperature Insulation Solutions and the development direction is new thermal insulation materials. High Temperature Oven Gaskets, Rubber Seals, Thermal Protection Products of Automotive Wire Harness, **Vacuum Insulation Panels(VIP)**, Polyurethane Foam Encapsulated VIP and Cool Boxes are the main products.

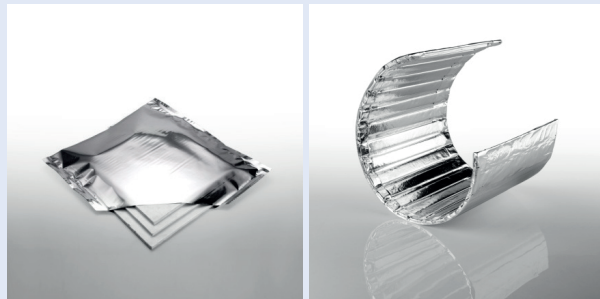
San you Dior pays attention to talent training and technological innovation, focuses on importing advanced processing technology and equipment, constantly optimizing product technology, actively absorbing new materials at the forefront of science and technology, optimizing product structure and improving product quality. We have 81 authorized patents at home and abroad, including 27 invention patents, which cover product structure design, production process, production equipment and other technical fields.

Most of the products are exported to Europe, North America, Japan, South Korea, Thailand etc. The main domestic customers are Haier and Gree. In 2009 and 2015, Sanyou Dior received the "Distinguished Supplier Award" twice granted by General Electric Appliance.

Sanyou Dior developed a **Vacuum Insulation Panel** for ultra-low temperature applications, which has obtained the application license from the Ministry of Aerospace of China.



### Vacuum Insulation Panel - Products



### Vacuum Insulation Panel - Applications



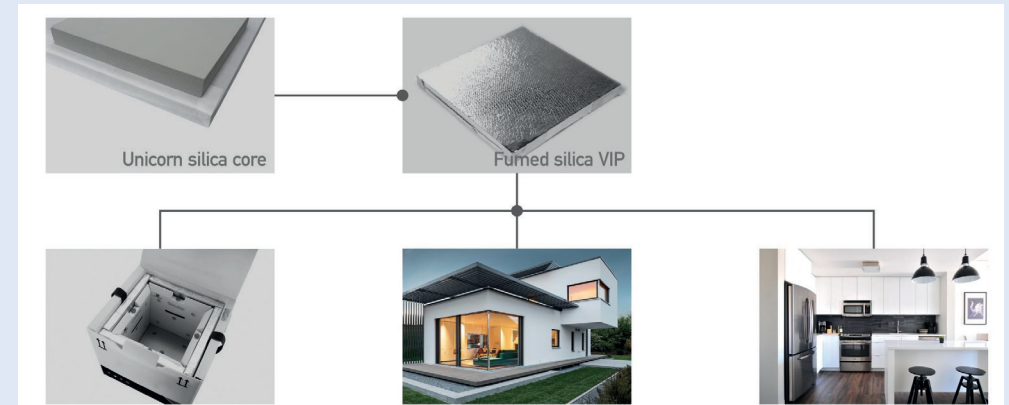
### Patents and Awards



## Microporous silica core material The CORE competence



The products of our **TT core** line find their home in various applications where high-performance insulation is indispensable.



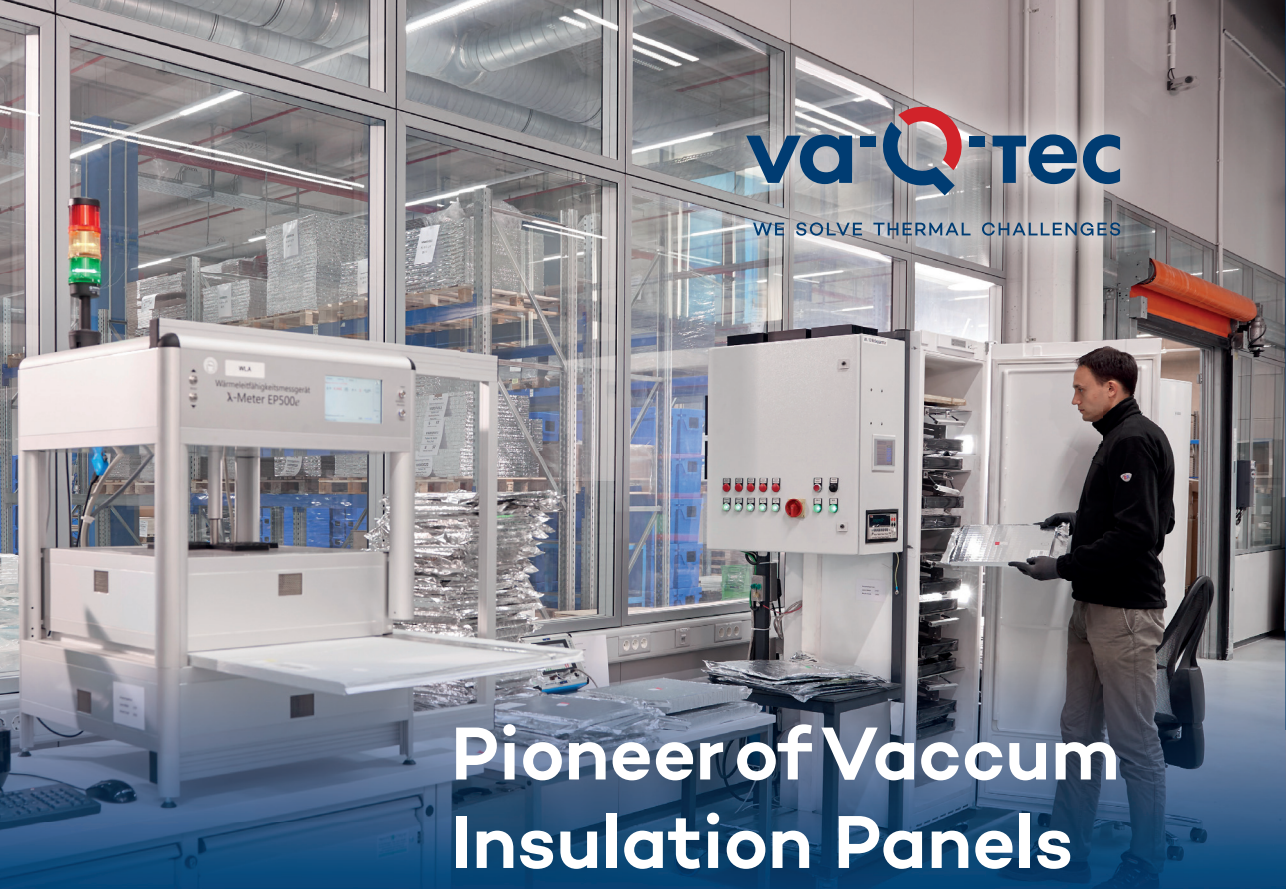
**Cold chain**  
Temperature controlled package:  
vaccine transport boxes, food deliveries, medical and blood samples packages.  
Cool cars, cool trucks

**Construction**  
Saving energy and CO2 in passive or plus energy houses

**Household appliances**  
Energy saving refrigerators  
Energy saving hot water boilers

Unicorn Insulations Limited





# Pioneer of Vacuum Insulation Panels

- More than 20 years of experience
- Most comprehensive product portfolio and continuous new innovations: e.g. va-Q-steel with temperature resistance from -196 °C to +400 °C



More information:

- va-Q-tec.com
- @vaQtec
- va-Q-tec






## REASONS TO JOIN

 STANDARDISATION	 NETWORKING	 INFLUENCE	 EXPERT INFORMATION
 KNOWLEDGE SHARING	 AWARENESS	 EVENTS	 MONITORING

## OUR MEMBERS



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