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TECHNIK SERVICE NEWS

PUBLIC TRANSPORT COURIER I ISSUE 1.2023

TITLE STORY

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Dear readers,

Diesel heating systems in cars, trucks and buses have been a prominent feature of the last 50 years. As the climate in the boiler room changes, we are likely to see the end of diesel buses in Europe in the foreseeable future. Some cities have already bought in phased driving restrictions based on emissions classes. With a potential ban on internal combustion engines in future, the use of e-fuels is being promoted as an alternative and CO_2-neutral solution. For that reason, many bus manufacturers are feeling scepticism and reluctance about continuing to invest in diesel and pushing ahead with the implementation of Euro 7.

A further question is how second-hand diesel buses can be given a new lease of life. A potential alternative here could be conversion and retrofitting as opposed to buying new vehicles. While there may be some mileage in converting diesel vehicles to electric ones, it is bus operators who will decide how future-proof this model is.

A brief poll by the ZDK (Federation of the German Motor Vehicle Trade) published in March suggested that the downward trend in plug-in hybrids and battery-driven vehicles could have triggered by changes to eligibility conditions for subsidies. Bus operators and the public transport sector agree that the expansion of e-mobility in the bus sector will be largely dependent on government funding. In addition to infrastructure and electricity prices, a further key issue is the servicing of high-voltage systems and how national laws regulate such work.

Valeo are also making moves to help shape this future, whether in terms of refrigerant (see title story, page 3), an area in which we offer suitable solutions for all scenarios, how our service organisation around high-voltage systems and equipment will be set up in future, and also the electrification of our products and ensuring that proper qualifications are in place. At this year's busworld in Brussels, Valeo will be presenting complete system solutions for alternative bus drive concepts, be these for minibuses or city/double-decker buses with electric drive (see page 5).

We are looking forward to productive discussions at busworld in Brussels in October and hope you enjoy reading the current edition of Technik Service News.

Thomas Schuster
OES Aftermarket Senior Account Manager

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LEGAL NOTICE / CONTACT

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REFRIGERANT: WHERE HAVE WE COME FROM? WHERE ARE WE GOING?

Central issues in current discussions about the refrigerants that are currently in deployment include the amendment of the F-Gas Regulation, PFAS (per- and polyfluoroalkyl substances), GWP (Global Warming Potential), TFA (trifluoroacetic acid), TEWI value (Total Equivalent Warming Impact) and are generating a keen debate around air-conditioning and refrigeration technology. Following the approval of the amendment of the F-Gas Regulation in March 2023 by the European Parliament's Committee on Environment, along with the PFAS limitation procedure, developed by agencies from Germany, the Netherlands, Denmark, Norway and Sweden in the context of the EU's REACH Chemicals Regulation, the use of fluorine-containing refrigerants will be strictly limited or prohibited in future. These announcements pose immense challenges for the whole of the air-conditioning and refrigeration industry.

The role of refrigerants in refrigeration or air-conditioning systems

Fridges or air-conditioning systems work by extracting heat from what is known as the refrigerated load – which may be food or ambient air. Heat can be extracted highly effectively from the cooled medium by evaporating a suitable fluid. In physical terms, this effect happens when the physical state changes from liquid to gas. This "compression refrigerant machine" principle is mainly used in air-conditioning and refrigeration technology and can be found for instance in most fridges. The absorbed heat, which is equivalent to the vaporisation enthalpy of the deployed fluid, is stored in the fluid and then emitted into the environment somewhere else – usually where there are no issues around adding additional heat – through the action of the compressor.

In refrigeration systems, these fluids are known as refrigerants and need to satisfy a wide range of requirements. In thermodynamic terms, refrigerants must exhibit both a high specific vaporisation enthalpy as well as good pressure and temperature ranges. They should be compatible with the materials and oils used in the systems and also be chemically stable. Refrigerants should also not be toxic or flammable, and above all they should not have a negative impact on our environment.

Ether, CO_2 and ammonia: the challenges of the early refrigerants

The first compression refrigeration machine was built in the USA as early as 1834 and used ether as its refrigerant. However, this first refrigerant was toxic, flammable and explosive and was replaced by CO_2 and ammonia over subsequent years. While these natural refrigerants exhibit excellent thermodynamic properties, their use at this time resulted in safety issues and some serious accidents, as the refrigerants either had a very high working pressure or were toxic or flammable.

1930 – 1990: the age of safety refrigerants

For this reason, what are known as safety refrigerants were developed and deployed between 1930 and 1990. These halogen-containing refrigerants such as the CFCs (chlorofluorocarbons) and H-CFCs (hydrochlorofluorocarbons) were used in almost all fridges and air-con-

ditioning systems as they were non-flammable and comparatively non-toxic. The systems could therefore be operated at moderate working pressures – i.e. safely.

The greenhouse effect and its effect on the choice of refrigerants

In 1974 it came to be understood that chlorine in the earth's atmosphere is responsible for the destruction of the ozone layer, and the Montreal Protocol banned these substances in 1987. These were replaced by chlorine-free HCFC refrigerants which, as we know today, also contribute to global heating. The public became aware of what is known as the greenhouse effect. The greenhouse effect is the impact of greenhouse gases in the atmosphere that cause temperatures on Earth to rise. This is mainly caused by elevated CO_2 levels in the atmosphere, primarily due to the use of fossil fuels such as coal, oil and gas. The contribution of HCFC refrigerants to the greenhouse effect is up to two percent.

The GWP value is key to evaluating the greenhouse potential

The GWP value (global warming potential) is central in this discussion. The GWP value of a refrigerant defines its relative greenhouse potential compared to CO_2. The higher the GWP value of a refrigerant, the more harmful its impact on the climate. For instance, the negative impacts of R134a on global heating over a time horizon of 100 years are classified as being worse than CO_2 by a factor of 1430 (GWP of CO_2 = 1 and GWP of R134a = 1430). Consequently, refrigerants with the lowest possible GWP value are preferable.

Discontinuation of fluorinated refrigerants in Europe

Accordingly, huge efforts were undertaken around the world to reduce greenhouse-gas emissions. The discontinuation of fluorinated refrigerants in Europe started as early as 2006 with Regulation (EC) No. 842/2006 (predecessor to the F-Gas Regulation) and Directive 2006/40/EC (emissions from air-conditioning systems in motor vehicles). The latter was passed by the European Parliament on 17 May 2006 and stipulated that only refrigerants with a GWP of less than 150 should be used for air-conditioning systems in new vehicle series from that point onwards. This Regulation applied – and continues to apply, at least for the time being – to vehicles with a total weight under 3.5 tonnes only.

R1234yf as an alternative to R134a

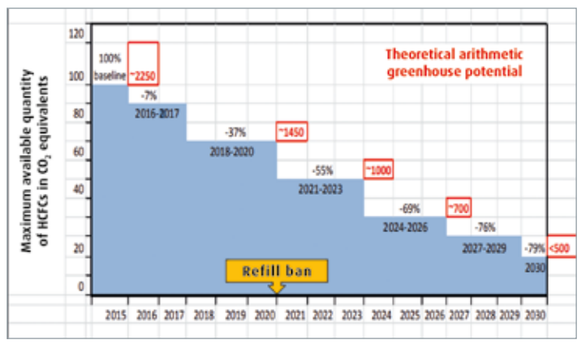
Refrigerant R1234yf with a GWP = 4 was used as an alternative to the refrigerant R134a found in vehicles up to that point. This alternative refrigerant belongs to the group of hydrofluoroolefins (HFO). The refrigerant R1234yf has now come under fire in a range of publications as it poses a not insignificant safety risk. Hydrogen fluoride is created if it comes into contact with fire, and R1234yf also breaks down in the atmosphere to produce trifluoroacetic acid (TFA) via decomposition products.

F-Gas Regulation replaces EC Regulation

The F-Gas Regulation (EU) No. 517/2014, which came into effect in January 2015, repealed EC Regulation No. 842/2006. A key element in emission reduction is what is known as the "phase-down process", which seeks to reduce the refrigerant emissions in the industrial sector by 79 percent (compared to 2015) to 35 million tonnes of CO_2 equivalents by 2030. The equivalent climate impact of the refrigerant is therefore assessed in tonnes of CO_2 equivalent (tCO_2eq). The calculation not only takes account of the GWP of the refrigerant, but also the quantity used.

Amendment of the F-Gas Regulation intensifies phase-down

On 30 March 2023, the European Parliament voted to amend the F-Gas Regulation. The draft by the Committee on Environment was adopted with a few exceptions. In contrast to the F-Gas Regulation (EU) No. 517/2014, one of the aims of the amendment is to intensify the phase-down process, which is intended for instance to achieve a reduction down to five percent (instead of 21 percent) in 2030. Additionally, the appendix contains the year from which the use of fluorinated refrigerants (H CFCs) will be banned for various sectors. For example, no HCFCs will be allowed in new fixed refrigeration systems from 2025 onwards, and the same will apply to mobile air-conditioning systems in vehicles from 2029.



Incremental restriction of the HCFCs available on the market by 2030 (Federal Ministry for the Environment, Nature Conservation, Nuclear Safety and Consumer Protection).

Similarly, the PFAS limitation process and the associated reduction of TFA emissions into the environment will significantly limit, or even prohibit, the use of halogenated refrigerants. The inclusion of the fluorinated refrigerants R134a and R1234yf also affects the refrigerants curently used in automotive applications. If the EU Commission approves the proposal, it is possible that a ban on F-gases in new, fixed refrigeration and air-conditioning systems could take effect in 2027, followed by automotive applications in 2032.

Natural refrigerants as a solution for the future

Both the F-Gas Regulation and PFAS will severely limit, or prohibit, the use of fluorine-containing refrigerants in future. The rise in global heating due to greenhouse gases can only be minimised by using low-GWP refrigerants. Additionally, future refrigerants should be suitable for use in air-conditioning systems without any negative impacts on the environment. Alternatives are refrigerant R744 (CO_2) with a GWP of 1 and R290 (propane) with a GWP of 3. These refrigerants have excellent thermodynamic properties and are ideally suited for use in heat-pump systems. They can absorb thermal energy stored in the environment even at ambient temperatures of -20 °C. This energy can then be used for heating purposes. There are no limits on the availability of the refrigerants, making them stable in price and future-proof. The high working pressure of R744 and the flammability of R290 can be managed with today's refrigeration and air-conditioning technology and, with a reasonable safety concept, can also be used for applications in the automotive sector.

VALEO AT THE BUS TRADE FAIRS IN 2023

After trade fair appearances were not possible in recent years during the coronavirus pandemic, Valeo will be at all key bus fairs this year. We exhibited at the VDV-Electric Bus Conference at the ElekBu in March, to be followed by the UITP in Barcelona in June. Probably the most important event of the bus industry this year, busworld in Brussels, will re-open its doors in October. Valeo will exhibit its latest products and developments over a large area of 130 sqm.

Valeo took part in the 14th VDV-Electric Bus Conference in Berlin from 27 to 28 March 2023 and presented its latest technologies at the accompanying ElekBu trade fair. The key themes of the two conference and exhibition days were: the current status of the drive technology of the future as well at the current challenges facing the industry, such as the technological transformation, driver shortage, self-driving vehicles in public transport and digitalisation. The aim is to pave the way to zero-emission mobility.

From 5 to 7 June 2023 at booth 6H218 of the UITP in Barcelona, Valeo will exhibit its "REVO®-E HP R744" HVAC unit and heat pump for zero-emission electric buses, which has been in serial production since last August. The company will also present its new "Thermo HV" high-voltage heater for electric buses, which is due to go into serial production in July 2023, and the "Greenline" antiviral multilayer filter.

The rapidly increasing market share of electric buses is having a significant effect on vehicle development and the systems connected to the drive unit, including heating and air conditioning. Demand is high for innovative and efficient bus HVAC systems (heating, ventilation, air conditioning) that enable the limited electrical energy of the drive batteries to be used as efficiently as possible.

From 7 to 12 October, Valeo will be an exhibitor at what is probably the world's largest and most important trade fair for buses and coaches: busworld in Brussels. Valeo will be exhibiting complete system solutions for alternative bus drive concepts at this biennial trade fair, which this year re-opens its doors for the first time after the coronavirus pandemic. The company will be at **booth 609 in hall 6** this year, where it will exhibit electric HVAC solutions for all climates and bus sizes – electric minibuses, city or double-decker buses – including the "REVO®-E HP R744" HVAC unit as well as "REVO®-E Global" for deployment anywhere in the world.

UITP 4-7 JUNE BARCELONA 2023 GLOBAL PUBLIC TRANSPORT SUMMIT

busworld EUROPE BRUSSELS 7-12 OCT 2023

From left: Franz Bergmaier (Key Account), Christian Schilder (Director After-Sales), Carsten Schmidt (Site General Manager) and Frank Färber (Head of Sales).

Expansion of the pump portfolio:

SPUMP S120 & S200

Valeo has added two more performance classes to the SPump product family: 120 and 200 watts. As well as the ON/OFF version, an intelligent CAN version is available for each variant. The SPump S120 is also available as a PWM version, and as a 12 V variant in addition to the 24 V version. These highly efficient pumps also feature an advanced diagnostics function, making them the ideal choice for a range of applications in the commercial vehicles sector and beyond.

THE SPUMP PRODUCT FAMILY

Valeo TBS is the market leader in high quality water pumps for buses. The SPump is the benchmark in Europe – also for electric buses.

Pumps form the heart of the water cycle and not only circulate refrigerant in preheating and cooling operations, but also ensure refrigerant throughput during driving.

Valeo's SPump S120 and the 200-watt variant are both circulating pumps with a compact size thanks to their canned-motor concept. This not only reduces a unit's susceptibility to faults, but also increases the service life (> 25,000 h), which is further supported by the motor used. Other benefits include the low weight (2.2 kilogrammes) and the high IP6k9k and IP67 classifications, enabling deployment in a wide range of possible scenarios. With a flow rate of 3,500 l/h at 0.4 bar (SPump S120) or 1,000 l/h at 1 bar (SPump S200), these pumps are ideal for comfort applications in commercial vehicles. Additional functions such as blocking protection, enhanced dry-run protection, optional speed control (CAN) and overtemperature protection mean that the SPump S can also be used in extreme climatic conditions (-40 °C to +85 or +95 °C), guaranteeing temperature control of the vehicle interior and the components.

About the SPump product family

The SPump circulating pump with the new CAN variant offers decisive advantages for the customer: the variable speed control enables optimum coordination with the main vehicle system, reducing energy consumption while increasing the vehicle's range. In addition, an intelligent diagnostic function in the pump sends early warning signals by automatic error detection and transmits key operating data. This makes the pump especially interesting for commercial vehicles with a hybrid, plug-in or electric drive, which rely on efficient energy management. The SPump can also be deployed in the trucks, agriculture and construction plant sectors, for cooling electrical components (e.g. the battery) as well as in other special applications.

Because the parameters on the CAN variants can be configured in line with the customer's requirements, they can be flexibly integrated into a range of vehicle systems. The modular concept enables up to nine pumps to be installed in a system under one part number. The reduced wiring effort assures quick and easy installation.

Participants in the Omnibusspiegel electric bus comparison test at the Stadtwerke Bonn Verkehrs-GmbH (SWB) depot. Photo: TWA Mobility

OMNIBUSSPIEGEL ELECTRIC BUS COMPARISON TEST

The fifth edition of the electric bus comparison test organised by the specialist publication Omnibusspiegel took place in Cologne from 17–20 April 2023. The event was held at the depot of the municipal transport operator Stadtwerke Bonn Verkehrs-GmbH (SWB). A total of nine vehicles took part, most of which use a battery electric drive. The participants were: Ebusco 3.0, Hess Lightram 12 Plug, Ikarus 120 E, Iveco Eway 12, Mercedes-Benz E-Citaro, the Quantron Cizaris 12 EV and an Otokar E-Kent, although this arrived in Cologne a day late.

A MAN Lion's City 10 E and a Tremonia Sprinter City 45 Electric were not included in the competition: although they took part in test drives, they were not part of the official comparison test because their small size makes them too different from the other buses. Additionally, a MAN SL-E from the Rheinbahn operator in Düsseldorf that had come to Bonn for a day was entered. Despite being approximately 50 years old, the vintage vehicle is also an electrically driven bus and as such slotted in well with the rest of the vehicles in the field. In contrast to today's vehicles, the battery, weighing in at around 1.5 tonnes, was carried in a single-axle trailer back then.

Alongside the OEMs mentioned, representatives of supplier companies were also present. These held short presentations to showcase their latest innovations in the field of electric mobility. Valeo TCV outlined the challenges in the area of heating and air-conditioning in the electric bus and presented solutions for today and the future.

The true focus of the event were the test drives. Points were awarded in three categories: driver, passengers and repair shop. The overall winner will be announced in issue 23-6 of Omnibusspiegel.

Supplier companies presented their latest innovations in all things electric mobility.

Stadtwerke Tübingen (TüBus) – electrification of public transport

44 NEW E-BUSES AS A BIG STEP TOWARDS THE ELECTRIFICATION OF TÜBUS

Stadtwerke Tübingen (swt) have successfully applied for funding as part of the German Federal Ministry of Transport and Digital Infrastructure's (BMDV) directive for the promotion of alternative drive systems in passenger-transport buses. Although this may sound complicated, it represents a big step forwards for TüBus in terms of converting its bus fleet to electric drives. Preparations are underway: 44 new e-buses will gradually make their way to Tübingen starting in 2023, which will accelerate the university city's progress towards its 2030 climate targets in the mobility sector. The "TueBus 2025_1_Stadtwerke Tübingen GmbH_New_Vehicles" project is being funded by the BMDV to the tune of a total of € 13,816,000 under its bus funding directive.

From 2023, 44 new e-buses will gradually make their way to Tübingen.

Ortwin Wiebecke, CEO of Stadtwerke Tübingen, said: "Previously at TüBus we have been converting the bus fleet to non-fossil-fuel engines in small continual steps over many years. Now with the funding from the German government and 44 new e-buses, we can take a big step forward towards an environmentally friendly and largely electrified public transport system in Tübingen in the next few years. We are delighted about this and are really keen to tackle the associated challenges."

New challenges from 2023 at a glance

The BMDV's bus/rail funding directive means that this process is finally picking up speed: it will take much less time to electrify a large part of the TüBus fleet than previously assumed. By the end of 2025, between 50 and 75 percent of the 80 vehicles could be powered entirely by electricity – assuming that sufficient numbers of e-buses are available on the market over the next few years.

Electrification of the TüBus fleet is picking up speed

The conversion of the TüBus fleet to electric and hybrid engines has been ongoing for several years. The first electric bus was added to the fleet in 2019. This was followed by two more electric rigid buses (2021) and four electric minibuses (2022). The electric buses and the six bendy buses acquired shortly afterwards were subsidised by grants from the state of Baden-Württemberg.

The six electric bendy buses from MAN were delivered to Stadtwerke Tübingen at the end of March and were put into service some weeks later. These are the first fully electric bendy buses in the TüBus fleet. Hybrid bendy buses have been serving the university city for five years. To ensure they were properly prepared for the integration of the new bendy e-buses, and also to gather some initial experience with this new vehicle type, TüBus trialled an identical test vehicle in regular operation for several days in the spring.

With a length of 18 metres and a height of 3.32 metres, the electric bendy bus manufactured by MAN cuts an impressive figure on the road. Two central electric motors drive two axles. Eight battery packs with a capacity of 640 kilowatt hours are fitted to the roof. The vehicles can be charged to up to 150 kilowatts. In favourable environmental conditions and with new batteries, the electric bendy bus can drive for up to 240 kilometres. The range is a key factor for planning which routes to use the buses on – especially after navigating Tübingen's gradients.

The environment is also central to the HVGAC system.

The MAN Lion's City bendy e-buses are fitted with the REVO®-E HP R744 all-electric, zero-emission CO_2 air-conditioning system from Valeo with an integrated heat pump, which has been specially designed for buses with alternative drives. The use of natural refrigerant R744 makes it an environmentally neutral HVAC system, offering efficient climate control at ambient temperatures from -20 to +44 °C and large heating capacity with less energy consumption.

Other benefits and technical details of the REVO®-E HP R744 such as low life-cycle costs, environmentally friendliness, comfort and many more, can be found at:
www.valeo-thermalbus.com

Profile of Stadtwerke Tübingen GmbH:
Stadtwerke Tübingen (swt) is a municipal energy and utility company for Tübingen and the surrounding region and distributes electricity and natural gas across Germany. Swt is wholly owned by the municipality and employs a staff of 560. As an expert in electricity, natural gas, district heating, water, telecommunications, swimming baths, car parks and city buses, swt manages key infrastructure services. Swt represents an ecological and innovative approach to utilities with a strong focus on expanding decentral and regenerative power generation. Its total annual turnover is in excess of € 200 million.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AFNOR CERTIFICATION

Certificat
Certificate

No : 103393 No IATF : *0467665*

AFNOR Certification certifie que le système de management mis en place par :
AFNOR Certification certifies that the management system implemented by:

VALEO THERMAL COMMERCIAL VEHICLES GERMANY GMBH

IATF CERTIFICATES FOR VALEO TCV GERMANY

Unattainable? We did it!

Valeo TCV's German sites successfully completed IATF certification at the start of February. The decision to apply for certification was taken in January 2022, and the coveted certificate was received just 14 months later. "We're not aware of any other supplier specialising in the bus industry that has achieved IATF certification. This naturally gives us a great competitive edge," said Bernd Eisser (Quality Director, Valeo TCV).

What is the IATF all about? Why is it so important for business? What role does it play in customer relationships? And how was it possible to meet the requirements in such a relatively short time? We discussed these questions with Bernd EISSER (Quality Director, Valeo TCV) and Markus BORGWARDT (Quality Manager Neubrandenburg, Valeo TCV).

What does IATF represent?
Bernd EISSER: The International Automotive Task Force (IATF for short) is a working group of the large automotive manufacturers and their various national associations that was set up with the aim of improving product quality for automotive customers around the world. Members of this task force are the manufacturers BMW, Daimler, Ford, General Motors, Renault, Stellantis and VW.

The IATF 16949 standard is the global technical specification and quality management standard and combines existing general requirements on quality management systems mainly in the US and European automobile industry. These requirements were developed jointly by the IATF members and published in October 2016 based on EN ISO 9001.

What are the benefits of IATF certification for Valeo TCV?
BE: In essence, IATF 16949 certification helps companies optimise their processes and the quality of their products. According to the standard, IATF certification is intended to generate the (potential) customer's trust in a (potential) supplier's system and process quality. We can consequently reduce the need for external customer audits, which saves us a lot of time.

What does certification involve?
Markus Borgwardt: Certification is awarded on the basis of the rules issued by the IATF (International Automotive Task Force).

All of the around 170 requirements of the standard must be implemented. The certificate is valid for three years and needs to be confirmed annually by IATF-certified auditors (third-party auditors) from accredited certification firms.

Which customers are already requesting certification?
BE: They are mainly our OEM customers. MAN or Evobus, for instance, have been asking us for this for a long time.

Where is the competition up to in this respect?
BE: We're not yet aware of any other supplier specialising in the bus industry that has achieved IATF certification. This naturally gives us a great competitive edge. As a certified global player, we've already cleared the formal obstacles that apply to suppliers.

What were the particular challenges on the route to certification?
BE: Although we're part of the automotive sector, the bus business differs from the car business in some important respects. The IATF requirements, on the other hand, are based on mass car production. That's not something that we do. In the bus segment we work with much lower unit numbers and a higher variability. So it's highly plausible that these special conditions do not permit all of Valeo's tools to be adopted and complied with 100 percent in the quality management process. We had to

create, advocate for and realise our own road map – naturally always within the spirit and parameters of the high requirements of the IATF standard.

What was decisive for success?
MB: A decisive factor was that the certification was prioritised by the management and was accorded a high significance, despite scarce resources and a range of operational issues. However, the way that both quality teams in Neubrandenburg and Gilching worked so well together helped us quickly satisfy the requirements under the standard. Open issues were discussed at daily meetings, and deviations from the standard were identified and dealt with promptly.

Neubrandenburg and Gilching were certified for Valeo TCV in an initial step. As a general rule, the certification can only be obtained for manufacturing sites, including what are termed "remote locations" or supporting sites (here: Gilching).

What was the certification procedure?
MB: The decision to apply for the certification was taken in January 2022. After successful training as an internal IATF auditor, we identified the open issues and resolved them. Processes were updated in almost all departments and adapted to meet the IATF requirements.

The external audit was then conducted in three stages in September & October of last year. The first thing to be inspected was the general readiness at the Neubrandenburg site. Gilching was then audited as a remote site and then Neubrandenburg as a manufacturing site. The final open issues were resolved between November and the end of January. We were awarded the certificate after just 14 months at the start of February.

And what happens now?
BE: Neubrandenburg and Gilching are the next two Valeo TCV sites – after the plant in Noida, India – that meet the requirements under the IATF standard. However, we won't just stop there. Against the backdrop of increasing globalisation, we will certify the sites in Finland, Turkey and Brazil, which partly supply the same OEMs, in 2024.

"Our experience means that we are well placed to provide our sites with all the support they need in attaining certification," agreed Bernd Eisser and Markus Borgwardt.

Mark Sondermann: "For a long time, the thinking internally was that IATF was unattainable. Two key factors made it possible. We have constantly been developing our processes and the staff had confidence in themselves and took on the challenge. This is also viewed very positively by our customers."

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AFNOR CERTIFICATION

Certificat
Certificate

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AFNOR Certification certifie que le système de management mis en place par :
AFNOR Certification certifies that the management system implemented by:

VALEO THERMAL COMMERCIAL VEHICLES GERMANY GMBH

pour les activités suivantes :
for the following activities:

DEVELOPMENT, DESIGN AND MANUFACTURING OF HEATING SYSTEMS, MANUFACTURING OF VENTILATION, AIR CONDITIONING SYSTEMS AND SYSTEMS OR COMPONENTS THEREOF AS WELL AS HATCHES FOR BUSSES

ENTWICKLUNG, DESIGN UND FERTIGUNG VON HEIZUNGSANLAGEN, FERTIGUNG VON LÜFTUNGS- UND KLIMAANLAGEN ODER DEREN KOMPONENTEN SOWIE KOMPLETTEN SYSTEMEN UND DACHLUKEN FÜR BUSSE

a été évalué et jugé conforme aux exigences requises par :
has been assessed and found to meet the requirements of:

IATF 16949: 2016

Sans l'exclusion du chapitre 8.3.
Without the exclusion of chapter 8.3.

et est déployé sur les sites suivants :
and is developed on the following locations:

IHLENFELDER STRAßE 148 DE-17034 NEUBRANDENBURG
IATF USI : PN9ZX6

Liste des fonctions supports entrant dans le périmètre de la certification en annexe
List of support functions within the certification scope on appendix

Ce certificat est valable à compter du (année/mois/jour) 2023-02-05 Jusqu'au 2026-02-04
This certificate is valid from (year/month/day) Until

Julien NIZRI
Directeur Général d'AFNOR Certification
Managing Director of AFNOR Certification

Flashez ce QR Code pour vérifier la validité du certificat.
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afnor CERTIFICATION

CONGRATULATIONS TO THE WHOLE TEAM!

Markus Borgwardt accepted the coveted certificate in Neubrandenburg on behalf of his team.
Standing from left: Stefan Zunk, Kristian Veit, Andy Gülzow, Alexander Fentzlaff, Ronny Preuss, Anwer Chnini, Markus Borgwardt
Sitting from left: Christian Heidenreich, Zafrul Haque, Steffen Wasmund.

Gilching quality team: standing from left: Sinan Susar, Stefan Funke, Ahmet Erdem, Bernd Eißer
Sitting from left: Antonio Hernandez, Sven Große-Kohorst, Nathalie Streicher.

Vazzola (Italy):

THE THIRD VALEO SALES PARTNER CONFERENCE

After a two-year break, the European Valeo sales partner conference was held at the premises of F.lli Amadio S.p.A. (sales partner for Italy) in Vazzola (Italy) in September 2022. The companies that convened there are responsible for the entire Valeo after-sales and retrofitting business plus original equipment for small OEMs and bodybuilders in their target markets. They are also in charge of customer care and guarantee a comprehensive service partner network in the respective markets. The agenda included topics such as the new Valeo climate heat-pump system, CO_2 as a refrigerant and servicing for electric buses.

Valeo with its distributors in front of the premises of F.lli Amadio S.p.A.

Valeo reports on its market innovations and current successes as part of the sales partner conference.

The topic of high-voltage servicing was particularly keenly discussed because, despite legislation being in place, the requirements in the markets vary significantly. This relates above all the different working equipment in the companies, the know-how, the local infrastructure and how prepared each country is for the transport transformation.

Material bottlenecks: Valeo can help

Because one of the notable features of 2022 were disruptions in the Valeo supply chain, the future outlook for this topic was also discussed. Valeo has already made some improvements in this regard. Adding new suppliers has enabled the affected modules to be replaced and individual components substituted. Additionally, an intensive discussion with customers meant that critical components could be forecast more precisely.

Valeo highlights: market and product innovations

Valeo TCV's Board of Management reported on the market innovations, such as current successes in OEM business, which also determine the future aftermarket business to a large extent. Additionally, product innovations were introduced, including the REVO®-E HP R744 HVAC system with climate-neutral refrigerant, the new Thermo HV high-voltage heater as well as the E-Cooler battery management system.

F.lli Amadio S.p.A.: a sales partner with decades of experience in the climate and heater segment

The conference finished with a tour of F.lli Amadio S.p.A. The company presented its ample warehouse space, the test stand for heater blowers as well as the servicing and maintenance area. Amadio's decades of experience in the air-conditioning and heating sector was plain to see. The Italian sales partner performs all service and training activities on the HVAC systems itself at its own training centre.

Valeo TCV draws a positive conclusion

We are grateful that so many of our partners attended, for the invaluable talks and discussions as well as the fantastic organisation by F.lli Amadio S.p.A. According to Volker Schuster (Regional Sales Manager Europa, Valeo TCV), the event was an important step for us in identifying key areas for future action and working on country-specific strategies and solutions.

THERMO E+ AS A SECOND LINE ALONGSIDE THE THERMO PLUS

In 2021 the Thermo E+ was added to the Valeo heater product range. Similar to the Thermo plus generation of heaters, this covers multiple performance classes (12, 20, 32 kW). With a length of 435 millimetres and a weight of 13.6 kilogrammes, the 12 kW variant is one of the shortest and lightest heaters in its class, which in turn means reduced fuel consumption. Available in 12 V or 24 V with a single or dual fuel-line system, the Thermo E+ can be deployed at external temperatures as low as -40 °C. It mainly differs from the Thermo plus in terms of the deployment capabilities offered by the 12 V variant.

Valeo Thermo Plus

Valeo Thermo E+

The Thermo E+/12 kW heater with a 12V current can be used in mini- and midi buses around the world. As an extra heater in addition to the heat pump, this variant is also ideal for use in electric buses, which today are still reliant on an additional fuel-operated heater due to their limited energy resources at low external temperatures.

A further benefit is the higher level of vertical integration. In contrast to the Thermo plus, the fuel pump is manufactured completely in house at the Neubrandenburg plant, for instance.

Additionally, the Thermo E+ has a diagnostic interface to the Valeo DTT (Diagnostic Thermo Test), similar to the Thermo plus. This enables rapid fault diagnosis regardless of the vehicle manufacturer during maintenance and in the event of faults. The Thermo E+ also features external actuation for the circulating pump and offers a choice of single or dual fuel-line connection in the vehicle. As such, the Thermo E+ represents an enhancement to the Valeo heater portfolio, enabling the broadest possible spectrum of installation and deployment capabilities.

TRAINING REQUIREMENT ON HIGH-VOLTAGE SYSTEMS

Valeo TCV has been offering electrically powered air-conditioning systems and heaters since the introduction of hybrid and electric buses. This poses new challenges for companies and repair shops because work on high-voltage systems that operate significantly in excess of 600V DC is subject to specific requirements. Before and during work on high-voltage systems, it must be ensured that all components are disconnected from the power source and do not pose a risk to the people working on them.

In the production of high-voltage systems, the responsibility for safety in development lies with the quality and production departments of the system manufacturer. At the same time, the safety of employees in repair workshops must be ensured. European and national stipulations set down how the responsibilities for safety measures and training are allocated and what measures need to be taken. In Germany this is governed by the German Social Accident Insurance Association (DGUV) in the document DGUVI 209-093. Independent institutions such as TÜV or Dekra offer qualification courses for working on high-voltage systems.

However, a trained and qualified person must be trained in the whole system of the vehicle on which the maintenance or repair work is being performed. This can vary from vehicle to vehicle. Valeo TCV offers the necessary training courses for high-voltage air-conditioning systems and heaters that teach participants about the structure, function and execution of the required tasks. Inquiries may be sent to: ths.tbs- training.mailbox@valeo.com.

THINKBUS: THE BDO'S NEW EVENT FORMAT

The bus sector discusses key trends and innovations

On 14 March, the new event format of the Federal Association of German Bus Operator (bdo) THINKBUS was held in Berlin for the first time. This event focuses on key trends and technical innovations in the public-transport sector, coach tourism and long-distance travel. At the forefront of this year's event were alternative drive technologies, cost considerations and opportunities for optimisation as well as relevant developments in the transformation process. The places – limited to 100 – were fully subscribed, which was probably due to the high quality of the speakers and topics selected.

Evobus provides insights into the planned transformation of its coaches

Till Oberwörder from EvoBus GmbH provided insights into current developments at EvoBus, above all the planned transformation in the coach segment. To this end, a special project team has been set up within the group called "ELCH" (Electrical Coach), which is looking into the concept of an electrified and modular coach. Generally speaking, transforming the coach is significantly more difficult than the city bus as they do not have set routes and few charging opportunities can be scheduled. It should be remembered that the very purpose for which the coach is used means that it is essentially defined by its range, passenger numbers and storage space. According to Oberwörder, this requirement profile will also apply to coaches with alternative drives. In essence, EvoBus is pursuing the same strategy as its in-house truck colleagues, according to which two drive technologies are being pursued: first, the battery-powered electric coach; and second, the fuel-cell-powered coach, each of which will be deployed depending on distance and topography. According to Oberwörder, the "one size fits all" approach will not work, but instead different battery and tank sizes will provide the necessary modularity. Oberwörder considers the climate targets specified for coaches of a 45-percent CO_2 reduction by 2030 – within the next seven years – as extremely ambitious overall. Meeting this target not only requires investments in the infrastructure, but vehicle manufacturers, suppliers, operators and fuel stations need to expand their products and equipment to enable the transformation. Not least, it must be ensured that staff are trained in the new technologies. In a word, then, extensive investments are needed that will affect the entire bus and coach sector, and indeed without the revenue losses from the pandemic years having yet been recouped. In closing, Oberwörder emphasised that the coach is already the most environmentally friendly way of travelling compared to planes and cars, and as such the negative press against this form of transport is not justified.

The new BDO THINKBUS event format discusses important trends and innovations in the industry.

The top-class speakers ensured that the event was completely booked out.

Industry newcomer Arthur Bus sets its sights on hydrogen

Philipp Glonner (CEO and Co-founder) presented the hydrogen concept of the industry newcomer Arthur Bus. In his presentation, Mr. Glonner emphasised that there is already sufficient and affordable green hydrogen available today that is perfectly suited to the hydrogen-powered city bus. He claims that the hydrogen bus can replace its diesel counterpart 1:1 as their range and fuelling times are almost identical. In his presentation, Glonner also emphasised that the mix of drive systems needs to be seen with an open mind and a blanket focus on battery vehicles is not in line with current developments.

MAN looks to electric coaches

Mr. Ließ from MAN Truck & Bus SE did not fully agree with the previous speaker. According to him, hydrogen should not be seen as a future energy source for powering buses and coaches. Although the procurement costs for a fuel-cell bus are lower than for a battery bus, the costs of installing the charging infrastructure across the board are significantly higher. What is more, countries such as Sweden have already ruled out the use of hydrogen in the transport sector, which means that a coach with a fuel cell could not refuel in Sweden. MAN has set itself the target of placing an initial fleet of around 50 electric coaches on the market with selected customers as early as 2025/2026 to gather some initial experience.

The bus and coach sector is changing

All speakers ultimately agreed on one point: the bus and coach sector is facing a huge change that poses significant challenges for everyone involved. This was ultimately underlined by a contribution from the audience, where a private coach operator with 40 vehicles expressed his existential fears because he does not know – from a purely financial perspective – how he is supposed to convert his fleet to alternative drives in the next few years. He is already shouldering the huge strains from the aftermath of the coronavirus pandemic, the low-cost "Deutschlandticket" train ticket, the bureaucratic overhead around the A1 certifications for coaches as well as an extreme driver shortage.

VALEO SERVICE IN SERBIA

The service and parts dealer "Klimatronik Centar" in Novi Sad (Serbia) specialises in the sale of spare parts as well as the installation and maintenance of air-conditioning and heating systems in buses, goods transport, special vehicles, rail freight and rail passenger transport. As such, the company is Valeo TCV's main sales partner in Serbia.

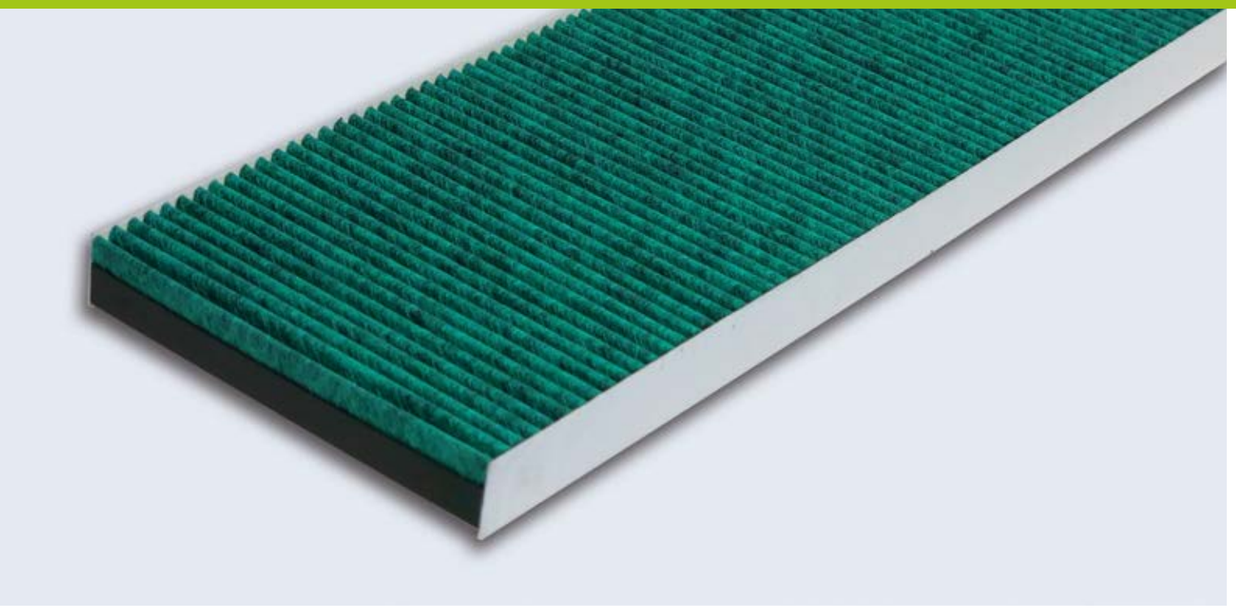
The company's main warehouse is located in the capital Belgrade, which is where the dealer's key customers are also based. Its main customers include the biggest public transport operators such as GSP Beograd, Lasta, Arriva, JGSP Novi Sad and the ministry of defence.

Teodor Vulin, born in 1975, set the company up in 2007 and is the sole shareholder. The family-run business now employs nine staff and aims to increase employee numbers to fifteen by the end of the year. The company has mobile teams and services travelling around the whole of Serbia day and night. The Klimatronik service vans are all equipped with tools, diagnostic devices, refrigerant and spare parts and are mainly deployed to assist bus companies, locomotives, military vehicles and some special vehicles.

Valeo TCV and Klimatronik Centar started working together in February 2020. "We are the first company in Serbia to be an authorised service company and dealer for Valeo products. This is a great honour for us and at the same time an obligation to further expand our servicing and spare parts business. Our vision for the next five years is to increase the number of vehicles fitted with Valeo HVAC systems. We see potential for a significant expansion of the business especially in the field of military vehicles. Additionally, we are planning to open a sales & service centre to expand sales to the countries of the former Yugoslavia," said Teodor Vulin (Managing Director, Klimatronik Centar).

Express warehouse of the Klimatronik Centar for Valeo service work.

Bus hall for air-conditioning work on the vehicle.

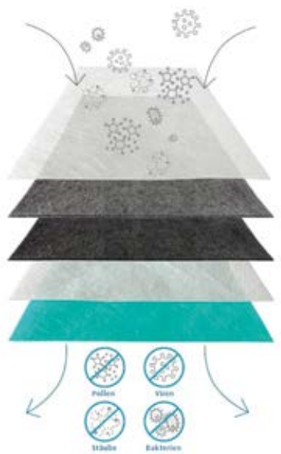


The specially developed filter medium consists of several high-performance functional layers and thus combines all the advantages of particle, activated-carbon and antiviral filters in one.

FILTER SYSTEM FOR BUSES: GREENLINE ANTIVIRAL MULTILAYER FILTER

High concentrations of exhaust fumes and fine particles, especially in urban and high-population areas, make efficient air filtration in local public transportation an absolute necessity. Air quality plays a key role specifically in buses, where a lot of people gather. Efficient filtration can only be achieved using highly effective filters which hold back even the smallest of particles besides harmful gases, viruses and bacteria, and also protect our airways. Valeo's new Greenline antiviral, multilayer filter purifies the air for all of these emission groups and is able to withstand many test cycles under real-life conditions. The filter is available immediately as a retrofit kit or ex works in the air-conditioning system on request.

The specially developed filter medium consists of several highly effective functional layers and as such combines all benefits of a particle, activated-carbon and antiviral filter in one. Each layer has a specific function. Specially impregnated premium activated carbon neutralises unpleasant odours and VOCs. Additionally, nitrous oxides (NOx) are removed from the ambient air and irreversibly bound. The Greenline has filter class F7 and filters fine dust in addition to coarse particles. The special impregnation of the filter media prevents the accumulation and growth of bacteria and eliminates enveloped viruses. The filter's effective protection against viruses and bacteria has been verified through a number of independent tests (DIN EN ISO 20743, ISO 18184, OFI SOP 350.012, Ansi/Ashrae 185.1-2020). Additionally, the Greenline filter meets the basic grant requirements for an antiviral filter system (see e.g. VM3-3894-254/24/1 for Baden Württemberg).



23 ELECTRIC BUSES FOR MAINZER MOBILITÄT WITH VALEO REVO®-E HP R744

The transport operator Mainzer Mobilität is gradually replacing its diesel buses with zero-emission vehicles. With the procurement of 23 MAN Lion's City 18E electric bendy buses, the company has taken a further step towards a zero-emission vehicle fleet. The climate-friendly buses are not only charged at the depot using green electricity, but also have two emission-free Valeo rooftop air conditioners with heat pump, the REVO®-E HP R744. This saves the Mainz-based transport operator around 500,000 litres of diesel fuel per year and reduces harmful emissions by some 1,250 tonnes of CO_2.

Valeo's environmentally neutral HVAC system operates with the natural refrigerant R744 (CO_2) and offers efficient air-conditioning at ambient temperatures from -20 to +44 °C with a high heat-pump capacity (27 kW at 0 °C / 20 kW at -10 °C) and low energy consumption. Additionally, Valeo's Thermo plus reduced-emission diesel heater and SPump 260 circulating pump are used in the state-of-the-art electric buses.

Mainzer Mobilität's medium-term goal for the incremental conversion from diesel to electric buses is for up to 100 electric buses to be in service in the next ten years with an ultimate view to a climate-neutral public-transport network. As such, the company is complying with the European Union's Clean Vehicles Directive (CVD).

About Mainzer Mobilität

The Mainz-based company has a long tradition. What started as a horse-drawn tramway in 1883 now consists of a bus fleet of approximately 150 buses, including 27 battery buses and one hydrogen-powered bus. The transport operator rebranded as "Mainzer Mobilität" in November 2017 and since that time has served the entire metropolitan area of Mainz. It is also part of the Verkehrsverbund Rhein-Main and the Rhein-Nahe Verkehrsregion public transport associations. The company employs 900 staff and carries over 180,000 passengers on working days, with annual passenger numbers in excess of 56 million.

Electric bendy bus of the type MAN L18C of the Mainz mobility.

NEW VDT DIAGNOSTIC TOOL FOR VALEO REVO®-E HP R744 AND THERMO HV

Valeo's climate-neutral REVO®-E HP R744 with heat pump has been in serial production since 2022. The first units have been delivered to customers' assembly lines, and numbers are constantly ramping up. A special feature of these systems is the use of the natural refrigerant R744, also known as CO_2. The enhanced functionality of the system and the special characteristics of the refrigerant pose new challenges for partners in the repair shops. To give them the support they need, Valeo has developed a diagnostic software tool, the VDT (Valeo Diagnostic Tool), in parallel to the development process. Alongside the HVAC system with heat pump, this can also be used for the Thermo HV electric high-voltage heater.

The software will be available for download from the Valeo TCV homepage from summer 2023 and can be installed on any computer with Windows 10 or higher. Two access levels have been implemented. The first level enables the system data (ID number, serial number, software version, current fault) to be queried and the current status of all components read so that the operator or service partner can perform a diagnosis. The second level requires training for high-voltage work in the vehicle.

Handling the refrigerant R744 additionally requires training on cooling technology. Participants who successfully complete this course will receive the dongle required for activation. This enables a component test to be performed and software updates installed. The diagnostic tool includes the software, the diagnostic cable and a set of instructions. Additionally, a CAN bus to USB adapter from PEAK-System Technik GmbH is required for connection to the diagnostic interface.

Full administrator rights are required for installation of the software.

Valeo Diagnostic Tool for REVO®-E HP R744.

SERVICING THE VALEO REVO®-E HP R744 HVAC UNITS

This recommendation of auxiliary materials and tools applies to the maintenance and repair of the roof-mounted REVO®-E HP R744 HVAC unit. The tasks set out in the maintenance schedule for the roof-mounted unit must each be performed at the specified intervals, or servicing tasks performed during repairs, to ensure flawless operation of the unit and to avoid damage to parts and components.

Work on the HVAC unit must only be undertaken by people who are qualified in accordance with DGUV Information 200-005 (previously BGI8686) or, outside the German market, who have been trained and are qualified under the corresponding local stipulations. The required qualifications differ depending on the content and scope of the work on the HVAC unit, which can be found under point 1.7.1 of the applicable workshop manual.

Evacuation and filling

Description	Option 1	Option 2	Option 3	Piece	Amounts	Description or comment
Assembly aid	X			1	piece	e.g. Testo digital 4-way manifold 557 set
Assembly aid		X		1	piece	e.g. Refco 2-way manifold with case M2-3-Deluxe-DS-R744-TC transcritical
Armoured hoses	X			1	3 in the set	e.g. Refco filling hose set 160 bar CCL-72-DN6-R744-TC 3 x 1,800 mm black
Vacuum pump	X	X		1	piece	Existing vacuum pumps can also be used
Refrigerant scale	X	X		1	piece	Accuracy of 10 g
Service station			X	1	piece	e.g. AVL DiTest 340

General tools, cutting and soldering

Description	Option 1	Option 2	Option 3	Piece	Amounts	Description or comment
Pipe cutter f. INOX - at least up to 16 mm	X	X	X	1	piece	e.g. Rothenberger pipe cutter MINICUT I PRO 3-16 mm
Deburrer f. INOX	X	X	X	1	piece	e.g. Rothenberger inside/outside deburrer 6 to 35 mm
Autogenous welding + soldering device	X	X	X	1	piece	
Solder material f. inox pipe connections solder - AlSi12 U-profile solder wire 1.6 x 2.6 various small tools/ small material	X	X	X	div.		
Refco abs. pressure vacuum gauge	X	X	X	1	piece	e.g. Refco absolute vacuum measuring stand with shut-off and safety valve
Valeo diagnostic tool				1	piece	Purchase from OEM or Valeo wholesalers
Leak detector	X	X	X	1	piece	e.g. Inficon electronic leak detector D-TEK select complete
Adapter - bottle connection	X	X	X	1	piece	Bottle connection VF 6 K 7/16" UNF - L27 - W21,80 x 1/14

INTELLIGENT THERMAL MANAGEMENT WITH DIAGNOSTIC SYSTEM FOR HVAC SYSTEMS IN ELECTRIC BUSES

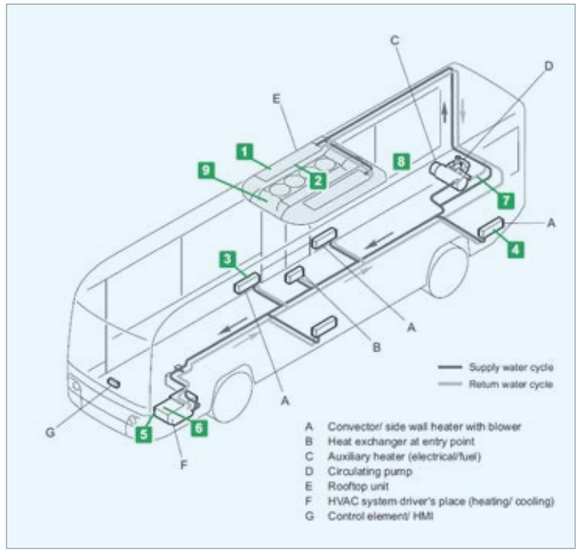
The use of energy-optimised actuation of HVAC components is absolutely essential in electric buses due to the substantially lower energy density of the traction batteries. This is because the energy requirement for heating and air conditioning may be larger than for driving itself, depending on the geographic region and deployment conditions. Valeo integrates comprehensive thermal management into its SC2000 climate control that monitors energy management throughout the entire bus. Development on this project started in early 2022.

Underlying this is an intelligent HVAC strategy for electric buses that assesses the energy requirement for the respective heating or air-conditioning task and selects the right component for the job. The control system always selects the HVAC component with the maximum efficiency depending on the environmental conditions and the available electrical energy resources, with the effect that the requisite cooling or heating performance is always generated with high efficiency and in line with demand. The necessary communication is handled via the SC2000 Valeo control software.

As a logical consequence, the diagnostic capability of the HVAC components has also been implemented in the software. With this accompanying "DST SC2000" diagnostic system, for the first time all error messages of the overall HVAC system can be read by a tool developed in house by Valeo TCV and maintenance tasks performed efficiently.

The "Diagnostic System Test SC2000" (order no. 11147715A) will be available from the second quarter of 2023.

To use an example, the fully electric roof-mounted REVO-E Pro HVAC unit and the Thermo H combined diesel-electric heater were installed as part of an initial application. However, other Valeo HVAC components can also be connected to the flexible control system. The entire HVAC system with its actors and sensors is depicted in the figure below. Letters A–G represent the actors, and numbers 1-9 the sensors.



No.	Qty	Designation
1	1	Right side inside RTU (duct temp)
2	1	Recirculation area inside RTU (temp Headzone)
3	1	Near by convector front right (2./3. seat row)
4	1	Near by convector rear left
5	1	Outblow air duct drivers place
6	1	Icing evaporator frontbox (defroster)
7	1	Surface sensor on coolant pipe close to heater inlet not used if coolant temp sent via CAN
8	1	CO2 sensor mounted on the ceiling (optional)
9	1	Ambient temperature Sensor → RTU

GREATER VERTICAL INTEGRATION FOR VALEO PUMP MANUFACTURE

In order to build products with an appropriate level of vertical integration at Valeo's Neubrandenburg plant, and to become more independent of individual suppliers, Valeo has recently developed the now production-ready SPump S alongside the SPump product family. This is built entirely in Neubrandenburg, including the motor module, and went into serial production in May 2023. The pump is available in a range of variants, with an equally high number of identical parts. The basic components of this pump can be made into models with a CAN interface, PWM interface and straightforward on/off pumps, both a 12 V and 24 V variants.

In this fully automated step, a type of thermally conductive paste is applied to the electronics housing by a dosing machine. This is done to enable the heat transfer between the power electronics and the housing and thus dissipate the heat that is enerated to the environment.

In this production-line step, the phase contacts are added to the printed circuit board (PCB). A QR code is then used to automatically check the electrical continuity and the identity of printed circuit board.

This is where the electronics housing and printed circuit board assembly are assembled. A press with a special uptake is used to press the printed circuit board on to the electronic housing with a defined force and then screwed in place.

The introduction of the new pump family "SPump S" has also boosted Valeo's manufacturing expertise. Manufacturing technologies such as thermal joining and rotation welding open up new opportunities for the manufacture of encapsulated components, i.e. self-contained components without separable joints. This enables a compact and effective construction method, which saves space, material and weight. Additionally, for the first time a 2-K liquid seal is applied to the SPump S by an automatic dispenser, in contrast to standard solid seals. Deploying a state-of-the-art, partially automated manufacturing line enables increasing demand to be met. A flexible end-of-line configuration for the pump means that different customer requirements can be realised.