



**Larisa**

solutions for the transport sector

PPHU "LARISA" is a reliable and trustworthy partner, designing and producing modern equipment and accessories based on mechanical, pneumatic, electrical, and electronic systems.

"LARISA" creates and continuously improves its own solutions dedicated mainly to manufacturers of means of transport. One of our specialities is the design and production of rear-view mirrors mounted in rail vehicles. For years we have been supplying these products to European markets, as well as to Asian and African ones.

The innovativeness of our solutions is mainly due to the low weight of the structure and miniaturized mechanical and control systems. Our advantages are also short lead times and competitive prices.



### RESEARCH AND DEVELOPMENT:



"LARISA" is a manufacturer of modern high quality products which have gained recognition of Customers and Users.

In order to ensure continuous development of the product range, as well as constantly increasing quality of products, Larisa invests in the development of machinery and systematically trains its employees. We approach each design individually. Our specialists make every effort to ensure that the solutions offered are both durable and safe to use. All products, before being introduced into serial production, are subjected to restrictive tests concerning both durability as well as functionality and ergonomics.

### INDIVIDUAL PROJECTS:



In addition to the ready-made solutions presented in this catalogue, we also prepare individual solutions tailored to the needs of the customer or end user. We are able to make a product both on the basis of the entrusted documentation, as well as to design and produce a new one from scratch, taking into account functional and aesthetic requirements. The implementation of design and production processes is supervised by qualified personnel with appropriate equipment at their disposal, which guarantees the optimum quality level of our products.

### QUALITY:



The main goal of our activity is to provide products that meet the requirements of our Customers in terms of technical solutions and aesthetics, which are produced in accordance with the guidelines of standards and regulations, which allows obtaining the necessary approvals and certificates to use the products, among others, in rolling stock. We have been maintaining high quality for years thanks to the system implemented in accordance with ISO 9001





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# Ramps: ■foldable ■sliding ■electric

Since the establishment of PPHU "LARISA" in 2006 and the creation of the first line of ramps, we have been focusing on the safety of use and durability of our products, as well as ease of operation and low weight, which is an advantage over other market products of this group, and makes our ramps extremely comfortable to use even for female staff. Based on the experience gained in cooperation with our customers and suppliers, we have created a line of EasyAccess® products, consisting of devices used by vehicle operators in an intuitive and safe way, and guaranteeing certainty and satisfaction of using them to the people for whom they were created. In addition to our series products presented in this catalogue, we carry out individual projects tailored to your needs, using innovative solutions and the appropriately selected materials and specialized technologies for production.



easy access for people with physical disabilities.  
Designed for people moving in wheelchairs



safety



compliance with TSI PRM standards

For the sake of safety in use, all our ramps are manufactured in accordance with applicable standards and regulations, including EU directives, on interoperability:

- EU Directive (TSI PRM)
- UIC Card
- DIN 32985
- DIN 51130
- EN 4554

We have the necessary quality documents (e.g. certificates and test reports) issued by specialised and accredited bodies confirming compliance with the requirements of the relevant normative documents



we adjust the length and width of the ramp individually to the needs of the users

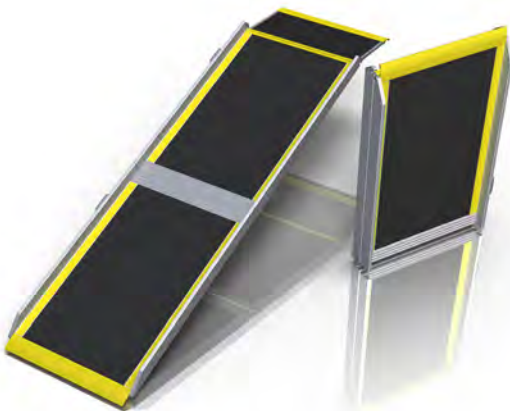


# Mobile ramps

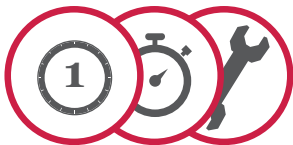
Portable ramps are characterized by compactness of construction which contributes to easy handling and unfolding. They can operate entrances on both sides of the vehicles, which saves space for storing the ramp in the vehicle, reducing the total weight of the vehicle and the cost of purchasing equipment. Mobile ramps can be located at stations and platforms from where they can be quickly moved to any place where they are needed. The proposed solutions allow for the use of our ramps also in infrastructure not adapted to the regulations in force.

weight (kg)	up to 8
length (mm)	up to 700
width (mm)	up to 760
load capacity (mm)	up to 350
security measures	barriers on both sides
usable surface	anti-slip mat
moving	handle

Due to periodical modernization of the offered products, actual weights and dimensions may slightly differ from those given in the catalogue.



Easy access for people with physical disabilities.  
Designed for people moving in wheelchairs



quick, easy and inexpensive installation on the vehicle



compliance with PRM TSI standards



we adjust the length and width of the ramp individually to the needs of the users



safety



lightweight

Each of the offered products is a result of thorough analyses, long-term research and consultations, as well as appropriately selected procedures of the design process. Portable frames manufactured by PPHU “LARISA” are equipped with the proprietary Larisa® RubberFoot system, which provides anti-slip and anti-vibration protection. They are made of materials resistant to corrosion caused by weather conditions, as well as road salt solutions. They are characterized by an optimal ratio of mass to load strength. They are manufactured according to current standards and regulations, as confirmed by test reports and certificates. Available in a wide range of dimensions and custom-made versions.

# TYPE LWXX-04

Ramps type LWXX-04 are the lightest mobile structures in our offer. When folded, they have the shape of a suitcase, which in combination with a comfortable handle and a strong belt with a FastLock velcro fastener and low weight makes it possible to carry them over long distances. It also enables them to be operated by even one not very strong person. All models are equipped with our proprietary Larisa® RubberFoot system, which provides anti-slip and anti-vibration protection. In addition, driveways on both sides are equipped with edge profiles, which prevent accidental driving outside the usable area. Elements made of anodized aluminium are a guarantee of durability of our product. Wide range of dimensions allows for free selection of the ramp to individual needs of our customers.



quick, easy and inexpensive installation on the vehicle



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we adjust the length and width of the ramp individually to the needs of the users

**TSI PRM**

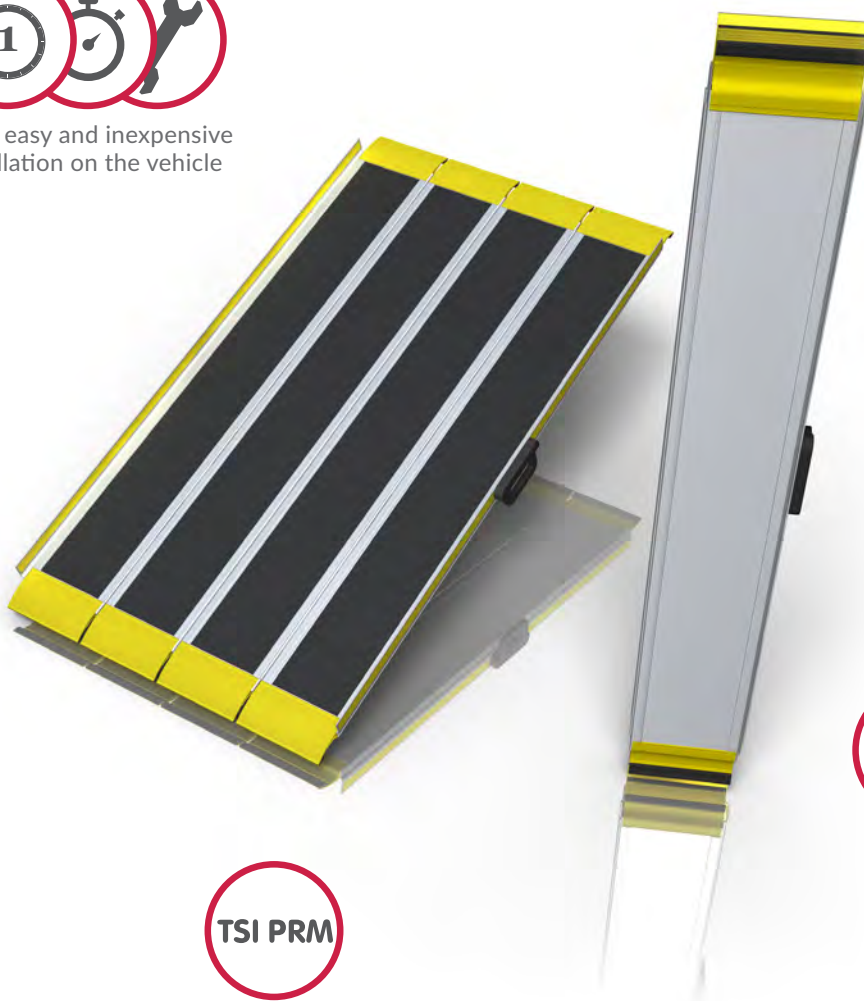
compliance with TSI PRM standards



lightweight

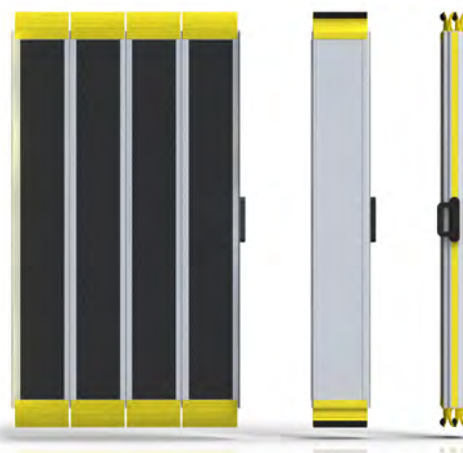


safety



## Ramp parameters in the LWXX-04 series

weight (kg)	up 8 to 23
length (mm)	up 830 to 2530
width (mm)	up 800 to 850
load capacity (mm)	up to 350
security measures	barriers on both sides
usable surface	anti-slip mat
moving	handle



Mobile Ramps type LSXX-02 are characterized by a minimalist design and intuitive and comfortable operation. They are boarding ramps used mainly in cars and buses. This solution is recommended for vehicles where it is required to use ramps with a length of more than 200 cm and where the difference in height between the platform and floor level is extremely large. It is possible to equip them with additional handles to attach the ramp to the vehicle structure. In order to make the handling of the gangways maximally easy, it is also possible to use integrated racks equipped with gas springs to support their unfolding. The ramps are offered in a wide range of lengths up to 3.5 m.



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compliance with TSI PRM standards



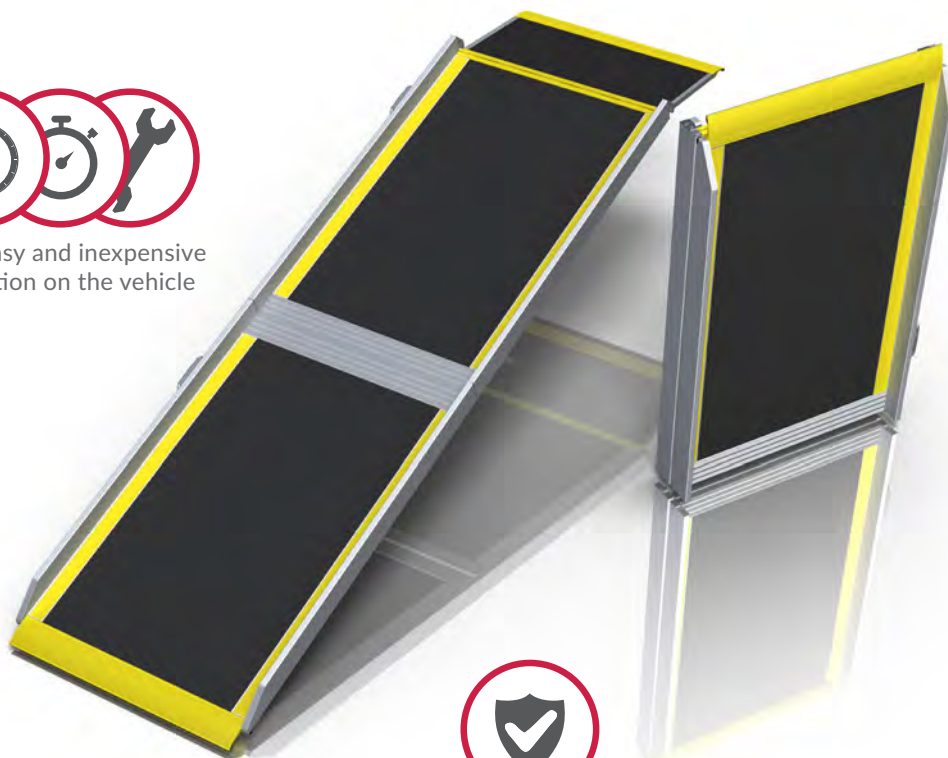
we adjust the length and width of the ramp individually to the needs of the users



safety

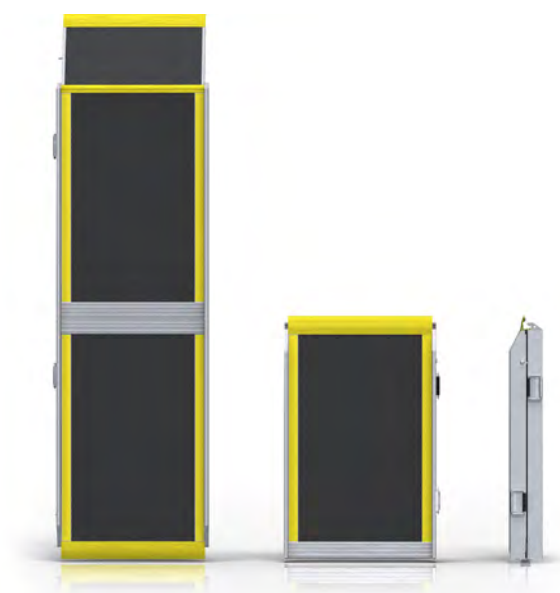


lightweight



## Ramp parameters in the LSXX-02

weight (kg)	up 12 to 34
length (mm)	up 930 to 3500
width (mm)	up 760 to 860
load capacity (mm)	350
security measures	barriers on both sides
usable surface	anti-slip mat
moving	handle





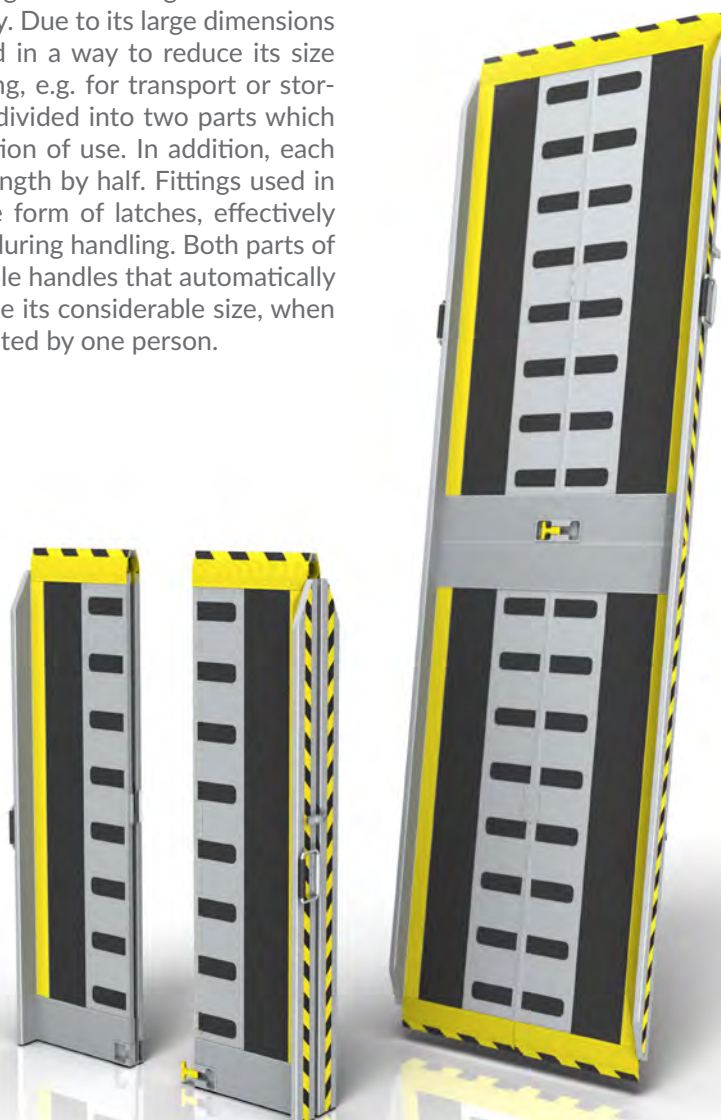
The LA28-04 portable ramp is made of aluminium elements, which significantly contributes to its low weight with a large usable area and high strength, and optimum rigidity. Due to its large dimensions in the unfolded state, it was designed in a way to reduce its size to the necessary minimum after folding, e.g. for transport or storage. For this purpose, the raceway is divided into two parts which are joined together only for the duration of use. In addition, each of them has a hinge to reduce their length by half. Fittings used in both parts of the access ramp, in the form of latches, effectively protect these elements from opening during handling. Both parts of the ramp are equipped with comfortable handles that automatically fold up during use and storage. Despite its considerable size, when unfolded, the ramp can be easily operated by one person.



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compliance with PRM TSI standards



lightweight

## Ramp parameters in the LA28-04

weight (kg)	31
length (mm)	2930
width (mm)	845
load capacity (mm)	up to 350
security measures	barriers on both sides
usable surface	anti-slip mat
moving	divided into two parts, folding handles

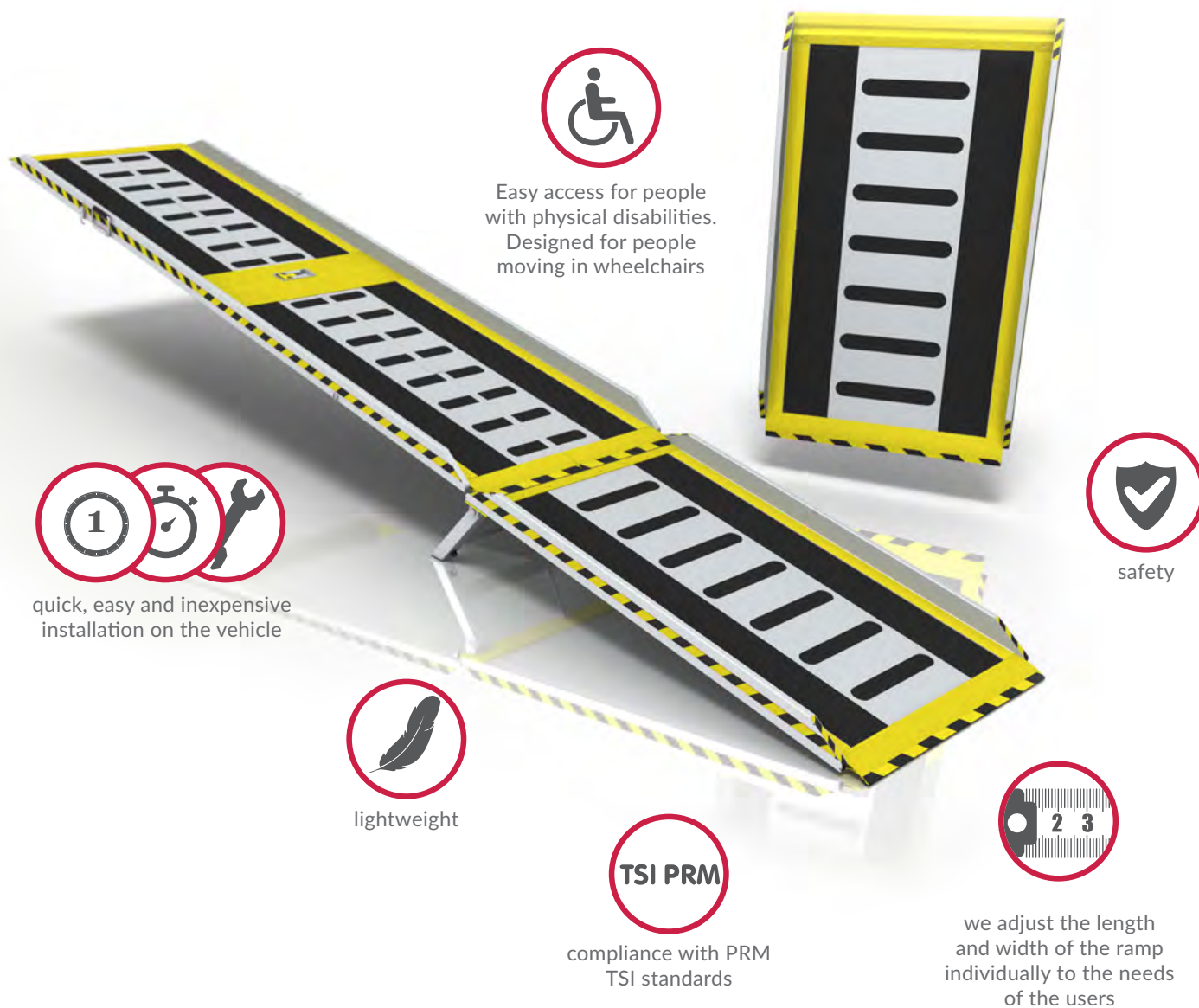


On request, it is possible to make ramps of different length adapted to individual needs.



# TYPE LA28-04 Plus (with extension)

The LA28-04 Plus is an extension of the LAXX-04 series. This solution uses an additional raceway pattern to extend the ramp, which, thanks to a dedicated attachment system, can be used optionally depending on the difference in levels between the vehicle floor and the platform. With an additional element, the ramp can be extended up to 4 metres. This allows the appropriate ramp angle to be achieved under specific conditions in accordance with the TSI requirements. The applied solution of dividing the raceway into two parts (ramp and extension) allows to reduce the weight of elements carried by the vehicle operators and to reduce the size of the ramp after folding.



Ramp parameters in the LA28-04 Plus

weight of the ramp/ramp with extension (kg)	31/48
length of the ramp/ramp with extension (mm)	2865/4000
width of the ramp/extension (mm)	760/765
load capacity (mm)	350
security measures	barriers on both sides
usable surface	anti-slip mat
moving	folding handles

# Stationary ramps

Stationary ramps are structurally fixed to the vehicle, i.e. place of use, which significantly facilitates and accelerates their operation. Devices of this type are usually installed in the vehicle floor and used mainly in trams, buses, trolley buses and suburban railways.

Fixed ramps can be installed:

- in the chassis (extending from under the floor)
- in the floor (part of the floor plane)
- in the cabinet at the door (linked by a joint).

## TYPE P95-01

Stationary flap ramp TYPE P95-01 is designed for installation in the vehicle floor.

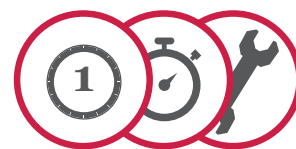
It is the most frequently used type of ramp both in trams and buses. It is characterized by a unique ease and fastness of operation. Its design ensures optimal adaptation to the floor surface without restricting the ability to move around the vehicle for both fully fit and disabled passengers (also in wheelchairs). The use of a special sealing significantly reduces the penetration of moisture and various types of contamination between the ramp flap and the base, reducing the need for frequent maintenance.

The durability and reliability of the device is guaranteed by, among other things, the right construction and light and durable materials used to build the ramp.

The Larisa® RubberFoot anti-slip system and a sensor monitoring the position of the flap provide additional safety for the access ramp users. It is possible to modify the dimensions of the ramp to individual order

TSI PRM

compliance with PRM  
TSI standards



quick, easy and inexpensive  
installation on the vehicle



easy access for people  
with physical disabilities.  
Designed for people  
moving in wheelchairs



lightweight



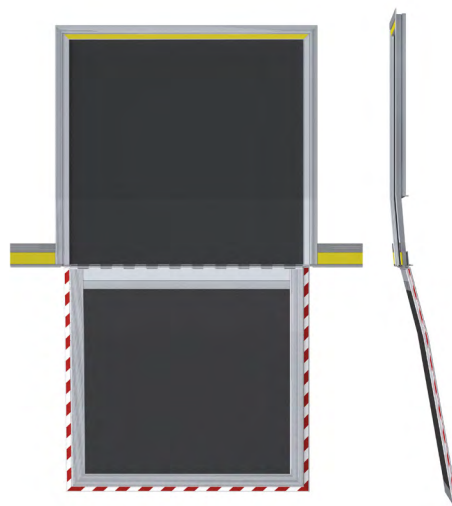
safety



we adjust the length  
and width of the ramp  
individually to the needs  
of the users

Ramp parameters in the P95-01

weight of mobile platform (kg)	13
total weight of the ramp (kg)	27
length of moving platform (mm)	990
width of moving platform (mm)	1070
load capacity (mm)	up to 350
usable surface	anti-slip mat
functions	opening from the vehicle floor
opening signalling	24V NC inductive sensor





The flap ramp PA060-100 is another option for the most commonly used ramps on both trams and buses. Its design ensures an optimal adaptation to the floor surface without restricting the ability to move around the vehicle for both fully fit and disabled passengers (also in wheelchairs). The uncomplicated fastening system makes it easy and quick to install the ramp in the vehicle floor. The proper geometry and the shift of the hinge axis of the flap to the maximum upper position also allow the ramp to be used when the vehicle floor is level with the platform/stop. The ramp then becomes a bridge. The simple design and the sealing used between the moving platform and the base reduce maintenance works to a large extent. For safety of use, the driveway and base surface are covered with high-friction anti-slip mats and an inductive sensor monitors the position of the flap.

It is possible to modify the dimensions of the ramp and its equipment to individual order.



quick, easy and inexpensive installation on the vehicle



compliance with PRM TSI standards



easy access for people with physical disabilities.  
Designed for people moving in wheelchairs



lightweight



safety



The structure of LSXXX-03 ramps is based on standard models of access ramps LSXX-02. The main difference is the mechanism used to attach the ramp permanently to a vehicle. It also acts as a system to assist in unfolding and folding the ramp, shortening the time of preparation for use and repositioning it in the transport position. Owing to a unique design solution, the ramps can be operated by one person using little force. A different type of raceway from the other LS series ramps is used here as well, made of perforated sheet metal covered with anti-slip paint with a high coefficient of friction. Due to the place of installation and accessibility of the ramp in order to prevent its uncontrolled use by unauthorized persons, the supporting mechanism was secured with a key-operated lock. An additional trolley and a ramp lock guarantee maximum safety for users.



## Ramp parameters in the LSXXX-03

weight (kg)	47
weight of the unfolding system (kg)	35
length (mm)	2930
width (mm)	968
load capacity (mm)	up to 350
security measures	barriers on both sides, security locks
usable surface	perforated sheet with anti-slip lacquer
way of unfolding	manual unfolding with spring assistance

The design of the R09-02 stationary ramp for installation in the vehicle chassis was developed in response to the growing demand for a simple, economical and reliable design, operated by the tram or car driver. The solution of extending the ramp from a cassette mounted in the vehicle chassis is an alternative to flap ramps installed in the floor. Owing to this, the floor plane in the passenger compartment is free of additional elements that make cleaning difficult. As with all offered ramps, R09-02 models are made of properly selected materials that ensure resistance to the conditions of use and are equipped with Larisa® RubberFoot anti-slip system and an induction sensor that tracks the position of the ejectable access ramp. It is possible to adjust the dimensions of the ramp to individual customer needs.



compliance with PRM  
TSI standards



safety



quick, easy and inexpensive  
installation on the vehicle



easy access for people  
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Designed for people  
moving in wheelchairs



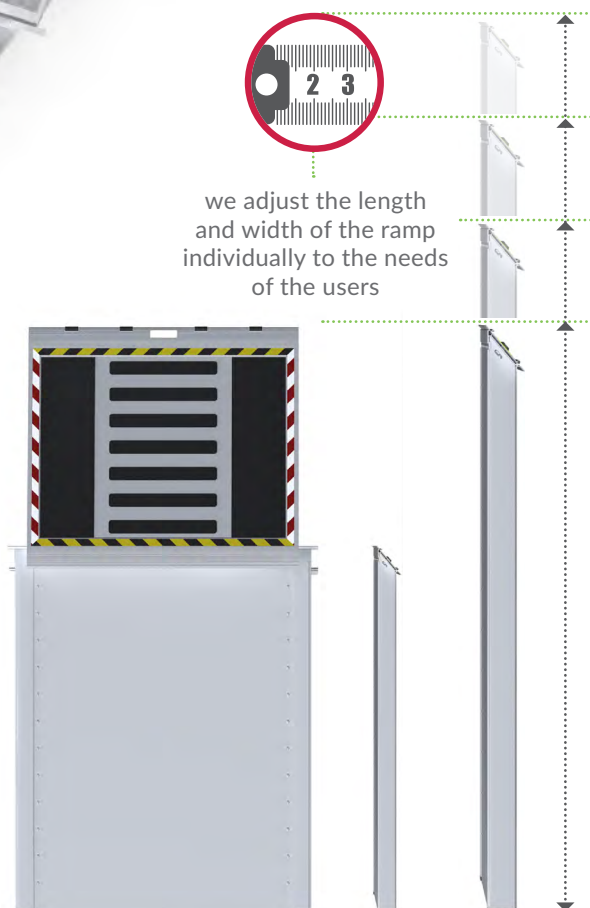
lightweight



we adjust the length  
and width of the ramp  
individually to the needs  
of the users

## Ramp parameters in the R09-02

weight of the ejectable platform (kg)	11
total weight of the ramp (kg)	38
length of moving platform (mm)	910
width of moving platform (mm)	910
load capacity (mm)	350
usable surface	anti-slip mat
functions	ejection from under the floor





The bridge APW-03 is a fully automatic device to assist people getting on and off public transport vehicles. The cassette design makes both installation and removal of the ramp quick and easy and requires no special tools. The materials used in the production of the bridge allowed the design to be compact and lightweight, while at the same time displaying great durability and strength. The embedded electronic systems allow full control of ramp operation as well as service diagnostics.



easy cleaning



high durability



easy access for people with physical disabilities.  
Designed for people moving in wheelchairs



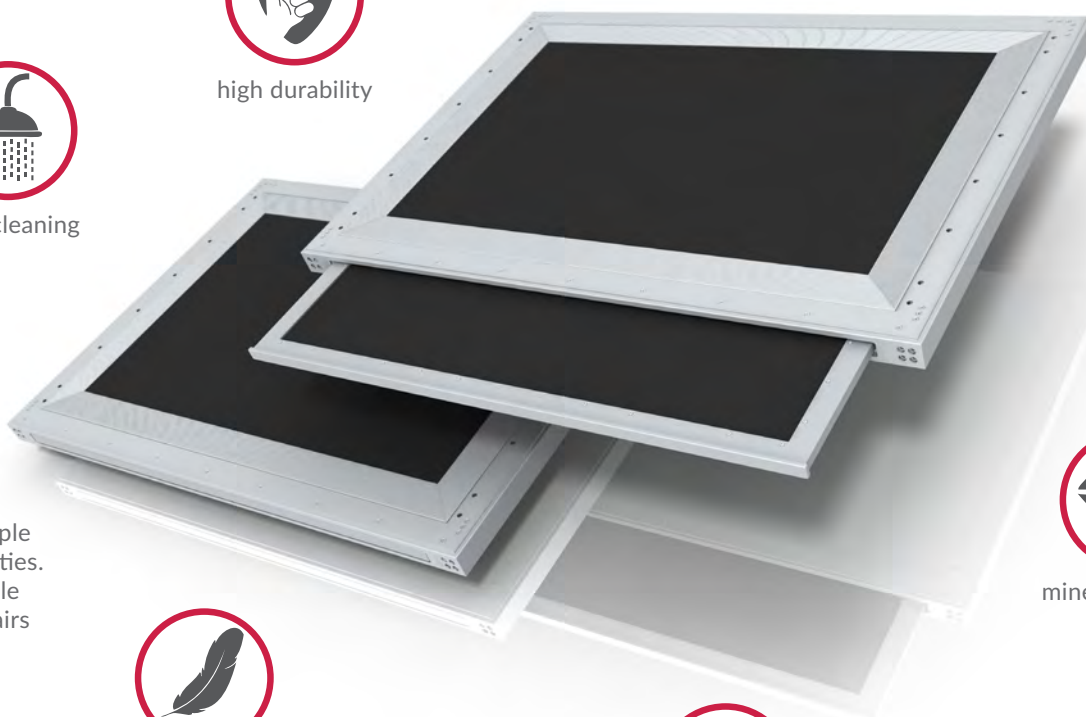
light weight



safety



mineral anti-slip



The bridge APW-03 can be equipped with:

- platform controller CAN bus, enabling detailed analysis of bridge parameters and data exchange with the vehicle controller
- GSM module, sending data collected from sensors directly to the manufacturer, enabling more efficient and faster diagnostics and, as a result, shorter maintenance times in the event of malfunctions or breakdowns both during and after the warranty period.



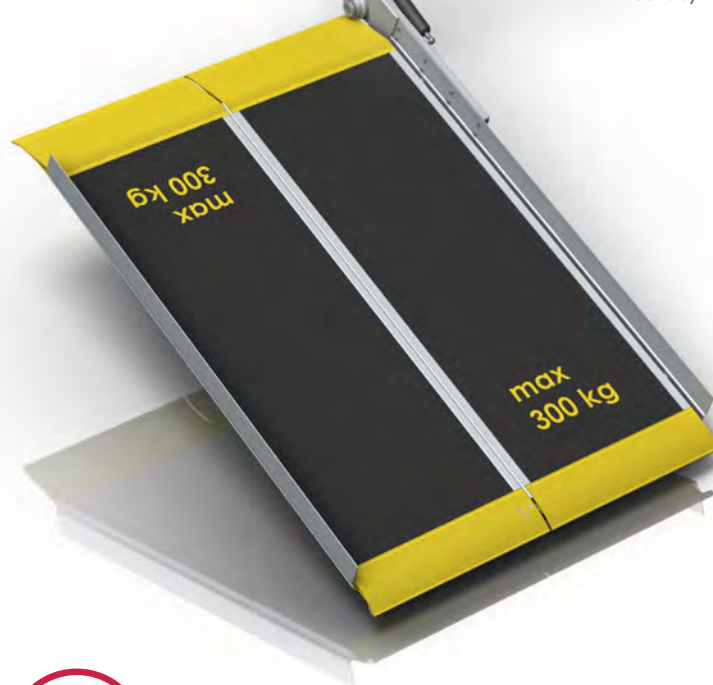
The type PC-01 is a combination of a portable ramp with a stable mounting frame to extend and fold it back up again. It is installed on the vehicle as a whole. This solution makes operating the ramp effortless and very simple. To ensure the safety of travellers and to prevent any unauthorized interference, the supporting mechanism is equipped with a key lock securing the ramp and a sensor for correct locking of the locking latch.



quick, easy and inexpensive  
installation on the vehicle



safety



easy access for people  
with physical disabilities.  
Designed for people  
moving in wheelchairs



Luggage shelves offered by PPHU "LARISA" are designed for installation in passenger compartments of public transport vehicles. Their structures meet high normative requirements in the railway industry. Owing to the use of selected materials, they are characterized by low weight, high strength and modern design. They can be equipped with additional elements extending their functionality

**These include, among others:**

- linear lighting and spotlighting systems,
- decorative lighting systems,
- place reservation systems,
- advertising systems,
- sun blind system



anodized coating  
for a high scratch  
resistance



easy to clean



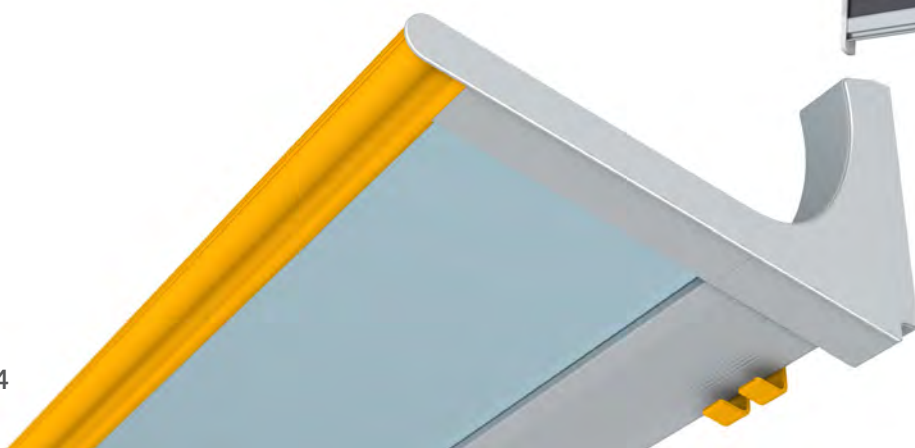
high strength



lightweight



multifunctionality





# Shelves TYPE LRXXX-01

The modular structure of the shelves type LRXXX-01 allows for the configuration of their elements both in terms of dimensions and design. Models are available in a variety of colours for anodised and varnished finishes. A characteristic element of these structures is the front profile which enhances their functionality, which allows passengers to use the shelves also as a handrail. Both openwork tops and glass panels are resistant to high loads, which guarantees their safe operation.



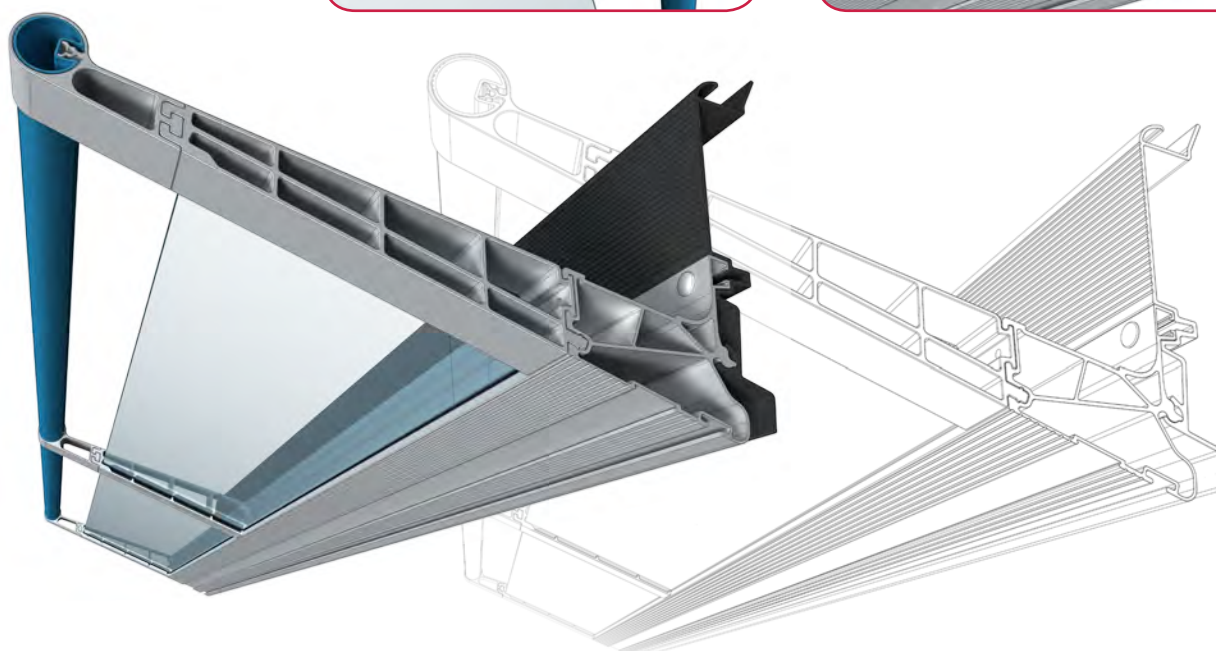
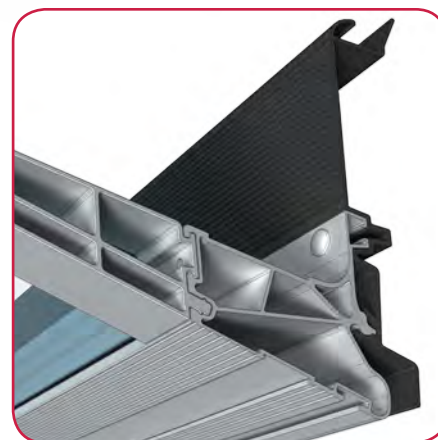
quick, easy and inexpensive installation on the vehicle



lightweight



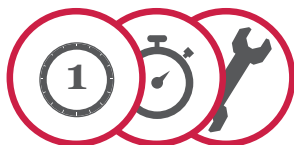
we adjust the length and width of the ramp individually to the needs of the users



Luggage shelf for PESA  
For the ELF2 train

# Shelves TYPE LRXXX-02

LRXXX-02 shelves are available in two constructional variants and several dozen of colour versions, which allows for harmonious adaptation of these elements of the compartment equipment to the design dominating in rooms or, on the contrary, they can be a contrasting element. In technical terms, they are distinguished by their ultralight structure and high load capacity. Both the materials and surface finish (anodizing, powder paint), as well as the structure of shelves make it easier to keep them clean.



quick, easy and inexpensive installation on the vehicle



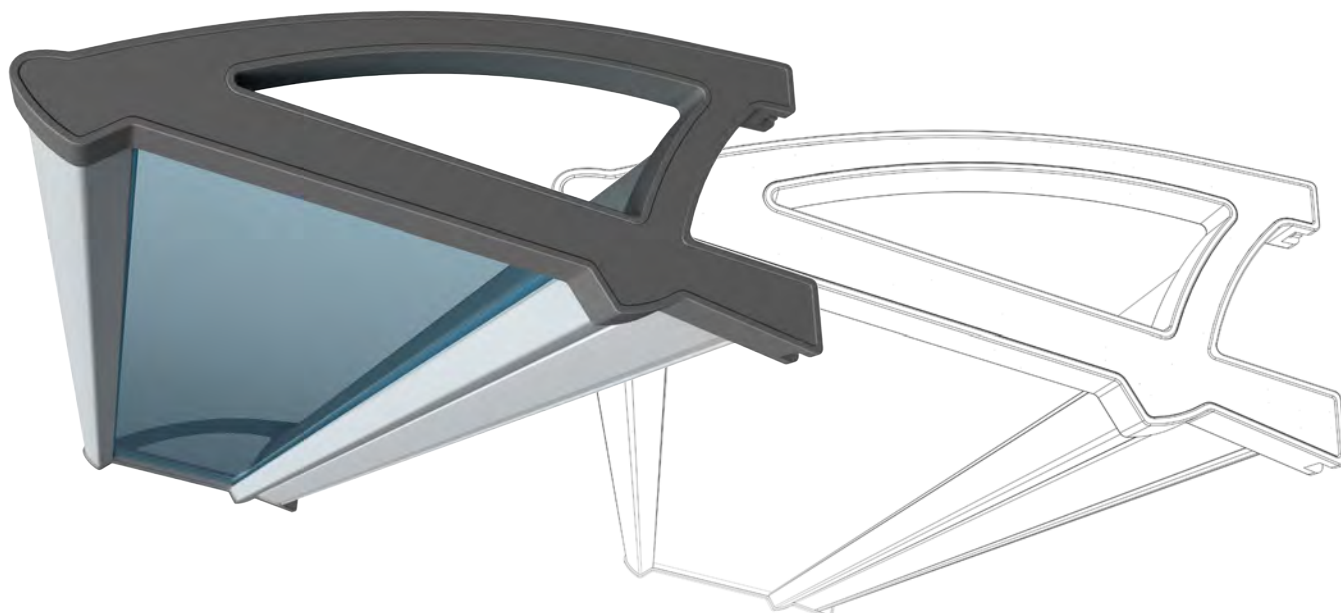
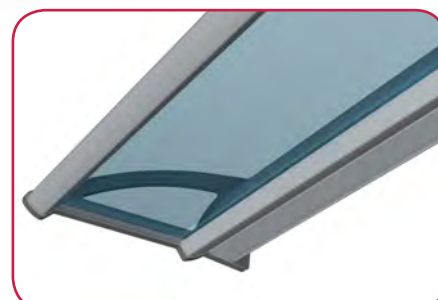
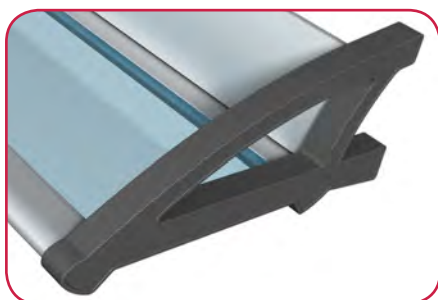
easy to clean



we adjust the length and width of the ramp individually to the needs of the users



lightweight





Shelves type LR02 are elements of equipment combining several functions. In addition to the primary purpose of storing luggage for the time of travel, they also provide a stable handrail that can be used by passengers. The equipment in the form of spotlights with LED light and switches significantly affects the comfort of travellers who need additional lighting. The whole is complemented by a set of hooks allowing for comfortable suspension of wardrobe elements. As in the case of other offered shelves, a modular structure was used here as a preference, which allows you to adjust the dimensions of the shelf to the place of their installation.



easy to clean



quick, easy and inexpensive  
installation on the vehicle



high strength



we adjust the length  
and width of the ramp  
individually to the needs  
of the users





# Shelves TYPE LR-03

The shelves LR-03 are multifunctional equipment components for passenger compartments, luggage compartments and areas used by vehicle personnel. They are made of modular anodised and powder-coated aluminium components and glass panels, making them available in an infinite range of widths so that their size can be adapted to the place of installation. They are very resilient despite their seemingly delicate design.

## Optional equipment components for shelves LR-03:

- hooks for suspension of wardrobe elements, bags, etc.
- LED spotlights with switch
- information displays
- sun blind system (fabric colour and texture can be customised)



quick, easy and inexpensive installation on the vehicle



we adjust the length and width of the ramp individually to the needs of the users



lightweight



multifunctionality

Rear-view mirrors, which are used to observe the space from the sides of the vehicle and can be used as an independent equipment or as a complement to the camera system.

**The advantages of using rear-view mirrors are:**

- Zero response time to changes in light intensity – unlike cameras, mirrors do not need time to adapt to changing lighting conditions, e.g. when entering or leaving a tunnel;
- An analogue form of image transmission is more often preferred by train drivers, tram drivers and vehicle drivers than the camera image seen on a monitor;
- The classic form of image transmission is free from the noise or faults of the camera-monitor system;
- The heating of the mirror automatically removes atmospheric agents (rain drops, steam, frost and ice) from its surface.

Mirrors are designed based on applicable national and international standards and regulations. It is possible to certify our products in accredited research units, e.g. for compliance with the following standards:

- **EN 50155** – Technical equipment used on rolling stock;
- **EN 61373** – Tests for resistance to mechanical impact and vibration;
- **EN 50121** – Electromagnetic compatibility;
- **EN 45545** – Fire protection in railway vehicles

For each new mirror design we carry out functional analyses, as well as visibility and strength calculations.

**Main functions:**

- folding of the mirror arm by means of electric or pneumatic drive;
- electrical mirror positioning by means of a joystick;
- heating of the mirror.

**Additional functions:**

- control by means of a dedicated LARK1 controller;
- automatic mirror folding after activation of the second cabin (for two-way vehicles);
- possibility of emergency mirror folding in case of loss of voltage or pressure;
- additional mirror for first door observation;
- OPEN CAN diagnostics;
- stylised casing

**Our mirrors are characterized by:**

- excellent visibility;
- high resistance to voltage fluctuations;
- high durability and strength;
- exceptional resistance to changing weather conditions;
- resistance to vibrations,
- possibility to cooperate with properly configured control systems.

PPHU “LARISA” also implements individual solutions based on entrusted designs or customer guidelines by designing a new product from scratch. Experienced constructors and stylists are a guarantee of a satisfactory effect of the design process.

Delivered sets of mirrors can be equipped with various types of accessories such as manipulators, controllers, covers, etc.



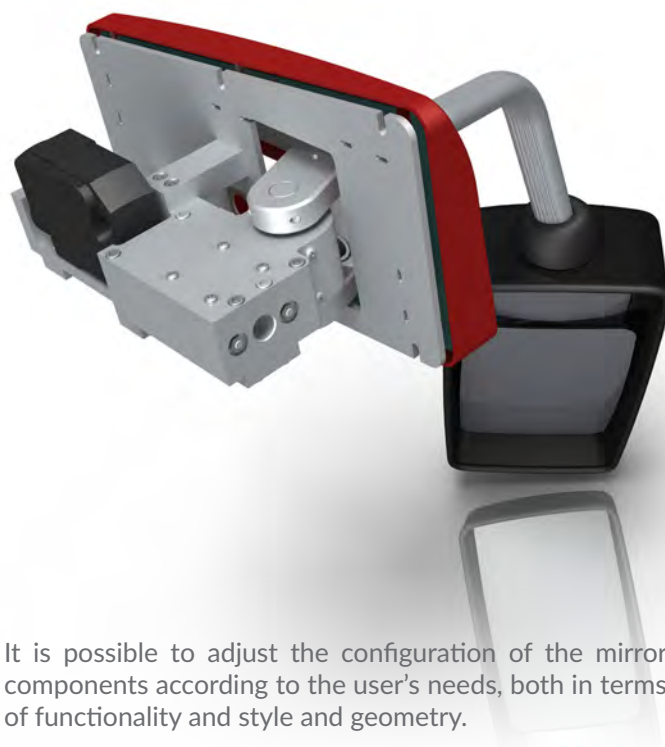
# Mirror system for trams

Due to the specific features of trams – including the size and geometry – the structure of mirrors differs significantly from mirrors used in other vehicles. The main distinguishing feature of a tramway mirror is the long arm between the mirror unit and the drive. This is largely due to the position of the driver's seat.

Our tram mirrors are designed on the basis of the UNECE regulations, which ensures optimum visibility and guarantees the safety of vehicle passengers.

To improve the quality of the visible image in the mirror, we have developed many innovative solutions. These include, among others:

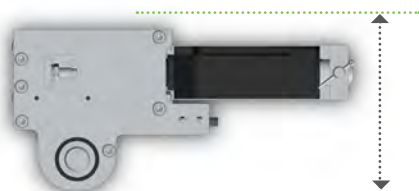
- use of dynamic vibration dampers to reduce the influence of vehicle structure vibrations on the mirror
- introduction of a system of couplings fulfilling, among others, the function of clearing the play in mechanical systems, by locking the system in the closed position to protect the mirror against pick-up on the automatic car wash, as well as the function of an overload (emergency) coupling and a coupling combining several functions at once.



It is possible to adjust the configuration of the mirror components according to the user's needs, both in terms of functionality and style and geometry.



The mirror mechanisms are characterized by low weight and optimal corrosion resistance, as well as strength at low weight thanks to the use of aluminium alloys and other high quality components supplied by renowned manufacturers for their construction.





# Tram mirror TYPE LUS05

The mechanism of the electric tram mirror of the LUS05 series is mounted in a recess located in the front of the vehicle under the cover, which guarantees 100% tightness of the cab and the possibility of preserving the original silhouette of the vehicle. This drive operates very quietly and allows precise control of the arm angle of the mirror unit. Long bore in the masking blank allows the arm to move freely when opening and closing the mirror. The “soft” start and stop function extends the life of the mechanism components. The mirror is equipped with a heating function, which definitely facilitates the work of tram drivers and increases the level of safety of travellers during autumn and winter days. The LUS05 series is equipped with a mechanical play correction function with integrated spring tensioners.

Mirror operating temperature range from -30 to +55°C



LUS016 mirrors are a structure built mostly of light alloys and polyester laminates. All elements are resistant to atmospheric corrosion and more aggressive conditions caused by e.g. solutions containing road salt.

The compact design of the electric arm moving mechanism allows for installation outside the body of the vehicle, which makes it possible to use these mirrors also in modernised vehicles where there is no space for the drive unit in the spaces under the sheathing. The applied housing perfectly masks the mechanism and its colouring can be matched to the vehicle colour. As with most of the exterior mirrors produced by PPHU "LARISA," it is possible to adjust the range of arm movements to suit the geometry of the vehicle.

Mirror operating temperature range from -30 to +55°C



resistance  
to temperature  
fluctuations



excellent visibility



tailored to different  
supply voltages



heated



vibration-resistance



The LUS010 series electric mirrors are mounted similarly to other dedicated mirrors for trams, so that it is possible to hide the mechanism under the vehicle's cover, while the arm and mirror assembly are optimally positioned. The mirror drive equipped with an electric actuator is characterized by precision and repeatability of movements.

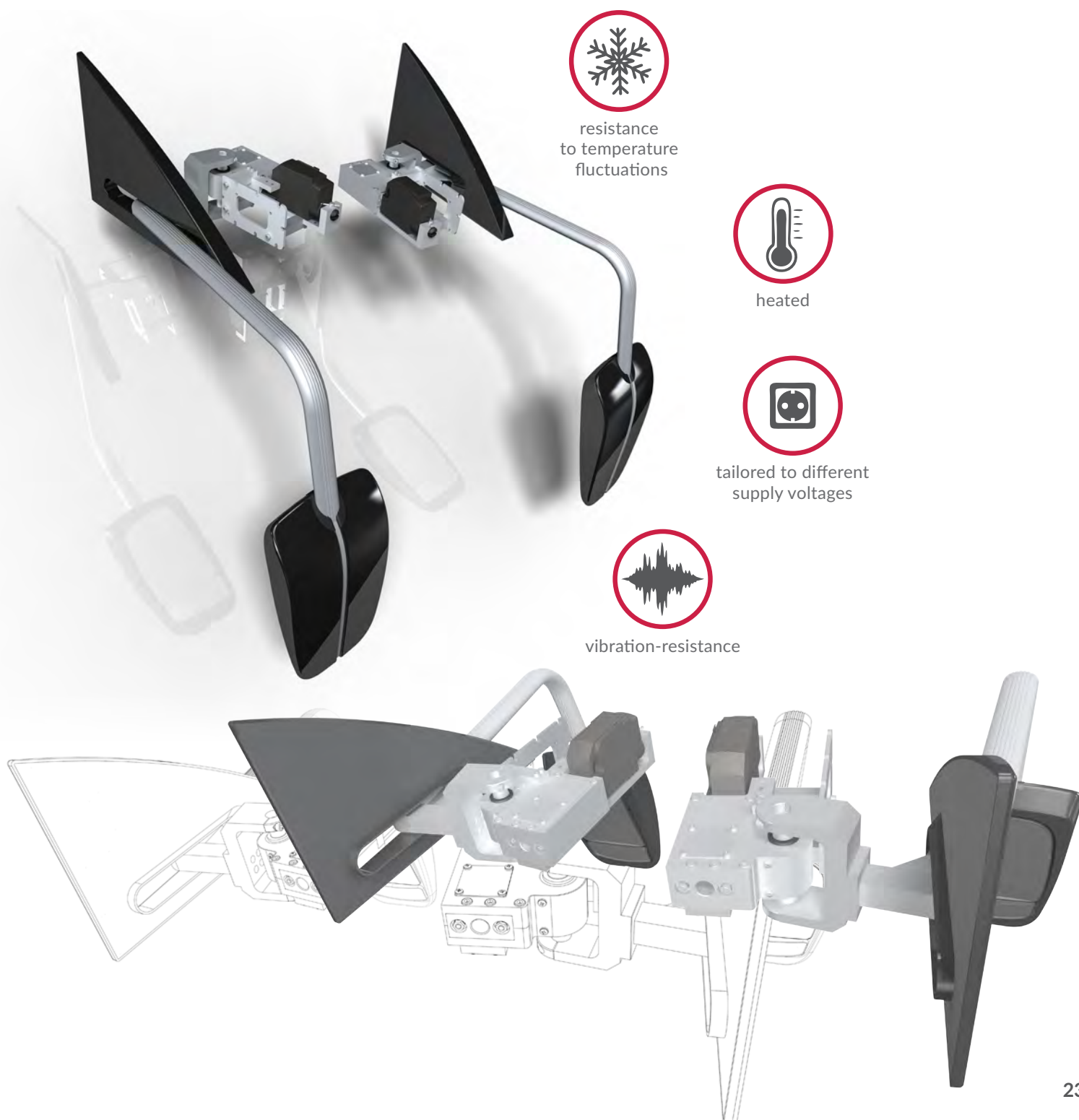
Its compact design reduces vibrations during arm movement and allows it to be placed in a small space.

The LUS010 series is equipped with a convenient emergency folding clutch so that in the event of a power outage or other cases where the mirror arm cannot be closed, it can be done manually. An additional mirror enlarging the range of visibility increases the safety level of passengers and animals travelling with them.

The "soft" START and STOP function extends the life of the mechanism components.

The main mirror is equipped with a heating function, which greatly facilitates the work of the tram drivers during autumn and winter days.

Mirror operating temperature range from -30 to +55°C





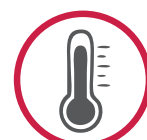
# Mirror TYPE LUS020

LUS020 mirrors can be used on most trams with mounting spaces located in the front of the vehicle. They are driven by precise electric actuators, which allows for repeatability and a wide range of arm movements. The components used to build individual mirror parts are highly resistant to corrosive factors, including road salt solutions. Optimally designed components guarantee high durability and rigidity of the system while maintaining low weight of the whole structure. Visible elements made of polyester composites and aluminum can be color-matched to the vehicle body. The work of mechanisms is controlled by electronic controllers enabling individual adjustment of each of the mirrors. To facilitate observation during adverse weather conditions, the mirrors have been fitted with heating mats.

The temperature range of the mirror is from -30 to +55 °C



resistance  
to temperature  
fluctuations



heated



vibration resistance



tailored to different  
supply voltages



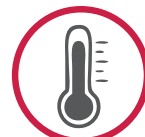
The mirror system of the LUS022 series is a solution for use in trams, buses and trolleybuses constructed based on the requirements of UNECE Regulation 46.

The manually folding arm of these mirrors is designed for customers looking for an economical solution for their vehicles. Its design has been optimised for harmonic movements during MES analysis and testing in our laboratory. The large mirror is housed in a slim case and provides very good visibility. Mirrors of this series are equipped with couplings that tighten the mirror housing to the side of the vehicle. This function is particularly useful during the process of washing the vehicle's sheathing in automatic car washes.

Mirror operating temperature range from -30 to +55°C



vibration-resistance



heated



tailored to different  
supply voltages



resistance  
to temperature  
fluctuations



# Tram mirror TYPE LUS028

The automatically controlled mirrors of the LUS028 series are dedicated for trams where the driving position does not allow observation of the reflection in the mirror through side windows, but only through the windscreen. The bipartite arm used for this purpose has been equipped with a clutch unit enabling manual emergency closing of the mirror. The electric drive mechanism is operated by a controller allowing for arm movements as well as for auto calibration of the drive mechanism position. Two remote-controlled and heated mirrors (main and auxiliary panoramic mirrors) provide optimal visibility in accordance with UNECE.

The design of the device enables its operation in the temperature range from -30 to +70°C for vehicles reaching maximum speeds up to 70 km/h.



vibration-resistance



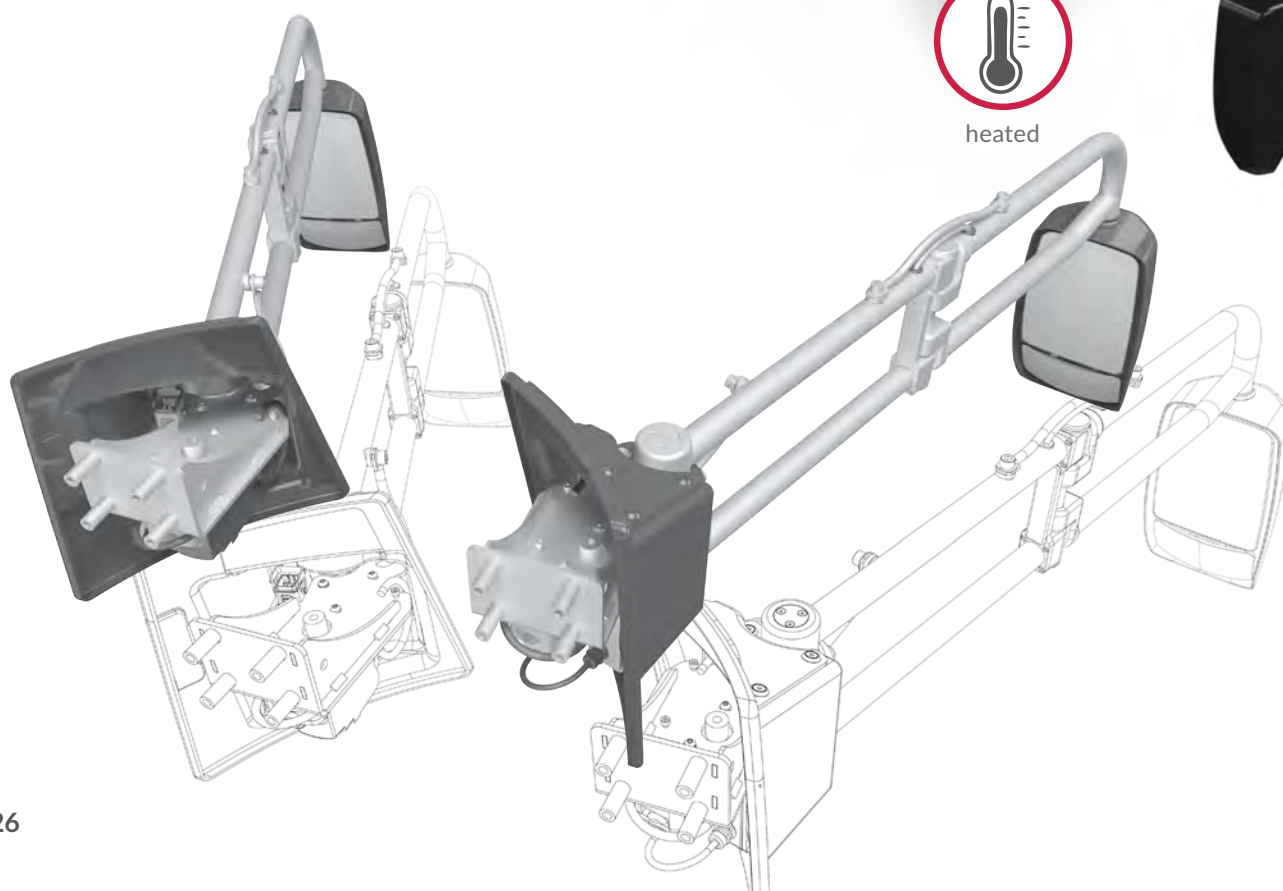
resistance  
to temperature  
fluctuations



tailored to different  
supply voltages



heated





The design of the mirror type LUS040 allows its installation directly on the vehicle's sheathing without the need to prepare a mounting socket located on the tram's outline. This feature and its easy installation enable it to be used in newly designed vehicles as well as in the modernisation of rolling stock already in operation. The mirror's component in the form of the mechanism that moves the arm is designed to operate seamlessly even in difficult weather conditions such as low and high temperatures snow and rainfall and strong wind. Two remote-controlled and heated mirrors provide optimal visibility. Both mechanism covers and mirror housings are made of lightweight laminates and are offered in a wide range of colours.

Mirror operating temperature range from -30 to +55 °C



resistance  
to temperature  
fluctuations



heated



quick and easy  
assembly



# Mirror system for trains

The train rear-view mirror systems produced by PPHU LARISA include specific conditions of use where they are exposed to high passing speeds, icing or gusts of wind. Our mirrors are used in the most modern rail vehicles manufactured by European and world leaders in this industry. Each new solution is subjected to complex tests and inspections, e.g. in a climatic chamber, as well as to electromagnetic and vibration resistance tests.



resistance  
to temperature  
fluctuations



resistant  
to wind blasts



excellent visibility



safe in operation



custom designs



Developed from a design  
by PESA Bydgoszcz SA  
for DMU LINK trains

# Mirror TYPE LUS02

The LUS02 series electric mirrors are characterised by a solid structure which guarantees high durability of this solution. The particularly quiet drive is compatible with most control systems in rail vehicles. The materials used to produce these mirrors provide high resistance to mechanical wear and weather conditions.

Mirror operating temperature range from -30 to +55°C



excellent visibility



vibration-resistance



tailored to different  
supply voltages



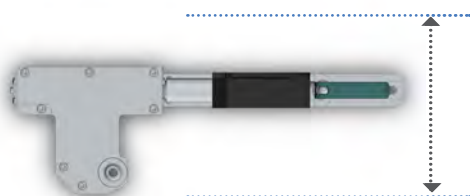
resistance  
to temperature  
fluctuations



heated



custom sizes



A characteristic feature of this product is the external axis of rotation of the mirror housing, thanks to which the mirror is not a part of the window assembly, but only a supplement, while the mirror housing mechanism is hidden under the vehicle's cover. On the outside there is only a casing with a mirror, which is completely enclosed in the vehicle extremity. The drive is equipped with an emergency mirror folding system to be used in the event of a situation preventing remote folding in automatic mode, allowing the vehicle to continue driving.



# Mirror TYPE LUS013

The LUS013 series mirror with electric drive is dedicated as a traction unit or locomotive equipment. Its casing is entirely made of aluminium and mounted as a side window unit or part of it. The compact design integrates the mechanism into the casing, allowing for quick installation of the entire unit in the cabin. A characteristic feature of this mirror is the mirror's mechanism of closing and opening, which is invisible from outside and works with high precision and low noise level. Owing to the internal axis of rotation of the mechanism, after the mirror is closed, the mirror's housing faces the vehicle's sheathing. The airtight housing is equipped with an internal heated window through which the driver can comfortably observe the sides of the vehicle, even during frost or precipitation.

Mirror operating temperature range from -30 to +60°C



# Mirror TYPE LUS017

The airtight housing of the LUS017 series airtight mirror is made of composites and equipped with a heated inner pane, which provides good visibility even in adverse weather conditions. LUS017 mirrors are designed to be mounted in place of the whole or part of the side window of the traction unit or locomotive cab. The compact design allows the mirror opening/closing mechanism to be placed inside the housing, which greatly facilitates and accelerates installation in the cabin. Owing to the internal axis of rotation of the mechanism, after closing the mirror housing, the whole mirror faces the vehicle body. A mechanism driven by a pneumatic cylinder is a guarantee that the mirror opens and closes without any play and very quickly. In order to prevent the mirror housing from breaking up at high speed, caused by vacuum, e.g. when a train enters a tunnel or passes another vehicle in case of lack of compressed air supply, the device is equipped with a clamping mechanism.

Mirror operating temperature range from -30 to +55°C



# Mirror TYPE LUS013-01

The LUS013-01 series are mirrors with an integrated design that encloses both the pneumatic drive element and the mirror unit in one piece. The airtight housing of these devices is made of composites allowing to adjust the visible surfaces to the colour of the rest of the vehicle.

In order to ensure optimum visibility, both the window pane and the mirror are equipped with heating elements. A mechanism driven by a pneumatic actuator allows for an instant mirror opening/closing cycle. Constant contact between the mirror housing and the main housing is provided by a clamping system to prevent the mirror from being raised at high speed due to vacuum when the train enters the tunnel or passes another vehicle. The single-shape mirror design makes it easy to install in place of all or part of the side window of the traction unit or locomotive cab.

LUS013-01 mirrors are characterized by extremely low weight and the possibility of full service access from inside the cabin.

Mirror operating temperature range from -30 to +55°C





# Mirror TYPE LUS032

LUS032 is another offered integrated rear-view mirror, which in the folded position faces the vehicle's sheathing. A characteristic feature of this model is the glass finish of the external surface which also serves as a window. The single-unit design of the device makes it measurably easier to mount the mirror in a vehicle. The remote-controlled position of the plane of the heated mirror allows an optimal field of view. The pneumatic mechanism used enables very fast opening and closing of the mirror flap. The use of a drive equipped with throttle valves enables simple adjustment of opening/closing speeds. The mirror has been equipped with a safety system that will fold the mirror itself in case of a power failure.

Mirror operating temperature range from -30 to +55°C



tailored to different  
supply voltages



vibration resistance



excellent visibility



heated



resistance  
to temperature  
fluctuations

Reliability and durability of the manual mirror LUS035 are guaranteed by a solid compact design based on a short solid two-sided arm connecting the mirror housing to the mounting plate via a joint. The large heated mirror used in this mirror allows effective observation of the space along the sides of the vehicle. Simple installation and removal on the sheathing enables the mirror to be replaced when needed. The materials used to design the mirrors are resistant to adverse weather conditions and do not require maintenance. The LUS035 mirror type are an economical alternative to electrically and pneumatically driven product.

Mirror operating temperature range from -30 to +55°C



vibration resistance



excellent visibility



resistance  
to temperature  
fluctuations



The construction of pneumatic mirrors LUS015 series is a combination of solutions used in locomotives and trams. The body of the driving mechanism and most of its parts are made of aluminium alloys, which keeps its weight to a minimum. The emergency clutch used in this device allows the arm to move independently of the position of the mechanism, so it is possible to move the arm manually when needed. Mirrors of this series are also equipped with a pressure system which prevents the mirror from opening automatically in case of a lack of compressed air supply.

Mirror operating temperature range from -30 to +55°C





# Roof installation covers

The roof installation covers are manufactured per customer designs or designed by PPHU Larisa from scratch, according to custom specifications. The roof installation cover components are largely made from composite materials and aluminium shapes. The products are precision made for easy on-site installation; this is the benefit of automated production and multiple inspections of components and the finished products.

PPHU Larisa is always happy to help with each project to enable streamlined integration of the roof installation covers with other roof components.



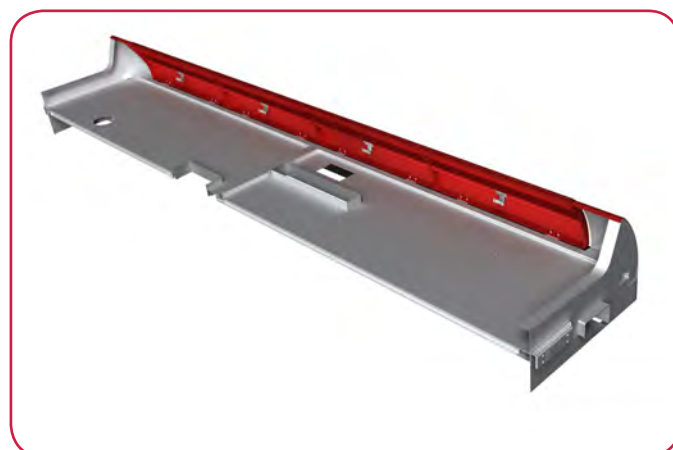
lightweight



high aesthetic  
quality



resistance to varying  
weather



# Compartment tables

PPHU Larisa's state-of-the-art tables for railway vehicles are very convenient and come with trendy and attractive design forms. Folding, window bottom, armrest-integrated, and/or complete with various fastener systems: these are the tables from PPHU Larisa. The tables may optionally be equipped with accessories which include dustbins, cupholders, induction chargers, and more. The tables are usually made from aluminium shape systems and plastics, which makes them light yet durable.

## The product range includes:

- small tables (with optional dustbins)
- medium tables (with optional dustbins)
- large tables with expandable tops.



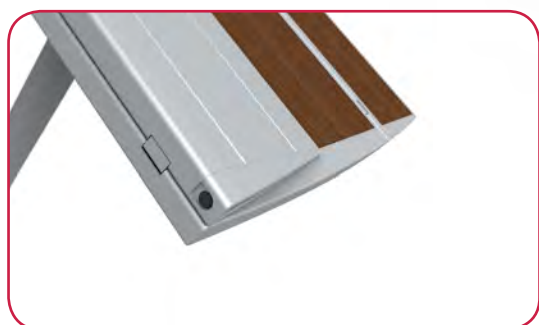
high quality



light and durable construction



custom design



hard anodised coating with a high resistance to corrosion and abrasion resistance class

## Tables SDS-001

High functionality and minimalistic design: the two flagship features of type SDS-001 tables. They are designed to enable custom configuration of the table tops. The recesses were designed to prevent objects (like bottles, cups and other liquid containers) from shifting and falling during sudden deceleration of the rail vehicle. The table top rests on a robust foot finished with chrome plating. To facilitate cleaning and sanitation, the table is fastened to the compartment wall with two hinges that facilitate lifting and folding. In the standard version the table tops are made from HPL plywood panels.

The premium version includes lightweight aluminium table tops. Other materials are available on request.



high aesthetic  
quality



custom design



hard anodised coating with  
a high resistance to corrosion  
and abrasion resistance class





## Tables SDS-003

The SDS-003 series of tables comprises dozens of models that differ mainly in size and shape. These are functional equipment components for both the passenger compartments and the service rooms of the vehicle personnel. They can be equipped with dustbins or racks, among other things. Their table tops are made of durable HPL compact laminates available in many colours. The surfaces of the table tops have special recesses designed to prevent displacement e.g. cups with liquid during sudden deceleration of the vehicle. Depending on the place of installation, size and shape of the table top, intended use, etc. the tables can be installed using dedicated brackets or wall-mounted hinges that enable the table to be lifted into an vertical position, e.g. in order to facilitate cleaning. Chrome or powder-coated versions of feet are available as a floor support.



highly sanitary



ergonomics



quick and easy  
assembly



multifunctionality



### Available accessories:

- dustbins – choice of material, size, colour
- racks and handles – choice of purpose, shape, material, colour
- inductive chargers – choice of the place of installation
- information displays – choice of size and intended use
- USB connectors – choice of the place of installation, number of connectors

# Tables **SDS-003** variants

Modular design and the availability of various construction and equipment options make it possible to produce the series of tables SDS-003 customised in terms of functionality, ergonomics and colours to meet the needs of a wide range of customers.



easy installation  
and removal



custom design



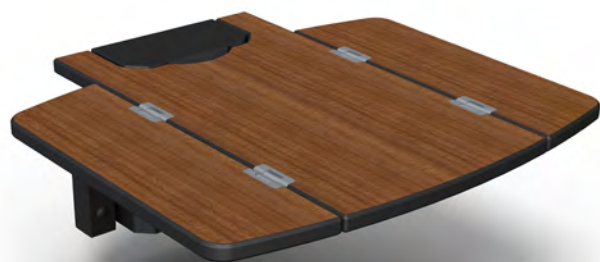
USB charger



high aesthetic  
quality



charger  
induction



easy to clean

# Tables SK-I-01

Type SK-I-01 tables are designed for premium-level passenger compartments. The durable aluminium table tops ensure a long service life while being light-weight, and the HPL lining helps match the product colour to the interior trim. An induction charger is integrated with the table top for wireless recharging of compatible mobile phones. When ready for recharging, the LED indicator goes on.

A dedicated non-slip adhesive pad insures higher safety of the mobile phone should the rail vehicle suddenly decelerate. The table can be customised in size or fitted with an optional dustbin.



easy to clean



high aesthetic  
quality



## Table/Small dustbins



high aesthetic  
quality



easy to clean



easy to empty



# Large dustbins

The dustbins from PPHU Larisa are universal sanitation products for public transport. The dustbins are available in standalone versions and as optional accessories dedicated to the tables from PPHU Larisa. All products are made from corrosion-resistant materials (aluminium, stainless steel and/or plastics). The finish options include anodising and powder coating.

The capacity ranges from 0.5 to 5 L.

Instead of plastic liner bags, which can be easily torn and reduce the aesthetic value of the vehicle interior, PPHU Larisa provides optional disposable polymer trays designed to fit the Larisa dustbin line.



high aesthetic  
quality



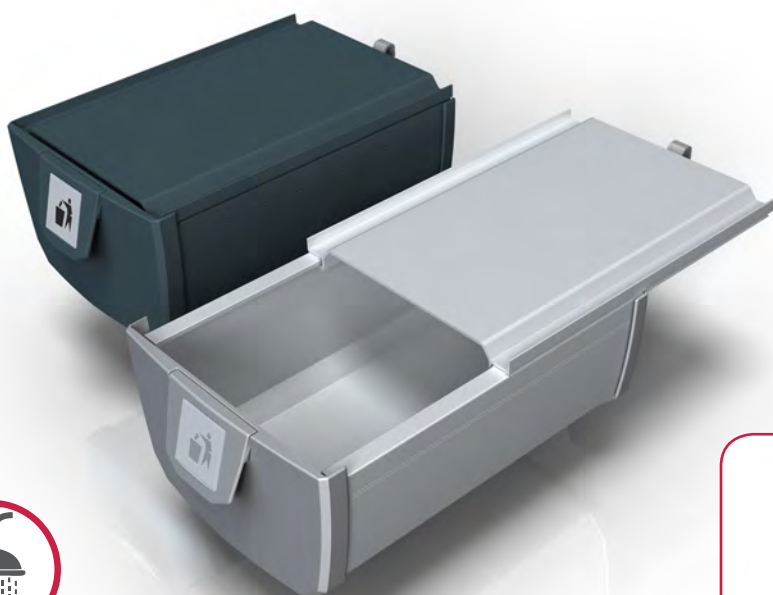
custom design



easy to empty



## Small dustbins



very safe



highly sanitary



high quality



In response to popular demand, PPHU Larisa has expanded its product range with durable and lightweight ceiling systems based on aluminium shapes. The ceiling systems can be adapted to accommodate including HVAC vents, lamps and structural supports for handrails and other trim features. The ceiling systems are modular and customisable to non-standard of the vehicle interior.



lightweight



high aesthetic  
quality



easy installation  
and removal



Developed from a design by PESA Bydgoszcz SA

# Re-railing covers

The re-railing channel covers complete the plating of the vehicle, increasing its aesthetic quality. The re-railing channel covers also protect the rail vehicle lifting bar from weather damage. The re-railing channel covers are made from a system of expanding elastomers, which are resistant to diluted acids, alkalis and oil over the entire operating range, while the elastic action of the material provides self-centring of the cover fascia. The re-railing channel covers are highly resistant to heavy-duty operation in severe urban environments and impervious to changing weather conditions.



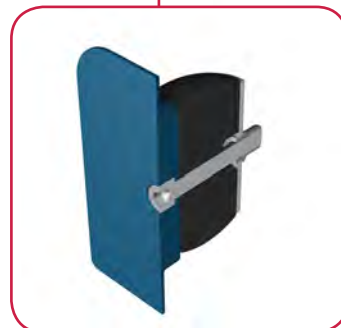
easy installation  
and removal



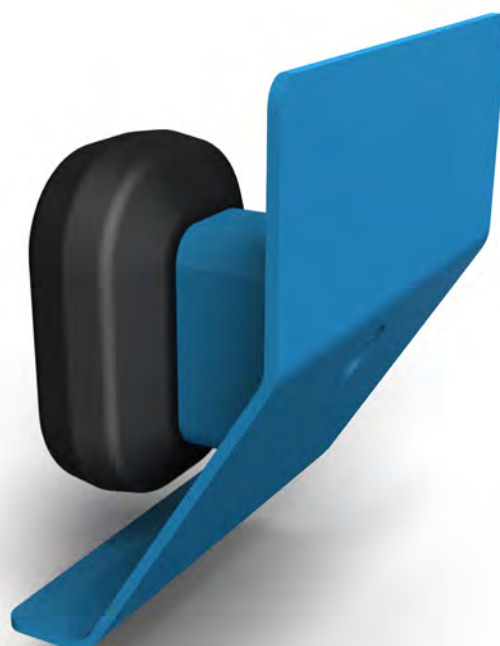
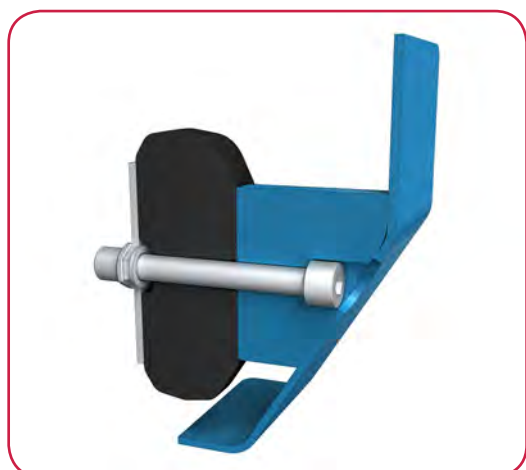
corrosion-resistant



robust vibration-resistant  
mounts



weather (ice and water)  
resistant





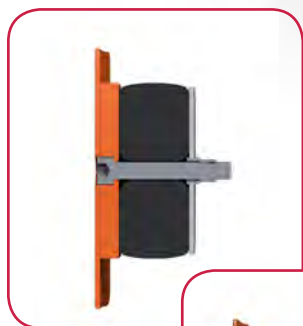
## Re-railing covers 07



## Re-railing covers 09



## Re-railing covers 10

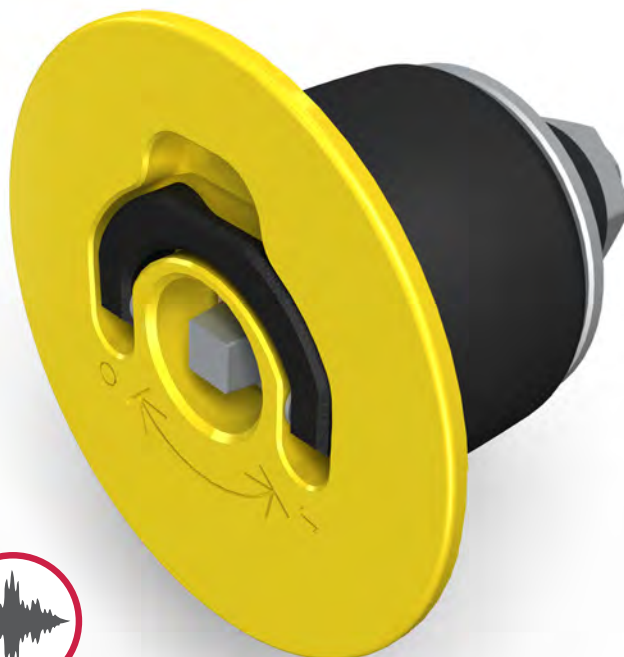


# Sander fill plugs

A universal product which can be adapted to the sander fill port diameter. The metal parts and the expanding elastomer seal provide improved resistance to heavy-duty conditions of railway service. The front fascia colour is customisable to match the body skin livery.

## Key features of the sander fill plugs:

- Quick and easy operation
- Sure fit and seal
- High durability



vibration resistance



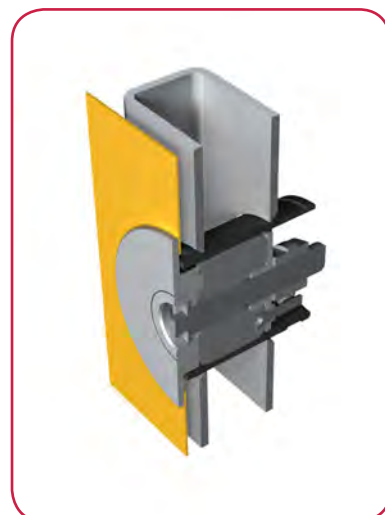
corrosion-resistant



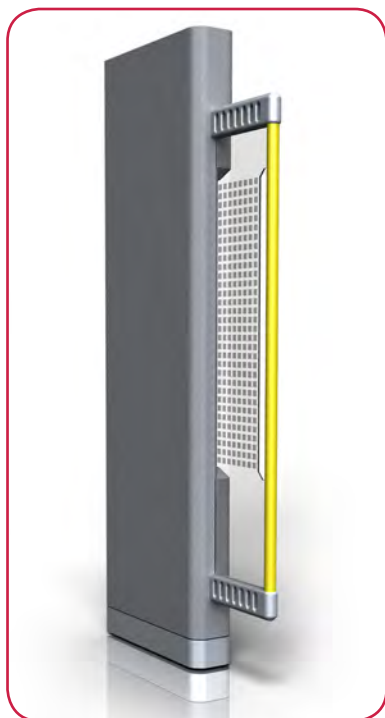
easy installation



weather-resistant



The system of vestibules protects the compartments from undesirable indoor temperature changes caused by the ingress of ambient air and improves the travelling comfort by shielding the passengers from the draught of ambient air. PPHU Larisa makes its vestibule units from stainless steel, tempered glass, and extruded light aluminium alloy shapes. The vestibules can optionally be equipped air heaters and dustbins between 16 and 20 litres of capacity. Custom design and installation configurations can be delivered according to customer designs or proprietary design engineering projects developed from concepts approved by the customers. All products offered by PPHU Larisa meet the applicable railway engineering standards.



easy installation  
and removal



safe and convenient  
to use



energy-efficient



TSI-compliant  
handrails



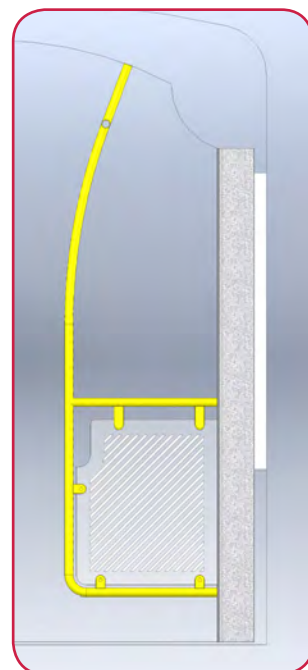
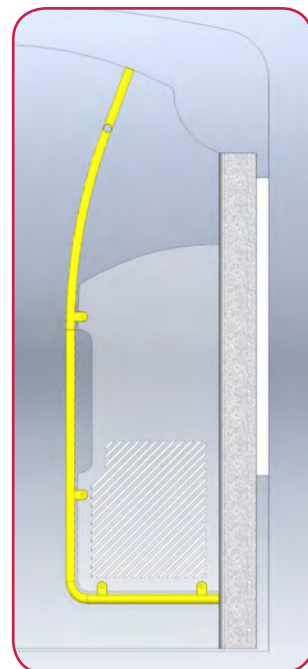
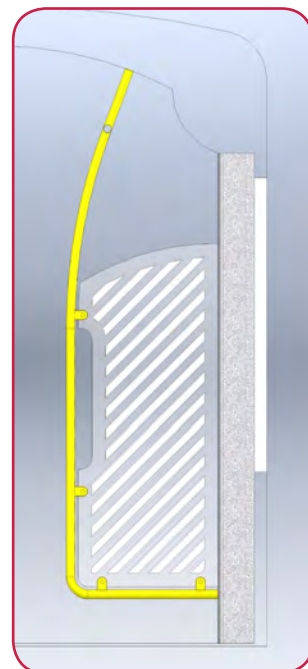
thermal comfort for  
the passengers



Custom design



Can accommodate  
optional dustbins





# Handrail connectors

The proprietary handrail connector system from PPHU Larisa guarantees efficient and strong joining of handrails, handholds, and vestibule units. These products feature superior quality provided by die casting of aluminium alloy components. The ergonomic shape of the handrail connectors provides comfortable and safe use of onboard handrail systems. Exceptional industrial design features and the powder-coat finish in any RAL colour of choice help harmonise the handrail solutions from PPHU Larisa with every vehicle interior colour pattern.



strong and durable



corrosion-resistant



contemporary design



dimensioned for standard handrails



easy installation and removal



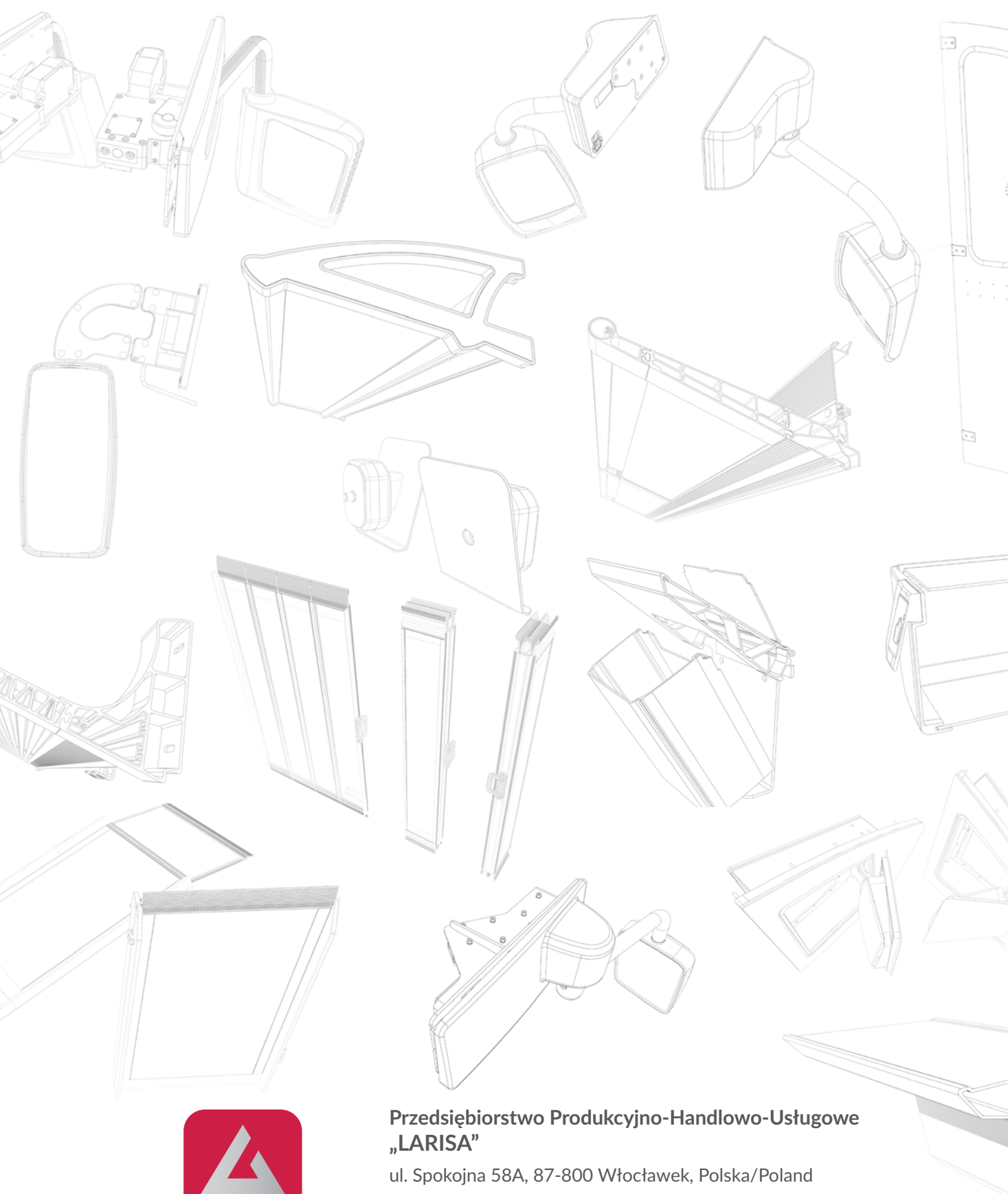
PPHU Larisa has optimised its cab door solutions for tram cars and trains according to the suggestions and feedback from vehicle drivers, based on the real-life use of the products. The cab doors harmoniously blend ergonomics, safety and aesthetic qualities. The cab doors can be provided with any configuration of door locks, latches, glazing, storage pockets, trays, and communication and display units, with custom livery colours to match the vehicles.

### Locomotive driver's cab doors



### Tram driver's cab doors





**Larisa**

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**ISO 9001**

LL-C (Certification)

In 2013, PPHU Larisa implemented an ISO 9001 Quality Management System.