**APPLICATION AND EXPRESSION OF INTEREST IN MARKET RESEARCH**

*Supply of eighteen -meter three-axle low-floor diesel and electric buses*

1. **PARTICIPANT**

|  |  |
| --- | --- |
| **Company (full title)** |  |
| **Registration No.** |  |

*The submitted application does not bind the supplier and the information provided in it will be used only for procurement preparation and will not be disclosed to third parties.*

1. **REPRESENTATIVE**

|  |  |
| --- | --- |
| **Name, Surname** |  |
| **Position in Company** |  |
| **Phone Number** |  |
| **E-mail** |  |

Representative in Latvia or a regional representative (if existent)

|  |  |
| --- | --- |
| **Representative company/entity** |  |
| **Address** |  |
| **Phone Number** |  |
| **E-mail** |  |

*The submitted application does not bind the supplier and the information provided in it will be used only for the preparation of the procurement and will not be disclosed to third parties.*

1. **DESCRIPTION OF THE PROCUREMENT.**

3.1. Within procurement it is planned to purchase 2 types of buses and it is planned to organize procurement in 2 lots:

* First lot: buses equipped with diesel engine, M3, I class, three-axle, articulated, low-floor (without steps), diesel fuel (LVS EN 590, LVS EN 15940), EURO 6 or higher exhaust emission standard, automatic gearbox (at least 4 gears forward and 1 reverse).
* Second lot: electrical buses, M3, I class, three-axle, articulated, low-floor (without steps), equipped with rechargeable energy storage system (traction battery) that supplies electricity to produce electric propulsion. Charging should be possible via plug connector type CCS “Combo 2” and via current collector contact system (current collector rails) located on front part of roof of the vehicle intended for charging the traction batteries through a connection automatically established with a lowered pantograph built-in in the charging station.

3.2. Hereby we confirm that we got acquainted with the documentation of this market research and:

we will participate in the public tender if it will be announced.

we will not participate in the tender, because we don’t have relevant experience.

other:

|  |
| --- |
| *Please provide information on obstacles.* |

3.3. The applicant has the right to deliver buses and/or electric buses, ensuring the fulfillment of warranty obligations (including full software coverage) because:

applicant is a manufacturer or an authorized representative of the proposed bus/electric bus manufacturer and has a document issued by the manufacturer confirming that:

* Full title of bus (diesel) manufacturer: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* Website containing manufacturers information (preferably containing information on the diesel bus offered): \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* Full title of bus (electric) manufacturer: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* Website containing manufacturers information (preferably containing information on the electric bus offered) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

3.4. Applicant has the opportunity to present his offer online (offered bus type) to provide a detailed information of the functional and technical advantages of buses/electric buses:

yes, contact person: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

no.

1. **RELEVANT COMPANY EXPRERIENCE**

4.1. Within last 7 years we supplied low floor articulated buses, designed for use in urban agglomeration (indicate not more than 5 contracts):

.. – electric buses.

|  |  |  |  |
| --- | --- | --- | --- |
| **Nr.** | **Customer (Company title, country, URL)** | **Volume supplied, year/period of supply** | **Contract value EUR, excl. VAT** |
| 1. |  |  |  |
| 2. |  |  |  |
| 3. |  |  |  |
| 4. |  |  |  |
| 5. |  |  |  |

.. – diesel buses

|  |  |  |  |
| --- | --- | --- | --- |
| **Nr.** | **Customer (Company title, country, URL)** | **Volume supplied, year/period of supply** | **Contract value EUR, excl. VAT** |
| 1. |  |  |  |
| 2. |  |  |  |
| 3. |  |  |  |
| 4. |  |  |  |
| 5. |  |  |  |

4.2. Approximate cost of buses (in EUR, excl. VAT):

|  |  |  |  |
| --- | --- | --- | --- |
| Price for a full lot of diesel buses (including full software coverage) | 37 pcs | 74 pcs | 111 pcs |
|  |  |  |
| Price for a full lot of electric buses (including full software coverage) | 20 pcs | 40 pcs | 60 pcs |
|  |  |  |

4.3. Proposed warranty for diesel buses:

|  |  |  |
| --- | --- | --- |
| Period, diesel buses | Whichever occurs first | |
| Years | Mileage (km) |
| Bodywork |  |  |
| Driving axle |  |  |
| Engine |  |  |
| Other | *Please provide description if relevant* | |

4.3.1. Warranty conditions (carrying out maintenance and repairs during the warranty period) for diesel buses.

|  |  |
| --- | --- |
| Repairs and / or maintenance performed by the supplier | Repairs and / or maintenance performed by the client |
| *Please describe here or enclose as annex* | *Please describe here or enclose as annex* |

4.4. Proposed warranty for electric buses:

|  |  |  |
| --- | --- | --- |
| Period, electric buses | Whichever occurs first | |
| Years | Mileage (km) |
| Bodywork |  |  |
| Driving axle |  |  |
| Traction batteries (no more than 20% of the initial capacity parameters of the traction batteries are lost) |  |  |
| Traction motor |  |  |
| Other | *Please provide description if relevant* | |

4.4.1. Warranty conditions (carrying out maintenance and repairs during the warranty period) for electric buses.

|  |  |
| --- | --- |
| Repairs and / or maintenance performed by the supplier | Repairs and / or maintenance performed by the client |
| *Please describe here or enclose as annex* | *Please describe here or enclose as annex* |

4.5. Manufacturing capacity and terms of delivery (time necessary for production and delivery of buses):

|  |  |  |  |
| --- | --- | --- | --- |
| Delivery capacity (number of months from the conclusion of the contract) of **diesel buses** | 37 pcs | 74 pcs | 111 pcs |
|  |  |  |
| Possible causes of delays (diesel buses) |  | | |
| Delivery capacity (number of months from the conclusion of the contract) of **electric** **buses** | 20 pcs | 40 pcs | 60 pcs |
|  |  |  |
| Possible causes of delays (electric buses) |  | | |

4.6. Information about electric buses:

- capacity of traction battery – \_\_\_\_ kWh;

- life cycle of traction battery - \_\_\_ years/hours.

|  |
| --- |
| *Please describe here or enclose as annex.* |

**5. OTHER INFORMATION**

5.1. If any of the technical performance parameters cannot be met, please indicate each of the parameter and solution offered by the participant:

|  |
| --- |
| *Please describe here or enclose as annex.* |

5.2. Other conditions:

|  |
| --- |
| *Please indicate, if existent, other conditions and terms under which the financial and technical offer is valid.* |

5.3. Main location of production and assembly of offered diesel buses and electric buses:

|  |
| --- |
| *Please provide a detailed description here or enclose as annex.* |

5.4. Name and location (country) of the authorized representative of the bus manufacturer of the closest proximity to Latvia:

|  |
| --- |
| *Please describe here or enclose as annex.* |

**General Technical Description of the Subject of Supply**

**(ELECTRIC BUSES)**

***If any of the technical performance parameters cannot be fulfilled, specify which and offer a possible alternative solution!***

Three-axle articulated low-floor **electric bus** (hereinafter referred to as – the Vehicle).

|  |  |  |  |
| --- | --- | --- | --- |
| **Customer’s requirements, technical parameters, and description** | | | **Comments and proposals** |
| Vehicle category and class | | M3, Class I. |  |
| Vehicle type and intended use | | The Vehicle – a three-axle articulated low-floor (without steps at doors and in main gangways) bus intended for carrying passengers within an urban agglomeration. The Vehicle shall be accessible for persons with reduced mobility, including wheelchair users and passengers with prams. |  |
| Source of electrical energy | | The Vehicle shall be equipped with a rechargeable energy storage system (traction battery) supplying electricity to generate electric propulsion. |  |
| Traction battery charging system | | Charging options using “Combo2” charging system plug and connector (CCS2), as well as a roof-mounted system of current collecting contacts (rails) in the front section of the Vehicle roof, ensuring charging through a lowerable pantograph built into a charging station. |  |
| Driving range reserve in urban driving cycle | | The energy storage system installed on the vehicle and fully charged shall ensure the power supply of the Vehicle and ensure an active driving range of at least **200** km before until recharging is required (this requirement shall be fulfilled with a fully laden Vehicle in the urban driving cycle in accordance with E-SORT 2 or equivalent testing conditions).  The output power of the traction batteries shall be sufficient to cover the maximum power consumption of the traction drive by providing electrical energy for generating propulsion, as well as for auxiliary consumers of electrical energy (auxiliary drive, HVAC, lighting, etc.). |  |
| Climatic conditions | | The Vehicle, its systems and subsystems shall safely function at ambient temperatures ranging from -30 0C to +40 0C (with relative air humidity 98% at temperatures of up to +25 0C). |  |
| Vehicle construction and conformity | | The overall construction of the Vehicle shall comply with the laws and regulations of the Republic of Latvia, the requirements of Regulation (EU) 2018/858 and the requirements of UNECE Regulation No. 107, which apply to special provisions for the vehicles of Category M3 used for the carriage of passengers, and the provisions of UNECE Regulation No. 100, which apply to the electrical safety requirements for electrical powertrains, and the provisions of Regulation (EU) 2019/1244, which apply to the general safety of vehicles and the protection of occupants and vulnerable road traffic users. |  |
| Equipment | | The Vehicle shall be equipped with a system for indirect vision consisting of video cameras and screens projecting the image of the video cameras into the driver’s cab of the Vehicle. |  |
| The Vehicle shall be equipped with a collision warning system. |  |
| The Vehicle shall be equipped with an interior and exterior video surveillance system. |  |
| OVERALL DIMENSIONS | | |  |
| Length including buffers (mm) | 17 900 – 18 200 | |  |
| Width excluding system for indirect vision (mm) | No less than 2 530, no more than 2 550 | |  |
| Height including roof-mounted equipment (mm) | ≤ 3 400,  when the tyres are inflated to the specified air pressure, the pneumatic suspension system is adjusted to working mode, and the bodywork lowering system is switched off | |  |
| PASSENGER CAPACITY | | |  |
| Total passenger capacity | ≥ 150,  (Including seats and spaces for standing passengers, calculated as 8 persons per one square meter of free space available for standing passengers) | |  |
| Number of seats | ≥ 35  (Folding seats excluded) | |  |
| Wheelchair spaces | 1 | |  |
| Pram spaces | 1 | |  |
| PASSENGER DOORS | | |  |
| Number of passenger doors | double-leaf doors, 4 | |  |
| Floor height at passenger doors (mm) | ≤ 340,  when the tyres are inflated to the specified air pressure, the pneumatic suspension system is adjusted to working mode, and the bodywork lowering system is switched off | |  |
| Boarding/alighting devices | A retractable (electro-mechanically driven) or reclining (manually driven) platform at the 2nd door facilitating access to the Vehicle for persons with reduced mobility. | |  |
| AXLES | | |  |
| Number of axles | 3 | |  |
| 1st axle | Steering axle, with an independent wheel suspension | |  |
| 2nd axle | Holding axle, with a lowered frame and dual wheels | |  |
| 3rd axle | Driven axle, with a lowered frame and dual wheels | |  |
| Tyre size | 275/70 R22.5, size 315/60 R22.5 is permissible for the front axle | |  |
| Clearance | ≥ 135 mm,  At nominal tyre pressure and maximum Vehicle load | |  |
| VEHICLE BODY | | |  |
| Traction motor | Alternating current (synchronous or asynchronous motor(-s) | |  |
| Traction converter | The traction converter shall be stepless, microprocessor controlled, with low power losses, and it shall provide the traction converter with appropriate alternating current drive. The converter shall be constructed on the basis of IGBT or SiC power electronics technology. | |  |
| VEHICLE BODY | | |  |
| Vehicle body framework | The load-bearing framework shall be resistant to material fatigue and penetrating corrosion throughout the entire service lifetime of the Vehicle. The elements of the Vehicle body framework shall be made of premium quality stainless steel or an equivalent material which is not less corrosion resistant or inferior by other properties to stainless steel. | |  |
| DYNAMIC CHARACTERISTICS | | |  |
| Maximum road up-hill gradient | 12%  A fully laden Vehicle shall be able to overcome the maximum up-hill gradient by starting to drive from any point on such a road. | |  |
| Maximum operating speed (with speed limiter) | ≥ 70 km/h | |  |
| *Vehicle acceleration (fully laden):* | | |  |
| Average acceleration 0-25 km/h | 1.2 m/s2 | |  |
| VEHICLE INFORMATION SYSTEMS  The information systems of the Vehicles and the devices ensuring their operation shall be such that they are compatible with the systems and devices already in use by the Customer. The Customer uses transport planning, coordination and control system Merakas, and the current operation of the information systems is ensured by the use of management system RMS Teltonika, using devices Teltonika RUTX50 and Teltonika TSW202 (currently, approximately 690 devices). The Customer currently uses more than 3000 cameras which are managed in a common video surveillance system which has been made compatible with camera standard Mobotix. | | |  |

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| --- | --- | --- |
| Communication equipment with a remote management licence for the entire warranty period, and with a suitable 5G/LTE/GPS antenna | Teltonika RUTX50 |  |
| Central commutator with a remote management licence for the entire warranty period | Teltonika TSW202 |  |
| Video surveillance terminal and software with recording function and transmission to the Customer’s server, including server licences | At least 8GB RAM, at least 1TB SSD, WIFI, ETH, at least 15", Windows Enterprise IoT LTSC. |  |
| Preparation for installing a ticketing system inside the Vehicle | A ticketing system control device shall be installed in an easily accessible and handy (ergonomic) location for the driver inside the driver’s cab.  Electronic ticketing system validators shall be installed inside the Vehicle passenger compartment opposite to each door.  Upon prior coordination with the Customer, the supplier shall ensure the integration of the electronic ticketing equipment and software into IBIS in accordance with the unified requirements of IBIS. |  |
| Vehicle driver On-Board device with integration into Customer’s platform Merakas | At least 8GB RAM, at least 256Gb SSD, WIFI, ETH, at least 8” Touchscreen, Windows Enterprise IoT LTSC.  The device shall be able to:   1. read Vehicle driver cards, 2. control LED screens and speakers. |  |
| Passenger compartment monitors – 2-sided, installed side-by-side in pairs, with integration into the Customer’s system CMS Merakas and supporting Chromium | At least 17”, with a resolution of at least 1920 x 1080Px, and each monitor shall:  1. be protected against acts of vandalism.  2. be scratch safe.  3. be moisture resistant.  4. be located in compliance with the requirements of European Union laws and standards on passenger transporting.  5. be installed in compliance with the following minimum conditions: distance from the floor to the bottom edge of the panel: no less than 1950 mm; recommended panel width: 800 mm (+/- 100 mm); vertical angle: no more than 30 degrees. |  |
| Video cameras with remote management and diagnostics licences | Resolution of at least 1280 x 720Px for recording. Mobotix, PoE, at least 8 cameras, with a requirement to cover the entire passenger compartment, as well as 1 camera installed above the driver and 1 camera installed on the exterior of the Vehicle facing towards other vehicles in front.   * Driver’s working position shall be fully visible. * Location and number inside the Vehicle driver’s cab shall be sufficient to control and identify conflict situations – use of alcohol interlock, sale of tickets, communication with passengers; the camera inside the driver’s cab shall have audio recording function. * Each passenger door area shall be monitored in order to control passenger boarding and alighting. * Entire passenger compartment shall be visible. * Location and number inside the passenger compartment shall be sufficient to control and identify presence in the passenger compartment. * Carriageway shall be visible both on the left and the right side of the Vehicle. * Carriageway shall be visible both in front and in the rear of the Vehicle (at a distance of no less than 50 m from the vehicle exterior). * Protection against acts of vandalism and the impacts of external weather conditions. |  |
| Integration into transport planning, coordination and control system Merakas Pikas Fleet | Bidirectional real-time data exchange, including route data, assignments, drivers, order changes, driving speed, driving habits, distance between Vehicles on route, etc. |  |
| Passenger flow measuring devices with data transmission to the transport planning, coordination and control system Merakas Pikas Fleet | Passenger flow measuring and analysing equipment shall ensure automatic counting of passenger along the entire route by recording time, route, direction, and location at each stop, as well as by recording the number of passengers who have boarded and alighted the Vehicle through each door, and the current number of passengers inside the Vehicle.  Self-diagnostics function shall be provided with the possibility to inform the driver and central database of the self-diagnostics results.  Accuracy of the passenger flow measuring shall be no less than 97% of all instances. |  |
| SOS button with integration into the Vehicle information system | Pressing of the button shall create a mark in the video feed and send a respective signal to Merakas Pikas Fleet. |  |
| LED panel at the Vehicle front providing information on route line number and direction of travel | The representation shall consist of two rows of letter at a height of at least 110 mm and three-digit route numbers at a height of 170 mm, as well as special graphical pictograms. The colour used for the representation shall be orange (LED). |  |
| LED panel at the Vehicle rear providing information on route line number and direction of travel | The colour used for the representation shall be orange (LED). |  |
| LED side panels (installed on the Vehicle exterior between passenger doors) providing information on route line number and direction of travel | The representation shall include:   1. at least two rows of letters at a height of at least 110 mm and three-digit route numbers at a height of 170 mm. 2. as well as special graphical pictograms. The colour used for the representation shall be orange (LED). |  |
| Vehicle interior and exterior speakers | The Vehicle speakers:   1. shall be in sufficient number so that audio announcements can be clearly heard at any moment of the Vehicle operation. 2. on the side of the Vehicle doors – moisture-resistant exterior speakers shall be installed. The audio feed shall be directed towards the door area of the Vehicle. 3. it shall be possible to control the exterior speakers from inside the driver’s cab of the Vehicle. The interior speakers shall be permanently activated. |  |
| Microphone | The driver’s cab shall be equipped with a microphone, installed on a flexible holder, with a built-in amplifier, used for communication with the passengers and for communication over the radio.  The driver’s cab shall be provided with a driver’s cab audio recording function (for the purpose of controlling the driver of the Vehicle) which shall be integrated into the video surveillance solution.  Microphone wires shall be shielded. |  |

The information systems installed on the Vehicle and the electrotechnical equipment related to these systems shall comply with the following requirements:

1. Ambient / operating / storage temperature:

[-30 + 40 / -30 +70 / -30 +80] OC.

1. Transport vibration level test methodology requirements:

* Fc[sinusoidal vibration] – in accordance with IEC EN60068-2-6 or equivalent.
* Fh[random wideband vibrations (digital control)] – in accordance with IEC EN60068-2-64 or equivalent.

1. Ingress protection rating:

≥ IP54 (if the construction includes components with an ingress rating of IP42 or lower, they shall be installed in separate electrical equipment compartments or containers); components installed on the exterior of the Vehicle shall have an ingress rating of IP65 or higher.

1. Electric power supply voltage of 24 VDC (working range of 16.8-30VDC); all equipment shall be provided with appropriate electric power supply lead-ins.
2. All equipment shall be provided with protection against overvoltage, overloads or short-circuits when the respective electrical installation is protected against overload and short-circuits by use of appropriate fuses or automatic switches.
3. Placement / installation requirements for equipment inside the Vehicles used for the carriage of passengers in accordance with UNECE Regulation No. 107.
4. No component, equipment or device shall not interfere with the operation of other existing electronic equipment or devices.
5. Components and devices shall have automatic self-diagnostics function.
6. Components and equipment shall not cause interference which could result in injury to a passenger or the vehicle driver.
7. Components and devices shall be mechanically and logically protected against sabotage or acts of vandalism. Compliance with impact protection rating IK07(2J) or an alternative.
8. Recommendation for all main components and equipment – provide compliance with ITxPT or equivalent specifications with corresponding ITxPT markings.
9. All equipment shall operate in a single (synchronised) time system and in synchronisation with the on-board computer.
10. Total readiness of the equipment for full operation after complete shutdown/initialisation shall be achieved after a time period of no more than 60 seconds.
11. All devices shall have a warranty period of at least 5 years and shall be suitable for use on vehicles.

The scope of delivery shall include technical documentation and user instructions, detailed descriptions of processes, and information exchange algorithms and formats, and schedules and descriptions of regular technical maintenance works.

Technical documentation, descriptions of systems and other information shall be prepared in Latvian and/or English.

System use and service instructions shall be prepared in Latvian.

The control interfaces (software interfaces and screens) of both devices and computer programmes shall be prepared in Latvian.

Information on LED panels and graphical monitors shall be displayed in Latvian, ensuring correct representation of all Latvian language special characters and punctuation marks.

**General Technical Description of the Subject of Supply**

**(DIESEL BUSES)**

***If any of the technical performance parameters cannot be fulfilled, specify which and offer a possible alternative solution!***

Three-axle articulated low-floor **bus** (hereinafter referred to as – the Vehicle).

|  |  |  |  |
| --- | --- | --- | --- |
| **Customer’s requirements, technical parameters, and description** | | | **Comments and proposals** |
| Vehicle category and class | | M3, Class I. |  |
| Vehicle type and intended use | | The Vehicle – a three-axle articulated low-floor (without steps at doors and in main gangways) bus intended for carrying passengers within an urban agglomeration. The Vehicle shall be accessible for persons with reduced mobility, including wheelchair users and passengers with prams. |  |
| Fuel type | | Diesel (LVS EN 590, LVS EN 15940). |  |
| Engine\* | | A diesel-powered engine complying with exhaust emission standard EURO 6 or higher. |  |
| The power of the diesel-powered engine shall be sufficient to ensure the dynamic characteristics (average acceleration) required by the Vehicle under the specified climatic conditions, as well as to ensure high fuel economy and engine durability. |  |
| Transmission\* | | Automatic gearbox with the number of gears of no less than 4 gears forward, and a reverse gear. |  |
| \*In the market research proposal, the tenderer may specify the use of various innovative technologies/concepts for achieving fuel economy and reducing exhaust emissions in the Vehicle technical construction. In Section “Engine”, the tenderer shall specify the maximum engine power (kW). | | |  |
| Climatic conditions | | The Vehicle, its systems and subsystems shall safely function at ambient temperatures ranging from -30 0C to +40 0C (with relative air humidity 98% at temperatures of up to +25 0C). |  |
| Vehicle construction and conformity | | The overall construction of the Vehicle shall comply with the laws and regulations of the Republic of Latvia, the requirements of Regulation (EU) 2018/858 and the requirements of UNECE Regulation No. 107, which apply to special provisions for the vehicles of Category M3 used for the carriage of passengers, and the provisions of Regulation (EU) 2019/1244, which apply to the general safety of vehicles and the protection of occupants and vulnerable road traffic users. |  |
| Equipment | | The Vehicle shall be equipped with a system for indirect vision consisting of video cameras and screens projecting the image of the video cameras into the driver’s cab of the Vehicle. |  |
| The Vehicle shall be equipped with a collision warning system. |  |
| The Vehicle shall be equipped with an interior and exterior video surveillance system. |  |
| OVERALL DIMENSIONS | | |  |
| Length including buffers (mm) | 17 900 – 18 200 | |  |
| Width excluding system for indirect vision (mm) | No less than 2 530, no more than 2 550 | |  |
| Height including roof-mounted equipment (mm) | ≤ 3 400,  when the tyres are inflated to the specified air pressure, the pneumatic suspension system is adjusted to working mode, and the bodywork lowering system is switched off | |  |
| PASSENGER CAPACITY | | |  |
| Total passenger capacity | ≥ 150,  (Including seats and spaces for standing passengers, calculated as 8 persons per one square meter of free space available for standing passengers) | |  |
| Number of seats | ≥ 35  (Folding seats excluded) | |  |
| Wheelchair spaces | 1 | |  |
| Pram spaces | 1 | |  |
| PASSENGER DOORS | | |  |
| Number of passenger doors | double-leaf doors, 4 | |  |
| Floor height at passenger doors (mm) | ≤ 340,  when the tyres are inflated to the specified air pressure, the pneumatic suspension system is adjusted to working mode, and the bodywork lowering system is switched off | |  |
| Boarding/alighting devices | A retractable (electro-mechanically driven) or reclining (manually driven) platform at the 2nd door facilitating access to the Vehicle for persons with reduced mobility. | |  |
| AXLES | | |  |
| Number of axles | 3 | |  |
| 1st axle | Steering axle, with an independent wheel suspension | |  |
| 2nd axle | Holding axle, with a lowered frame and dual wheels | |  |
| 3rd axle | Driven axle, with a lowered frame and dual wheels | |  |
| Tyre size | 275/70 R22.5, size 315/60 R22.5 is permissible for the front axle | |  |
| Clearance | ≥ 135 mm,  At nominal tyre pressure and maximum Vehicle load | |  |
| VEHICLE BODY | | |  |
| Vehicle body framework | The load-bearing framework shall be resistant to material fatigue and penetrating corrosion throughout the entire service lifetime of the Vehicle. The elements of the Vehicle body framework shall be made of premium quality stainless steel or an equivalent material which is not less corrosion resistant or inferior by other properties to stainless steel. | |  |
| DYNAMIC CHARACTERISTICS | | |  |
| Maximum road up-hill gradient | 12%  A fully laden Vehicle shall be able to overcome the maximum up-hill gradient by starting to drive from any point on such a road. | |  |
| Maximum operating speed (with speed limiter) | ≥ 85 km/h | |  |
| *Vehicle acceleration (fully laden):* | | |  |
| Average acceleration 0-25 km/h | 1.2 m/s2 | |  |
| VEHICLE INFORMATION SYSTEMS  The information systems of the Vehicles and the devices ensuring their operation shall be such that they are compatible with the systems and devices already in use by the Customer. The Customer uses transport planning, coordination and control system Merakas, and the current operation of the information systems is ensured by the use of management system RMS Teltonika, using devices Teltonika RUTX50 and Teltonika TSW202 (currently, approximately 690 devices). The Customer currently uses more than 3000 cameras which are managed in a common video surveillance system which has been made compatible with camera standard Mobotix. | | |  |

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| --- | --- | --- |
| Communication equipment with a remote management licence for the entire warranty period, and with a suitable 5G/LTE/GPS antenna | Teltonika RUTX50 |  |
| Central commutator with a remote management licence for the entire warranty period | Teltonika TSW202 |  |
| Video surveillance terminal and software with recording function and transmission to the Customer’s server, including server licences | At least 8GB RAM, at least 1TB SSD, WIFI, ETH, at least 15", Windows Enterprise IoT LTSC. |  |
| Preparation for installing a ticketing system inside the Vehicle | A ticketing system control device shall be installed in an easily accessible and handy (ergonomic) location for the driver inside the driver’s cab.  Electronic ticketing system validators shall be installed inside the Vehicle passenger compartment opposite to each door.  Upon prior coordination with the Customer, the supplier shall ensure the integration of the electronic ticketing equipment and software into IBIS in accordance with the unified requirements of IBIS. |  |
| Vehicle driver On-Board device with integration into Customer’s platform Merakas | At least 8GB RAM, at least 256Gb SSD, WIFI, ETH, at least 8” Touchscreen, Windows Enterprise IoT LTSC.  The device shall be able to:   1. read Vehicle driver cards, 2. control LED screens and speakers. |  |
| Passenger compartment monitors – 2-sided, installed side-by-side in pairs, with integration into the Customer’s system CMS Merakas and supporting Chromium | At least 17”, with a resolution of at least 1920 x 1080Px, and each monitor shall:  1. be protected against acts of vandalism.  2. be scratch safe.  3. be moisture resistant.  4. be located in compliance with the requirements of European Union laws and standards on passenger transporting.  5. be installed in compliance with the following minimum conditions: distance from the floor to the bottom edge of the panel: no less than 1950 mm; recommended panel width: 800 mm (+/- 100 mm); vertical angle: no more than 30 degrees. |  |
| Video cameras with remote management and diagnostics licences | Resolution of at least 1280 x 720Px for recording. Mobotix, PoE, at least 8 cameras, with a requirement to cover the entire passenger compartment, as well as 1 camera installed above the driver and 1 camera installed on the exterior of the Vehicle facing towards other vehicles in front.   * Driver’s working position shall be fully visible. * Location and number inside the Vehicle driver’s cab shall be sufficient to control and identify conflict situations – use of alcohol interlock, sale of tickets, communication with passengers; the camera inside the driver’s cab shall have audio recording function. * Each passenger door area shall be monitored in order to control passenger boarding and alighting. * Entire passenger compartment shall be visible. * Location and number inside the passenger compartment shall be sufficient to control and identify presence in the passenger compartment. * Carriageway shall be visible both on the left and the right side of the Vehicle. * Carriageway shall be visible both in front and in the rear of the Vehicle (at a distance of no less than 50 m from the vehicle exterior). * Protection against acts of vandalism and the impacts of external weather conditions. |  |
| Integration into transport planning, coordination and control system Merakas Pikas Fleet | Bidirectional real-time data exchange, including route data, assignments, drivers, order changes, driving speed, driving habits, distance between Vehicles on route, etc. |  |
| Passenger flow measuring devices with data transmission to the transport planning, coordination and control system Merakas Pikas Fleet | Passenger flow measuring and analysing equipment shall ensure automatic counting of passenger along the entire route by recording time, route, direction, and location at each stop, as well as by recording the number of passengers who have boarded and alighted the Vehicle through each door, and the current number of passengers inside the Vehicle.  Self-diagnostics function shall be provided with the possibility to inform the driver and central database of the self-diagnostics results.  Accuracy of the passenger flow measuring shall be no less than 97% of all instances. |  |
| SOS button with integration into the Vehicle information system | Pressing of the button shall create a mark in the video feed and send a respective signal to Merakas Pikas Fleet. |  |
| LED panel at the Vehicle front providing information on route line number and direction of travel | The representation shall consist of two rows of letter at a height of at least 110 mm and three-digit route numbers at a height of 170 mm, as well as special graphical pictograms. The colour used for the representation shall be orange (LED). |  |
| LED panel at the Vehicle rear providing information on route line number and direction of travel | The colour used for the representation shall be orange (LED). |  |
| LED side panels (installed on the Vehicle exterior between passenger doors) providing information on route line number and direction of travel | The representation shall include:   1. at least two rows of letters at a height of at least 110 mm and three-digit route numbers at a height of 170 mm. 2. as well as special graphical pictograms. The colour used for the representation shall be orange (LED). |  |
| Vehicle interior and exterior speakers | The Vehicle speakers:   1. shall be in sufficient number so that audio announcements can be clearly heard at any moment of the Vehicle operation. 2. on the side of the Vehicle doors – moisture-resistant exterior speakers shall be installed. The audio feed shall be directed towards the door area of the Vehicle. 3. it shall be possible to control the exterior speakers from inside the driver’s cab of the Vehicle. The interior speakers shall be permanently activated. |  |
| Microphone | The driver’s cab shall be equipped with a microphone, installed on a flexible holder, with a built-in amplifier, used for communication with the passengers and for communication over the radio.  The driver’s cab shall be provided with a driver’s cab audio recording function (for the purpose of controlling the driver of the Vehicle) which shall be integrated into the video surveillance solution.  Microphone wires shall be shielded. |  |

The information systems installed on the Vehicle and the electrotechnical equipment related to these systems shall comply with the following requirements:

1. Ambient / operating / storage temperature:

[-30 + 40 / -30 +70 / -30 +80] OC.

1. Transport vibration level test methodology requirements:

* Fc[sinusoidal vibration] – in accordance with IEC EN60068-2-6 or equivalent.
* Fh[random wideband vibrations (digital control)] – in accordance with IEC EN60068-2-64 or equivalent.

1. Ingress protection rating:

≥ IP54 (if the construction includes components with an ingress rating of IP42 or lower, they shall be installed in separate electrical equipment compartments or containers); components installed on the exterior of the Vehicle shall have an ingress rating of IP65 or higher.

1. *Electric power supply voltage of 24 VDC (working range of 16.8-30VDC); all equipment shall be provided with appropriate electric power supply lead-ins*.
2. All equipment shall be provided with protection against overvoltage, overloads or short-circuits when the respective electrical installation is protected against overload and short-circuits by use of appropriate fuses or automatic switches.
3. Placement / installation requirements for equipment inside the Vehicles used for the carriage of passengers in accordance with UNECE Regulation No. 107.
4. No component, equipment or device shall not interfere with the operation of other existing electronic equipment or devices.
5. Components and devices shall have automatic self-diagnostics function.
6. Components and equipment shall not cause interference which could result in injury to a passenger or the vehicle driver.
7. Components and devices shall be mechanically and logically protected against sabotage or acts of vandalism. Compliance with impact protection rating IK07(2J) or an alternative.
8. Recommendation for all main components and equipment – provide compliance with ITxPT or equivalent specifications with corresponding ITxPT markings.
9. All equipment shall operate in a single (synchronised) time system and in synchronisation with the on-board computer.
10. Total readiness of the equipment for full operation after complete shutdown/initialisation shall be achieved after a time period of no more than 60 seconds.
11. All devices shall have a warranty period of at least 5 years and shall be suitable for use on vehicles.

The scope of delivery shall include technical documentation and user instructions, detailed descriptions of processes, and information exchange algorithms and formats, and schedules and descriptions of regular technical maintenance works.

Technical documentation, descriptions of systems and other information shall be prepared in Latvian and/or English.

System use and service instructions shall be prepared in Latvian.

The control interfaces (software interfaces and screens) of both devices and computer programmes shall be prepared in Latvian.

Information on LED panels and graphical monitors shall be displayed in Latvian, ensuring correct representation of all Latvian language special characters and punctuation marks.