Appendix 8

TECHNICAL SPECIFICATION AND TECHNICAL BID TEMPLATE

**18-Metre Articulated Electric Bus\***

**\***hereinafter referred to as – the Vehicle

*!!! If any of the technical parameters or criteria cannot be met, please provide the respective reasons, and offer a feasible alternative solution.*

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| **Technical Parameter or Criterion** | **Customer’s Requirements, Characteristics, and Description** | **Tenderer’s Indication of Compliance with the Requirements** (yes – complies; no – does not comply), **and Commentary or Offer** | |
| **General Requirements** | |  | |
| Vehicle Category and Class | Category M3, Class I. | yes  no |  |
| Vehicle Type and Application | * Three-axle articulated low-floor bus (without steps in doorways and main gangways), designed and intended for the carriage of passengers within urban agglomeration. * The Vehicle shall be accessible to passengers with reduced mobility, including passengers in wheelchairs and passengers with prams. | yes  no |  |
| Climatic Operating Conditions | The Vehicle, its systems and subsystems shall function safely at ambient temperatures from -300C to +400C (relative air humidity 98% at temperatures of up to +250C). | yes  no |  |
| Vehicle Compliance | The Vehicle shall comply with the laws and regulations of the Republic of Latvia and with the provisions of Regulation (EU) 2018/858, as attested by the Vehicle type-approval certificate, including Requirements of Regulation (EU) 2019/1244 concerning the general safety of vehicles and the protection of vehicle occupants and vulnerable road users (GSR2). | yes  no |  |
| **Electric Powertrain** | |  | |
| Type of Powertrain | Electric powertrain based on a Rechargeable Electrical Energy Storage System (REESS) – a traction battery that provides electrical energy for ensuring electric propulsion force. | yes  no |  |
| Range | The capacity and power of the traction battery shall be sufficient to ensure the operation of a loaded vehicle in urban driving cycle mode at a distance of **at least 150 km\*** until recharging.  *\** *According to the electricity consumption confirmed by the VECTO simulation or the results of the E-SORT-2 driving tests.* | yes  no | Please indicate the capacity of the traction battery, the range and the electricity consumption |
| Traction Battery Charging | * Lithium-ion type (LFP, NMC or of other chemical compound) traction battery with appropriate thermoregulation system (forced air or forced water cooling). * Battery Management System (BMS) ensuring optimal and safe operation and charging of the traction battery. * Traction batteries shall be installed in a well-ventilated compartment, separated from the passenger compartment, or on the roof of the Vehicle. | yes  no | Please specify traction battery type and installation location |
| Charging of Traction Battery | * Slow charging (in the vehicle park) from a DC charging device, using the Combined Charging System (CCS2) “Combo2” type plug and socket connection built into the rear section of the Vehicle. * Fast charging (at route end stations) from a high-power DC charging device via a drop-down (inverted) pantograph built into charging station, using a roof-mounted conductive contact system (rails) installed in the front section of the Vehicle. | yes  no |  |
| Traction Motor and Traction Converter | * AC asynchronous or permanent magnet synchronous motor/-s with sufficient output power to ensure the dynamic performance characteristics of the Vehicle. * The traction motor converter (inverter) shall have low power losses and shall ensure stable operation of the traction motor/-s in all its modes and across the entire range of power. * The regenerative braking process shall ensure that the energy generated in the traction motor is returned to the traction battery (recuperation function). | yes  no | Please specify motor type and output power |
| **Dimensions and Passenger Capacity** | |  | |
| Length | ≤18 750 mm | yes  no |  |
| Width | ≤ 2 550 mm | yes  no |  |
| Height | ≤ 3 400 mm | yes  no |  |
| Total Passenger Capacity | ≥ 150  (*the conventional space for standing passengers shall be calculated in accordance with the provisions of UN Regulation No. 107*) | yes  no | Please specify total passenger capacity |
| Number of Seats | ≥ 35  (*determined in accordance with the provisions of Regulation (EU) 2018/858*) | yes  no | Please specify the number of seats |
| Space for Passengers in Wheelchairs and for Passengers with Prams | 1+1  (*all installed in accordance with the provisions of UN Regulation No. 107*) | yes  no |  |

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| **Accessibility and Passenger Compartment** | |  | |
| Passenger Doors | 4 (four) inward or outward opening two-leaf doors on the right side of the Vehicle, with pneumatic or electric drive. | yes  no | Please specify door type and drive type |
| Floor Height at Passenger Doors | ≤ 340 mm | yes  no |  |
| Height in Gangways and at Doors of the Passenger Compartment | ≤ 1950 mm | yes  no |  |
| Boarding and Deboarding Assistance Equipment | Manually folding (as an option – electromechanically retractable), compliant with the provisions of UN Regulation No. 107, installed at the 2nd door to facilitate boarding into the Vehicle for passengers with reduced mobility. | yes  no |  |
| Bodywork Tilting Function (*kneeling*) | The Vehicle body shall be capable of being tilted to the right side to lower the boarding height to 240-260 mm relative to the surface of the road. | yes  no |  |
| HVAC System | Energy efficient and optimised heating and air conditioning system (integration of a fuel-powered autonomous heater is permissible).   * Integration of the heat pump into the heating system (as an option) to improve heating efficiency and/or electricity/fuel economy. * An efficient and easy-to-manage preconditioning system that provides preheating/precooling of the cabin before disconnecting the vehicle from the charging station. | yes  no |  |
| Passenger seats | Durable seats of ergonomic structure that provide maximum comfort to passengers.   * For finishing of seat cushion and backrest should be used a high-quality and sustainable synthetic material, which has following properties:   + high wear and tear resistance,   + resistance to vandalism,   + dirt and water repellent properties,   + fire resistance,   + easy to clean and quick to dry. | yes  no | Please indicate possible alternative materials for seat finishing |
| **Chassis, Axles and Suspension** | |  | |
| Load-bearing Structure | The elements of the chassis frame shall be made of premium quality stainless steel or equivalent material, the corrosion resistance and strength properties of which are not worse. | yes  no |  |
| Axles | * Front (steering) axle with independent suspension. * Rear and central axle with lowered frame (portal) and propulsion configuration appropriate to the Vehicle concept. * Axles shall be fitted with mechanical stabilisers (if the design so provides) to ensure adequate dynamic stability of the vehicle and to improve steerability and safety. | yes  no | Please specify drive axle configuration |
| Tyres | 275/70 R22.5   * The labelling of tyres regarding performance rating shall meet at least the following classes: * Fuel efficiency (rolling resistance) — B * External noise — A * Wet grip — C | yes  no | Please specify a different tyre size if necessary |
| Suspension | * Electronically Controlled Air Suspension (ECAS). * Adaptive shock absorbers (as an option) to improve driving comfort and vehicle dynamic stability. | yes  no |  |
| Clearance | ≥ 135 mm  (*at rated tyre pressure, rated suspension height and full Vehicle load*) | yes  no |  |
| Additional Equipment | Central lubrication system (CES) providing automatic lubricant supply to steering axle, steering gear and articulated joint gear assemblies (if the design so requires). | yes  no | Please specify a CES solution if this option exists |
| **Dynamic Characteristics** | |  | |
| Maximum Speed Limit | ≥ 70 km/h   * A possibility (as an option) to provide dynamic speed limiting (DSLS), using real-time location data (GPS) of the Vehicle and an appropriate remote management system. | yes  no | Please specify a DSLS solution if this option exists |
| Maximum Road Up-hill Gradient | 12%  (*a fully loaded Vehicle shall be able to overcome the maximum up-hill road gradient, starting to drive from any point of such road*) | yes  no |  |
| Average Acceleration | ≥ 1.2 m/s2  (*with the Vehicle developing a speed from 0 to 25 km/h*) | yes  no |  |
| **Safety Systems and Driver Assistance Systems** | |  | |
| Fire Extinguishing System | The Vehicle shall be equipped with an effective automatic fire protection and extinguishing system for traction batteries. | yes  no |  |
| Advanced Driver Assistance Systems | * The Vehicle shall be equipped with all mandatory Advanced Driver Assistance Systems (ADAS) required by GSR2. * Additionally (as an option), Advanced Emergency Braking System (AEBS), optimized for urban traffic conditions, shall be installed. | yes  no |  |
| Devices for Indirect Vision | It shall be possible (as an option) to equip the Vehicle with a system of camera-monitor devices which would replace the functionality of exterior rear-view mirrors. | yes  no |  |
| **Maintenance and Servicing** | |  | |
| Diagnostics and Repairs Equipment | * Together with the first Vehicle, 2 (two) complete sets of special equipment shall be delivered, including software necessary for conducting complete diagnostics and repairs of all systems. * Additionally, it shall be possible to order the delivery of 5 (five) more diagnostics sets (for a separate fee). | yes  no |  |
| Technical Documentation | * All necessary Vehicle use (operation), maintenance, repairs and diagnostics instructions, diagrams and schematics shall be delivered or provided access to. * A detailed and illustrated spare parts catalogue shall be delivered or provided access to. | yes  no |  |
| **Information System Equipment** | |  | |
| General Requirements | * The Supplier shall ensure the installation and connection of devices of an On-board Integrated Information System (IBIS) selected and provided by the Customer, as well as the connection and assembly of the relevant 24V power supply. * The Supplier shall coordinate the specifications for the placement, installation, connection, and compatibility of software of IBIS devices with the Customer before the start of production of the Vehicle. | yes  no |  |
| Information System (Driver’s) Control Unit | Tablet with an Android operating system and a touch screen of at least 10” (*to be provided by the Customer*). | yes  no |  |
| Passenger Information System (PIS) | * At least 2 LCD passenger compartment monitors with two separate 17-inch information screens (*devices to be provided by the Customer, but housing, fastenings and assembly in the vehicle to be provided by the Supplier*). * LED external panels in the front, rear and on the sides of each section of the Vehicle (*devices to be provided by the Customer, but housing, fastenings and assembly in the vehicle to be provided by the Supplier*) * Audio announcement playback system:   + Audio amplifier with a linear audio input and microphone input (*to be provided by the Supplier*)   + Speakers in the interior of the Vehicle and on the exterior of the Vehicle (at doors) in an appropriate quantity (*to be provided by the Supplier*)   + Microphone, installed on a flexible stand, inside the driver’s cab (*to be provided by the Supplier*) | yes  no |  |
| Video Surveillance System (CCTV) | * Digital (IP) colour video cameras in an appropriate quantity to view the passenger compartment, door areas and the carriageway outside the Vehicle (*devices to be provided by the Customer, but installation in the Vehicle to be provided by the Supplier*). * Video surveillance monitor (no smaller than 15-inch) inside the driver’s cabin of the Vehicle with the possibility to display online video from any camera (*devices to be provided by the Customer, but installation in the Vehicle to be provided by the Supplier*). * Video surveillance terminal and software (with licenses) with recording function and transfer to the Customer’s server (Digifort) (*to be provided by the Customer*). | yes  no |  |
| Passenger Counting System (APC) | The Vehicle shall be equipped with an automatic passenger counting system enabling automated data analysis and transfer to the Customer’s planning, coordination, and control system (*devices to be provided by the Customer, but installation in the Vehicle to be provided by the Supplier according to the APC manufacturer’s specification*). | yes  no |  |
| Local Data Exchange Network | * 5G/LTE/GPS communication device (router) and internal Ethernet network switches with POE functionality (*devices to be provided by the Customer, but installation in the Vehicle to be provided by the Supplier, coordinating the placement with the Customer*). * The Vehicle shall be equipped with an Ethernet network (at least 1000BASE-TX) used uniformly by all IBIS devices (*to be provided by the Supplier*) * GPS (GNNS)/LTE combined antenna (to be provided by the Customer) which must be installed appropriately on the roof of the Vehicle (to be provided by the Supplier). | yes  no |  |
| Electronic Ticket Control System | The Vehicle shall be pre-equipped with installation sites and connections sites for ticket selling and control devices, including all the necessary relevant communications and power supply and installation (*to be provided by the Supplier, coordinating the placement and connections with the Customer*). | yes  no |  |

[Updated on May 6, 2025]