

Zero Emission Bus Certificate

Customer: Switch Mobility				DYNAMOMETER SETTINGS		
Customer Address:	Hurricane Way South, Sherburn-in-Elmet, North Yorks	Telematics Capability	Yes	Test Weight	13683	kg
Test Purpose:	Zero Emission Bus Testing	Maximum Speed (km/h)	80 km/h	F ^o	211.53	N
Vehicle Manufacturer:	Switch Mobility	Seated Capacity	69	F ¹	3.3260	N/kmh
Vehicle Model Name:	MetroDecker EV	Passenger Capacity	98	F ²	0.23358	N/kmh ²
Powertrain Technology:	Battery Electric	Declared Unladen Weight (kg)	11180	Equivalent test passengers	34.5	passengers
Powertrain Configuration:	250kW Hub Motor	Gross Weight (kg)	19500	Measured Unladen Weight	11262	kg
Zero Emission Heating:	PTC Heaters	GVW Check	OK	Number of consecutive tests completed	4	Tests
Battery Specification		Charging and Refuelling Capability		Hydrogen Specification		
Battery Manufacturer	Lithion Battery	Plug Type	AC Type 2 / DC CCS 2	Fuel Cell Manufacturer	N/A	
Battery Chemistry	LFP	Max Charge Capability (kW)	Up to 88kW	Fuel Cell Power Rating (kW)	N/A	
Battery Installed Capacity (kWh)	300	Charger Compatibility	AC or DC	Hydrogen Storage Capacity (kg)	N/A	
Battery Usable Capacity (kWh)*	250	Charge time from 20-80% SOC**	3-6 hours	Hydrogen Storage Pressure (bar)	N/A	

* Recommended manufacturer guideline, subject to warranty

** Based on manufacturer estimate

Declared fuel, properties and source plus carbon conversion factors

Well-to-Tank Factor:	Electricity	72.65	g CO ₂ e / MJ	Fuel Provider	UK market standard	WTT evidence	DBEIS Conversion 2022
Well-to-Tank Factor:	Hydrogen	N/A	g CO ₂ e / MJ	Capacity of Tanker (kg)	N/A	Fuel Type / Pathway	UK Grid Electricity
Energy Density	Hydrogen	120	MJ / kg	Transport Distance of Hydrogen (km)	N/A	Energy Source	UK Grid

Emissions and Energy consumption results from approved test facility - Average 4 tests

Test Phase	HC (g/km)	CO (g/km)	NOx (g/km)	PM (g/km)	CO ₂ (g/km)	CH ₄ (g/km)*	N ₂ O (g/km)*	Total Energy Consumption (kWh)	Vehicle Energy Consumption (kWh/km)	Grid Electrical Energy Consumption (kWh/100km)
Outer Urban	N/A	N/A	N/A	N/A	N/A	N/A	N/A	7.79	1.22	154.93
Inner Urban	N/A	N/A	N/A	N/A	N/A	N/A	N/A	3.93	1.56	198.48
Rural	N/A	N/A	N/A	N/A	N/A	N/A	N/A	6.95	0.94	119.28
LBC Average	N/A	N/A	N/A	N/A	N/A	N/A	N/A	11.91	1.31	167.22
UK BUS Average	N/A	N/A	N/A	N/A	N/A	N/A	N/A	18.67	1.14	145.42

Zero Emissions (Z.E.) Range: Energy consumption and charging efficiency

Test Charger Used	22 kW	Total measured energy consumed on vehicle (kWh)¹	120.79	Max ZE Range at 100% SOC (km)	219
Hydrogen Energy Over Test (kWh)	N/A	Measured grid energy during charging (kWh)	154.00	Max ZE Range at 80% SOC (km)	175
Hydrogen Delivered to Vehicle (kg)	N/A	Grid-to-Wheel efficiency (%)²	78%	Test Distance Travelled (km)	65

¹ Total measured energy may include energy used during the 23 minute warmup, this is needed for charge efficiency calculation.

² Grid to Wheel efficiency represents the total energy losses between the grid and the wheels of the bus.

Calculated total Well-to-Wheel GHG CO₂ equivalent emissions over test

Test Phase	Fuel Energy (MJ/km)	Fuel WTT*GHG Emissions (g CO ₂ e / km)	Electrical Energy (MJ / km)	Electricity WTT* GHG Emissions (g CO ₂ e / km)	Data Generated by (On behalf of Test facility): Date: Data Approved by: Date:
Outer Urban	N/A	N/A	5.58	405.22	
Inner Urban	N/A	N/A	7.15	519.11	
Rural	N/A	N/A	4.29	311.96	
LBC Average	N/A	N/A	6.02	437.35	
UK BUS Average	N/A	N/A	5.24	380.33	

Zero Emission Bus Certificate Summary

Test Vehicle	Average Euro VI Diesel Equivalent				
Greenhouse Gas Emissions: Well-to-Wheel	380.3	g CO ₂ e / km	Average Diesel GHG Emissions Equivalent	1403	g CO ₂ e / km
WTW CO₂ per passenger km (@ Max Pass Capacity)	3.9	g CO ₂ e/pass km	WTW CO₂ per passenger km (@ Max Pass Capacity)	14.3	g CO ₂ e/pass km
Overall Zero Emission Bus Performance					
WTW GHG saving	1022.8	g CO ₂ e / km	Maximum Theoretical Zero Emission Range (km)	219.3	
% WTW GHG saving	73%	g CO ₂ e / km	Vehicle Energy Consumption (kWh/ km)	1.14	
Approved as Zero Emission Bus? (50% GHG saving or more)				YES	

* WTT : Well-to-Tank

** TTW : Tank-to-Wheel

*** WTW : Well-to Wheel

COMMENTS: Emission results marked in red are below detection levels. LBC = London Bus Cycle - Inner & Outer Urban phases of UKBC only.	Heating Requirement	Cell	Lower Saloon	Upper Saloon
	Target Temperatures ±2 (°C) :	10	17	17
	Average Temperatures across testing (°C)	9.34	17.43	16.92

Test Numbers: ML02018714 (18.07.2019), ML02018715 (18.07.2019), ML02018716 (18.07.2019), ML02018717 (18.07.2019)

Certificate approved by: On behalf of Bus manufacturer Tom Cox 23/03/2023 	Certificate Approved by: On behalf of DfT / Zemo Partnership Tim Griffen 21.03.2023
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