

Zero Emission Bus Certificate

Customer:	EVM Direct Ltd			DYNAMOMETER SETTINGS		
Customer Address:	Unit 1 Oakhurst Business Park, Southwater, RH13 9RT	Telematics Capability	Yes	Test Weight	4638	kg
Test Purpose:	Zero Emission Bus Testing	Maximum Speed (km/h)	80 km/h	F°	-73.65	N
Vehicle Manufacturer:	EVM	Seated Capacity	13	F ¹	-0.0397	N/kmh
Vehicle Model Name:	Novus	Passenger Capacity	15	F ²	0.08246	N/kmh ²
Powertrain Technology:	Battery Electric	Declared Unladen Weight (kg)	4120	Equivalent test passengers	6.5	passengers
Powertrain Configuration:	Direct Drive	Gross Weight (kg)	5500	Measured Unladen Weight	4196	kg
Zero Emission Heating:	Heat Pump	GVW Check	OK	Number of consecutive tests completed	4	Tests
Battery Specification		Charging and Refuelling Capability		Hydrogen Specification		
Battery Manufacturer	N/A	Plug Type	CCS2 / AC Type 2	Fuel Cell Manufacturer	N/A	
Battery Chemistry	NMC	Max Charge Capability (kW)	70kW / 22 kW	Fuel Cell Power Rating (kW)	N/A	
Battery Installed Capacity (kWh)	115	Charger Compatibility	DC / AC	Hydrogen Storage Capacity (kg)	N/A	
Battery Usable Capacity (kWh)*	92	Charge time from 20-80% SOC**	2-6 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	N/A

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	2.56	0.40	54.79
Inner Urban	N/A	N/A	N/A	N/A	N/A	N/A	N/A	1.35	0.55	75.34
Rural	N/A	N/A	N/A	N/A	N/A	N/A	N/A	2.11	0.29	39.73
LBC Average	N/A	N/A	N/A	N/A	N/A	N/A	N/A	3.90	0.44	60.27
UK BUS Average	N/A	N/A	N/A	N/A	N/A	N/A	N/A	6.02	0.37	50.68

Zero Emissions (Z.E.) Range: Energy consumption and charging efficiency					
Test Charger Used	22 kW	Total measured energy consumed on vehicle (kWh) ¹	30.00	Max ZE Range at 100% SOC (km)	249
Hydrogen Energy Over Test (kWh)	N/A	Measured grid energy during charging (kWh)	41.00	Max ZE Range at 80% SOC (km)	199
Hydrogen Delivered to Vehicle (kg)	N/A	Grid-to-Wheel efficiency (%) ²	73%	Test Distance Travelled (km)	80

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 CO ₂ equivalent emissions over test					Data Generated by (On behalf of Test facility):	Date:
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 Approved by:	Date:
Outer Urban	N/A	N/A	1.97	143.31		
Inner Urban	N/A	N/A	2.71	197.05		
Rural	N/A	N/A	1.43	103.90		
LBC Average	N/A	N/A	2.17	157.64		
UK BUS Average	N/A	N/A	1.82	132.56		

Zero Emission Bus Certificate Summary							
Test Vehicle			Average Euro VI Diesel Equivalent				
Greenhouse Gas Emissions: Well-to-Wheel		132.6	g CO ₂ e / km	Average Diesel GHG Emissions Equivalent		621	g CO ₂ e / km
WTW CO ₂ per passenger km (@ Max Pass Capacity)		8.8	g CO ₂ e/pass km	WTW CO ₂ per passenger km (@ Max Pass Capacity)		41.4	g CO ₂ e/pass km
Overall Zero Emission Bus Performance							
WTW GHG saving		488.7	g CO ₂ e / km	Maximum Theoretical Zero Emission Range (km)		248.6	
% WTW GHG saving		79%	g CO ₂ e / km	Vehicle Energy Consumption (kWh/ km)		0.37	
Approved as Zero Emission Bus? (50% GHG saving or more)				YES			

* WTT : Well-to-Tank

** TTW : Tank-to-Wheel

*** WTW : Well-to Wheel

COMMENTS: Current measured from positive and negative terminals was combined to give final result. This was advised as the method to assume for measurement losses through shielded cabling by customer. This assumes exactly 50% of current was able to be measured by each amp	Heating Requirement	Cell	Lower Saloon	Upper Saloon
	Target Temperatures ±2 (°C) :	10	17	17
	Average Temperatures across testing (°C)	9.98	20.90	N/A

Test Numbers: 20220329_1533, 20220329_1646, 20220329_1919, 20220329_2021

 Certificate approved by:
 On behalf of Bus manufacturer

Certificate Approved by:

Tim Griffen

On behalf of DfT / Zemo Partnership

21.03.2023