

Zero Emission Bus Certificate

Customer: Pelican Bus and Coach				DYNAMOMETER SETTINGS	
Customer Address:	Wakefield Europort, Alofts Lane, Wakefield	Telematics Capability	Yes	Test Weight	15110 kg
Test Purpose:	Zero Emission Bus Testing	Maximum Speed (km/h)	80 km/h	F¹	-335.26 N
Vehicle Manufacturer:	Yutong	Seated Capacity	37	F²	-2.5310 N/kmh
Vehicle Model Name:	E12	Passenger Capacity	70		0.15277 N/kmh ²
Powertrain Technology:	Battery Electric	Declared Unladen Weight (kg)	13750	Equivalent test passengers	18.5
Powertrain Configuration:	Direct Drive	Gross Weight (kg)	19500	Measured Unladen Weight (kg)	13852
Zero Emission Heating:	PTC Heaters	GVW Check	OK	Number of consecutive tests completed	4
Battery Specification		Charging and Refuelling Capability		Hydrogen Specification	
Battery Manufacturer	CATL	Plug Type	DC CCS 2 (x2)	Fuel Cell Manufacturer	N/A
Battery Chemistry	LFP	Max Charge Capability (kW)	Up to 240kW	Fuel Cell Power Rating (kW)	N/A
Battery Installed Capacity (kWh)	422	Charger Compatibility	DC	Hydrogen Storage Capacity (kg)	N/A
Battery Usable Capacity (kWh)*	371	Charge time from 20-80% SOC	1.5 - 4 hours	Hydrogen Storage Pressure (bar)	N/A

* Recommended manufacturer guideline, subject to warranty

Declared fuel, properties and source plus carbon conversion factors

Well-to-Tank Factor:	Electricity	80.92	g CO _{2e} / MJ	Fuel Provider	UK market standard	WTT evidence	DBEIS Conversion 2021
Well-to-Tank Factor:	Hydrogen	N/A	g CO _{2e} / 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	Hydrogen Production 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)*	Vehicle 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	5.86	0.91	99.11
Inner Urban	N/A	N/A	N/A	N/A	N/A	N/A	N/A	2.54	1.01	110.37
Rural	N/A	N/A	N/A	N/A	N/A	N/A	N/A	5.26	0.71	77.54
LBC Average	N/A	N/A	N/A	N/A	N/A	N/A	N/A	8.40	0.94	102.26
UK BUS Average	N/A	N/A	N/A	N/A	N/A	N/A	N/A	13.65	0.84	91.07

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

Test Charger Used	22 kW	Total measured energy consumed on vehicle (kWh)¹	55.00	Max ZE Range at 100% SOC (km)	443
Hydrogen Energy Over Test (kWh)	N/A	Measured grid energy during charging (kWh)	60.00	Max ZE Range at 80% SOC (km)	355
Hydrogen Delivered to Vehicle (kg)	N/A	Grid-to-Wheel efficiency (%)²	92%	Test Distance Travelled (km)	65

¹ Total measured energy includes 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					Data Generated by (On behalf of Test facility):	Date:
Test Phase	Fuel Energy (MJ /km)	Fuel WTT*GHG Emissions (g CO _{2e} / km)	Electrical Energy (MJ / km)	Electricity WTT* GHG Emissions (g CO _{2e} / km)	Data Approved by:	Date:
Outer Urban	N/A	N/A	3.57	288.72		
Inner Urban	N/A	N/A	3.97	321.52		
Rural	N/A	N/A	2.79	225.88		
LBC Average	N/A	N/A	3.68	297.90		
UK BUS Average	N/A	N/A	3.28	265.31		

Zero Emission Bus Certificate Summary

Test Vehicle			Average Euro VI Diesel Equivalent		
GHG Well-to-Wheel	265.3	g CO _{2e} / km	Average Diesel Equivalent	1139	g CO _{2e} / km
WTW CO₂ per passenger km (@ Max Pass Capacity)	3.8	g CO _{2e} /pass km	WTW CO₂ per passenger km (@ Max Pass Capacity)	16.3	g CO _{2e} /pass km
Overall Zero Emission Bus Performance					
WTW GHG saving	874.1	g CO _{2e} / km	Maximum Theoretical Zero Emission Range (km)	443.2	
% WTW GHG saving	77%	g CO _{2e} / km	Vehicle Energy Consumption (kWh/ km)	0.84	
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.		Cell	Lower Saloon	Upper Saloon
	Target Temperatures ±2 (°C) :	10	17	N/A
	Average Temperatures across testing (°C)	9.98	19.67	N/A

Test Numbers: 20220311_1522, 20220311_1655, 20220311_1812, 20220311_1921

Certificate approved by:
On behalf of Bus manufacturer

Certificate Approved by: Daniel Hayes
On behalf of DfT / Zemo Partnership
7.04.2022