

Zero Emission Bus Certificate

Customer: Pelican Bus and Coach		DYNAMOMETER SETTINGS			
Customer Address: Wakefield Europort, Alofts Lane, Wakefield	Telematics Capability	Yes	Test Weight	15585	kg
Test Purpose: Zero Emission Bus Testing	Maximum Speed (km/h)	80 km/h	F°	66.05	N
Vehicle Manufacturer: Yutong	Seated Capacity	50	F¹	-4.6295	N/kmh
Vehicle Model Name: TCE12	Passenger Capacity	50	F²	0.4	N/kmh ²
Powertrain Technology: Battery Electric	Declared Unladen Weight (kg)	13885	F³	-0.0027	N/kmh ³
Powertrain Configuration: Direct Drive	Gross Weight (kg)	18500	Equivalent test passengers		25
Zero Emission Heating: PTC Heaters	GVW Check	OK	Measured Unladen Weight (kg)		13885
Battery Specification		Charging and Refuelling Capability		Hydrogen Specification	
Battery Manufacturer	CATL	Plug Type	DC CCS 2	Fuel Cell Manufacturer	N/A
Battery Chemistry	LFP	Max Charge Capability (kW)	Up to 150kW	Fuel Cell Power Rating (kW)	N/A
Battery Installed Capacity (kWh)	281	Charger Compatibility	DC	Hydrogen Storage Capacity (kg)	N/A
Battery Usable Capacity (kWh)	247	Charge time from 20-80% SOC	1.5 - 4 hours	Hydrogen Storage Pressure (bar)	N/A

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	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)*	Total Energy Consumed	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	6.31	0.97	135.62
Inner Urban	N/A	N/A	N/A	N/A	N/A	N/A	N/A	3.36	1.33	185.95
Rural	N/A	N/A	N/A	N/A	N/A	N/A	N/A	5.12	0.69	96.47
LBC Average	N/A	N/A	N/A	N/A	N/A	N/A	N/A	9.67	1.07	149.60
UK BUS Average	N/A	N/A	N/A	N/A	N/A	N/A	N/A	14.79	0.90	125.83

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

Test Charger Used	22 kW	Total measured energy consumed on vehicle (kWh)¹	108.00	Max ZE Range at 100% SOC (km)	275
Hydrogen Energy Over Test (kWh)	N/A	Measured grid energy during charging (kWh)	151.00	Max ZE Range at 80% SOC (km)	220
Hydrogen Delivered to Vehicle (kg)	N/A	Grid-to-Wheel efficiency (%)²	72%	Test Distance Travelled (km)	121

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

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)
Outer Urban	N/A	N/A	4.88	354.70
Inner Urban	N/A	N/A	6.69	486.34
Rural	N/A	N/A	3.47	252.31
LBC Average	N/A	N/A	5.39	391.27
UK BUS Average	N/A	N/A	4.53	329.10

Data Generated by (On behalf of Test facility): _____ Date: _____

Data Approved by: _____ Date: _____

Zero Emission Bus Certificate Summary

Test Vehicle		Average Euro VI Diesel Equivalent	
GHG Well-to-Wheel	329.1 g CO ₂ e / km	Average Diesel Equivalent	951 g CO ₂ e / km
WTW CO₂ per passenger km (@ Max Pass Capacity)	6.6 g CO ₂ e/pass km	WTW CO₂ per passenger km (@ Max Pass Capacity)	19.0 g CO ₂ e/pass km
Overall Zero Emission Bus Performance			
WTW GHG saving	621.9 g CO ₂ e / km	Maximum Theoretical Zero Emission Range (km)	274.8
% WTW GHG saving	65% g CO ₂ e / km	Vehicle Energy Consumption (kWh/ km)	0.9
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.	Target Temperatures ±2 (°C) : Average Temperatures across testing (°C)	Cell	Lower Saloon	Upper Saloon
		10	17	N/A
		9.58	16.72	N/A
Test Numbers: ML02019316 (13-Aug-20), ML02019317 (13-Aug-20), ML02019318 (13-Aug-20), ML02019319 (13-Aug-20).				
Certificate approved by: On behalf of Bus manufacturer	Certificate Approved by: On behalf of DfT / Zemo Partnership	Tim Griffen 21.03.2023		