

## Low Emission Bus Scheme Certificate

Customer:	Alexander Dennis Ltd.				
Customer Address:	Dennis Way, Guildford, Surrey, GU1 1AF				
Test Purpose:	LEB Testing	DYNAMOMETER SETTINGS			
Vehicle Manufacturer:	Alexander Dennis Ltd.	Unladen weight (kg)	10782.0	Test Weight	13369 kg
Vehicle Type & Number:	E400, E457	Gross Weight (kg)	18000.0	F°	52.59 N
Engine:	Cummins ISBe4.5 EU6, 210ps	Seated Capacity	72	F <sup>1</sup>	15.0460 N/kmh
Transmission:	Automatic	Passenger Capacity	99	F <sup>2</sup>	-0.22356 N/kmh <sup>2</sup>
Euro VI certificate Y/N	Manufacturer Certified	GVW Check	OK	F <sup>3</sup>	0.002958 N/kmh <sup>3</sup>

### Declared fuel, properties and source plus carbon conversion factors

Net Heating Value: Diesel	36.00	MJ / Litre	Fuel Provider	UK market standard
Well-to-Tank Factor: Diesel	15.42	g CO <sub>2</sub> e / MJ	WTT evidence	UK GHG reporting factors 2016
Well-to-Tank Factor: Electricity	143.50	g CO <sub>2</sub> e / MJ	Fuel Type	UK Pump Diesel, UK Grid Electricity

### Emissions and Energy consumption results from approved test facility - Average 3 tests

Test Phase	HC (g/km)	CO (g/km)	NOx (g/km)	PM (g/km)	CO <sub>2</sub> (g/km)	CH <sub>4</sub> (g/km)*	N <sub>2</sub> O (g/km)	Fuel Consumption (l/100 km)	Fuel used over phase/cycle (litres)
Rural	0.010	0.015	0.018	N/A	734.9	0.000	0.155	27.75	2.045
Outer London	0.023	0.029	0.015	N/A	888.9	0.000	0.218	33.56	2.165
Inner London	0.034	0.043	0.038	N/A	1143.4	0.000	0.245	43.17	1.069
MLTB Average	0.026	0.033	0.022	N/A	959.5	0.000	0.225	36.23	3.234
LUB Average	0.019	0.025	0.020	0.0079	857.9	0.000	0.193	32.39	5.279

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

Total measured energy consumed on vehicle (kWh)	N/A	Distance in Z.E. mode (km)	N/A	Usable Battery Capacity (kWh)	N/A
Measured grid energy during charging (kWh)*	N/A	Charging efficiency (%)	N/A	Max Theoretical Z.E. Range (km)	N/A

### Total Tank-to-Wheel GHG CO<sub>2</sub> equivalent

Test Phase	CO <sub>2</sub> (g/km)	CH <sub>4</sub> (g/km x 25)*	N <sub>2</sub> O (g/km x 298)	Fuel TTW** GHG (CO <sub>2</sub> Equivalent g/km)
Rural	734.9	0.000	46.120	781.0
Outer London	888.9	0.000	64.868	953.8
Inner London	1143.4	0.000	73.092	1216.5
MLTB Average	959.5	0.000	67.149	1026.7
LUB Average	857.9	0.000	57.633	915.5

### Calculated total Well-to-Wheel GHG CO<sub>2</sub> equivalent emissions over test

Test Phase	Fuel Energy (MJ / km)	Fuel WTT*GHG Emissions (g CO <sub>2</sub> e / km)	Electrical Energy (MJ / km)	Electricity WTT* GHG Emissions (g CO <sub>2</sub> e / km)	Measured Fuel TTW** GHG Emissions (g CO <sub>2</sub> e / km)	Total WTW*** GHG Emissions (g CO <sub>2</sub> e / km)
Rural	9.99	154.0	N/A	N/A	781.0	935.0
Outer London	12.08	186.3	N/A	N/A	953.8	1140.1
Inner London	15.54	239.7	N/A	N/A	1216.5	1456.2
MLTB Average	13.04	201.1	N/A	N/A	1026.7	1227.8
LUB Average	11.66	179.8	N/A	N/A	915.5	1095.4

Data Generated by (On behalf of Test facility):

Date: 26.03.2018

Data Approved by:



Date: 27.03.2018

### Low Emission Bus Certificate Summary

GHG Well-to-Wheel	1095.4	g CO <sub>2</sub> e / km
Euro V Average Diesel Equivalent	1412.6	g CO <sub>2</sub> e / km
WTW GHG saving (compared with Euro V diesel equivalent)	317.2	g CO <sub>2</sub> e / km
% WTW GHG saving (compared with Euro V diesel equivalent)	22%	g CO <sub>2</sub> e / km
Zero Emission operating range (km)	N/A	km
WTW CO <sub>2</sub> per passenger km (@ Max Pass Capacity)	11.1	g CO <sub>2</sub> e/pass km
Approved as Low Emission Bus? (15% saving or more)	<b>YES</b>	

\* WTT : Well-to-Tank

\*\* TTW : Tank-to-Wheel

\*\*\* WTW : Well-to Wheel

**COMMENTS:**

Emission results marked in red are below detection levels.

Vehicle ignition cycled on and off at several points during all three tests to clear warning lights caused by prototype part on vehicle, Email Reference 28.03.2018.

**Test Numbers:** ML02017852 (21 March 2018), ML02017854 (22 March 2018), ML02017857 (22 March 2018).

Certificate approved by:

On behalf of Bus manufacturer

Certificate Approved by:

On behalf of LowCVP/DfT