

Ultra Low Emission Bus Scheme Certificate

Customer:	Optare Group Ltd			DYNAMOMETER SETTINGS		
Customer Address:	Hurricane Way South, Sherburn Ind. Est, Sherburn-in-Elmet, North Yorkshire, LS25 6PT			<i>Measured Kerb Weight (kg)</i>	11262	
Test Purpose:	ULEB EV Bus Testing			Equivalent test passengers	34.5	
Vehicle Manufacturer:	Optare Group Ltd	<i>Seated Capacity</i>	69	<i>Test Weight</i>		13683kg
Vehicle Type & Number:	MetroDecker EV, 340015	<i>Passenger Capacity</i>	98	F°	211.528	N
Engine:	ZF AVE130 ELECTRIC AXLE	<i>Declared Kerb Weight (kg)</i>	11180	F ¹	3.3260	N/kmh
Transmission:	ZF AVE130 ELECTRIC AXLE	<i>Gross Vehicle Weight (kg)</i>	18000	F ²	0.23358	N/kmh ²
Euro VI certificate Y/N	Manufacturer Certified	<i>GVW CHECK</i>	OK	F ³	0.000627	N/kmh ³

Declared fuel, properties and source plus carbon conversion factors

<i>Net Heating Value: Diesel</i>	36.00	MJ / Litre	<i>Fuel Provider</i>	UK market standard	
<i>Well-to-Tank Factor: Diesel</i>	17.23	g CO ₂ e / MJ	<i>WTT evidence</i>	UK GHG reporting factors 2019	
<i>Well-to-Tank Factor: Electricity</i>	87.77	g CO ₂ e / MJ	<i>Fuel Type</i>	UK Grid Electricity	

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)*	Energy Consumption (Kwh/km)	Energy Consumption (Kwh)	Energy used over phase/cycle (kWh/100km)
Outer London	0.000	0.000	0.000	0.00	0.0	0.000	0.000	1.20	7.67	152.489
Inner London	0.000	0.000	0.000	0.00	0.0	0.000	0.000	1.53	3.87	195.350
Rural	0.000	0.000	0.000	0.00	0.0	0.000	0.000	0.92	6.84	117.396
<i>LBC Average</i>	<i>0.000</i>	<i>0.000</i>	<i>0.000</i>	<i>0.00000</i>	<i>0.0</i>	<i>0.000</i>	<i>0.000</i>	<i>1.29</i>	<i>11.53</i>	<i>164.583</i>
UKBC Average	0.000	0.000	0.000	0.0000	0.0	0.000	0.000	1.12	18.38	143.123

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

<i>Total measured energy consumed on vehicle (kWh)+</i>	121	<i>Distance in Z.E. mode (km)++</i>	98	<i>Usable Battery Capacity (kWh)</i>	250
<i>Measured grid energy during charging (kWh)+</i>	154	<i>Charging efficiency (%)+</i>	78%	<i>Max Theoretical Z.E. Range (km)</i>	223

Total Tank-to-Wheel GHG CO₂ equivalent

Test Phase	CO ₂ (g/km)	CH ₄ (g/km x 25)*	N ₂ O (g/km x 298)*	Fuel TTW** GHG (CO ₂ Equivalent g/km)
Outer London	0.0	0.000	0.000	0.0
Inner London	0.0	0.000	0.000	0.0
Rural	0.0	0.000	0.000	0.0
<i>LBC Average</i>	<i>0.0</i>	<i>0.000</i>	<i>0.000</i>	<i>0.0</i>
UKBC Average	0.0	0.000	0.000	0.0

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)	Measured Fuel TTW** GHG Emissions (g CO ₂ e / km)	Total WTW*** GHG Emissions (g CO ₂ e / km)
Outer London	N/A	N/A	5.49	481.82	0.0	481.8
Inner London	N/A	N/A	7.03	617.25	0.0	617.3
Rural	N/A	N/A	4.23	370.94	0.0	370.9
<i>LBC Average</i>	<i>N/A</i>	<i>N/A</i>	<i>5.92</i>	<i>520.04</i>	<i>0.0</i>	<i>520.0</i>
UKBC Average	N/A	N/A	5.15	452.23	0.0	452.2

<i>Data Generated by (On behalf of Test facility):</i>	<i>Date: 31.07.19</i>	<i>Data Approved by:</i>	<i>Date: 31.07.2019</i>
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Ultra Low Emission Bus Certificate Summary

GHG Well-to-Wheel	452.2	g CO ₂ e / km
Euro VI Average Diesel Equivalent	1431.2	g CO ₂ e / km
WTW GHG saving (compared with Euro VI diesel equivalent)	979.0	g CO ₂ e / km
% WTW GHG saving (compared with Euro VI diesel equivalent)	68%	g CO ₂ e / km
Max Theoretical Zero Emission Operating Range (km)	222.7	km
WTW CO₂ per passenger km (@ Max Pass Capacity)	4.6	g CO ₂ e/pass km
Approved as Ultra-Low Emission Bus? (30% saving or more)	YES	

* WTT : Well-to-Tank

** TTW : Tank-to-Wheel

*** WTW : Well-to Wheel

COMMENTS: + 6 Tests carried out on 18/07/19 for energy consumption and range test, warm up for Coastdown match and vehicle movements all logged for charge efficiency calculations ++ Total test distance driven in ZE mode; 6 UKBC tests +++ First 4 tests used for certificate energy consumption calculations +++ Test Numbers: ML02018714 (18.07.2019), ML02018715 (18.07.2019), ML02018716 (18.07.2019), ML02018717 (18.07.2019)				
	Target Temperatures ±2 (°C) :	10	17	17
	Average Temperatures across testing (°C)	9.34	17.43	16.92

WTT Factors Published: 7th June 2019

<i>Certificate approved by:</i>	<i>Certificate Approved by:</i>
<i>On behalf of Bus manufacturer</i>	<i>On behalf of LowCVP/DfT</i>