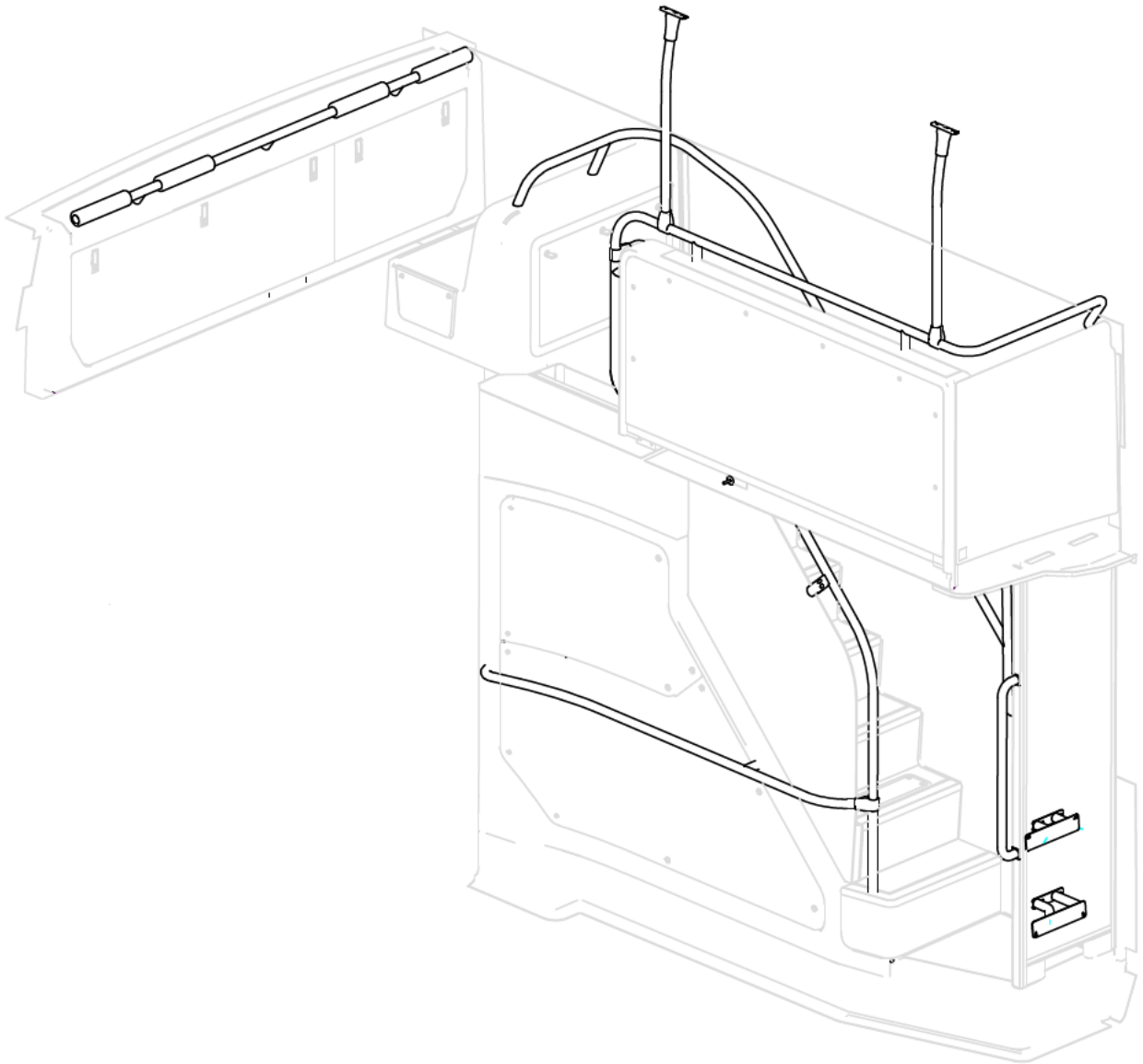
STREETDECK H2 10.9

Powerfloor FC

APPENDIX 5 ANNEX D

STAIRCASE LAYOUT

March 2019



- Number of Steps — 9 Steps
- Max Step Riser — 245mm
- Step Tread Depth — 234mm
- Min Headroom at Lower Steps — 1831mm

Provisional drawing
Uncontrolled document

- This Version Drawn By / Date [redacted]

TfL_scp

Vehicle Certification Agency

VCA, 1 Eastgate Office Centre,
Eastgate Road, Bristol, BS5 6XX, United Kingdom
enquiries@vca.gov.uk | www.dft.gov.uk/vca | +44(0) 300 330 5797

[redacted]

Issue: 0

Test Report:
Approval / Extension Without Test

Legislation*

UNECE Regulation No(s)	107	series	02	supplement	2
UK SI 2009/717	Part 4 (M2, M3, N2, N3 and O)			Item(s)	52

**Delete lines as applicable.*

Test Details

Reason for Test Report:	~~New approval~~ / ~~Extension of approval~~ / Test Report only

Manufacturer Details

Name and Address:	Wrightbus Ltd. Galgorm Industrial Estate Fenaghy Road Ballymena County Antrim BT42 1PY Northern Ireland
Type:	StreetDeck H2**
Commercial Description:	Wrightbus StreetDeck H2
Category:	M3

Conclusion

The above mentioned vehicle was assessed in accordance with the above mentioned legislation and was found to comply in all respects. This report relates only to the items tested.

Signature: [redacted]

Name: [redacted]

List of Annexes

Annex	No of Pages	Subject
I	53	VSP295412 Test report
II	22	Manufacturers information document

UK Approva Author ty Vehicle Certification Agency
04-Oct-18

PART NUMBER	QTY (L)	DESCRIPTION	SYSTEM	METALLIC
-	-	-	-	-
-	-	-	-	-
-	-	-	-	-
-	-	-	-	-
-	-	-	-	-

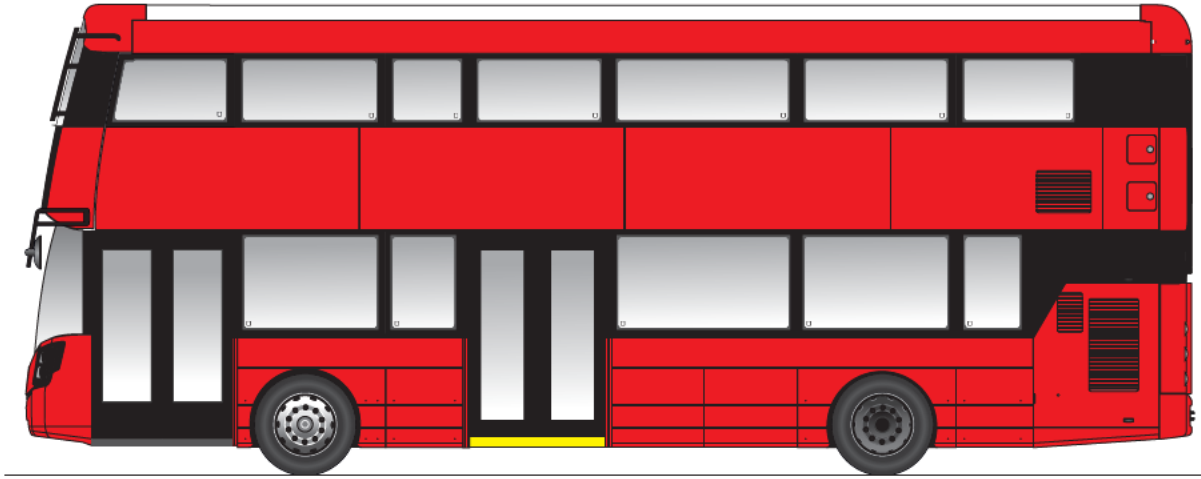
THIS DRAWING COMPLEMENTS THE ELECTRONIC DATA FILES PROVIDED ON REQUEST BY WRIGHTBUS

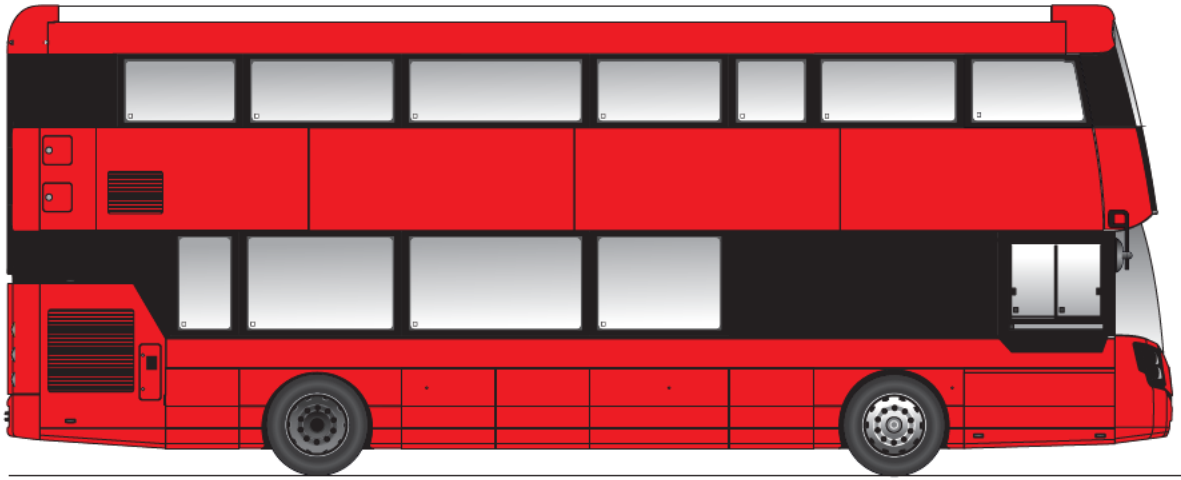
PROVISIONAL DRAWING

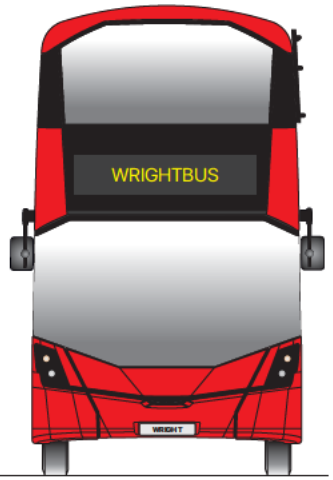
DRAWING TO BE INTERPRETED AS AN APPROXIMATE INDICATION OF THE VEHICLE LIVERY ONLY.
ALL OTHER FEATURES AND BODY ARRANGEMENTS SUCH AS HOPPER POSITIONS, MIRRORS,
BRANCH DEFLECTORS, ADVERT FRAMING ETC. ARE TO BE DISREGARDED.

SHEET 1 OF 1

MUST COMPLY WITH WMP-02040







Unless stamped "Controlled Document", use for reference purposes only - if in doubt, latest revision is available from the Engineering Office.

REV	BY	DATE	DETAILS	CHANGE NO.

WRIGHT
BALLYMENA, NORTHERN IRELAND

DO NOT SCALE

DESCRIPTION	STREETDECK - HYDROGEN - STEALTH			
DRAWN BY	DATE	SCALE	UNLESS SPECIFICALLY STATED ON THIS DRAWING, ALL TOLERANCES TO COMPLY WITH THE RELEVANT SECTION OF WES080 (LATEST REVISION), EXCEPT FOR CRITICAL DIMENSIONS WHERE ±0 5MM APPLIES	
S.B	13-Aug-18	1:50		
CHECKED BY	CHECK DATE	SIZE	PART No	REV
CMcV	13-Aug-18	A3	March 2019 XXX-XXXXX	1

The Customcare Training Programme can provide the highest level of aftersales training and support to all our product range. This can be exemplified at our Training facilities in London Orpington or at our headquarters in Ballymena. All our products are designed with a very unique structure and are designed for long and trouble free operation. All our training will be tailored to suit your needs which will keep your staff at the cutting edge of the industry thus keeping your buses moving and your passengers safe.

Our new Training programme offer an exciting range of courses to meet the increasing demands of new technology which includes Euro 6, Hybrid, HEV and Hydrogen.

We can also offer excellent training opportunities for your apprentices as part of their External Training Programme. Our Training will provide Apprentices with the opportunity to also experience new technology first hand working alongside different departments and understanding all aspects from design to planning.

- The Wrightbus Academy offer City and Guilds approved courses, this can range from Accreditations, NVQ Level 2 and NVQ Level 3.

- City and Guilds as the awarding body issue the Certificates to delegates on successful completion of any course completed.

- Technicians can use any award as part of their CPD. All City and Guilds courses are identified in this programme with the City and Guilds Logo.

As the Wright Group supply fully Integrated vehicles, (thus supplying the Chassis and the body) we are in a more advanced position to provide all training by our key personnel within the Wright Group.

Hydrogen Fuel Cell Overview and Hydrogen Awareness.

As Hydrogen is relevantly new technology to the industry the Wright Group are working towards submitting new courses at NVQ level 2 and NVQ level 3 for approval to City & Guilds. (Approval date March 2018)

Principle

A fuel cell is a device that uses Hydrogen and Oxygen to create Electricity. Fuel cells are more energy efficient than Combustion Engines.

Training provided: -
Learning Topics for all Personnel involved with Hydrogen Vehicles.

Health & Safety to all personnel working or in close proximity of a Hydrogen Vehicles.

Delegates will understand the DO'S & DON'T'S Safety, Codes and Standards

- Handling Compressed Hydrogen Gas Cylinders
- Personnel Handling Gas Cylinders
- Connecting a Cylinder to Piping or Tubing Re-filling
- Transporting, Receiving and Staging Cylinders
- Storing Cylinders

Hydrogen Fuel Cell, HEV and Hybrid – Level 2 and Level 3 Technician Course

Delegates will fully understand how a Wrightbus Hydrogen , HEV and Hybrid vehicle operates. The full benefits and principles of each system will be explained fully along with a level 3 diagnostic course which will allow your staff to use software to it's full potential thus identifying faults quicker and more efficiently. Software will be loaded onto the operator's laptop and checked during the course that all is operational.

Delegates who attend and pass any of the above courses will be able to safely shut down a Hybrid, HEV and Hydrogen vehicle without any cause for concern.

A Full program can be presented and will explain further on the above courses.

Accredited Courses also available: -

Electrical Multiplex & CAN - Continental (Kibes 32)

This Module offers the learner to gain new skills in identifying electrical systems, to include both drawings and node schedules. It informs the learner to be aware of the safety precautions before carrying out any electrical operations. Being able to Identify multiplex and CAN wiring looms. The learner will also gain awareness of signal types to include digital inputs and outputs. Delegates will gain skills in the:- logic functions of a multiplex system, identify online test diagnostic procedures, external node diagnostic methods to include CAN line, gain skills in identifying and describing the four parts in the KS32 installations, describe the restoration of KIBES runtime. They will also be aware of the procedures for functions of online test.

Aims

The aim is to provide candidates with the knowledge and the understanding of electrical systems of Wrightbus vehicles. Also to aim in providing knowledge of electrical software programmes.

Module 2 – Glazing

Within this module Delegates will identify all components that make up the glazing systems. They will be able to state the safety precautions that need to be taken before carrying out routine maintenance and installations. With this award they will also be aware of the correct propping of chassis, the correct use in safety and technical data for all materials. Be able to identify the sealing procedures for gasket glazing. Delegates will also gain the skills to identify the correct tools that are required for fitting glazing systems.

Aims

The aim is to include the identification of components that make up glazing systems.Knowing the installation, repairs, and maintenance of glazing systems.

Module 3 – Ramps

This module offers Delegates skills in identifying components of the ramp systems. This will gain Delegates skill in being aware of the precautions when carrying out routine maintenance and repairs. This module will offer skills in safety mechanisms, prior to any service or maintenance on the ramps systems. Learner's will be able to identify control mechanisms, and pneumatics systems used on ramps, diagnostic software to include PSV Power Ramp and Bookleaf Ramp. Also skills to include the identifications of the manual systems for the use of electrical ramps.

Aims

The aim will teach candidates to identify the components that make up the ramps system. Know the construction, functions of ramp systems. Also aim to understand the manual systems used for ramps.

Module 4 – Ventura Doors Entrance and Exit

This module offers Delegates skills in identifying components that make up all door systems of the Wright Bus vehicles. Delegates will be able to state the safety precautions taken before fitting and repairing any door system. They will learn about the safety of tools, equipment's used, torque settings and calibration dates of torque setting tools. They will gain skills in identifying technical data, mechanical and electrical information, settings and measurements of door systems. Describe the vulnerable wearing parts on door systems, identify the greasing/lubrication points, frequency of maintenance required, leaks in the pneumatics systems. Delegates will also learn the tension of the drive cables using a tenson meter.

Aims

The aim is to provide candidates with knowledge and skills in components that make door systems, of the Wrightbus Vehicles.

Module 5 – Heating and Ventilation

This module will offer Delegates skills in identifying the systems and components in heating and ventilation. The learner will gain skills in the key aspects of safety, and safety devices incorporated into this system. The learner will also learn how to identify the control panels, electrical supply's, and technical data. They will know at the end of this module the routine inspection and maintenances to include filters for pollution, radiators for pollution, know the belt drive systems for both tension and their conditions. Identify leaks and know the functionality's of all blower motors. Skills will also be learned with connection procedures in conjunction with laptops and heat controllers. Know how to test systems, describe various fault codes, and the process for closing test modes.

Aims

The aim is to provide candidates knowledge to identify systems and components, the constructions and functions in heating and Ventilation.

Module 6 – Structural

With the Wrighbus structural systems Delegates will know the structural components required for the body build, including structural animations. Be aware of the constructions and functions of the individual body parts. Identify the extrusions, various fasteners, torque settings, adhesives use, various sealers and methods on the build. Safety skills will be gained to identify high voltage cabling, the use of tools and equipment's, safety precautions, use of appropriate supplier data sheets, and ensure all safety critical procedures are adhered to. They will know the pillar repair methods, plank repair methods and the can-trail repair methods.

Aim

The aim is to give candidates an understanding of knowing how to identify structural components used for the body build including animations. They will learn to describe the constructions and functions of individual body parts.

Module 7 – Chassis and Driveline

The Wrighbus Chassis systems module will help the learner know the components that make up the chassis system, the constructions and functions of associated components. Delegates will know the safety precautions that need to be taken before carrying any repair or maintenance procedure. Delegates will know how to state the characteristics of the Daimler Mercedes engine, Cummins engine, the Voith gearbox system, the ZF axle system and describe the pneumatics/electrical systems.

(ECAS). They will also be able to describe the characteristics of the axle systems (ABS)(EBS). Know the SCR system, steering systems and data along with identifying engine mounting systems. Know the relevant procedures to identify the schedules and specifications for maintenance.

Aim

The aim is to teach candidates with the knowledge and skills of being able to identify components, parts and different functions of associated components, related to Chassis systems.

Manufacturing Manuals Provided: -

A full kit of Manuals will be presented to the customer along with full training on how manuals can be used effectively. Prior to new vehicles being delivered training will be carried out, this will allow the end user to prepare for the arrival of his new vehicles.
Should any updated information come to light during the service life the customer will be notified immediately.

Manuals provided by the Wright Group will be as follows: -

Parts Manuals (Including 3D Models)
Operation Manual
Service and Maintenance Manual
Full Driveline Manuals
Electrical Manual with Node Schedules
Heating, Ventilation and A/C Manual
Entrance & Ext Door Manuals
Body Repair Manual

Further details on all courses can be obtained from the Learning & Development Department at Wrightbus Ballymena.

Wrightbus Fuel Cell StreetAir EV DF Chassis & Body Inspection Service Matrix, 4 Week Rota Over 5 Years
Based on 50,000 Miles / Annum

Service intervals are defined by time in service or distance, which ever comes first.
On the maintenance scheduled after year 5 the schedule is repeated.

	Inspection & Service Action		1 Month	3 Months	6 Months	9 Months	12 Months	18 Months	24 Months	36 Months	48 Months	60 Months
			4000 Miles A	12000 Miles B	24000 Miles C	36000 Miles D	48000 Miles E	72000 Miles F	96000 Miles G	144000 Miles H	192000 Miles I	240000 Miles J
Front Axle	**Check hub bearing condition**	6 monthly			✓		✓	✓	✓	✓	✓	✓
	Strip and examine hub bearings, regrease	monthly									✓	
	Check oil seals for leaks	monthly	Visual	Visual	Visual	Visual	Visual	Visual	Visual	Visual	Visual	Visual
	Check axle fixings	monthly	Visual	Visual	Visual	Visual	✓	Visual	✓	✓	✓	✓
	Check wheel alignment and lock stop adjustment	yearly					✓		✓	✓	✓	✓
	Check king pins for wear	yearly					✓		✓	✓	✓	✓
	Lubricate king pins top and bottom, top and bottom wishbone bearings.	2 yearly					✓		✓	✓	✓	✓
Front Suspension	**Check inboard wishbone bushes and fixings**	monthly	Visual	Visual	Visual	Visual	✓	Visual	✓	✓	✓	✓
	Check condition of bump stops	yearly					✓		✓	✓	✓	✓
	Check damper bushes	monthly	Visual	Visual	Visual	Visual	Visual	Visual	Visual	Visual	Visual	Visual
Rear Axle	**Check oil level. Top up as required.**	6 monthly	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Change oil (4 places)	9 monthly	40,000 miles or 1 year									
	Check hub bearing condition	6 monthly			✓		✓	✓	✓	✓	✓	✓
	Strip and examine hub bearings, regrease	2 yearly									✓	
	Check hub and pinion oil seal for leakage	monthly	Visual	Visual	Visual	Visual	Visual	Visual	Visual	Visual	Visual	Visual
	Leakage test	6 monthly	First month - once per week. After first month - every 6 weeks									
	Check axle fixings	monthly	Visual	Visual	Visual	Visual	✓	Visual	✓	✓	✓	✓
Rear Suspension	**Check V stay and control rod bushes, fixings**	monthly	Visual	Visual	Visual	Visual	✓	Visual	✓	✓	✓	✓
	Check condition of bump stops	yearly					✓		✓	✓	✓	✓
Foundation Brakes	**Check pad wear**	monthly	Visual	Visual	Visual	Visual	Visual	Visual	Visual	Visual	Visual	Visual
	Check disc wear and condition	monthly	Visual	Visual	Visual	Visual	Visual	Visual	Visual	Visual	Visual	Visual
	Check condition of brake wear indicators, seals, pad retention components	monthly	Visual	Visual	Visual	Visual	Visual	Visual	Visual	Visual	Visual	Visual
	Check condition of hoses and wiring	monthly	Visual	Visual	Visual	Visual	Visual	Visual	Visual	Visual	Visual	Visual
	Check presence, fit and condition of sealing caps	monthly	Visual	Visual	Visual	Visual	Visual	Visual	Visual	Visual	Visual	Visual
Pneumatic Brake System	**Check, investigate stored errors on EBS3**	monthly	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Check compressor oil levels	monthly	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Clean unit prior to maintenance	yearly					✓		✓	✓	✓	✓
	Change compressor oil and oil filter	yearly					✓		✓	✓	✓	✓
	Change coalescing element	yearly					✓		✓	✓	✓	✓
	Change compressor intake filters;main and safety filters	yearly					✓		✓	✓	✓	✓
	Seal overhaul of the compressor	4 yearly								✓		
	Check compressor condition, e.g. oil carry over and build up times, oil leaks, air leaks	monthly	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Check all systems and warning buzzer function correctly. Confirm correct operating pressures are being achieved.	monthly	Visual	Visual	Visual	Visual	Visual	Visual	Visual	Visual	Visual	Visual
	Check all pipe connections for leakage and fixings for security. Check rubber hoses etc for cracks and hardening	monthly	Visual	Visual	Visual	Visual	Visual	Visual	Visual	Visual	Visual	Visual
	Check operation of the park brake	monthly	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Check operation of service brakes	monthly	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Check air processing unit function. Check govenor cut in and cut out pressures, build up times	monthly	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Change air dryer twin cartridges	yearly					✓		✓	✓	✓	✓
	Drain air reservoirs of condensate	monthly	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Check for contamination discharge from silencers	monthly	Visual	Visual	Visual	Visual	Visual	Visual	Visual	Visual	Visual	Visual
	Brake Roller test	monthly	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Wrightbus Fuel Cell StreetAir EV DF Chassis & Body Inspection Service Matrix, 4 Week Rota Over 5 Years
Based on 50,000 Miles / Annum

Service intervals are defined by time in service or distance, which ever comes first.
On the maintenance scheduled after year 5 the schedule is repeated.

	Inspection & Service Action		1 Month	3 Months	6 Months	9 Months	12 Months	18 Months	24 Months	36 Months	48 Months	60 Months
			4000 Miles A	12000 Miles B	24000 Miles C	36000 Miles D	48000 Miles E	72000 Miles F	96000 Miles G	144000 Miles H	192000 Miles I	240000 Miles J
Electrical 24V	**Check connections for cleanliness, security and insulation**	6 monthly			Visual		Visual		Visual	Visual	Visual	Visual
	Check instrument warning lights, switches, direction indicators, fog lights, brake lights and horn for correct operation	monthly	Visual	Visual	Visual	Visual	Visual	Visual	Visual	Visual	Visual	Visual
	Check correct operation of the instruments	monthly	Visual	Visual	Visual	Visual	Visual	Visual	Visual	Visual	Visual	Visual
	Check terminal security and re-apply petroleum jelly	monthly	Visual	Visual	Visual	Visual	Visual	Visual	Visual	Visual	Visual	Visual
	Check condition and security of all earth bonds	monthly	Visual	Visual	Visual	Visual	✓	Visual	✓	✓	✓	✓
HV Battery	**Check earths for damage, condition, security, continuity, all components.**	yearly					Visual		Visual	Visual	Visual	Visual
	Check high voltage cables for damage, chaffing, heat.	monthly	Visual	Visual	Visual	Visual	Visual	Visual	Visual	Visual	Visual	Visual
	Check coolant level.	monthly	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Check coolant cap function.	monthly	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Check coolant condition / replace	monthly	Assumed every 3 years (in line with diesel engine application)									
	Check coolant pump operation.	yearly					✓		✓	✓	✓	✓
	Check coolant hoses for deterioration & for leaks.	monthly	Visual	Visual	Visual	Visual	Visual	Visual	Visual	Visual	Visual	Visual
Driveline	**Check high voltage cables for damage, chaffing, heat. Include rear axle to chassis cables.**	monthly	Visual	Visual	Visual	Visual	Visual	Visual	Visual	Visual	Visual	Visual
	Check coolant level.	daily	daily	daily	daily	daily	daily	daily	daily	daily	daily	daily
	Check coolant cap function.	monthly	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Check coolant condition / replace		Assumed every 3 years (in line with diesel engine application)									
	Check coolant pump operation.	yearly					✓		✓	✓	✓	✓
	Check coolant hoses for deterioration & for leaks.	monthly	Visual	Visual	Visual	Visual	Visual	Visual	Visual	Visual	Visual	Visual
	Check radiator mountings.	2 yearly							✓		✓	
	Check radiator matrix and clean external debris.	monthly	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Check fan and motor for mounting security and damage.	monthly	Visual	Visual	Visual	Visual	✓	Visual	✓	✓	✓	✓
	Check operation of cooling fans.	6 monthly			✓		✓	✓	✓	✓	✓	✓
Steering Gear	**Check, investigate stored errors on EPAS**	monthly	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Check oil reservoir mounting integrity	monthly	Visual	Visual	Visual	Visual	Visual	Visual	Visual	Visual	Visual	Visual
	Check hydraulic oil fluid level	monthly	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Clean unit prior to maintenance	yearly					✓		✓	✓	✓	✓
	Change hydraulic filter	yearly					✓		✓	✓	✓	✓
	Change hydraulic fluid	yearly					✓		✓	✓	✓	✓
	Check steering and bevel boxes for leakage, security	monthly	Visual	Visual	Visual	Visual	Visual	Visual	Visual	Visual	Visual	Visual
	Check for steering column / wheel play	monthly	Visual	Visual	Visual	Visual	Visual	Visual	Visual	Visual	Visual	Visual
	Check linkages and ball joints for wear and security	monthly	Visual	Visual	Visual	Visual	Visual	Visual	Visual	Visual	Visual	Visual
	Check hydraulic steering limiter	yearly					✓		✓	✓	✓	✓
	Check piping system for leaks	monthly	Visual	Visual	Visual	Visual	Visual	Visual	Visual	Visual	Visual	Visual
	Lubricate steering relays	yearly					✓		✓	✓	✓	✓

Wrightbus Fuel Cell StreetAir EV DF Chassis & Body Inspection Service Matrix, 4 Week Rota Over 5 Years
Based on 50,000 Miles / Annum

Service intervals are defined by time in service or distance, which ever comes first.
On the maintenance scheduled after year 5 the schedule is repeated.

	Inspection & Service Action		1 Month	3 Months	6 Months	9 Months	12 Months	18 Months	24 Months	36 Months	48 Months	60 Months
			4000 Miles A	12000 Miles B	24000 Miles C	36000 Miles D	48000 Miles E	72000 Miles F	96000 Miles G	144000 Miles H	192000 Miles I	240000 Miles J
Air Suspension	Check piping system for leaks	monthly	Visual	Visual	Visual	Visual	Visual	Visual	Visual	Visual	Visual	Visual
	Check security of wiring, and sensors for damage	monthly	Visual	Visual	Visual	Visual	Visual	Visual	Visual	Visual	Visual	Visual
	Check ferry lift and kneel function	monthly	Visual	Visual	Visual	Visual	Visual	Visual	Visual	Visual	Visual	Visual
	Check spring mountings for security	monthly	Visual	Visual	Visual	Visual	✓	Visual	✓	✓	✓	✓
	Check shock dampers and their mountings	monthly	Visual	Visual	Visual	Visual	✓	Visual	✓	✓	✓	✓
	Check vehicle ride height	monthly	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Wheels and Tyres	Visually inspect all wheel nuts	monthly	Visual	Visual	Visual	Visual	Visual	Visual	Visual	Visual	Visual	Visual
	Check and torque all wheel nuts. Note loose wheel nuts	monthly	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Check tyres are free from damage, cuts, bulging, debris	monthly	Visual	Visual	Visual	Visual	Visual	Visual	Visual	Visual	Visual	Visual
	Check all tyre pressures	monthly	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Check tread depth to legal limit	monthly	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Check valves are at 180° to each other on rear axle twin tyres	monthly	Visual	Visual	Visual	Visual	Visual	Visual	Visual	Visual	Visual	Visual
Body	Inspect body connections for security	yearly					Visual		Visual	Visual	Visual	Visual
	Check wheelchair ramp, and warning lights	monthly	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Align headlamps	yearly					✓		✓	✓	✓	✓
	Clean out and lubricate wheelchair ramp	monthly	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Check operation of door micro switches	monthly	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Check heaters, Remove & clean refit heater / demister filters	monthly	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Roof heaters, visual inspection	monthly	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Drivers air con, service	yearly					✓		✓	✓	✓	✓
	Lubricate all hinges, locks, door/seat mechanisms, blind gear	monthly	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Check emergency switches operate	2 weekly	Every 2 wks	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Drain door regulator bowl	monthly	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Hydrogen Storage System	Cylinder Solenoid Valves : Check valve is secure, free from mechanical damage and the PRD heat shrink is intact	3 monthly			Visual	Visual	Visual	Visual	Visual	Visual	Visual	Visual
	Cylinder Solenoid Valves: Certification Inspection. Valve & mating components fully inspected to ensure no dama. Internal & external leak inspection	Yearly					✓		✓	✓	✓	✓
	Hydrogen Cylinders : Visual inspection to ensure that the cylinder, mounting & piping are in good condition	3 Monthly			Visual	Visual	Visual	Visual	Visual	Visual	Visual	Visual
	Hydrogen Cylinders : Detailed inspection to ensure that the cylinder, mounting & piping are in good condition	3 Yearly								✓		
Hydrogen Delivery System	Visual inspection to ensure that the pipework, connectors and other components are in good condition	Monthly	Visual	Visual	Visual	Visual	Visual	Visual	Visual	Visual	Visual	Visual
	Fuelling Box : Visual inspection to ensure that the pipework, connectors and all components are in good condition	3 Monthly	Visual	Visual	Visual	Visual	Visual	Visual	Visual	Visual	Visual	Visual
	Check calibration of hydrogen sensors located in the engine bay	3 Monthly	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Verify torque seal consistency all connections	3 Monthly	Visual	Visual	Visual	Visual	Visual	Visual	Visual	Visual	Visual	Visual
	Check for hydrogen leaks	6 Monthly	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Visual inspection of fuel filters for material build up in the filter elements	Yearly					✓		✓	✓	✓	✓
	Full certification inspection performed on the entire system	3 Yearly								✓		

Wrightbus Fuel Cell StreetAir EV DF Chassis & Body Inspection Service Matrix, 4 Week Rota Over 5 Years
Based on 50,000 Miles / Annum

Service intervals are defined by time in service or distance, which ever comes first.
On the maintenance scheduled after year 5 the schedule is repeated.

	Inspection & Service Action		1 Month	3 Months	6 Months	9 Months	12 Months	18 Months	24 Months	36 Months	48 Months	60 Months
			4000 Miles A	12000 Miles B	24000 Miles C	36000 Miles D	48000 Miles E	72000 Miles F	96000 Miles G	144000 Miles H	192000 Miles I	240000 Miles J
Hydrogen Fuel Cell	Check all harnesses & hoses for signs of damage.	Monthly	Visual	Visual	Visual	Visual	Visual	Visual	Visual	Visual	Visual	Visual
	Check for coolant leaks	Monthly	Visual	Visual	Visual	Visual	Visual	Visual	Visual	Visual	Visual	Visual
	Process air filter pressure (pressure drop check) & inspection	Monthly	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Check air compressor oil level	Monthly	Visual	Visual	Visual	Visual	Visual	Visual	Visual	Visual	Visual	Visual
	Check Stack Coolant Conductivity	Monthly	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Check module ventilation air intake filter and fan	Monthly	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Check Fuel Cell air intake & exhaust system connections	Monthly	Visual	Visual	Visual	Visual	Visual	Visual	Visual	Visual	Visual	Visual
	Check calibration of hydrogen sensors and replace hydrogen filter assembly	3 Monthly			✓	✓	✓	✓	✓		✓	✓
	Check smoke detector functionality	3 Monthly			✓	✓	✓	✓	✓	✓	✓	✓
	Rotrex air compressor oil and oil filter change	3 Monthly			✓	✓	✓	✓	✓	✓	✓	✓
	Check ground fault monitor functionality	3 Monthly			✓	✓	✓	✓	✓	✓	✓	✓
	Provide Ballard with maintenance record	3 Monthly			✓	✓	✓	✓	✓	✓	✓	✓
	Check coolant level.	daily	daily	daily	daily	daily	daily	daily	daily	daily	daily	daily
	Check coolant cap function.					✓		✓	✓	✓	✓	✓
	Check coolant pump operation.	yearly					✓		✓	✓	✓	✓
	Check / replace fuel cell particulate & chemical air filter.	yearly					✓		✓	✓	✓	✓
	Check & clean fuel cell coolant Y strainer		Check / clean at coolant change point									
	Replace DI polisher cartridge		Replace at coolant change point									

*** HEV Hybrid consists of; Air con inverter, fuel cell DC/DC, air compressor, axle motor inverters, power steering inverter, charger, DC/DC inverter, inductance box, rear axle electrical.**

SCHEDULE 2

STATEMENT OF REQUIREMENTS FOR SERVICES

Maintenance shall be as per the Requirements Specification Clause 34.3 and 40.9.

SCHEDULE 3

CHARGES AND OTHER PRICING PROVISIONS

Summary

1. Currency and Base Date

The pricing in this Schedule is in Sterling (GBP) and excludes VAT.

2. Vehicle Pricing

20 number of Vehicles

£514,000 per Vehicle

Plus £28,509 per vehicle for London Spec (including £4,723 Bus Safety Standard as agreed at BAFO)

£52,000 for delivery to London of all 20 buses payable per bus on delivery.

3. Maintenance and Spares

As per the Specification, the Supplier has agreed to provide the annual maintenance cost for the levels of service stated.

4. Invoice Address

TfL Finance,
14 Pier Walk,
London
SE10 0ES

5. Pricing and Payment Schedule for Vehicles

Pricing_Schedule
Wrightbus Pricing Letter

TfL_scp_001548 Hydrogen Fuel Cell Bus Framework

Key to cell styles used on the submission sheet:

	Bidder to enter figures
	TfL Supplied data. Not to be changed.

General

All prices must be stated in 2018/19 prices
All costs to be in pounds sterling (£)

Pre-populated text is provided as example only and should be deleted and where necessary, overwritten before submission

Detailed notes are provided on how to fill in each section on the individual sheets

Hydrogen Bus Vehicles Procurement - Volume 3 (Financial submission template)

Lot 2 - Hydrogen Fuel Cell Double Deck - 10.9M

Bidder: Wrightbus Limited

All costs to be in 2018/19 prices

All costs to be in pounds sterling (£)

Base Vehicle Purchase

Right Hand Drive

Order quantity (vehicles):	1	20
Purchase Unit Price **(exc** HV Battery extended warranty in purchaseprice)	**£768,000.00**	**£514,000.00**
Total Price	**£15,360,000.00**	**£10,280,000.00**

** Please refer to notes below*

Proposed Milestone Payment	1	2	3	4
Percentage (%)	**12%**	**28%**	**40%**	**20%**
Milestone Acceptance Criteria	**12% payment on receipt of Purchase Order**	**28% payment on start of chassis build**	**40% payment per vehicle on inspection and ex works ready**	**20% payment on acceptance at delivery site**

Delivery Costs

Please provide the **total** price to deliver the stated number of buses to the stated destination

Delivery to London	20
Total Cost for all 20 buses	**£52,000.00**

The Supplier has provided the unit price for each size of order stated below.

The unit price below is sufficient to deliver the fully vehicle specifcation in full for each stated order size.

ALL PRICES BELOW ARE EXCLUSIVE OF VAT

[redacted]

Right Hand Drive	Subject to Schedul 3 Wrightbus letter t[redacted]
Order quantity (vehicles):	50
Purchase Unit Price	£514,000.00
Total Price	£25,700,000.00

Hydrogen Bus Vehicles Procurement - Volume 3 (Financial submission template)

London Specification Buses - Double Deck

Bidder: **Wrightbus Limited**

NOTE: The unit price below must be sufficient to deliver the fully vehicle specifcation in full for each stated order size. In cells F18 and G18 please provide the total cost of the full London specicifaction includiong items detailed in section 8.9 and 24.6 of the specification. In cells F24 and G24 please provide a breakdown of the cost of those specification items only, this is for information purposes.

London Specification - Double Deck (excluding Base Vehicle Cost)

Order quantity (vehicles):	1	20
Purchase Unit Price	£28,509.00	£28,509.00
Total Price	£28,509.00	£570,180.00

London Specification - Bus Safety Standards Features - Specification Items 8.9 and 24.6

Order quantity (vehicles):	1	20
Purchase Unit Price	£4,723.00	£4,723.00
Total Price	£4,723.00	£94,460.00

** Refer to supplementary notes*

Supplementary Notes

With respect to the Bus Safety Standards outlined in 8.9 there is some uncertainty as to the exact specification of the countermeasures identified. During a meeting on the 30th July it was discussed that Wrightbus wanted to be flexible to ensure that the Fuel Cell Electric Bus meets the latest safety standards, but that until this was defined in more detail this section was difficult to cost accurately without pricing in uncertainty. It was agreed that Wrightbus would cost these countermeasures against a set of defined assumptions, and that once the detailed specification for the Bus Safety Standard is available these assumptions will be reviewed on an open book basis. The following bullet point list defines the assumptions the parties have agreed against each countermeasure.

Description	Contract Price
1) Acoustic Vehicle Alerting System – this is a forward facing based sounder meeting all requirements of EU Reg 540/2014 Annex VIII, and will have uploadable sounds.	Included.
2) Pedal confusion – provision has been made for the a halt brake system which requires the driver to press the brake following release of handbrake. Additionally a provision has been made to provide an icon with the drivers display indicating which pedal is being pressed, there is no provision for additional lights in the cab. Additionally a provision has been made for an internal sounder which provides a audible feedback on the proportion by which the throttle pedal is pressed.	First sentence only is included. Remainder is not included.
3) Flooring – a provision has ben made for metal encapsulated vinyl flooring.	Included.
4) Interior Design – no provision has been made for changes internally. Any requested changes will be at an agreed cost.	Included.
5) Runaway Vehicle – a provision has been made for a system to apply the pneumatic park brake when the driver gets out of his seat or opens cab door.	Included.
6) Direct and Indirect Vision – Provision has been made for one additional camera and one monitor to replace the nearside mirror. The monitor will be located in an agreed position, with no knock on changes to the vehicle. There has been no provision made for modifications to reduce drive blind spots and assault screen position / viewing angle. The price of the additional off side camera will be capped at the same price as the nearside camera.	Included except for off side camera not included.
7) As per Clause 31.10 of Specification, the bus will have the ability to communicate with the hydrogen fuelling station using an infra-red (IR) data connection complying to SAE J2799 IR standard. This has not been priced and any difference will be applied to the total cost of the bus. Supplier will supply prices to LBSL within 14 days of contract award and prior to any approval which shall be provided within 14 days of receipt of the price.	Not included. Capped maximum price £3,500 per bus.
8) Blinds 26.1 and 26.2 of Specification.	26.1 included, 26.2 not included.
9) Additional notices according to Specification 25.2. Any additional notices required to comply with hydrogen vehicle type approval and exterior logos by project funding bodies (FCH-JU, EU, CEF, OLEV etc.), shall be provided by Wright Bus.	Not included.
For all items above that state "Not included", the parties agree that all prices including IR interface will be agreed on an open book basis.	Not included

30th November 2018

[redacted]

As the JIVE procurement draws to a conclusion it has become clear that the co-ordination of the three cities approval process is becoming a challenge. Each city cannot give commitment for the order until it has completed its governance. However, without the commitment of the others each city can only prepare its business case with figures based solely on their volume not the combined volume. Clearly this negates the price advantage derived from the consortium approach originally embarked up.

In an effort to allow each city to present the project in the most favourable light Wrightbus are prepared to commit to each city that it will honour the price of the 50 bus order for each city, irrespective of decision or commitment from the other cities. Wrightbus are taking this risk as a sign of its commitment to the JIVE project, and the role of fuel cell electric buses as part of the UK's zero emission future.

I will circulate this letter to both the teams in Aberdeen and Birmingham, so that they may to reflect the lower price (based on 50 vehicles) in their respective business cases.

I should also note the further potential upside that could be obtain should Brighton obtain its funding and be ready to order in a similar timescale to the JIVE 1 cities. If this can be achieved Wrightbus will be able to reduce the price based on the increased volume, as indicating in our BAFO submission.

I trust that the commitments Wrightbus are taking, as set out in this letter, will be viewed positively and will allow Transport for London to reduce a level of uncertainty on the price of the vehicle.

Please do not hesitate to contact me if you have any questions.

Best Re[redacted]

SCHEDULE 4

PARTICULARS

Delivery Date and Time of the first vehicle:	Week commencing 20 January 2020
Delivery Location:	Metroline Perivale Bus Garage Alperton Lane Greenford Middlesex UB6 8AA
Service Levels for the Vehicles and Services:	As per Specification.
Commencement Date:	As per Call Off Contract Award Date
Charges:	As per Pricing Schedule.

SCHEDULE 5

DELIVERY PLAN

The pre and post vehicle delivery inspection examinations tests and Vehicle Acceptance Process as per LBSL standard and Metroline processes and procedures shall apply.

Hydrogen Bus Delivery Schedule

TfL Hydrogen Bus Delivery Schedule

	W/C	Bus number	Other Information
	11/03/2019		Evidence for payment
	18/03/2019		Evidence for payment
	25/03/2019		Evidence for payment
	01/04/2019		Evidence for payment
	08/04/2019		Evidence for payment
	15/04/2019		Evidence for payment
	22/04/2019		Evidence for payment
	29/04/2019		Evidence for payment
	06/05/2019		Evidence for payment
	13/05/2019		Evidence for payment
	20/05/2019		Evidence for payment
	27/05/2019		Evidence for payment
	03/06/2019		Evidence for payment
	10/06/2019		Evidence for payment
	17/06/2019		Evidence for payment
	24/06/2019		Evidence for payment
	01/07/2019		Evidence for payment
			Evidence for payment
			Evidence for payment
	22/07/2019		Evidence for payment
	29/07/2019		Evidence for payment
	05/08/2019		Evidence for payment
	12/08/2019		Evidence for payment
	19/08/2019		Evidence for payment
	26/08/2019		Evidence for payment
	02/09/2019		Evidence for payment
	09/09/2019		Evidence for payment
	16/09/2019		Evidence for payment
	23/09/2019		Evidence for payment
	30/09/2019		Evidence for payment, Chassis build stage
	07/10/2019		Evidence for payment
	14/10/2019		Evidence for payment
	21/10/2019		Evidence for payment
	28/10/2019		Evidence for payment
	04/11/2019		Evidence for payment
	11/11/2019		Evidence for payment
	18/11/2019		Evidence for payment
	25/11/2019		Evidence for payment
	02/12/2019		Evidence for payment
	09/12/2019		Evidence for payment
	16/12/2019		Evidence for payment
			Evidence for payment
			Evidence for payment
	06/01/2020		Evidence for payment
Bus Delivery	13/01/2020		HRS Testing
	20/01/2020	1	HRS Testing
	27/01/2020		HRS Testing
	03/02/2020	2	HRS Fully Operational
	10/02/2020	3	
	17/02/2020	4	
	24/02/2020	5	
	02/03/2020	6	Planned phased route operation commences
	09/03/2020	7, 8	
	16/03/2020	9,10	
	23/03/2020	11,12	
	30/03/2020	13,14	
	06/04/2020	15,16	
	13/04/2020	17,18	
	20/04/2020	19,20	

SCHEDULE 6

FORM OF ACCEPTANCE CERTIFICATE

Metroline version or as amended this version is also acceptable to Wrightbus.

To:

[Date]

ACCEPTANCE CERTIFICATE

We refer to this Call-Off Purchase Agreement dated [ ] between [ ] and [ ] (this Call-Off Purchase Agreement). Terms defined in this Call-Off Purchase Agreement shall have the same meanings when used in this document.

We confirm that with effect from the Acceptance Date for each Vehicle specified we have accepted those Vehicles for purchase under this Call-Off Purchase Agreement in accordance with this Call-Off Purchase Agreement.

Vehicles	**Acceptance Date**
[*Specify Vehicle and index number*]	[ ]

[ ]
Signed for and on behalf of

[ ]

SCHEDULE 7

Spare Parts Ordering and Delivery Procedure

See Clause 8 of the Call Off Agreement for terms and conditions.

The parties agree that the Parts Assurance Package covers the driveline. The driveline is defined as all parts between (and including) the hydrogen refuelling nozzle and the drive axle. This includes hydrogen pipe work, valves, tanks, fuel cell, air intake, balance of plant, radiators, fans, dc-dc, hv distribution, HEV battery, inverters, and drive axle. The brake resistor is included. The heating and AC system is not.

Goods are to be delivered to the address on Schedule 4 of this Call Off Agreement.

Spare parts prices are as listed in insert Volume 3 Pricing Schedule - Annex B Parts Pricing

Spare Parts Pricing

The following spare parts price list has been developed based on the current Bill of Materials. The parts listed and the associated pricing has been provided as requested for information purposes only. Both the parts used and the parts price are subject to change due to final build specification and volume of vehicles sold.

The parts do not include VAT or delivery.

SCHEDULE 8

Vehicle Warranty and Spare Parts Warranty

Warranty shall be as stated in the Pricing Schedule.