

National ambulance vehicle specification for English NHS ambulance trusts

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Introduction

Purpose

1. This document gives the national ambulance vehicle specification for English NHS ambulance trusts, to be mandated through the NHS Standard Contract for ambulance services from 2019/20.

Context

2. Lord Carter's 2018 review, [*Operational productivity and performance in English NHS ambulance trusts: unwarranted variations*](#), found significant unwarranted variation in the national ambulance fleet and a lack of innovation at scale.
3. His review considered that the sector could benefit significantly by adopting a standard vehicle specification and by procuring vehicles through a single channel. These actions would drive innovation on a national scale in partnership across the sector, and with suppliers and other expert groups.
4. This document gives the high-level specification to be adopted by all English NHS ambulance trusts and on which national procurement activity will be based. It will be referred to in the NHS Standard Contract for ambulance services.

Standard specifications

5. English NHS ambulance trusts use several vehicle types, reflecting the different services they provide. Services include, but are not limited to, responding to urgent and emergency 999 calls and providing patient transport, including specialist paediatric transport.
6. The specification in this document is for a **standard emergency double-crewed ambulance**.

National specification for a standard emergency double-crewed ambulance

Definition

1. This specification is for a standard emergency double-crewed ambulance (DCA), which is further defined in standard BS EN 1789:2007 + A2:2014 (as amended and/or replaced) as a type B emergency ambulance: a “road ambulance designed and equipped for the transport, basic treatment and monitoring of patients”.
2. For clarity, this specification excludes any specialist/adapted vehicles used solely to provide services to specific patient groups, eg bariatric and paediatric.
3. Due to the specific and complex nature of a DCA, trusts commonly purchase the base vehicle and its conversion separately, and this specification is in two parts:
 - part 1: base vehicle
 - part 2: conversion.
4. Providing the specification in two parts allows for separate procurement while retaining a supplier’s ability to provide a turnkey solution.

Adoption

5. This specification is the high-level minimum standard for the purchase of new DCAs. It allows local variation within the parameters provided. We expect that with more collaboration across the sector, such as through formal/informal alliances, local variations will converge. Furthermore, as the vehicles, their design and the equipment they carry develop over time, largely through collaborative innovation, this specification will need to become more detailed and the parameters narrowed.

Part 1: Base vehicle

1. Vehicles and equipment supplied as part of this specification must comply with standard BS EN 1789:2007 + A2:2014, and the European Community Whole Vehicle Type Approval (ECWVTA) 2007/46/EC, both as amended and/or replaced, with reference to the national ambulance specification service-level agreement (SLA).
2. A letter of non-objection between the base vehicle manufacturer and the converter must be provided to demonstrate compliance with the standards and ECWVTA until such time as the Worldwide Harmonised Light Vehicle Test Procedure (WLTP) supersedes this requirement.
3. Table 1 below gives the requirements for a base vehicle.

Table 1: Base vehicle requirements for an emergency DCA

Area	Description	Specification
Type	Panel van	Compliant
Regulatory compliance	General Safety Regulation 2015	Compliant
	BS EN 1789	Compliant
Safety features	Adaptive electronic stability programme	Fitted
	Electronic brake force distribution	Fitted
	Brake assist	Fitted
	Adaptive brake lights	Optional
	Immobiliser	Fitted
	Heated washers	Fitted, active while engine running
	Driver and passenger air bags	Fitted
	Side air bags in cab	Fitted

Area	Description	Specification
Warranty	Driveline	5 years
	Structural (corrosion)	12 years
Exterior dimensions	Height (exc flexible aerials/antennas)	2,750 mm to 2,920 mm
	Width	2,050 mm to 2,450 mm
	Length	6,350 mm to 6,950 mm
	Wheelbase	3,600 mm to 4,500 mm
	Front overhang	900 mm to 1,050 mm
	Rear overhang	1,300 mm to 1,500 mm
	Approach angle clearance	20 to 25 degrees
	Departure angle clearance	10 to 15 degrees
	Turning circle (wall to wall)	13,500 mm to 14,500 mm
	Ground clearance	190 mm to 240 mm
	GVW	Minimum 4,250 kg
Tilt test	Minimum 38 degrees	
Driveline	Power output	120 kW to 135 kW
	Euro rating	6
	Acceleration	0 km/h to 80 km/h in <35 seconds
	Gearbox	Manual or automatic
	Vehicle range	Up to 500 miles
Tyres	Tyre	All season
	Tyre pressure monitoring system	Fitted
Electrical	Electromagnetic compatibility	Compliant
	Interface socket	Fitted
	CAN gateway	Fitted
	Alternator output	Minimum 200 amps
	Fog lights	Fitted

Area	Description	Specification
	Day running lights	Fitted
	Battery boost socket	Fitted
HVAC	Cab – climate control	Fitted
	Saloon – climate control	Fitted (or as part of conversion)
Cab area	Reversing alarm	Fitted
	Reversing camera	Fitted
	Entertainment equipment	Fitted
	Bluetooth, USB charger	Fitted
	Space for additional data terminal	Provided
	Locking	Remote central locking, three keys
Exterior	Paint finish	RAL 1016
	Delivery PDI and number plates	Included
	Noise emission 86/188/EEC	Compliant
Saloon area	Bulkhead EN 1789:2007	Compliant (or as part of conversion)
	Floor BS EN 11378-2	Compliant
	Nearside sliding door with window	Compliant
	Twin rear doors opening to 270 degrees	Compliant
	Interior height	Minimum 1,890 mm

Part 2: Conversion

1. Please note that where we refer to equipment supplier names, part numbers and other details in this specification, this is solely for the purposes of identifying the equipment type and the performance levels required by the trust. There is no mandatory requirement for a converter to include this specific equipment in any conversion offer it submits.
2. The conversion specification has nine parts:
 - A. general requirements
 - B. body exterior
 - C. technology
 - D. cab requirements
 - E. saloon requirements
 - F. emergency lighting and switches
 - G. vehicle inventory
 - H. vehicle markings and livery
 - I. compliance verification.

A. General requirements

Assurance

1. Vehicles and equipment supplied as part of this specification must comply with UK standards BS EN 1789:2007 + A2:2014, BS EN 1865-4:2012 and the ECWVTA 2007/46/EC, both as amended and/or replaced, with reference to the national ambulance specification SLA.
2. A letter of non-objection between the base vehicle manufacturer and the converter must be provided to demonstrate compliance with the standards and ECWVTA until such time as the Worldwide Harmonised Light Vehicle Test Procedure (WLTP) supersedes this requirement.

3. The converter must certify that at the time of delivery the completed vehicle with all equipment fitted fully complies with all current vehicle legislative regulations, British standards and the latest CEN requirement for type B emergency ambulances and the national ambulance specification SLA.
4. The converter will be responsible for ensuring the converted vehicles are fit for purpose and meet the requirements of all applicable standards and legislation. This will include: all aspects of liaison, warranty and support; setting agreements; and conformity/interface matters to do with the base vehicle and equipment manufacture. Trusts are responsible for the day-to-day legality of operating the vehicle.
5. The converter will be responsible for assessing the vehicle build and requirement, and at the earliest opportunity must identify and inform the relevant trust about all issues/problems/non-compliance that may affect the operation/use of the vehicle.
6. The converter for each build will supply the trust(s) with an assurance manual and statement confirming the vehicle is fit for purpose and complies with the stated requirements.
7. No base vehicle system or circuit will be tampered with unless a written letter of non-objection to this is provided by the base vehicle manufacturer. All electrical systems as part of the conversion must interface with the base vehicle manufacturer's CANbus system. The converter is responsible for obtaining this written permission.

Durability

8. The conversion will be designed and constructed to withstand the rigours of use as a 24/7 ambulance with a seven-year life.

Delivery

9. The converter will produce a delivery plan and meet all agreed target timescales for each purchase order. Both the converter and trust(s) must agree any changes to the timescales. The converter will deliver vehicles to the locations designated by the trust(s).

Ergonomics and design

10. The converter must ensure that the design and layout of a fully operational vehicle are fit for the purpose of ambulance use, and minimise manual handling for trust staff and patients and risk of work-related musculoskeletal disorders for trust staff.
11. The conversion must be ergonomically designed using computer-aided design (CAD) with reference to relevant research.

Environmental sustainability and innovation

12. Technologies that can reduce the vehicle's environmental impact will be considered. Innovation in design is required to improve aerodynamics and to reduce weight, the need to operate the engine on standby and fuel consumption.

Under-body protection

13. The complete vehicle will have under-body protection applied. All fittings or alterations carried out by the converter must be de-rusted and treated to prevent corrosion, including electrolytic corrosion.

Water test

14. Each converted vehicle must pass a high-volume, whole-vehicle pressure water test. This is to be certified.

Tilt test

15. Each converted vehicle must pass a tilt test in line with CEN EN 107. The vehicle will achieve a minimum tilt of 38 degrees without its outside wheels losing contact with the tilt bed. This is to be certified.

Assessment of handling and stability

16. A competent independent authority will have assessed the complete vehicle's handling characteristics (fully operational) and in its report confirmed a satisfactory assessment of the following:
 - steady-state cornering

- straight line behaviour
- obstacle avoidance
- straight line braking
- braking in a turn
- negotiation of speed humps without grounding
- overall confidence and safety.

Electromagnetic compatibility test

17. The converter must certify that the complete vehicle with all communication and medical equipment fitted (supplied by each relevant trust until common equipment is agreed) fully complies with the latest and any pending electromagnetic compatibility requirements.

Insulation

18. All cavities between the interior and exterior body mouldings (including the rear doors) must be filled with suitable fire-retardant thermal insulation material to ISO 3795, fitted in accordance with the manufacturer's recommendations. The insulation must extend into all relevant framing members.

Noise test

19. The converter will ensure that a fully converted ambulance does not exceed the Control of Noise at Work Regulations 2005 (Directive 86/188/EEC) or the current standard of the day.
20. A noise test must be completed in a variety of environments and using only test equipment that has been registered and fully calibrated. A compliance report should be provided giving the maximum exposure for each road speed tested.
21. The noise test involves:
 - sirens switched on
 - noise levels tested from both the driver and passenger seating positions
 - test completed at road speeds of 30 mph, 50 mph, 70 mph and maximum speed

- test repeated with the driver and passenger windows open.

Vehicle mass test

22. The converter must test that the vehicle is not overloaded as a whole, on an axle or on a wheel position once it is fully constructed and loaded to its operational mass. Operational mass must meet the requirements of BS EN 1789. As a minimum the operational mass must include: a fully equipped operational vehicle with all equipment and medical items on board; one person weighing 75 kg on each seat and on the stretcher; and a full tank of fuel.
23. The converter will calculate this mass before starting production, to confirm the required test criteria can be met and to avoid unnecessary cost and time. If the design fails any test criterion, it will be reconsidered and the test repeated until the design passes it.
24. The following test criteria must be met:
 - total operating vehicle mass <95% of the base vehicle manufacturer's gross vehicle mass
 - total operating axle mass <95% of the base vehicle manufacturer's gross axle mass
 - no wheel position exceeds 60% of its axle mass rating.
25. The converter must produce a compliance certificate for each vehicle confirming:
 - gross kerbside mass
 - gross vehicle mass
 - operational mass
 - each axle mass
 - each wheel position mass.

Infection prevention and control (IPC)

26. To minimise infection, surfaces inside the ambulance must be white, easy-to-clean, without material edging and clutter free. The design will follow the

principles of one-piece design theory with no dirt or finger traps, and have a smooth, clean and tidy appearance overall.

27. The converter must use materials and construction methods that can withstand deep, rigorous cleaning regimens in line with relevant IPC requirements. For example, surfaces should be manufactured from materials that can withstand daily wear and resist surface corrosion under extreme cleaning regimes. Converters should consider using materials with anti-soiling properties to meet BS EN ISO 11378-2, and anti-bacterial/fungicidal qualities.

Latex policy

28. The converter must achieve a Latex-free environment.

Electrical

General

29. Before starting to build, the converter will carry out a full and complete electrical calculation – that is, the electrical drain when all equipment and vehicle and auxiliary batteries are in use – and compare this to the alternator output over the entire engine rev range.
30. The calculation must show the vehicle equipment and control systems are adequate and suitably designed to maintain the battery. All batteries must be protected against deteriorating below 11.7 V.
31. Power management and load shedding systems must be provided to optimise battery condition and protect sensitive electronic equipment, including, but not limited to, by reducing power demand from ‘parasitics’ based on priorities agreed by each trust.
32. The inverter (1,800 W) should be capable of running a minimum of two 230-V three-pin sockets.
33. A shoreline with an external IP65-rated plug must be provided at a location to be decided by each trust.
34. The vehicle will require a ‘run lock’ security system that shuts down the engine when the vehicle’s handbrake is released. This system will allow the base

vehicle ignition key to be removed and the vehicle locked with this key, and allow the engine to run at a speed that ensures the alternator output meets the maximum current consumption. The run lock can be activated either through the 'arrive scene' mode or a specific button on the power management control panel.

35. The converter will provide each relevant trust with detailed electrical/wiring diagrams for each batch of vehicles.

Emergency lighting and siren

36. Emergency lighting must comply with European regulations for blue lights and meet ECE-R-65 Class 2 compliance as a system once fitted to the vehicle. The table in paragraph 7.2 of this standard stipulates the minimum light output values. Measured at a vertical angle of 0 degrees and a horizontal angle of 360 degrees, these are 120 cd (day) and 50 cd (night).
37. The converter must fit an audible warning system comprising a wail/yelp/piercer/bullhorn noise siren that faces out from the front of the vehicle but is recessed so as not to cause injury. The minimum output from the yelp/wail/piercer/bullhorn tone should be 100 W and be wired through and operated by the vehicle road-horn control; a bullhorn button must also be installed for the driver to use. For data logging of siren activity, the siren must provide an interdomain routing output back to the power management system.

Link to base vehicle

38. The converter will be approved by the chassis manufacturer for chassis conversion and will be responsible for ensuring that the chassis manufacturer knows about all the installed auxiliary electrics. The converter will supply a certificate of conformity as part of the contract document pack.

Auxiliary electrical demand

39. Although recommendations are given for minimum auxiliary battery capacities and alternator size, the converter will be ultimately responsible for ensuring that the auxiliary power system can support the auxiliary electrical demand on the ambulance. In particular, supporting documentation including test data will be supplied as part of the contract document pack on conclusion of the

contract. This will demonstrate that the vehicle can meet its on-board electrical power requirements.

Wiring and installation

40. All DC and AC wiring must conform to current Institution of Electrical Engineers (IEE) wiring regulations. On completion, the wiring system will be inspected, tested to those standards and an NICEIC completion certificate stating the chassis number of the ambulance issued by the authorised body. This certificate will be supplied as part of the contract document pack on conclusion of the contract, along with electrical schematics for both DC and AC for the ambulance. In particular:
- All wiring will be multistrand, flexible PVC-covered cable that is identified correctly by colour and protected by being run through appropriate trunking or conduit. Where routed through bulkheads, wiring will be protected by glands, and at points liable to chafing by grommets or rubber.
 - Wiring terminations will be adequately protected and insulated.
 - All circuits will be separately protected and installed in accessible positions, and tested for insulation, non-contact and continuity.
 - All underfloor wiring will be fitted into approved sleeving and all joints sealed with PVC adhesive tape, and must comply with British Standard BS AU7:1963.
 - DC cables must be protected by fuses or circuit breakers at source and these must be rated for the current-carrying capability of the wire, and AC cables protected by circuit breakers.
 - Cables must be of the correct size for the current required by the circuit they supply, to avoid overheating and excessive voltage loss.
 - All wiring or appliances that require electrical warning or hazard identification will display clear labels, in accordance with current regulations.
 - All auxiliary electrical components will be CE and 'e-marked' in accordance with current regulations. If the component is not 'e-marked', it must be supplied with an attestation with regard to annex I, 3.2.9. of 72/245/EEC as amended BY 2006/28/EC.
 - Except for the isolator switch, all switches in the cab must be within easy reach of the driver and labelled appropriately.

- Where more than one vehicle is converted, all electrical components must be mounted in identical locations and wiring routed uniformly.
- Wherever possible, electrical components will be mounted on subassemblies using 'plug and play' connectors, to facilitate easy removal and replacement if repair or maintenance is needed.

Quality control

41. Quality and build standard control will apply to a fully converted ambulance, including the base vehicle and all components and systems identified in the specification or related requirements. The converter will provide and ensure quality control assurance throughout the build, including for all medical items, equipment and components supplied. The converter must have a current ISO quality control system that is relevant to the building of vehicles.

Warranty and support

42. The converter will provide a comprehensive seven-year parts and labour warranty for the integrity and structure of the conversion, including specified and purchased items, with a written procedure for warranty claims and carrying out work. There should be a seven-year anti-corrosion warranty and a minimum five-year warranty for electrical installations.
43. The medical gas pipeline system must conform to all applicable regulations and standards.
44. A process should be in place for resolving matters urgently and priority given to both the resolution and any associated works. Repairs, campaign work and technical workshop support should be available 8 am to 5 pm, Monday to Friday, as a minimum. Support response times will be subject to a managed SLA. Each relevant trust will require approval to conduct work in its own workshops that is rechargeable to the converter.

Specialist tooling

45. The converter will provide each relevant trust with a comprehensive list of specialist tooling and with any specialist tooling required to maintain and repair the converted vehicle.

Spare parts

46. The converter will provide each relevant trust with a comprehensive parts list giving part numbers in electronic format. All parts must be available for a minimum of seven years from date of manufacture. In addition, the converter will provide an online system that gives access to parts listing and ordering, and technical information/support; ideally this will be in the form of a dedicated customer-specific web portal.

Training

47. The converter will provide the operational and workshop staff for each relevant trust with on-site training. Operational training will cover the operational use of the vehicle and its equipment, and workshop training will cover maintenance, fault diagnosis and repairs.
48. An associated written training syllabus will be provided along with confirmation certificates detailing who has been trained and what criteria they have met.
49. To support training delivery the converter will provide the following in electronic form, in hard copy and online:
 - an operational manual explaining operator use
 - a copy maintenance manual for technical staff that includes:
 - system hardware location schematics
 - wiring diagrams
 - fault diagnosis guidance information
 - warranty claims process and contact information
 - spare parts catalogue.

Build information pack

50. For each build batch the converter must supply each relevant trust with a comprehensive manual (written and electronic copy) that contains:
 - specification
 - agreed changes listing
 - CEN compliancy certificates

- proof of compliance with ECWVTA for the specific chassis type and vehicle design
- statement confirming Disability Acts have been considered and adhered to where applicable
- electromagnetic compatibility test and report
- build identification numbers for each chassis number
- operational and equipment manual
- training syllabus
- vehicle mass certificates
- noise, water and tilt test reports
- road handling test report
- other component/equipment certification as required
- warranty terms, contacts and procedure
- electrical wiring diagrams and location of components and connections in the vehicle's electrical system
- drawings of external and internal layouts
- letters of non-objection/certificates of conformity as required
- bill of materials.

Meetings

51. The converter and each relevant trust will hold meetings during the build process at predetermined milestones or more regularly if required. Minutes of meetings will be produced and distributed to an agreed circulation, including representatives from all English NHS ambulance trusts.
52. The converter will attend user group meetings on a six-monthly basis or more regularly if required, to establish working relationships and determine product effectiveness. These visits will be used to improve the product and drive innovation in vehicle design.

Production and conversion process

53. A fully controlled and documented construction process should be used that accurately documents each stage of the build process to maintain quality and traceability, and to provide accurate after-sales information. This will ensure that all spare parts are correct and fit first time, every time.

54. Suppliers should provide proof of certification to the standards EN 1789, ISO 9001 and ISO 14001.

B. Body exterior

1. Exterior dimensions must meet the requirements set out in the base vehicle specification and should not be compromised by the conversion.
2. The complete exterior must be finished in RAL 1016 yellow.
3. Wheels and bumpers must be left in factory finish. Rear bumpers must have underside stainless steel skid plates (2 mm) fitted.
4. Wheel nut retention devices must be fitted.
5. A mis-fuelling safeguarding device must be fitted.
6. If the base vehicle is not fitted with an OE rubbing strip, a suitable protective rubbing strip must be fitted on each side of the vehicle.
7. All external door locks must have a central locking facility and the extra facility that enables the vehicle to be locked while on run lock. This function should be controlled by the manufacturer's key fob.

Body exterior windows

8. Body window(s) must be tinted to 10% light transition to prevent inward vision, and provide an emergency means of escape in line with CEN regulations.
9. The nearside sliding door should have one window tinted to 10% light transition tint and a top slider overlaid with a solid opaque lower section; the slider should have 10-mm opaque strips. The glass design should be such that if the door sliding mechanism fails, no part of the door will contact the glass and break it.
10. Break glass hammers will be provided.

C. Technology

1. The converter will install a black box system to a specification agreed by each trust until a national specification is defined. The system will record a range of inputs from the vehicle's chassis and saloon.
2. Poling rates should be configurable, but as a minimum report every five seconds for routine driving, every one second when blue lights are activated, and multiple inputs per second when the vehicle is in crash phase.
3. Accelerometers at 100 Hz must record in X, Y and Z directions up to + and -16 g to an accuracy of ± 0.01 g. This could include linked low and high range accelerometers (eg ± 0 to 3 g and 3 to 16 g).
4. The system should collect information for the entire trip, showing:
 - start and stop times throughout the trip
 - positional information at relevant stages throughout the trip (breadcrumbs)
 - ability to develop geofences
 - detailed speed information
 - detailed idle times
 - odometer readings
 - detailed fuel usage and levels
 - siren activation
 - blue light activation
 - emergency/non-emergency miles
 - chassis lights information
 - seat belts engaged information for all seats
 - windscreen wipers information
 - brake lights information
 - dash warning lights information
 - steering wheel position
 - throttle position
 - X, Y, Z accelerometer inputs.

5. The system should be able to identify drivers as determined at individual trust level.
6. The black box equipment should be installed in a secure space that can be accessed by engineers but not routinely by unauthorised personnel.
7. The converter will consider black box systems that integrate with other data systems and communication devices in the vehicle, and with other systems used by the relevant trust, to provide the foundation for a connected digital ambulance. The system will also integrate with back office systems and have a standalone reporting portal.
8. The converter will supply and install a tamper-proof, two-way intercom system between the cab and the saloon area that is powered when the ignition is on. This device should have an open-speech facility from the saloon to the cab and a press-to-talk button should be fitted in the cab for the driver's use. It should be possible to control volume from the cab but not to turn off the device. The intercom system should be correctly calibrated to provide clearly audible communications.
9. The converter will fit an audible reverse warning device operated by the gearbox-mounted reverse lamp switch, lamp feed or CAN. This device will be used to alert pedestrians that the vehicle is reversing and will be fitted with a night isolation switch. An ultrasonic reversing aid connected to a reversing proximity warning device will be provided to give the driver audible and visual (a tri-colour light-emitting diode (LED) will be located on the right of the main instrument console) warning of any obstruction at the rear. The device must not to be sensitive to emergency vehicle LED lights.
10. A rear (reversing/incident) camera that operates when reverse gear is selected will aid reversing; the rear image is displayed on the dashboard monitor. This camera must be positioned high up under the rear light bar where it gives a wide-angle image across the rear of the vehicle that includes the ramp or tail lift and about 3 m to the rear of the vehicle.
11. The converter will install a CCTV system for staff protection and to provide evidence in any incident/collision.

- **VDRHD 8 channel (minimum) recorder:**
 - records a minimum of eight cameras at resolution 720 × 576
 - records vehicle G force data in three separate axes, each individually adjusted
 - records vehicle GPS data for integration with mapping in playback software
 - records vehicle GPS speed
 - logs use of left/right indicators and brakes, with all functions individually searchable in playback software
 - integrates with ambulance management system outputs to record use of sirens/blues/HLF/panic alarm – system should differentiate between sirens armed and sirens emitting noise
 - programmable shutdown delay
 - programmable/switched video output
 - removable 500-GB hard drive with dedicated lock
 - lockable front cover
 - fault LED visible to engineering staff
 - fault output for third-party integration
 - front accessed monitor output for set-up and testing
 - event search function allowing operator to search and view specific recorded scenarios, eg only those recordings when the vehicle's blue lights are active, or the vehicle is travelling at a certain speed, or any combination of multiple events
 - SD card back-up recording function
 - SD card recording of driver behaviour data such as acceleration, braking and speed
 - option for 4G/Wi-Fi connection to vehicle to view live images and download recorded footage
 - ability to review footage on PC direct from the removable hard drive and remote from the vehicle
 - option to auto-convert encrypted format footage to AVI format directly from playback software
 - ability to display all external camera images simultaneously on the monitor in the saloon.

- **Forward-facing camera:**
 - mounted behind the rearview mirror looking forwards
 - cameras to record when vehicle is in operation and for a predetermined time after ignition (to be agreed by trust).
- **Nearside and offside externally mounted micro-dome cameras:**
 - mounted nearside and offside at the rear of the vehicle facing forwards
 - external cameras mounted on micro-dome base
 - high resolution with minimum day/night function of 600 TVL
 - vandal resistant with lockable rim
 - cameras to record when vehicle is in operation and for a predetermined time after ignition (to be agreed by each trust).
- **Saloon micro-dome cameras:**
 - two flush mounted into the ceiling above the bulkhead cabinet and at the foot end of the stretcher
 - high resolution with minimum day/night function of 600 TVL
 - vandal resistant with lockable rim
 - camera to record when the saloon panic button is pressed; passive recording function set to capture footage one minute before activation
 - associated microphone installed in saloon area that is turned on with a switch that includes a visual warning (red LED light) that recording is active. Crews should also be able to leave this in continuous record mode during a city centre nightshift, for example. When activated in this mode, no voice warning in the saloon is required – that is, it will operate in covert mode.
- **Rear camera:**
 - mounted at the rear of the vehicle, in the centre. This camera is used as a reversing aid and to record events at the rear of the vehicle. The converter will ensure this is wired in such a way that there is no delay between selection of reverse gear and footage being displayed on the dashboard screen
 - camera to record while the vehicle is in operation and for a predetermined time after ignition (to be agreed by each trust).
- **Camera extension cables:**
 - as required.

- **Accident review service:**
 - CCTV supplier to offer option to recover or receive accident footage and to prepare an independent expert report on the circumstances, possible causation and liability.
 - This must comply with relevant data protection requirements including the General Data Protection Regulation as it applies in the UK (GDPR).
- **Footage preparation service:**
 - CCTV supplier to have process to retrieve footage from trust locations in a timely manner (within 24 hours) or receive incident footage required for third-party purposes such as police request. Footage is to be prepared in a format that meets data protection requirements including GDPR and that fulfils appropriate audit trail guidelines.

D. Cab requirements

1. The cab design will maximise crew comfort and leg room for both driver and passenger.
2. No fittings in the cab will restrict the range of seat adjustment provided by the manufacturer.
3. The dashboard must be designed to appropriately incorporate the additional electrical switching, warning and communication equipment and the mobile data terminal. This should be achieved with robust extra moulded cowls that do not obstruct routine maintenance tasks. The final design must be suitably ergonomic, look tidy and clean, and comply with relevant regulation and. It will be subject to ECWVTA if it is different from the base vehicle design.
4. Any cab overhead shelf will be removed and the area made good.
5. A floor-mounted console will be installed in the centre between the passenger and driver seats to provide maximum storage, including space for document storage, drinks holders and a waste bin. A suitable area for storage of the crew's personal protective equipment will be agreed with each relevant trust.
6. Two rechargeable torches will be installed at positions both crew members can easily reach. The charging system will operate in a way that preserves torch battery life for as long as possible to reduce through-life cost.

7. Two coat hooks will be fitted.
8. A non-slip wear plate will be supplied and fitted on the cab floor below the driver's pedals. This must be sealed around its edges to prevent ingress under the plate.
9. Bump pads will be fitted around the cab door apertures to minimise head injuries.
10. One 2.0-L, aqueous film forming foam visible gauge, controllable flow fire extinguisher will be positioned within easy reach of the driver and also from outside the vehicle, and not at head height. Its bracket will be a complete base, not two-pronged.
11. Supplementary cab-dimmable strip lighting will be fitted above the driver and passenger seats, for completion of paperwork.
12. Two 12-V and two 5-V USB outlets, or as appropriate, will be fitted for charging of aux devices and to supplement the base vehicle fitted outlets.
13. Strengthening plates will be supplied and fitted to the driver and passenger doors with check strap mounting points at the 'A' pillar.
14. Tailored infection control seat covers will be fitted to the driver and passenger seats. These will be made according to the base vehicle manufacturer's digital patterns and have a maximum tolerance of 0.02 mm to ensure a perfect fit. Where airbags are fitted for the original seats, they must conform to applicable TUV crash safety standards and applicable regulation.
15. Two grab handles will be fitted to aid entry to the driver and passenger sides of the cab.

E. Saloon requirements

1. The bulkhead will have one square (1,430-mm² minimum), left-side opening window in line with CEN requirements.
2. The saloon interior roof (including its components) must be at a height not lower than 1,890 mm.

3. The saloon interior design must allow ambulance type carry chairs to pass between the wheel arch/nearside seating and the stretcher in its locks, with attendant seats in stowed position.
4. The vehicle must be able to carry a bariatric stretcher in the fixed floor stretcher mountings without any equipment needing to be moved.
5. The bulkhead must have no protrusions that touch a person sitting in the seat when in its most rearward position.
6. The original base vehicle cab dimensions must not be compromised during the construction of the bulkhead; in particular, the geometry relative to the driver and passenger seating must be maintained.
7. All seat coverings will be made from a single piece of material and have sealed seams to prevent the ingress of body fluids for infection control purposes and to protect against damage.
8. Appropriate storage in cabinets and overhead cant lockers will be provided. Locker lift-up doors will be made of a clear material of 8-mm minimum depth, with strong hinges and two gas struts per locker.
9. All lockers will have contents identification labels.
10. Sufficient grab rails will be appropriately positioned and finished in RAL 1016 yellow.
11. Sufficient head impact and bump pads will be appropriately positioned, finished in pantone 5535C green.
12. Each locker and cupboard door will have a reset device that indicates if it has been opened.
13. The converter will provide suitable and secure storage for controlled drugs, including key-only or keypad access. Details will be confirmed at individual trust level.
14. The converter will provide options for temperature-controlled storage of suitable size, as determined by each trust. Options should also consider a link to black box technology to allow remote monitoring.

15. All saloon door entrances will have grab rails/handles to aid entry/exit. Such devices must be strong enough to take the weight of heavy persons and be finished in RAL 1016 yellow powder coating or rubber. As a minimum, there should be two at the side door and two at the rear doors.
16. If required at individual trust level, a side-step incorporated into the side of the vehicle must fold away inside of the van and not be underslung. The step must unfold and fold automatically with the opening and closing of the side door.
17. Assisters will be fitted to the rear doors, to aid opening and to hold the doors open. Their design must not affect the integrity of the base vehicle doors, hinges or mountings.
18. A bariatric capable self-load stretcher or access ramp or tail lift is to be provided as determined at individual trust level.
19. Where relevant the ramp or tail lift must be fitted to the rear of the vehicle and covered with replaceable and maintainable anti-slip material. When not in use, the ramp must fold flush with the vehicle floor or the tail lift must fold to the back of the vehicle without this exceeding the stated vehicle dimensions. Manual operation of the ramp or tail lift must be possible in the event of mechanical failure. High visibility markings must be fitted around the edge of the ramp or tail lift and visible when these are deployed.
20. If an access ramp is fitted, a single speed bariatric capable stretcher winch should be fitted, with a wander lead positioned at the rear doors and a pendant control to operate the winch, air suppression and ramp.
21. Warning red LED lights must be fitted to all doors, to warn moving traffic around the vehicle that a door is open.
22. Suitable illumination to entries will be provided; this is turned on through door activated micro-switches. To provide a combined puddle, alley and blue lights will be fitted above the driver and passenger doors.
23. Nearside, offside and rear scene lights that can be switched on independently will be provided. The side-scene lights will have a 45-degree alley lights facility or separate light. (Note: scene lights must be switched off when road speed is

above 10 mph.) Scene lights will be positioned on each rear door to illuminate each rear corner of the vehicle and to aid reversing – all scene lights need to come on when reverse gear is selected and the vehicle’s headlights are on.

24. Nearside and offside alley lights will be mounted above the driver and passenger doors. (Note: scene lights must be switched off when road speed is above 10 mph.)

Floor construction

25. The floor covering will be made from a single piece and have antibacterial properties. Its edges will be sealed to make washout easy and to enhance infection control. The floor must be of a non-slip quality that complies with BS EN ISO-11378-2, and resilient enough to withstand high wear rates.
26. The stretcher fastening must be tested according to EN 1789. Floor mountings must be fitted using the stretcher manufacturer’s approved jig to ensure all vehicles are built to the same standard.
27. The underside of the floor panel will be coated with suitable underseal protection.
28. The wheel arch sections will be treated with suitable stone chip protection.

General design

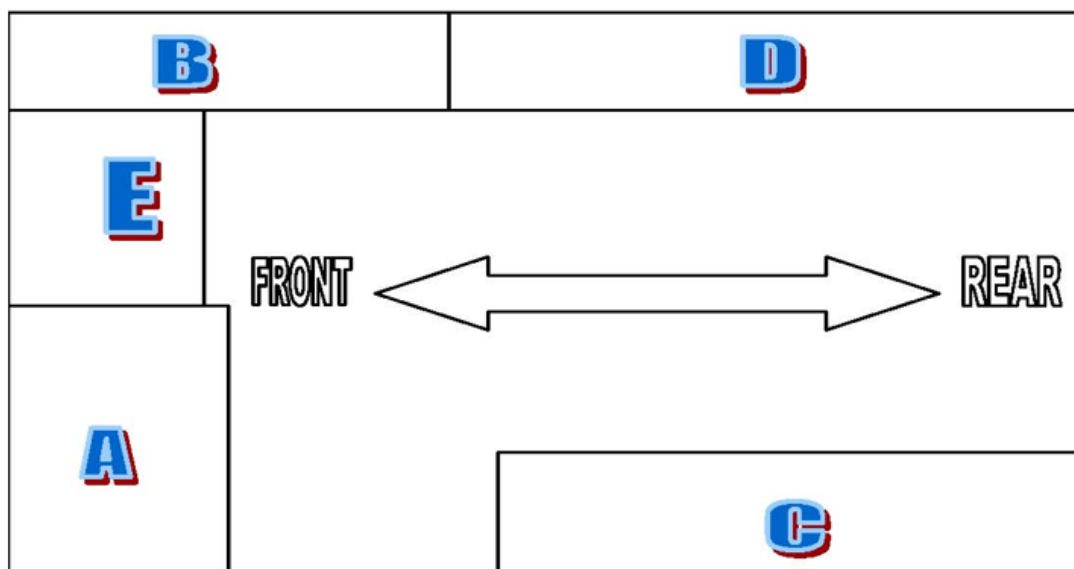
25. Figure 1 below divides the saloon into seven indicative zones for positioning of cabinets and cupboards, storage of equipment and medical items. The exact location of equipment may vary by trust, but it should always be in the same zone; therefore, a variable mounting system will be required. The final design will be agreed at individual trust level.

Zone A

26. This zone will be used to store equipment and bags that need to be quickly accessed from inside the vehicle or through the side sliding door. The storage facility must have open shelving with stainless-steel sheet protection to allow access from the side door, and a door(s) for access from inside the vehicle. This zone will hold the following items: response bags including AED, oxygen,

drugs (subject to any associated legislation), resuscitation equipment and extrication equipment.

Figure 1: Indicative saloon layout



- F** Indicates Roof Area
- G** Indicates Floor Area

27. Further design features in this zone will be determined by individual trust requirements.

Zone B

28. This zone will include provision for IPC-friendly, UN rigid clinical and domestic waste containers, including a sharps box and all associated markings. In addition, brackets and poles to hold and support clinical equipment will be required. Details will be determined at individual trust level. Further design features are possible in this zone as determined by individual trust requirements.

Zone C

29. This zone will include two forward-facing seats fitted on the left-hand side.

- Each seat will recline and swivel (locking at a maximum of 45 degrees) and be able to fold against the side of the vehicle.

- Both seats must have a headrest, adjustable armrests and a three-point retractor seat belt with the tongue attachment on the right side. Seat belts long enough to secure a child seat or accommodate a bariatric patient will be provided.
 - Seat squabs will be 470 mm above the floor.
 - An enclosure will be created for the front forward-facing seat and under no circumstances should the seat base be drilled to fix a shroud.
 - These seats should be designed and positioned to ensure maximum comfort, accessibility and ergonomic movement, and to maximise effective care of a patient lying on a stretcher.
 - A stainless-steel plate must be fitted to the nearside wall of the vehicle to protect the interior liner from damage by the seats.
 - The seat edges should be fitted with protectors to prevent damage to seat covers from contact with equipment – for example, stretchers and carry chairs.
 - Space must be sufficient to allow the forward-facing seat to be oriented to face the stretcher and with enough leg room between the seat and stretcher. With the forward-facing seat orientated to face the stretcher, a person must be able to comfortably occupy the rear seat in its forward-facing position.
30. The converter will supply and fit vertical grab handles, one near the side door and one near the rear door. Grab handles will have recess areas large enough to accommodate large hands.
31. Further design features in this zone will be determined by individual trust requirements, including the secure storage of medical equipment.

Zone D

32. In this zone a cupboard in the right-hand rear corner will accommodate medical gases as determined by each individual trust. The cylinders will be vertically mounted with the pressure gauges visible through a suitable window from all seating positions, along with a suitably positioned mirror to assist viewing. (All cylinder mountings and cupboard enclosures require crash testing approval.)

33. Further design features in this zone will be determined by individual trust requirements, including the secure storage of medical equipment.

Zone E

34. In this zone a rearward-facing attendant's seat will be fitted at the head end of the stretcher.
- This will be an all-ages seat and seat belt configuration, and ideally include Isofix child seat fittings.
 - The seat squab will be 470 mm above the floor.
 - A padded panel will be fitted above the seat for head protection.
 - The seat edges should be fitted with protectors to prevent damage to seat covers from contact with equipment – for example, stretchers and carry chairs.
 - It must be possible to move the seat forward and aft for easy cleaning behind it.
35. Further design features in this zone will be determined by individual trust requirements, including the secure storage of medical equipment.

Zone F (interior roof)

36. Two infusion bag rails will be provided along the roof or on the underside of cabinets above the stretcher.
37. A full-length driver alert strip will be fitted in the roof lining to activate a buzzer in the cab and additional strips positioned adjacent to and within easy reach of the attendant and rear saloon seats. This system must have a cancel button in the cab area that is within easy reach of the driver.
38. An extract/intake fan will be provided that works in conjunction with the extraction fan mounted low down on the nearside of the saloon.

Zone G (interior floor)

39. The saloon floor must be constructed from a lightweight composite material and finished according to the flooring specification previously detailed. It will have anti-soiling properties to meet BS EN ISO 11378-2 and anti-

bacterial/fungicidal qualities. It must be laid with coving wherever possible at the edges and with reinforced corner radii. All floor covering edges will be sealed.

40. The floor will be RAL 7035 light grey.
41. The stretcher fixation device will be, at a minimum, a two-point lock. The fixation point will be strategically positioned to accommodate an emergency stretcher, an incubator and a critical care trolley, and with space for the attendant to walk between the stretcher and side seats when these are stowed.
42. Four independent fixation devices will be fitted in the floor (flush fitting and easy fit) at the foot end of the stretcher to secure the aortic balloon.

F. Emergency lighting and switches

1. All lights will be latest generation LED and incorporated into front and rear aerodynamically profiled pods, to reduce their impact on the aerodynamics of the base vehicle.
2. A front light bar and a rear light bar will be provided to the specification determined by each trust.
3. High-level blue lights that emit light all around the ambulance body will be fitted.
4. Two high-level rear red lights with an interlock to the handbrake (to prevent operation while the vehicle is in motion) and a dashboard warning light will be fitted.
5. Two grill mounted blue flashing lights and two side facing, wing mounted blue flashing lights will be fitted.
6. A multi-random flash headlamp system will be fitted. The headlamps must flash on high beam and be wired so that they cannot operate when the base vehicle headlamp switch is in the on position.
7. A number plate plinth with blue flashing lights will be fitted at each side.

8. Two blue flashing lights will be fitted at the rear of the vehicle above the rear lights.
9. Multifunctional lights will be fitted above the cab doors to give puddle, alley and blue flashing light.
10. Red LED lights will be positioned in all door apertures to be visible from the rear of vehicle when the doors are open.
11. A speed enforcement camera identification blue light will be fitted to the rear.
12. All body builder fitted accessories will be fed directly from the vehicle manufacturer's electrical interface. Items that function only in conjunction with side lights or ignition will be supplied by relays activated by an appropriate vehicle system.

Electrical switch layout

13. The switches will be housed in a one-piece panel in zone C that provides touch control and mounted in the roof-mounted pod, in the centre and angled to aid easy visibility of the controls. The switch panel facia will have an infection control barrier cover.
14. The converter will provide a solution that safely and securely mounts each relevant trust's MDT screen to the dashboard without obscuring access to the radio controls. The screen will be angled at about 12 degrees to the driver's side and must meet any relevant regulations.
15. Switch panel specification: the vehicle will be fitted with a load management system and associated switch panels. The backboards will be manufactured by the company producing the power management system. All electrical backboards/systems will have access panels for viewing system integrity and easy access reset as required. For clarity, the converter will purchase a complete solution.
16. The following list describes the functionality of the cab switch control panel and rear saloon panel (navigation between one panel and another will be provided via a menu option and thus operated from each seat position):
 - Cancel all mode.

- Pre-check sequence:
 - five seconds after activation with the ignition and the handbrake on, each function that can be visually inspected is activated, individually and in a predetermined order, to allow it to be inspected. All mode functions will be checked, and a warning given if defective
 - this ‘health check’ links to the black box technology where applicable.
- 999 mode: activates all emergency lights, the siren and headlight flash.
- Rear emergency lights: activates rear emergency lights only, including the flashing reds.
- Arrive scene mode:
 - disables all emergency lighting, sirens and headlight flashing and the 999 function, but not other functions
 - the ignition security feature is activated first, allowing the driver to remove the keys and leave the engine running securely; depending on the specification the engine rpm may increase from idle. If the handbrake is released, the engine stalls or the vehicle moves when the system is activated.
- Leave scene mode: activates saloon lights, grill lights, dashboard light wing lights and head light flash.
- Hospital arrive mode: deactivates emergency lighting and 999 function, and activates saloon lights that switch off if the vehicle is stationary for 20 minutes (plip key operation can override this).
- Head lamp flash: activates the headlight flash. This can only be selected when the side lights are off and is otherwise disabled.
- Left scene/alley light: activates the 45-degree alley lights.
- Rear scene light: activates when the handbrake is on and the vehicle is stationary.
- All-scene light: activates when the handbrake is on and the vehicle is stationary.
- Saloon-light master: deactivates the saloon light dimming device.
- Siren: activates the siren
- Left saloon lights: activates the left saloon lights and deactivates the saloon light dim.
- Right saloon lights: activates the right saloon lights and deactivates the saloon light dim.

- Saloon light dim: activates the saloon dim lights.
- Stretcher light bright: activates the above-stretcher specialist lights.
- Climate control: activates and deactivates the climate control system.

17. At least five spare outlets will be provided.
18. A run lock activation function that is independent of all the functions mentioned above will be provided.
19. A battery link emergency start function will be provided.

G. Vehicle inventory

1. Details of equipment/consumables carried and their layout in the zones described above will be provided to individual trusts until a national common standard equipment and consumables load list is developed.

H. Vehicle markings and livery

1. All markings will be in the universally recognised format:
 - hazard warnings – black lettering on a yellow background
 - mandatory instruction – white lettering on a blue background
 - prohibition signs – white lettering on a red background
 - exit/safe condition signs – white lettering on a green background
 - equipment location signs – red lettering on a white background.

Exterior

2. Exterior marking specification will be as per the ATAG National Battenberg specification.
3. The following markings in a suitable polyester base under printed film are a guide to what should be applied; final detail will be confirmed at individual trust level.

-  on both side and rear doors.

- If applicable: 'CAUTION – STAND CLEAR SIDE STEP DEPLOYS AUTOMATICALLY AS DOOR IS OPENED' in black 12-mm lettering on a white warning sign with a 45-mm yellow warning triangle must be fitted to the outside of the external side sliding door.



- With a design similar to the 'Patient Assessment' sign above, a 400-mm wide, 'KEEP CLEAR – PATIENT LOADING PLEASE LEAVE 3.5 METRES SPACE BEHIND THIS VEHICLE' on the rear door.
- 100-mm green Hazchem sign for compressed gas on rear door to meet current legislative requirements.

- 12.5-mm red lettering on a white background, 'BATTERY ACCESS', on compartment panel plus multiple hazard warning 'DANGER BATTERY CHARGING AREA, WEAR PERSONAL PROTECTIVE EQUIPMENT, NO SMOKING, NO NAKED LIGHT'.



- 12.5-mm red lettering on a white background, 'DIESEL ONLY', adjacent to fuel filler, plus warning triangle.

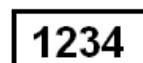


- on hinged doors above door handle.



- on side sliding door above outer door handle.

- 10-mm red lettering on a white background on rear left side, near switch location, 'PATIENT LOADING MANUAL OVERRIDE CONTROL'. ↓
- 10-mm black lettering, 'TYRE PRESSURE ## PSI' on front and 'TYRE PRESSURE ## PSI' on rear, over each wheel arch. Note: to be agreed after mass testing has been completed and approval obtained from the tyre manufacturer.
- 10-mm black lettering, 'WHEEL NUT TORQUE ### Nm', over each wheel arch.
- 10-mm red lettering on a white background, 'KERB WEIGHT #### KG', along bottom of right-hand cab door.
- 75 mm x 15 mm gauge numbers surrounded by a box 200 mm x 100 mm x 5 mm gauge, in the centre of the front over-cab area, towards



the windscreen top, and rear towards the right side, and below right-hand rear door window. Each trust to confirm fleet numbers.

- Battery charging notice, 110 mm × 90 mm, with black print on a yellow background, to be attached on the cab adjacent to the mains charging point.

Interior

- The following markings in a suitable polyester base under printed film are a guide to what should be applied to firm surfaces where possible; final detail will be confirmed at individual trust level.

-  on hinged doors above door handle.
-  on side sliding door adjacent to the inner door handle.
- Nationally recognised 'NO SMOKING' signs to be conspicuously positioned in the cab and saloon. 
- 'SEAT BELTS MUST BE WORN' in both the cab and saloon, plus BS5378 blue 83 mm × 100 mm pictogram. 
- 'MIND YOUR HEAD' above the side and rear doors, and on both cab doors. 
- 'EMERGENCY EXIT' on the side and rear doors, and 'BREAK GLASS WITH HAMMER PROVIDED' on the side windows. 

- Fire equipment sign adjacent to each fire extinguisher, highlighting its location and appropriate use. 

- 'STOP ABUSE' red hexagonal stop sign in clear view at the front and on both saloon walls. 

- ‘DANGER COMPRESSED GAS’ on the gas compartment door and Entonox bottle location.



- ‘HOT AIR OUTLET DO NOT OBSTRUCT’ adjacent to the saloon heater outlets, plus yellow warning triangles and ‘AIR INLET DO NOT OBSTRUCT’ adjacent to the duct.



- 10-mm red letters on a white background, ‘SEATING FOR TWO PASSENGERS ONLY’, on left-hand side below window.
- Patient loading system operating instructions near to control panel; supplied by loading system manufacturer.
- 7.5-mm red letters on a white background giving vehicle dimensions (length, width and height in metric and imperial units), positioned on the windscreen’s shaded out area, centred in the right half and adjacent to the overhead mirror.
- 5-mm red letters on a white background ‘± WITH 12 VOLTS DC’, positioned above screw terminals.
- 5-mm red letters on a white background, ‘12 VOLTS DC’, directly below LSU terminals and cigar-type socket.
- 5-mm red letters on a white background, ‘240 V AC,’ directly adjacent to the 13-A socket.
- 10-mm red letters on a white background, ‘DOMESTIC WASTE ONLY’, adjacent to the container.
- 10-mm red letter on a white background, ‘CLINICAL WASTE ONLY’, adjacent to the container, plus a pictogram biohazard symbol.
- 10-mm red letter on a white background, ‘SHARPS ONLY’, adjacent to the container, plus a pictogram biohazard symbol.
- 12.5-mm red lettering on a white background, ‘ISOLATOR SWITCH’, adjacent to the switch.
- Reflective edge markings in 3M 3DG fluorescent yellow and red film to lower vertical surface of side and rear steps if applicable.



- Tiger stripe anti-slip floor markings at floor edge next to entry/exits or suitable alternative, and in a conspicuous location, 'CAUTION – MIND THE STEP'.



- In front of the passenger seat in the cab, on the windscreen in a clearly visible position but outside the windscreen wipers swept area and not obstructing the driver's vision, 'CAUTION AIRBAG HAZARD DO NOT PLACE FEET ON DASH'.



- For CCTV, in clear view opposite the saloon-side entry door, a Data Protection-compliant CCTV warning sign, and visible on entry to the rear doors, a CCTV in operation caution sign.



Livery

5. Livery to be provided that meets relevant NHS branding guidelines and fitted in line with current guidelines and legislation, including the guidelines published by the Association of Chief Police Officers.
6. Converter to provide trust crests and name identification.
7. Markings must be applied and positioned consistent with the artwork supplied by each individual trust for continuity across the trust's fleet, until national guidelines are published.

Regulations

8. The use of reflective films and design of livery must comply with the relevant Vehicle Lighting and Safety Regulations, current Regulation 11 of The Road Vehicles Lighting Regulations 1989 and the Variation order to Section 44 of the Road Transport Act, 1988.

Materials

9. Retro-reflective material.
10. High performance material.

11. All sections must have appropriately sealed edges.
12. Non-metallic construction to prevent corrosion.
13. Application of mixed materials should be minimised.

Warranty on livery

14. Seven-year performance warranty.
15. No cracking.
16. No fading.
17. No peeling.
18. No loss of adhesion.
19. No ingress.
20. Must provide a livery parts catalogue/drawing identified by a unique reference.

Side livery application

21. The side panels must cover the entire length of the vehicle but not exceed half the total height of the vehicle. Where possible the livery will be positioned below the lower line of the cab window.
22. The application of the livery will start with a green panel at the midpoint of the length of the vehicle.
23. The panel size will be chosen so that:
 - there are seven panels in the top row
 - the widths of each panel on the top row are equal, except for the front most and rear most, which are a minimum of two-thirds the size of the main panels
 - the height of the panels on the top row is half their length; the panels on the bottom row can be reduced height to fit/fill the side of the vehicle.

24. Fluorescent retro-reflective yellow panels will be fitted to either side of the central top row green panel, with alternating colours to the front and rear of the vehicle, ending with yellow panels.
25. The pattern will then be extended downwards, starting with a yellow panel vertically below the central green panel on the top row and extending horizontally to the front and rear of the vehicle. The bottom row may be of any height to fit/fill the side of the vehicle.
26. The material will not be folded over the edges but cut short of all edges and cut-outs.
27. The edge of the 'A' pillar must be silver/white or white. The cab, body edges and roofline will be outlined in 25-mm wide, yellow retro-reflective material.
28. In a position above the Battenberg livery and below the boarder trim, the words 'EMERGENCY AMBULANCE', service title, crown, and NHS logo will be positioned.
29. National NHS communication messages will be displayed on the rear third of the side panel, with the ability to change these as required without damaging the vehicle, or other decals or livery.

Rear livery application

30. The rear of the vehicle will have a full height chevron pattern. The angle of the chevrons will be determined by the width of the vehicle.
31. Throughout the highest-grade fluorescent and retro-reflective material of width 150 mm will be used.
32. The materials will be applied as follows:
 - The centre point of the rear panels/doors will be located and a line drawn from this point to the outer edges of the vehicle, half height from the bottom edge of the vehicle.
 - From the centre point, lines will be drawn to the bottom corners of the rear of the vehicle and orange strips applied below and to the edge of the lines. The strips will be cut around any vehicle fittings.

- Yellow strips will be applied above and below the orange strips, to the full height of the vehicle.
 - As much of the remaining area as possible will be filled with additional strips in alternating colours.
33. In 125-mm red letters, the word '**AMBULANCE**' will be positioned above the rear windows.
 34. In 50-mm red letters, the words '**KEEP CLEAR**' will be positioned midway between the lower window line and ground level, centred across the rear doors.
 35. The vehicle fleet number will be applied on the right-side upper area (75 mm x 15 mm gauge numbers surrounded by a box 200 x 100 x 5 mm gauge). Fleet numbering to be advised by each trust.
 36. A compressed gas hazard diamond will be positioned on the left-side panel of the rear markings.
 37. The relevant trust's Crown Decal will be positioned on the right-side panel of the rear markings.

Front livery application

38. The bonnet, cab roof and any other forward-facing surfaces above cab level will be painted yellow.
39. The word '**AMBULANCE**' in reflective green (mirror image) will be positioned at the front of the bonnet, in the middle. A small trust crest will be included on the front-facing roof section if there is enough space.
40. The vehicle fleet number will be applied to the middle of the panel above the windscreen on the front of the vehicle, at the bottom. Decal to include a black border (75 mm x 15 mm gauge numbers surrounded by a box 200 mm x 100 mm x 5 mm gauge).

Roof marking application

41. The word '**AMBULANCE**' will be added to the panel above the windscreen in reflective green.

Internal rear door

42. The chevron pattern must be applied to a proportion of the internal rear doors dependent on the surface available, and a strip of red reflective tape applied to the edge of the doors.

Colour and finishing

43. All interior surfaces in the saloon will be fully colour impregnated white during the lay-up process, with upholstery finished in pantone 5535C green.

I. Compliance verification

1. The convertor will demonstrate compliance with technical aspects of the specification as follows:
2. **Body electrical power calculation:**
 - Tenderers should supply a body electrical power calculation test datasheet with their tender submission.
 - The datasheet should include power consumption in:
 - 999 mode
 - arrive scene mode
 - leave scene mode
 - hospital arrive mode.
 - The datasheet should be based on a five continuous call basis to replicate the vehicle not being shoreline charged. The call outs should be based on:
 - 10 minutes urban travel to incident
 - 20 minutes on scene (with differential between engine running and engine off and run lock applied shown)
 - 10 minutes urban travel to hospital
 - 20 minutes at hospital.
3. **Body tilt and axle bias:**
 - Tenderers should supply a theoretical body tilt and axle bias calculation datasheet with their tender submission and undertake formal testing with an independent authority on the initial build unit.

- The datasheet should include:
 - total centre of gravity
 - calculation of axis
 - symmetry of axis
 - height of centre of gravity
 - tilt angle
 - limiting velocity.

4. **Subjective handling test:**

- Tenderers will be required to provide a report from an independent authority of a subjective handling test on one of the first completed units by arrangement with each trust and at the converter's expense.
- The report will confirm that the following key handling issues are satisfactory:
 - steady-state cornering
 - straight line behaviour
 - obstacle avoidance
 - straight line braking
 - braking while turning
 - negotiation of speed humps without grounding
 - overall confidence and safe handling.
- Testing will include a tilt test in which the completed vehicle will achieve a minimum tilt of 38 degrees without the outside wheels losing contact with the tilt bed.

Environmental sustainability

5. An overview of the deconstruction process and an end-of-life environmental impact assessment of conversion components should be provided with the tender response. This must conform to current legislation and applicable standards.

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