

### BUS PANEL SPECIFICATION NO 3

This document is the specification for the variants for **TWO DOOR CITY BUSES**. Items shaded grey are not applicable to the specification variant. **RESPONSES ARE REQUIRED IN ALL CLEAR CELLS. NO PRICING INFORMATION OF ANY KIND IS TO BE SUPPLIED HERE.**

1. DEFINITIONS		
1.1	<b>ADR</b>	Australian Design Rule applicable to an ME category Heavy Omnibus.
1.2	<b>A-Pillar</b>	A structural body frame pillar at the front of a Bus either side of the windscreen.
1.3	<b>Bus</b>	Bus meeting the specification set out in this document.
1.4	<b>Bus Operator</b>	See Operator.
1.5	<b>Centre Door</b>	Passenger entry/exit door opening on the left-hand side of the Bus located between the front axle and the rear axle.
1.6	<b>Compliance Plate</b>	A plate described in Section 10 of the Motor Vehicle Standards Act 1989. (ADR Definitions and Vehicle Categories)
1.7	<b>Date of Acceptance</b>	The Date of Acceptance by the Bus Operator for each individual bus.
1.8	<b>DDA</b>	Disability Discrimination Act 1992 and those Standards supplementing the DDA (standards being the legally binding Regulations set by the Attorney-General under the DDA).
1.9	<b>Deed</b>	TfNSW Deed of Standing Offer for Buses Procurement by Bus Operators.
1.10	<b>Diesel</b>	Automotive diesel as defined by the Australian Fuel Standard(Automotive Diesel) Determination 2001. (Diesel fuel sulfur level is 10 mg/kg)
1.11	<b>Double Deck Bus</b>	A low floor, wheelchair accessible, two door bus, three axle configuration, with an upper deck for seated passengers only and a lower deck for seated and standing passengers, used for passenger services in city and metropolitan areas.
1.12	<b>Double Door</b>	Door opening containing two door leaves.
1.13	<b>Failure</b>	Any incidence of malfunction, intermittent condition or Failure of any component or piece of equipment which prevents its safe operation or would result in a defect being issued during a road worthiness check. A Failure does not include Failures resulting from abuse, mishandling, improper storage, accident damage or Failure or malfunction of additional equipment not provided by the Supplier.
1.14	<b>14.5 m Bus</b>	A low floor, wheelchair accessible, two door bus, three axle configuration, with a 14.5 long, single deck , used in city and metropolitan areas.
1.15	<b>Front Door</b>	Passenger entry/exit door opening on the left-hand side of the Bus ahead of the front axle.
1.16	<b>Fully Laden</b>	As specified by the manufacturer, but no less than the Bus with driver, full load of seated and standing passengers, all individual options fitted where greater than 2.3kg in mass, all fluids and no less than 75% of Nominal Fuel Tank Capacity of fuel. (Refer ADR Definitions and Vehicle Categories, Maximum Loaded Test Mass)
1.17	<b>Gross Vehicle Mass</b>	The maximum laden mass of a motor vehicle as specified by the manufacturer. (ADR Definitions and Vehicle Categories)
1.18	<b>Ground clearance</b>	The minimum distance to the ground from the underside of a vehicle excluding its tyres, wheels, wheel hubs, brake backing plates and flexible mudguards and mudflaps. (ADR Definitions and Vehicle Categories)
1.19	<b>Laden Mass</b>	The mass of the vehicle and its load borne on the surface on which it is standing or running. (ADR Definitions and Vehicle Categories)
1.20	<b>Manufacturer</b>	The name of the person or company who accepts responsibility for the compliance with the Australian Design Rules and to whom the 'Compliance Plate' approval certificate is issued. (ADR Definitions and Vehicle Categories)

1.21	<b>Nominal Fuel Tank Capacity</b>	The volume of the fuel tank, specified by the "manufacturer" to the nearest 0.5 litre which may be filled through the (fuel *) tank filler inlet. (ADR Definitions and Vehicle Categories) * fuel in this Specification is Diesel
1.22	<b>Occupant capacity</b>	In determining the occupant capacity of an omnibus, the loading condition shall be that in which a mass of 65kg is located in each of the 'manufacturer's' nominated seating and standing positions for the driver passenger and crew. (ADR 58/00) NB: Personal hand luggage is not included in calculating the occupant capacity.
1.23	<b>One door Urban Bus</b>	A low floor, wheelchair accessible, seatbelted, one door Bus used for passenger services in regional towns.
1.24	<b>Operator</b>	Bus Operator contracted to TfNSW to provide Bus services under a Bus services contract and who is the registered owner of the Bus.
1.25	<b>Prime</b>	Prime Bus Supplier as set out in an individual Deed.
1.26	<b>Rear Door</b>	Passenger entry/exit door opening on the left-hand side of the Bus behind the rear axle.
1.27	<b>RMS</b>	Roads and Maritime Services NSW.
1.28	<b>School Bus Category 3</b>	A mid floor, one door , seatbelted, two axle configuration, single deck, with passenger capacity up to 43 seats (excluding driver), used for the provision of dedicated school services under a Rural and Regional Bus Service Contract.
1.29	<b>School Bus Category 4</b>	A mid floor, one door , seatbelted, two axle configuration, single deck, with passenger capacity greater than 43 seats (excluding driver), used for the provision of dedicated school services under a Rural and Regional Bus Service Contract.
1.30	<b>Shall</b>	Indicates a mandatory requirement.
1.31	<b>Should</b>	Indicates a recommendation or that which is advised but not mandatory.
1.32	<b>Single Door</b>	Passenger door opening with one door leaf.
1.33	<b>Specification</b>	Detailed specification set out in this document or final approved Bus as agreed by TfNSW.
1.34	<b>Supplier</b>	Bus supplier under the Deed also referred to as the prime supplier.
1.35	<b>TfNSW</b>	Transport for NSW.
1.36	<b>Two Door Bus</b>	Bus with Front and Centre doors.
1.37	<b>Two Door City Bus</b>	A low floor, wheelchair accessible, two door bus, two axle configuration, single deck, used for passenger services in city and metropolitan areas.
1.38	<b>Unladen Mass</b>	The mass of the vehicle in running order, unoccupied and unladen with all fluid reservoirs filled to nominal capacity including fuel, and with all standard equipment. (ADR Definitions and Vehicle Categories)

In this section, in the offer column, enter as appropriate, either the make/model of the item, the specific data (eg. length in mm), or if the statement complies (C=complies, PC=partially complies and NC=not comply). Grey shaded cells indicate the item does not apply for that item. NO PRICING INFORMATION OF ANY KIND IS TO BE SUPPLIED HERE.		2 DOOR CITY BUS OFFER
<b>2. SUMMARY CONFIGURATION</b>		Grey Shading = means not required.
The following summary provides a summary of the Bus configuration:		
2.1	Vehicle and Configuration Details.	
	2.1.1	Chassis Manufacturer
	2.1.2	Chassis Model
	2.1.3	Body Manufacturer
	2.1.4	Body Model

2.1.5	Air Conditioning OPTION 1 (STANDARD)	
2.1.6	Air Conditioning OPTION 2	
2.1.7	Air Conditioning OPTION 3	
2.1.8	Air Conditioning OPTION 4	
2.1.9	Air Conditioning OPTION 5	
2.1.10	Door OPTION 1 (STANDARD)	
2.1.11	Door OPTION 2	
2.1.12	Door OPTION 3	
2.1.13	CCTV OPTION 1 (STANDARD)	
2.1.14	CCTV OPTION 2	
2.1.15	CCTV OPTION 3	
2.1.16	EBFSS OPTION 1 (STANDARD)	
2.1.17	EBFSS OPTION 2	
2.1.18	EBFSS OPTION 3	
2.1.19	TPMS OPTION 1 (STANDARD)	
2.1.20	TPMS OPTION 2	
2.1.21	TPMS OPTION 3	
2.1.22	DESTINATION SIGNS OPTION 1 (BASE)	
2.1.23	DESTINATION SIGNS OPTION 2	
2.1.24	DESTINATION SIGNS OPTION 3	
2.1.25	PASSENGER INFORMATION DISPLAY (PID) OPTION 1 (STANDARD)	
2.1.26	PASSENGER INFORMATION DISPLAY (PID) OPTION 2	
2.1.27	PASSENGER INFORMATION DISPLAY (PID) OPTION 3	
2.1.28	SEATS OPTION 1 (BASE)	
2.1.29	SEATS OPTION 2	
2.1.30	SEATS OPTION 3	
2.2	Fully compliant to Australian Design Rules for ME category vehicles;	
2.3	Fully compliant to NSW Roads and Maritime Services Technical Standards (TS);	
2.4	Euro 6 emission as standard, or if not available, Euro 5 minimum to meet ADR80/03;	
2.5	Body length mm	
2.6	Body width mm;	
2.7	Overall height mm;	
2.8	Wheelbase mm;	
2.9	Rear overhang mm;	
2.10	Right hand drive;	
2.11	Axle configuration:	

	2.11.1	Two-axle, single tyre steer, dual tyre rear;	
	2.11.2	Three-axle, single tyre steer, dual tyre drive, single steerable tag;	
	2.11.3	Three-axle, twin axle steer, dual tyre drive.	
2.12	Unladen Mass kg		
	2.12.1	Front Axle	
	2.11.2	Rear Axle	
2.12	Fully Laden Mass kg		
	2.12.1	Front Axle	
	2.12.2	Rear Axle	
2.13	Vehicle mass kg		
	2.13.1	Unladen	
	2.13.2	Fully Laden	
2.14	Width Front door mm (left hand side);		
2.15	Width Centre door mm (left hand side)		
2.16	Bus door safety systems to TS155;		
2.17	Warning signs and lights for school buses to TS150;		
2.18	Destination sign location:		
	2.18.1	Front	
	2.18.2	Side	
	2.18.3	Rear	
2.19	Electric adjustable, heated, exterior, high mounted, rear vision mirrors;		
2.20	standard metro seats - non seatbelted		
2.21	ADR68/00 seatbelted seats		
2.22	Steps at front door entry;		
	2.22.1	Step less	
	2.22.2	Steps	
2.23	Wheel chair accessible		
2.24	Diesel powered;		
2.25	Engine power kW;		
2.26	Engine Torque min. Nm		
2.27	Engine location;		
	2.27.1	rear	
	2.27.2	mid	
	2.27.3	front	
2.28	Automatic transmission		
2.29	Integral retarder		
2.30	Heat/cool air-conditioned;		
2.31	Minimum seated capacity;		
2.32	Minimum standing capacity;		
2.33	Minimum 2 for 3 (2 seats for 3 people) under 12 years old;		

2.34	Suitable for heavy duty public city Bus operations and motorway use speed limited to by operator from 60km to maximum of 100km/h;	
2.35	Number of emergency exits to ADR44/02;	
2.36	Meets Australian Disability Standards for Accessible Public Transport (2002) and AS1481.1 and AS1428.2;	
2.37	Meets flammability standards BS476 Part 7 (specific body and firewall items), UL94 V0 (plastic items and cappings), BS5852 Crib 7 (upholstery), European ECE 118 for all other items;	
2.38	Meets AS 5062 for fire mitigation in Bus design;	
2.39	Meets AS5062 and SPCR 183 for engine bay fire suppression; and	
2.40	Rear axle tyre pressure monitoring system with over temperature alarm.	

Any proposals for INNOVATION AND SAFETY shall be inserted in the INNOVATION AND SAFETY column(s) in Sections 4 to 61. The INNOVATION AND SAFETY column shall detail the new items proposed.

### 3. INNOVATION AND SAFETY

3.1	This specification details the standard requirements for the Buses in the Request for Proposals. Within this specification, in accordance with the latest procurement strategy, this specification represents a step change in Innovation and Safety. Specific areas of change include: extensive fire mitigation and fire suppression requirements, significant noise control and comfort improvements to enhance passenger and driver comfort, passenger information displays to communicate travel information and important safety messages, recycling and emissions innovations to enhance further the benefits of public transport and rigorous engineering management and testing and acceptance requirements to ensure all buses are built and supported to the highest global safety standards.	
3.2	To ensure new safety ideas and improved technology may be considered for this panel contract, TfNSW requests Suppliers actively participate, by providing additional responses to the standard specification.	
3.3	Any such offers shall be inserted in the returnable spreadsheet in the INNOVATION AND SAFETY column(s), separate to the mandatory responses for the standard offer. The INNOVATION AND SAFETY column shall detail the new items proposed.	
3.4	Innovative offers may include, but not be restricted to:	
3.4.1	Mirrors and camera monitoring;	
3.4.2	New seating configuration to improve passenger seated capacity and reduce passenger falls;	
3.4.3	New seating types and materials for improved comfort and cleanliness;	
3.4.4	Window configuration;	
3.4.5	Regenerative braking or energy storage devices to reduce fuel consumption and greenhouse gases;	
3.4.6	Recycling of materials;	
3.4.7	Fuel efficiency and exhaust emission improvements associated with diesel fuelled buses only. (Alternative fuels, such as electric battery powered	
3.4.8	Passenger information systems;	
3.4.9	Destination equipment;	
3.4.10	Accessibility improvements for disabled passengers;	
3.4.11	Fire mitigation improvements;	
3.4.12	Passenger safety improvements;	
3.4.13	Graffiti reduction and reduced maintenance;	
3.4.14	Driver assist features, lane departure, blind spot monitoring and collision avoidance or warning systems.	

INDEX	In this COMPLIANCE STATUS section, in the offer column, enter as appropriate, either the make/model of the item, the specific data (eg. length in mm), or if the statement complies (C=complies, PC=partially complies and NC=not comply). Grey shaded cells indicate the item does not apply for that item. NO PRICING INFORMATION OF ANY KIND IS TO BE SUPPLIED HERE.		2 DOOR CITY BUS OFFER 1A
1	<b>4. OPERATING ENVIRONMENT</b>		
2	The Buses will operate in the following environment and the Supplier shall confirm its Buses are designed to operate within each of the parameters set out in this table:		
3	4.1 General and average traffic conditions for operation:	4.1.1 Frequent stopping in high density CBD, inner city and urban areas across Metropolitan and Outer Metropolitan Sydney.	
4		4.1.2 Longer distance (up to 50km long routes) limited-stop, route services on city and suburban roads, motorways and toll roads at traffic speeds up to 100km/h.	
5		4.1.3 Dedicated school Bus operations which requires frequent stopping in rural and regional areas and longer distance limited stop services on rural roads with up to 100km/hr speed limits.	
6	4.2 Minimum average speed including stops:		
7	4.2.1	12km/hour in city areas,	
8	4.2.2	30km/hr in suburban areas,	
9	4.2.3	60km/hr on highways and motorways.	
10	4.3 Daily operating duration:	18 to 22 hours per day and up to 450km per shift.	
11	4.4 Fuel need:		
12	4.4.1	Minimum 18 hours per day and up to 450km without the need to refuel. (Air conditioning on)	
13	4.4.2	Minimum 18 hours per day and up to 300km without the need to recharge/replenish. (Air conditioning on)	
14	4.5 Maximum road gradient:	18%	
15	4.6 Typical road cross-fall:	Up to 7% (average 3%)	
16	4.7 Bus Operating and Service Life:	300 months.	
17	4.8 Average annual distance:	50,000 - 80,000km/year.	
18	4.9 Maximum summer shade temperature:	48°C.	
19	4.10 Minimum winter temperature:	-10°C.	
20	4.11 Outdoor Relative Humidity:	50% to 80%	
21	4.12 Road surfaces estimated:	Main road: Smooth concrete/ asphalt highway 80% minimum. Secondary road: Rough gravel asphalt 20% maximum.	
22	<b>5. OPERATING REQUIREMENTS</b>		
23	The Bus must meet the following minimum operating requirements:		
24	5.1 Right hand drive		
25	5.2 The axle configuration required is:		
26		Two-axle, single tyre steer, dual tyre rear;	
27		Three-axle, single tyre steer, dual tyre drive, single steerable tag	
28		Three-axle, twin axle steer, dual tyre drive	
29	5.3 Be capable of accelerating when fully laden with air conditioning compressor engaged in accordance with the following:		
30	5.3.1	zero to 20 km/hour 5.0 seconds	

31	5.3.2	zero to 50 km/hour 15.0 seconds	
32	5.3.3	zero to 60 km/hour 19.0 seconds	
33	5.3.4	zero to 80 km/hour 27.0 seconds	
34	5.4	Supplier to confirm testing at 5.3 is conducted on an asphalt or concrete surface which is level or with a positive gradient. Downhill or negative road gradients are not permitted.	
35	5.5	Acceleration and gear changing (both up and down changes) must be smooth enough to prevent annoyance or discomfort to passengers.	
36	5.6	Be capable of stopping, being held on the park brake, and re-starting without rolling back on sealed grades or not less than 18%, both uphill and downhill when fully laden.	
37	5.7	Be capable of reaching 100km/hr, in top gear, under the conditions described in 5.3 and 5.4.	
38	5.8	The Bus must not suffer any structural Failures or damage to panels and fittings attributable to the negotiation of roundabouts, speed bumps, slow points and other traffic calming devices encountered in high density urban and suburban areas, plus longer distance limited stop services on roads with 100 km/h speed limits.	
39	5.9	The Bus must be designed to maximise passenger comfort. Particular attention must be taken to minimise noise, vibration and harshness transmitted to passengers. Factors such as rattles, wind noise, road noise, mechanical noise and air conditioning noise must be minimised.	
40	5.10	The interior noise levels at the rear five passenger seat must be below 70dB(A) at engine idle, and 80 dB(A) at full throttle during a test drive on metropolitan streets using the full range of operating speeds nominated in Section 4. The $L_{eq}$ (1 hour) which is the average noise level on an energy basis (not arithmetic average) for one hour, must not exceed 72dB(A).	
41	5.11	Suppliers are to ensure harmonics, including those from the driveline, are eliminated by appropriate design.	
42	5.12	The Bus must be designed to maximise driver comfort in accordance with the passenger requirements of 5.9 and with particular attention to driver's ergonomics, view of mirrors (Refer ADR14 Class II mirrors), ventilation airflow and careful location of positioning sunshades to minimise glare in the driver's field of view. Particular attention is required to minimising the gaps between:	
43	5.12.1	the windscreen sunshade and the right-hand A-Pillar;	
44	5.12.2	the windscreen sunshade and the inner edge of the left-hand rear vision mirror;	
45	5.12.3	the right-hand A-Pillar and the inner edge of the right-hand rear vision mirror; and	
46	5.12.4	the driver's window sunshade and the outer edge of the right-hand rear vision mirror.	
47	5.13	Blind spot minimisation is required by minimising the A- Pillar profile from the driver's viewing point while retaining structural integrity as described in 5.8. Also refer to Rear Vision Mirror Section 28 on locating the exterior right-hand mirror regarding blind spot minimisation.	
48	5.14	Minimum Passenger Seated Capacity (Passenger Seated Capacity is exclusive of the driver, 65 kg per passenger. (Refer ADR 58/00))	
49	5.14.1	29-43	
50	5.14.2	44	
51	5.14.3	48	
52	5.14.4	44-57	
53	5.14.5	57	
54	5.14.6	84	
55	5.15	Minimum Passenger Standing Capacity (Passenger standing capacity is to be calculated based on: 65kg per passenger; and 6.25 passengers maximum per square metre of floor area. Note standing area maximum slope is 8% (4.57°) as per ADR58/00))	
56	5.15.1	16	
57	5.15.2	20	
58	5.15.3	30	
59	5.16	Minimum 2 seats for 3 people under 12 years old;	
60	5.16.1	54	

61	5.16.2	78	
62	5.17	Wheelchair allocated spaces	Two (2) wheel chair allocated spaces with wheel chair access in accordance with the Disability Standards for Accessible Public Transport (2002).
63	5.18	Peak Engine power	
64	5.18.1		150kW to 180kW (200hp to 250hp)
65	5.18.2		210kW to 245kW (280hp to 330hp).
66	5.19	Engine torque	
67	5.19.1		750Nm minimum @approx 1200 RPM
68	5.19.2		1200Nm minimum @ approx.1200 RPM.
69	5.19.3		1600Nm minimum@ approx 1200 RPM
70	5.20	Double deck Bus stability	The stability of the vehicle shall be such that with the upper deck loaded to the most critical conditions of loading and representing a full load of passengers on such deck the vehicle shall be stable when positioned on a flat surface with a 28° transverse slope. (ADR 58/00)
71	5.21	Axle Masses. Suppliers shall provide the masses (refer Definitions):	
72	5.21.1		Unladen Mass FRONT axle
73	5.21.2		Unladen Mass REAR axle
74	5.21.3		TOTAL Unladen Mass
75	5.21.4		Fully Laden Mass FRONT axle
76	5.21.5		Fully Laden Mass REAR axle
77	5.21.6		TOTAL Fully Laden Mass
78	5.22	Not used	
79	<b>6. DIMENSIONS</b>		
80	The Bus must conform to the following requirements.		
81	6.1	Maximum length (mm)	ADR 43/04
82	6.1.1		10.0m to 11.5m body length
83	6.1.2		12.0m to 12.5m body length
84	6.1.3		14.4 to 14.5m body length
85	6.2	Maximum width excluding mirrors (mm)	2,500 ADR 43/04
86	6.3	Maximum height (mm)	
87	2.6.1		3.5m
88	2.6.2		3.8m
89	2.6.3		4.3m
90	6.4	Maximum wall to wall turning circle diameter (mm)	25,000 ADR 43/04 NB: 24,300 preferred maximum
91	6.5	Minimum ground clearance at mid-point between axles (mm)	Wheelbase in metres x 33.33 (may use lifting device to achieve)
92	6.6	Minimum ground clearance at any other point on the bus	Vehicle must be able to travel over a peak located between consecutive axles. Peak is formed by two planes tangential to the tyres on those axles. The planes are at 3.82° (1:15) to the horizontal. Refer ADR43/04 Clause 6.4.3 and Fig 1.
93	6.7	Maximum rear overhang (mm)	3,700 or 60% of wheelbase ADR 43/04
94	6.8	Minimum approach angle fully laden	8.0°

95	6.9	Minimum departure angle fully laden	7.4°	
96	6.10	Minimum departure angle fully laden	8.0°	
97	6.11	Maximum height (mm) from ground to the top of door step at normal suspension setting.	380	
98	6.12	Maximum height (mm) from ground to top of door step with suspension kneeling.	320	
99	6.13	Head room interior single deck and lower deck	The interior height of the saloon in the aisle areas of a single deck Bus or lower deck must be a minimum of 1800mm (Refer ADR 58/00).	
100	6.14	Head room interior upper deck	The interior height of the saloon in the aisle areas of the upper deck on a double deck Bus must be a minimum of 1720mm (this is in excess of minimum required by ADR 58/00).	
101	6.15	Headroom at rear five passenger seat step	A minimum of 1650mm at the step immediately in front of the rear five seat	
102	6.16	Minimum vertical distance from a passenger seat cushion to any overhead structure including air conditioning ducts	950mm measured as per ADR58/00.	
103	6.17	Minimum aisle width for single deck Bus or lower deck	380mm	
104	6.18	Minimum aisle width for upper deck on double deck bus	300mm	
105	6.19	Wheelbase mm	Enter wheelbase in mm	
106	<b>7. QUALITY ASSURANCE</b>			
107	7.1	The Bus must be constructed in facilities which have appropriate quality assurance systems for design and manufacturing of road vehicles for registration in NSW. The supplier must provide evidence of this system as requested in Section 55. Appropriate systems for example would be those that comply with ISO9001, ISO 55000 and AS ISO 55001.		
108	7.2	The chassis sub-assembly of the Bus must be constructed in facilities which have appropriate quality assurance systems for design and manufacturing of road vehicles for registration in NSW. The supplier must provide evidence of this system as requested in Section 55. Appropriate systems for example would be those that comply with ISO9001, ISO 55000 and AS ISO 55001.		
109	<b>8. OPERATIONAL SERVICE LIFE AND WARRANTIES</b>			
110	The Supplier warrants from the Date of Acceptance for each Bus that:			
111	8.1	Each Bus (chassis and body) is designed to withstand the dynamic and operational loads imposed on it during normal operations for twenty five (25) years.		
112	8.2	The body and chassis frames will not be compromised due to corrosion and will remain operational and fit for their intended purpose in accordance with requirements of the Contract for a minimum period of twenty (20) years.		
113	8.3	The body frame will not fail due to structural deficiencies and will remain operational and fit for its intended purpose in accordance with the requirements of the Contract for a minimum period of twenty (20) years.		
114	8.4	The panels, floor structure, insulating materials, shields, electrical cable and wiring system will remain operational and fit for its intended purpose in accordance with the requirements of the Contract for a minimum period of twenty (20) years.		
115	8.5	The Bus is to be warranted for replacement of parts and labour for a minimum of three (3) years for all components excluding: items to be replaced at nominated services; drive belts for fan, alternator and refrigerant compressor or belt adjustments; engine tuning; cooling inhibitor maintenance; recharge of air conditioning; re-torquing of bolts; wheel balance and alignment; wheel bearing adjustments; filters; panel adjustments; light globes other than headlamps; fuses; windscreen wiper blades, brake and clutch linings except where specifically warranted, and items damaged by collisions, projectiles, mishandling or abuse.		
116	8.6	Destination equipment warranted for ten (10) years.		
117	8.7	Air conditioning piping, compressor, condenser and evaporator coils are to be warranted for five (5) years; electronic logic circuits, pressure switches, expansion valves, receiver, valves, thermostats and other control items, condenser fans, evaporator fans, dryer and compressor clutch to be warranted for three (3) years; and drive belts to be warranted for one (1) year.		
118	8.8	The floor covering shall be designed for the operation life of the Bus and will be warranted for five (5) years.		

119	8.9	Spare parts will be available for a period of not less than twenty (20) years. Where advances in technology, particularly, but not limited to electrical and electronic equipment, make provision of identical spare parts impractical, the Supplier guarantees that replacement non-identical spare parts will be interchangeable and will not degrade the performance or life of the Buses.	
120	8.1	All disc pads will provide a minimum service life of 50,000km when used in normal operation before replacement is required.	
121	8.11	Decals must be fit for their intended purpose, be designed for a minimum of seven (7) years for internally fitted decals and a minimum of five (5) years for externally fitted decals. Warranty is for three (3) years including but not limited to:	
122	8.11.1	Peeling	
123	8.11.2	Cracking	
124	8.11.3	Fading	
125	8.11.4	Loss of resistance to all cleaning chemicals including graffiti removers.	
126	8.12	Rain or wash water will not penetrate the structure, panelling or the interior of the Bus for a minimum period of twenty (20) years.	
127	<b>9. VEHICLE COMPLIANCE AND PRECEDENCE</b>		
128	9.1	Where a conflict exists between any part of this Specification and the requirements of Clauses 9.2 and 9.3, Clauses 9.2 and 9.3 take precedence.	
129	9.2	At the Date of Acceptance, each Bus must comply with all relevant Australian Design Rules (ADRs) and National Heavy Vehicle Regulations, as well as all instructions, notices and regulations issued by Transport for NSW (TfNSW) and the Roads and Maritime Services in NSW (RMS); including Technical Specifications (TS) published by RMS.	
130	9.3	At the Date of Acceptance, each Bus must comply with all instructions, notices and regulations issued by Transport for NSW (TfNSW) and the Roads and Maritime Services in NSW (RMS); including Technical Specifications (TS) published by RMS.	
131	9.4	Each Bus must comply with all relevant Australian and International Standards Codes including lawful directions of all competent authorities. including compliance with Federal Government vehicle recall process, relating to or otherwise affecting the subject matter of the Contract.	
132	9.5	Each Bus must meet the relevant exhaust emissions regulations in effect at date of registration to the TfNSW contracted Bus operator. Currently ADR80/03 requires Euro 5 standard emissions, however TfNSW recognises European manufacturers have been producing Euro 6 engines and this cleaner technology is the preferred standard. If a manufacturer does not have a Euro 6 engine available, Euro 5 will be considered.	
133	9.6	The Bus must be registrable in NSW by RMS at time of entering the Deed and throughout the term of the Deed.	
134	<b>10. ACCESSIBLE PUBLIC TRANSPORT REQUIREMENTS</b>		
135	10.1	Each Bus must comply with the Disability Standards for Accessible Public Transport 2002.	
136	10.2	Each Bus must have access for wheelchairs and conveyances through the Front Door and have a floor which is level to within 1:30 (0.12 degrees) from the front entrance through to the rear edge of the rearmost wheelchair space.	
137	10.3	The exterior of the front door must have two vertical strips, in colour specified in Section 14, 25mm wide, to delineate the door aperture in accordance with AS1428.1. These vertical strips may be positioned internally on the door glass as per the diagram in Appendix 10.	
138	10.4	Each Bus must have two (2) wheelchair allocated spaces.	
139	10.5	Wheel chair allocated spaces are a minimum size of 1300mm long by 800mm wide and clear for a minimum height of 1500mm above the space as per AS 1428.2.	
140	10.6	The allocated space must have a border 25mm wide (within the allocated space dimension) with colour as per Section 1515, the allocated space within the boundary being coloured as per Section 15.	
141		For aesthetic purposes, the border shall have a 25mm internal radius at the corners.	
142	10.7	The international accessibility symbol, as defined in AS 1428.1, height of symbol to be approximately 300mm, in colour specified in Section 15, is to be located centrally in the allocated space and must indicate the correct orientation of the wheelchair against its passive restraint described in 10.22 (the occupant facing the rear of the bus).	
143	10.8	The border and accessibility symbol must not be thin surface coatings, rather they are to be a significant thickness of the floor covering, suitably sealed to prevent liquid leakage to the underlying floor material.	

144	10.9	A wheelchair ramp Bus stop request button is to be clearly marked with an international accessibility symbol, in the wheelchair allocated space. The button must be positioned on the Bus side wall in an area 700mm to 1300mm from the Bus floor and 700mm to 900mm rearward of the padding on the passive restraint described in 10.22. The Reach requirement (common zone) was determined from AS1428.2, Clause 22.	
145	10.10	The Bus stop push button surface in the wheelchair allocated space must be a minimum of 25mm in radius or width, and flush to its housing so as not be susceptible to accidental activation. Refer AS1428.2	
146	10.11	The audible tone of the wheelchair Bus stop push button must be readily different to the standard Bus stop push button.	
147	10.12	Additional Bus stop push buttons are required in the wheelchair accessible area for passengers not requiring the wheelchair ramp to be deployed by the driver.	
148	10.13	The design of any luggage rack, modesty screen or fitting must not intrude on circulation spaces to access the allocated spaces for wheelchairs.	
149	10.14	A grab handle compliant with AS1428.1 must be provided in the wheel chair area sidewall located in the vicinity of the stop push button to allow comfortable access for wheelchair users.	
150	10.15	The grab handle at 10.14 must not create a shoulder or head strike hazard for passengers sitting in the fold down seats in the wheelchair allocated space.	
151	10.16	Each Bus must have a manually operated wheelchair ramp located at the Front Door, to be operated by the driver.	
152	10.17	Wheel chair ramp is to be compliant with AS 3856.1 and AS 3856.2 for Type E Appliances to be manufactured from materials which minimise weight and maximise durability.	
153	10.18	The wheel chair ramp must be designed to ensure easy usage by the Bus driver with minimal effort to deploy and retrieve (100N maximum force as per AS 3856.2).	
154	10.19	A hooked rod or other device to lift the ramp is to be provided and be able to be stored in the driver's area in a location not able to be reached by passengers and the rod must not to rattle in its holder.	
155	10.20	The wheel chair ramp must interface with the Bus door safety system such that the Front Door cannot be closed with the ramp in the deployed position.	
156	10.21	Any area to be accessed by a wheelchair, including the wheel chair ramp, shall have a minimum safe working load rating of 300kg. Refer AS 3856.2.	
157	10.22	In each wheelchair area, to restrict movement of a wheel chair or conveyance in the forward direction, a passive restraint in the form of a padded vertical board is required, where the padding complies with TS148, and	
158	10.23	to restrict sideways movement, a tether strap is required which comprises an inertia locking retractor and buckle complying with ADR4. The buckle and retractor are co-located to allow the webbing to be looped around a suitable part of the wheelchair or conveyance.	
159	10.24	Each Bus must be fitted with a hearing augmentation system (loop) in accordance with AS 1428.2 that provides 100% coverage of the total area of the internal passenger space of the Bus.	
160	10.25	Automatic "stand clear doors closing" audible warning tone shall sound when the Centre Door is closing.	
161	10.26	A decal of size 110mm x 100mm, in accordance with AS1428.2, indicating the Bus is equipped with hearing augmentation is to be fitted to the entry door as per the relevant TfNSW decal manual.	
162	10.27	The passenger information system described in Section 38 must provide information in accordance with DDA requirements meeting AS 1428.1 and AS1428.2.	
163	10.28	To accommodate passengers with visual impairment, the destination signage as set out in Section 35 must be white on black LED type indicators, fitted to the front, left hand side and rear.	
164	10.29	All step and platform edges must be fitted an aluminium edging with size and contrast in accordance with AS 1428.2. Figs. 8 & 9. A slip resistant strip insert on the horizontal face is to be coloured as per Section 15.	
165	10.30	Step riser height: ADR 58/00 specifies a maximum internal step height of 300mm, but for this Bus specification, a maximum of 250mm riser height is specified to improve safety. (For reference, AS 1428.2 specifies a riser of 165mm maximum, but gives precedence to ADR58/00. )	
166	10.31	Step tread depth: ADR 58/00 specifies a minimum internal step tread dimension of only 225mm, but for this Bus specification, a minimum of 250mm plus a 25mm undercut, giving 275mm in total tread depth is specified to improve safety. (For reference, AS 1428.2 specifies a tread depth of 275mm minimum, but gives precedence to ADR58/00)	
167	10.32	Steps in any consecutive sequence must have an even riser height within 5mm.	
168	10.32	Handrails and grab handles must comply with the requirements of AS 1428.2. The colour specified in Section 15.	
169	10.33	Handrails and grabrails must be located to allow passengers to always have at least one hand hold to move around the Bus with particular attention to:	
170	10.33.1	the area between the Front Door and the wheel chair allocated areas	
171	10.33.2	the access paths from the Front Door to the top of the upper deck staircase	
172	10.33.3	the access path from the top of the staircase to the Centre Door	

173	10.33.4	preventing seated passengers and passengers manoeuvring on the upper deck while the Bus is in service, from falling into the open space above the staircase.	
174	10.34	Where steps are relieved with a cut-out, to allow the swing in of a glide away door for example, a heavy duty kick panel in stainless steel sheet with a suitable frame is to be provided to prevent a passenger's foot from slipping into the cut-out or accidentally stepping into that area.	
175	<b>11. FIRE MITIGATION DESIGN AND MATERIALS</b>		
176	11.1	The Supplier shall ensure that the Bus is designed, constructed and commissioned such that it satisfies the Fire Risk Management and Fire Risk Reduction requirements of AS 5062-2016, and the Supplier shall also consider the information contained in the Bus Industry Confederation (BIC) Fire Mitigation Advisory, published in 2014.	
177	11.2	Not used	
178	11.3	Not used	
182	11.4	To limit the risk of occupant injury due to fire the following standards shall apply:	
183	11.4.1	To limit ignition and <b>flame spread</b> in materials, BS476 Part 7 shall apply to the various areas of the bus nominated below in accordance with the Class specified (Class 1, 2 or 3), or where an area is not specified shall comply with ECE Regulation 118 Annexes 6, 7 and 8 .	
184	11.4.2	As an alternative to 11.4.1, European Standard EN45545-2 /HL2 (Hazard level 2) which requires test method ISO 5658-2 for <b>flame spread</b> , shall be applied to the areas nominated below. In some parts of the bus, such as the roof and the floor, ISO 9239-1 will apply in lieu of ISO 5658-2. (Note that in EN45545-2, material requirement sets range from R1 through to R26. Specific parts of the vehicle are required to comply with a specific requirement set, for example, roof panels have a requirement set R8. )	
189	11.5	All exterior fibreglass materials shall comply with BS476 Part 7 Class 2 or EN45545-2 R7/HL2 - ISO 5658-2;	
191	11.6	All exterior roof materials shall comply with BS476 Part 7 Class 2 or EN45545-2 R8/HL2 - ISO 5658-2;	
193	11.7	Front exterior fibreglass panel materials comply with BS476 Part 7 Class 3 or EN45545-2 R7/HL2 - ISO 5658-2;	
195	11.8	Internal panels and laminate materials shall comply with BS476 Part 7 Class 2 or or EN45545-2 R1/HL2 - ISO 5658-2;	
197	11.9	Floor covering materials shall comply with BS476 Part 7 Class 2 or EN45545-2 R10/HL2 - ISO 5658-2;	
199	11.10	Floor structural material shall comply with BS476 Part 7 Class 2 or EN45545-2 R10/HL2 - ISO 5658-2;	
201	11.11	Seat frames ABS or polycarbonate material comply with UL94, V0;	
203	11.12	Seat fabric/foam shall comply with BS5852 Crib 7, no flaming allowed to continue after 13 minutes from start of test;	
205	11.13	Body insulation materials shall comply with BS476 Part 7 Class 2 or EN45545-2 R1/HL2 - ISO 5658-2;	
207	11.14	All internal air conditioning ducts, ABS products, cappings and finishing items shall comply with UL94, V0 or EN45545-2 R1/HL2 - ISO 5658-2;	
209	11.15	Internal light diffusers shall comply with BS476 Part 7 Class 2 and UL94, V0 or EN45545-2 R4/HL2 - ISO 5658-2 and UL94, V; and	
211	11.16	All electrical wiring shall be resistant to flame propagation in accordance with ISO 6722-2006 or EN45545-2 R15 and R16 /HL2 ISO 60332-1-2, and 60332-3-24 or EN 50305.	
212	11.17	All internal components in the Bus not specified above shall meet the specifications of ECE Regulation 118 or the flame spread requirement for the relevant material requirement set specified in EN45545-2/HL2 -ISO 5658-2 .	
213	11.18	Not used	
224	11.19	Each Bus must have a firewall between the engine bay and passenger compartment that in the event of a fire in the engine bay would prevent the fire from entering the passenger compartment for 15 minutes to enable all passengers to evacuate the Bus. For double deck buses the air conditioning compartment above the engine must also have a firewall to prevent fire entering the passenger space for 15 minutes.	

225	11.20	All materials forming the fire wall between the engine area and the passenger area must comply with BS476 Part 7 Class 1, ECE Regulation 118, or EN45545-2 R7/HL2 - ISO 5658-2.	
226	11.21	Particular attention shall be paid to ensuring that all penetrations and voids are protected with appropriate fire rated materials to achieve the fire barrier requirement.	
227	11.22	Where hoses and cables penetrate a fire wall, appropriate fire protection wrapping or sleeving is required to ensure a fire path is not created through the firewall.	
228	11.23	Any sealants or adhesives used in the firewalls must be fire rated as per AS1530 Part 3 - minimum 30min/30min/30min for structural adequacy/integrity/insulation respectively.	
229	11.24	No insulating material likely to become impregnated with fuel, lubricant or other combustible substances shall be used in the engine compartment. Non-absorbency to be in accordance with Annex 9 of EN118. The insulating material is to be covered by an impermeable non-flammable sheet.	
230	11.25	Precautions shall be taken, either by a suitable layout of the engine compartment or by the provision of drainage orifices, to avoid as far as possible, the accumulation of fuel, coolant, lubricating oil or any other combustible material in any part of the engine compartment. (Refer ADR58/00)	
231	11.26	Heat shields made from non-flammable materials with melting temperatures in excess of 1200 C (such as steel) shall be fitted between heat sources such as exhaust systems, catalytic converters, retarders, heaters (other than those supplied by hot water) and the other Bus components and equipment to prevent heat damage and possible fire if those components become defective such as alternators.	
232	11.27	Heat sources at item 11.26 are also to be adequately ventilated to dissipate heat outside the bus. Particular attention is required to adequately provide space between flooring, hatches and side walls. Temperature measurements are to be taken to ensure the surrounding materials are within their maximum heat ratings.	
233	11.28	Drip shields are to be fitted to prevent fuel, coolant, lubricating oil or any other combustible fluids leaking onto hot items or items that may fail and become hot, such as alternators, where those temperatures exceed the ignition temperature of the fluids.	
234	11.29	Each Bus shall have a means to stop the supply of fuel to the engine bay without damaging the Bus. If this system is manually activated it must be able to be activated from the driver's cabin.	
235	11.30	A 4.5kg (agent capacity) ABE fire extinguisher with a fire rating of 4A:80B:E (22 secs discharge, approximate dimensions: height 470mm, width 216mm, depth 148mm) shall be provided in a housing located near the driver's cab. Alternatively, to address individual driver weight handling requirements, two fire extinguisher with a minimum capacity of 1.5kg (agent capacity) ABE fire extinguishers may be provided., the first extinguisher located near the driver, the second extinguisher shall not be accessed on the exterior right-hand side of the bus (traffic hazard). It is acknowledged these requirements exceed the minimum requirements of AS 2444.	
236	11.31	Two fire extinguisher with a minimum capacity of 1.5kg (agent capacity) ABE fire extinguishers may be provided., the first extinguisher located near the driver, the second extinguisher shall not be accessed on the exterior right-hand side of the bus (traffic hazard). It is acknowledged these requirements exceed the minimum requirements of AS 2444.	
237	11.32	For double deck buses the upper deck will be supplied with an additional fire extinguisher as per 11.30 in a break glass enclosure with the extinguisher alarmed as per the emergency hammers.	
238	11.33	Not used	
239	11.34	Floor hatches must be sufficiently sealed to prevent smoke ingress, noise insulated and no less flammable than the surrounding floor.	
240	11.35	The service schedules for the complete Bus must include specific instructions on checks to reduce fire hazards. Such checks must address all areas known as causes of fires, and all areas of fire risk.	
241	11.36	All wheelarches are to be designed to prevent wheel fires entering the the passenger space as per 11.19.	
242	11.37	The upper deck rear seated area must have a concealed smoke detector fitted with a warning device incorporated in the driver's dashboard providing and audible and visual warning.	
243	<b>12. ENGINE BAY FIRE SUPPRESSION SYSTEM (EBFSS)</b>		
244	Each Bus must have an automatic Engine Bay Fire Suppression System (EBFSS) that:		
245	12.1	12.1.1	Meets the P-Mark certification standard SPCR 183;
246		12.1.2	Satisfies the requirements of AS 5062:2016;
247		12.1.3	Is not a hazard to any person;
248		12.1.4	Is suitable for installation on vehicles used for mass transit services;
249		12.1.5	Is able to protect the engine, transmission and surrounding areas taking into account known heat sources including, but not limited to, the alternator, turbocharger, fuel lines, catalytic converter and major electrical connection points;

250	12.1.6	Is designed to prevent a fire progressing to the Bus body and passenger compartment;	
251	12.1.7	Is designed to function effectively whilst the Bus is in motion, stopped with the engine running or stopped without the engine running;	
252	12.1.8	Includes a system fault function test for technicians;	
253	12.1.9	Provides the driver with an audible and visual notification on Bus start-up that the system is operative;	
254	12.1.10	Takes account of likely flame front direction or fire paths and all recognized possible sources of fire;	
255	12.1.11	Includes components, such as mountings and connections that are fitted in accordance with any relevant requirements of the vehicle supplier so as not to void any chassis or body warranties. No chemicals or other materials used shall void the chassis or body warranties; and	
256	12.1.12	includes an effective notification system that provides the driver with a clear and distinguishable audible and visible alarm to the driver when the fire suppression system has been activated; and	
257	12.1.13	is discrete enough so as not to panic passengers on the Bus.	
258	12.1.14	Takes into account the passenger unloading time for the configuration of Bus ( low floor, mid floor, double deck)	
259	12.2	Power for the System control panel must be provided from at least two separate power supplies, as follows:	
260	12.2.1	The primary power supply shall be of sufficient capacity to independently provide power for all System functions when the equipment is running;	
261	12.2.2	The secondary power supply shall be capable of supplying sufficient power to operate all System functions; and	
262	12.2.3	The secondary power supply shall be supervised and generate a fault condition when it's no longer able to meet the requirement in point (i) above.	
263	<b>13. TYRE PRESSURE MONITORING SYSTEM (TPMS)</b>		
264	13.1	The TPMS must be fully automatic and inclusive of all hardware and fittings for a complete installation. The TPMS must be robust and of good quality and provide for continues monitoring of tyre pressure and warns of over temperature. The TPMS must be able to provide:	
265	13.1.1	A dash mounted graphical user interface that indicates the system is active and which provides functions including visible and audible warnings with overrides;	
266	13.1.2	User defined minimum and maximum tyre air pressure and exceeding 80°C temperature with audible and visible alerts to the driver when minimum and maximum pressure settings have been reached and when the 80°C temperature has been exceeded;	
267	13.1.3	Constant monitoring of tyre air pressure, with pressure measurements provided in PSI, KPA and BAR and temperature measurements provided in Celsius Capable of monitoring 4 to 20 tyres;	
268	13.1.4	Monitoring of sensors to alert a problem or malfunction on the driver display screen;	
269	13.1.5	Owner TPMS manuals;	
270	13.1.6	System dedicated power supply;	
271	13.1.7	Detection Ease of maintenance and repair when necessary;	
272	13.1.8	Reliable performance and not be affected by road vibration;	
273	13.1.9	Wireless monitoring sensors;	
274	13.1.10	All mounting brackets, power cable, clamps and necessary works including all necessary fittings and fixings and consumables items to secure equipment to various makes and models of Bus;	
275	13.1.11	All required labelling, and operating signage.	
276	13.2	The System must be designed to be fail-safe. Regardless of what is occurring on the Bus, the System must operate when activated and be so designed that it does not create potential safety issues.	
277	<b>14. BUS LIVERY - EXTERNAL</b>		

278	14.1	The Bus must comply with the information set out in document: BC/14-23562 (2018) SMBSC and OSMBSC Transport for NSW Bus Livery or any later revision released by TfNSW. Refer Appendix 1.	
279	14.2	A general arrangement drawing is required for TfNSW approval. (Refer Section 55).	
280	14.3	TfNSW Bus Livery Colour Scheme, PPG Reference Colour Codes:	
281	14.3.1	297C Blue Delfleet	
282	14.3.2	10MA White Delfleet	
283	14.3.3	KT79 Black Delfleet	
284	14.3.4	ALL 417 LINE.	
285	14.4	Contrasting vertical strips at front door to be YELLOW.	
286	14.5	Housing of left hand rear vision mirror is to be YELLOW.	
287	14.6	Any Bus body design change during the term of the Deed must be reflected in the general arrangement drawing provided at Section 55 and submitted to TfNSW.	
288	<b>15. BUS COLOUR SCHEME – INTERNAL</b>		
289	15.1	Seat colour BLUE moquette material similar to Camira or Reatex anti-graffiti or otherwise approved.	
290	15.2	Priority Seating and seating in the wheel chair area to be moquette material colour RED similar to Camira OR Reatex anti-graffiti or otherwise approved.	
291	15.3	Interior floor colour DARK GREY similar to Gerflor TaraBus Sirius 6727 Anthracite NT	
292	15.4	Floor colour in non-standing areas to be RED similar to Gerflor TaraBus Sirius 6132 Rubis NT	
293	15.5	Lettering in non-standing areas to be YELLOW with words NO STANDING AREA	
294	15.6	Wall colour is LIGHT GREY or similar.	
295	15.7	Wheel chair space border colour is WHITE	
296	15.8	Wheelchair allocated space is LIGHT GREY similar to Gerflor TaraBus Sirius NT: 6768 Griffon	
297	15.9	International Accessibility Logo (proportions in AS1428.1) in allocated space is WHITE.	
298	15.10	Rear vision mirror casing on left-hand side to be INDUSTRIAL YELLOW.	
299	15.11	Step edging and plinth edging inserts to be coloured INDUSTRIAL YELLOW.	
300	15.12	Window cappings to be DARK GREY or similar.	
301	15.13	Air-conditioning ducts to be MID GREY or similar colour to hide hand marks and stains.	
302	15.14	Centre ceiling panel to be WHITE or similar light colour.	
303	15.15	Horizontal handrails STAINLESS STEEL.	
304	15.16	Vertical handrails to be STAINLESS STEEL.	
305	15.17	Grab handles to be INDUSTRIAL YELLOW (If powder coated, to be in accordance with AS 4506:2005).	
306	15.18	Door handrails INDUSTRIAL YELLOW (If powder coated, to be in accordance with AS 4506:2005 ).	
307	15.19	Bus stop push button casings YELLOW.	
308	<b>16. INTERIOR DECALS AND EXTERNAL LOGOS</b>		
309	16.1	Interior Decals and Exterior Logos must be applied to comply with the document: BC/14-23560 (2019) SMBSC and OSMBSC Transport for NSW Interior Decals and Exterior Logos, or latest revision released by TfNSW. Refer Appendix 2.	
310	16.2	All Decals shall be manufactured in accordance with AS 4833-2007 (Pressure sensitive labels for stock-paper, stock-plastic and general purpose use).	
311	16.3	Retro reflective decals shall have a reflective property in accordance with AS/NZS 1906.2:2007 (Retro-reflective Materials and Devices for Road Traffic Control).	

312	16.4	Luminous or self-illuminating decals to be in accordance with ADR44/02, which requires the decal to be luminous for at least 15 minutes after the vehicle ceases operation or 15 minutes after loss of battery power.	
313	16.5	Decals to be supplied in Calendar Vinyl minimum thickness 110 microns (including adhesive).	
314	16.6	Decals shall be covered with a graffiti resistant over laminate to be applied as a clear gloss film. Spray type laminates are not preferred.	
315	16.7	The laminate shall have an adhesive that will bond permanently to the decal, be clear in colour and shall not discolour the printed decal.	
316	16.8	Decals shall have an adhesive quality such that the Decals cannot be easily removed.	
317	16.9	The graffiti resistant laminate must be the exact size of and fully cover the printed decal.	
318	16.10	The laminate must be resistant to all cleaning chemicals and be able to withstand repeated cleaning using commercially available solvents or paint remover without leaving residual staining or discolouring the decal surface.	
319	16.11	Suppliers must provide drawings, confirming compliance with the above document, for approval by TfNSW prior to construction of the first bus. Refer Section 55.	
320	<b>17. SERVICE ACCESS</b>		
321	17.1	All components of the Buses which may require servicing at regular intervals must be readily accessible without the need to remove fixed panels, frame members or fittings.	
322	17.2	For driver and road maintenance team safety, all road service related breakdown items must be located on the front, rear or left-hand side of the Bus body only.	
323	17.3	Typically for workshop maintenance, in addition to the access doors at 17.2, right hand side door(s) would be required for exterior access to the engine area.	
324	17.4	Floor hatches are to be designed in accordance with the Body Builder's Instructions supplied by the chassis manufacturer as a minimum requirement. (Also refer to Section 11 for Fire Mitigation).	
325	17.5	All exterior hatches and doors must be made from a durable and lightweight material and be provided with gas struts or similar devices to keep the hatches or doors open and positively closed when shut. Doors that open vertically (i.e. the hinge line is horizontal) must open to at least 150 degrees from the closed vertical position and the hinge be located on the upper edge.	
326	17.6	All fluids, including lubricating oils and windscreen washer water must be able to be filled from the exterior of the Bus. It must not be necessary to enter the interior of the Bus in order to fill any fluids, except for the automatic transmission fluid.	
327	17.7	A small access hatch must be provided to allow quick access to the transmission oil dipstick.	
328	17.8	Easy access for safely checking and filling hydraulic oils	
329	17.9	Easy access for safely checking and filling engine oil.	
330	17.10	Easy access for safely checking and filling engine coolant	
331	17.11	Any exterior ventilation panels on the Bus below the cant rail must have a mesh/hole size of less than 5mm to prevent finger entrapment by children or adults, who may be standing outside the Bus or provide hand-holds for bicyclists. Holes in panels with tapered shapes are not permitted.	
332	17.12	With the exception of equipment that must be accessible in an emergency, all hatches and doors must be provided with suitable locking devices such as:	
333	17.12.1	Key locks for CCTV and drivers lockers.	
334	17.12.2	Quarter turn locks with 7mm square locking pegs for hatches and doors.	
335	17.12.3	If quarter turn locks are used there must only be one locked and one unlocked position and there must be a visual indication of the locked/unlocked position.	
336	17.13	All service access locks must be identical and driver keys must be identical (but different from the service keys).	
337	17.14	Service access to critical areas such as the rear of the alternator, turbo charger, batteries, brakes, transmission and other critical items shall be provided to facilitate maintenance of these items.	
338	<b>18. BODY – GENERAL</b>		
339	18.1	The body frame material preference is for non-corrosive metals such as stainless steel or aluminium alloy.	
340	18.2	Coated or galvanised steel frames may be considered subject to demonstrating a high level of corrosion protection.	
341	18.3	Suitable protection must be provided below the wheel chair ramp to protect the ramp and passenger door area from impact damage.	

342	18.4	Suitable precautions must be taken to minimise the effects of any collision on the driver's cab, battery compartment, steering and braking controls.	
343	18.5	Suitable precautions must be taken to minimise the effects of any collision on passengers, particularly side impacts in the low floor section.	
344	18.6	Suitable protection must be provided at the rear of the Bus (engine, and radiator) to minimise damage in the event of a rear end or side collision. Particular attention is to be paid to protect from oil leaks, electrical shorting and damage to drive belt pulleys.	
345	18.7	The bodies must be constructed so as to allow, as far as possible for ease of repair and maintenance, quickly replaceable parts and sub-assemblies.	
346	18.8	All internal components and trim with any fixings exposed to the interior of the Bus must be fixed using tamper-proof components which are not readily removable without special tools. Acceptable fixings include such items as Allen head screws, and screws with special head designs. Normal slotted or Phillips head screw fixings are not acceptable.	
347	18.9	Interior panels must durable and lightweight and be bonded or mounted with threaded screws or suitable methods to ensure panels do not work loose or rattle. Self-tapping screws are not acceptable.	
348	18.10	The top corners of the body cross-section are curved rather than having sharp corners, and otherwise designed so as to minimise the damage caused by collision with overhanging branches, canopies and signs.	
349	18.11	The cant panel areas must be capable of being readily repaired or replaced without disturbing the roof centre or adjoining roof sections.	
350	18.12	The Bus body shall be designed to maximise potential advertising space for the purchaser. Specific areas considered suitable for advertising include the rear panels, side panels below the window line, rear engine door, the cant panel area above the passenger windows, and passenger windows. These areas shall be free from any unnecessary indentations and protrusions.	
351	18.13	Signage, advertising materials and decals must be secured in a manner that allows their successful repeat application and removal without specialised techniques, significant effort, or damaging the Bus body.	
352	18.14	The exterior surfaces of each Bus must be free of protrusions likely to cause injury to pedestrians or Bus occupants. Refer ADR42/04	
353	18.15	Exterior panels, including roof panels, must be durable and lightweight. Panels must be fully segregated below floor / seat rail and may be partially segregated above floor / seat rail.	
354	18.16	Exterior panels must be readily repairable in the event of minor damage.	
355	18.17	All exterior panels must be easily replaceable without disturbing any adjacent panels or window(s).	
356	18.18	All exterior panels must be fitted or bonded to the Bus body in a manner which prevents water being trapped behind the panel creating a corrosion risk.	
357	18.19	Guttering must not be joined over any doorway.	
358	18.20	The front and rear corner panels must be made up as sub-assemblies and must be easily replaceable without disturbing any adjacent sections.	
359	18.21	The front and rear bumpers must be made from a material which is durable and lightweight, in three sections and each section must be easily replaceable without disturbing adjacent sections.	
360	18.22	Each Bus must be painted using an appropriate automotive paint process. The Bus manufacturer must ensure that all preparation and painting, is carried out in strict accordance with the paint suppliers written instructions and	
361	18.23	The Bus must be fitted with heavy duty, rear mud flaps.	
362	18.24	The Supplier must detail the materials, such as: C3R12 stainless steel; 304 stainless steel; galvanised steel or 6000 series aluminium alloy, that are used in the Bus frame, chassis extension, wheel arches, steps and floor support framework.	
363	18.25	The methods used for frame joints must be described with reference to quality assurance processes used to demonstrate compliance. (welded or bolted)	
364	18.26	Where there is potential for dissimilar metals in the frame and/or chassis to come into contact, appropriate measures must be taken to prevent galvanic corrosion.	
365	18.27	Two skids must be fitted at the front corners, and two at the rear corners of each Bus. Each skid must be securely attached to the chassis or under-frame of each bus. Each skid must be installed such that it is on the lowest point on the angle of approach or angle of departure of the Bus.	
366	18.28	The floor of any upper deck on a double deck Bus shall be constructed and drained to prevent water from entering any lower deck	
367	18.29	Emergency exits are to be provided in accordance with ADR44/02.	
368	18.29.1	Minimum number of emergency exits on single or lower deck shall be 6.	

369	18.29.2	Minimum number of emergency exits on upper deck shall be 6. NB: access between decks may be considered an emergency exit for each deck.	
370	18.29.3	In the case of a double deck vehicle there shall be an emergency exit in either the front face or rear face of each deck. (ADR44/02). In this Bus specification an emergency exit on the lower deck shall be through the front windscreen.	
371	18.29.4	Each emergency exit, including the windscreen if used as an emergency exit, shall be capable of operation from both inside and outside the vehicle .(ADR44/02)	
372	18.29.5	Emergency exit windows, including the windscreen if used as an emergency exit, shall be easily operated by one adult and take no longer than 30 seconds to open/break.	
373	18.29.6	External operation of a break glass emergency exit may be conducted by using a heavy item such as a rock . Typically the external emergency sign will depict a rock.	
374	18.29.7	Suppliers are to note the internal and external emergency exit signage requirements in ADR44/02, including the self illuminating, retroreflective size and positioning requirements.	
375	18.29.8	'Break Glass' hammers at emergency window exits must be retained with high tensile heavy-duty wire and must activate an audible and visible alarm when removed from their mounting.	
376	18.29.9	For emergency exit windows, a decal with contrasting letters no less than 20mm high must be located below the EMERGENCY EXIT sign with the words "DO NOT FIT IMPACT FILM"	
377	18.30	For buses which may require vehicle frontal protection systems (VFPS) such as bull bars, refer Options Section 62	
378	<b>19. ELECTRONIC TICKETING: TfNSW – ETS / OPAL</b>		
379	The supplier must prepare each Bus ready for wiring for Electronic Ticketing Equipment (ETS) in accordance with the Coachbuilders ETS SOW 7.1.pdf 1 February 2019. (refer Appendix 4). The Opal specifications include details of:		
380	19.1	Driver console mount positioned so the ticket machine does not interfere with driver forward vision and ensure compliance with ADR 42 regarding compliance with field of view.	
381	19.2	Driver console mount to support the Opal driver console.	
382	19.3	Driver console and mount to ensure Bus operator's driver cash box can be used.	
383	19.4	Suitable cable concealment tray incorporated or securely fixed to Driver console mount to support cables to the driver's console.	
384	19.5	Opal reader mounted on the Bus dash board area.	
385	19.6	Suitable locations to support additional opal readers at the Front and Centre doors.	
386	19.7	Power to ETS Bus tap off terminal strip or plug mounted in the allocated space inclusive of 24v/0V DC constant supply. Cable needs to be suitable to carry a maximum 15 amps.	
387	19.8	Ignition DC constant 24v DC. Cable needs to be suitable to carry maximum 5 amps.	
388	19.9	Reverse signal 24 V DC signal for when Bus is in reverse and 0 V signal for when Bus is not in reverse.	
389	19.10	The Bus Chassis Manufacturer to ensure the odometer signal used by the AVL meet the industry standard C3 Pulse width modulation. Odometer signal specified is 5.0v DC minimum high and 0.6v DC maximum low.	
390	19.11	Cable pathways to support the wiring of Opal at a later stage to all devices inclusive of conduit and draw wires down stanchions and through A/C ducts where access is limited.	
391	19.12	Suitable location on the Bus roof of a metal sheet under the fibreglass, with a supporting bracket located to mount the Tri band Antenna.	
392	19.13	Suitable infrastructure to support a second Opal reader at the front door ensuring DDA, ADR and Opal ergonomic and installation guidelines are maintained.	
393	19.14	Suitable infrastructure to support two Opal readers at any other door ensuring DDA, ADR and Opal ergonomic and installation guidelines are maintained.	
394	19.15	An equipment storage space is required within the Bus to mount the supporting infrastructure to support ETS devices. This space must be secure and away from passengers. Refer to Appendix 4 for equipment space details.	
395	19.16	The space referred to in 19.15 requires easy access, for maintenance, via a hinged door with industry standard locks.	

396	19.17	This space may be integrated with the housing for the passenger information display, with the equipment for the PID being located in space additional to that reserved for the ETS.	
397	<b>20. PASSENGER DOORS</b>		
398	20.1	Passenger doors must fully comply with ADR58/00, the RMS Technical Specification 155 and RMS Technical Specification 147 and any relevant Technical Specification updated during the term of the Deed.	
399	20.2	For the Bus door safety system defined by RMS technical specification TS155, the pre-set speed for the safety system is 5km/hr;	
400	20.3	When the door brake is activated the retardation is to be in the range 0.15g and 0.25g; and	
401	20.4	The gradient to be used for the TS155 retardation test is 12° or 18%.	
402	20.5	The Front Door must be an inward glide Double Door opening, with full depth glazing.	
403	20.6	The Front Door must be an inward glide Single Door opening, with full depth glazing.	
404	20.7	The front door function is for wheel chair and ambulant entry/exit.	
405	20.8	Front door minimum clear width minimum	
406	20.8.1	850mm (minimum)	
407	20.8.2	920mm (minimum)	
408	20.9	The Centre Door must be an inward glide Double Door opening.	
409	20.10	The centre door function is for ambulant entry /exit.	
410	20.11	Centre door minimum clear width 920mm.	
411	20.12	Passenger doors must be close fitting in their apertures to reduce wind noise and dirt and moisture ingress.	
412	20.13	Passenger doors must be:	
413	20.13.1	designed for high frequency duty cycles;	
414	20.13.2	have highly reliable entrapment sensors not affected by rain, leaves discarded rubbish, pressure waves from passing trucks or any other effects experienced in a busy operating passenger transport environment;	
415	20.13.3	constructed from robust and reliable components; and	
416	20.13.4	precision designed to require minimal adjustment	
417	20.14	Passenger doors must be designed not to burst open if a person falls heavily against the doors.	
418	20.15	Designed using long life components.	
419	20.16	The Front Door and Centre Door shall not be fitted with locks as standard, but locks may be provided as an option for specific Bus operators. Refer Section 61.	
420	20.17	The driver door controls must be on the right hand side of the driver.	
421	20.18	The door control is to be spring-loaded toggle switch with fore and aft action, or push buttons (open and close), depending on Operator preference.	
422		Status indicators (LEDs ) are required near the door control buttons / switches to indicate if the door system has:	
423	20.18.1	a fault (red LED),	
424	20.18.2	is OK (green LED)	
425	20.18.3	or is in override condition (amber LED).	
426	20.18.4	each light is to be appropriately labelled.	
427	20.19	Emergency Door Release (EDR) Buttons must be provided for each door internally and externally in accordance with information at Appendix 5.	
428	20.20	Each EDR button will be covered by a top-hinged flap to prevent inadvertent activation.	

429	20.21	The interior EDR buttons must be marked in letters at least 10mm high, in a colour which contrasts with the background on 'self-illuminating material" (ADR 44/02)	
430	20.22	The exterior EDR buttons must be marked in letters at least 10mm high, in a colour which contrasts with the background on 'retroreflective material" (ADR 44/02)	
431	20.23	The internal EDR buttons at the front and centre doors are to be red.	
432	20.24	The front door external EDR button is to be red and located in the same housing a door close button which is green (The green button must not close door unless hand brake applied).	
433	20.25	The Centre door external EDR button is to be red.	
434	20.26	A door override switch is required for each door, appropriately labelled, located inside the front door header box.	
435	20.27	When the front door over ride switch is activated the door safety system (reopening and accelerator interlock) will be deactivated and the door will open. The door can then be operated using the door control buttons.	
436	20.28	When the centre door over ride switch is activated the door safety system will be deactivated and the door will close. The door will also be isolated and cannot be opened or closed using the driver door control buttons.	
437	20.29	No door override switch can be activated if the handbrake is not applied.	
438	20.30	The handrails on the doors are to be designed to allow a 5 percentile female passenger standing on ground level to comfortably reach the hand rail before stepping on to the bus, and that the hand rail sweep upward to allow that passenger a comfortable hand hold once boarded.	
439	20.31	The handrails on the doors are to be coloured as per Section 15.	
440	<b>21. GLAZING</b>		
441	21.1	All glazing must comply with ADR8/01. Glazing includes all body glass, windscreen and any other transparent panels in the Bus. Internal panels such as modesty panels and driver's protection screens may be made of plastic materials and must comply with Appendices 14 and 15 in ADR8/01.	
442	21.2	All glass must carry the indelible marking or marks of the relevant standards and be visible when the glass is fitted to the vehicle in accordance with clause 7.4 in ADR8/01.	
443	21.3	Any bonded glass must be able to be replaced without damaging any corrosion protection coatings on the Bus body frame.	
444	21.4	For safe operations, the glazing and dashboard must be designed to allow the driver to sight a one metre high object, positioned outside the bus, immediately adjacent to the left hand A- Pillar.	
445	21.5	The windscreen must be laminated glass with a light transmission of at least 70% and no tinting in the field of view as per ADR8/01.	
446	21.6	Windscreens are to be one piece. (Refer Section 61 Options for two-piece windscreens).	
447	21.7	Windscreens are to be directly bonded. (Refer Section 61 Options for rubber mounted).	
448	21.8	Windscreen heat filtering film such as XIR type must be configured to ensure that toll tags function effectively.	
449	21.9	Side windows must be made from toughened glass, tinted grey with 35% light transmission.	
450	21.10	Side windows are to be directly bonded. (Refer Section 61 Options for rubber mounted).	
451	21.11	The driver's window shall:	
452	21.11.1	comprise twin sliding panels	
453	21.11.2	limited to opening 100mm maximum	
454	21.11.3	have tempered glass	
455	21.11.4	have 35% light transmission (Road Transport (Vehicle Registration) Regulation 2017 Cl, 44(6))	
456	21.11.5	be fitted with a transparent guard panel (such as tempered glass) to prevent a person standing outside the driver's window from reaching the door close controls.	
457	21.12	Front door glass must have at least 35% light transmission. (Road Transport (Vehicle Registration) Regulation 2017 Cl, 44(6))	
458	21.13	Glazing covering external destination signs must be separate from other windows and untinted with at least 70% light transmission.	
459	21.14	A rear window glass is not mandatory and consideration shall be made to provide a fire barrier.	
460	21.15	Full height modesty panels comprising glazing from least above waist rail level, must be provided at the rear of the Front Door and the front and rear of the Centre Door. They must be located so as to prevent passengers from trapping their hands when a door opens, and any integrated handrail or grab rail must comply with ADR1428.2.	

461	21.16	Side windows, rear windows (if fitted) and door glass, but excluding any break glass emergency exit windows, are to be fitted with an impact resistant, anti-graffiti, replaceable protective film. The impact protection provided is to be in compliance with Section 5 in AS1288.	
462	21.17	The protective film must be clear, easily replaced, designed to protect the window glass from scratching and vandalism, provide additional impact protection as per 21.16 and reduce heat transfer into the bus.	
463	21.18	For the driver's window the impact film combined with the glass must prevent at least 98% of UV(A) passing into the bus.	
464	<b>22. WINDSCREEN WIPER AND WASHERS</b>		
465	22.1	Large 'fold over' windscreen wipers must be fitted, and they must incorporate variable intermittent, normal and fast speeds. Refer ADR42/04.	
466	22.2	Windscreen washers must be mounted on the windscreen wipers so that they move across the screen with the wipers, with a minimum holding container capacity of five litres. Refer ADR42/04.	
467	22.3	The wiper motor and linkages must be easily accessible for inspection and maintenance.	
468	22.4	Wipers must operate smoothly without juddering or bounce at the various design speeds of the Bus and for sub-tropical heavy rain events expected in the operating area.	
469	22.5	Wipers are to minimise, as much as possible, unswept areas adjacent to the A-pillars to minimise blind spots.	
470	<b>23. BODY INSULATION</b>		
471	23.1	The body sides and roof of each Bus must be fitted with suitable thermal insulation. Refer Section 11 Fire Mitigation.	
472	23.2	The thermal insulation must be not be capable of absorbing moisture and fuel oil. Refer Section 11 Fire Mitigation.	
473	23.3	The underside of the floor behind the rear axle must be fitted with suitable heat insulation, noise absorption and noise insulation material. Refer Section 11 Fire Mitigation.	
474	23.4	The insulation must be capable of suppressing noise levels as specified at Section 5.	
475	<b>24. HANDRAILS AND GRAB RAILS</b>		
476	24.1	Handrails and grab rails must conform to the Disability Standards for Accessible Public Transport (2002) and the associated Australian Standards AS 1428.1 and 1428.2.	
477	24.2	For hygiene and cleanliness, handrails and grab rails are not to have finely textured surfaces which trap dirt and grease. Open textures may be permitted if easy to clean.	
478	24.3	The fastenings, materials and construction of the handrails and grab rails are to comply with the load requirements of AS1428.1	
479	24.4	Particular attention must be paid to the positioning handrails and grab rails in the accessible area and in the vicinity of the driver's cabin and front and centre door areas to provide support for passengers boarding and alighting the bus, and for support while the Bus is in motion.	
480	24.5	All vertical handrails to be as per Section 15 with matching clamps and fixings.	
481	24.6	Longitudinal, overhead handrails, finished as per Section 15, must be fitted on both sides of the aisle in the low floor section of the bus. These handrails must be fitted with individual hanging grab handles coloured as per Section 15 for standing passengers.	
482	24.7	On any pair of facing seats, grab handles of colour specified in Section 15, complying with AS1428.1, must be fitted to the interior body sides approximately midway between the seats. The aisle edge of the pair of facing seat frames must also be provided with grab handles complying with AS1428.1, coloured as per Section 15.	
483	24.8	On any transverse seat where the aisle or stepped aisle is more than 100mm lower than the level of the floor at the passenger's feet, the aisle-side edge of the seat frame must be provided with a grab handle coloured as per Section 15, complying with AS1428.1.	
484	24.9	Suitable transverse grab handles, coloured as per Section 15, complying with AS1428.1 must be provided on each bulkhead or screen ahead of any forward facing seats.	
485	24.1	Any handrail or grab handle where a passenger may strike the handrail or handle in an emergency stop or heavy braking, must comply with TS148.	
486	24.11	Hanging grab handles or straps and seat mounting grips must be installed in each Bus in accordance with standing capacity.	

487	24.12	The hanging grab handles or straps mounted to the longitudinal hand rails must equate to a minimum of 65% of the total standing capacity.	
488	24.13	Seat mounted grips must be aisle side mounted.	
489	<b>25. BUS STOP REQUEST BUTTONS</b>		
490	25.1	Bus stop request buttons to alert the driver a passenger requests the Bus to stop must be fitted to all stanchions adjacent to seats and designed not to be susceptible to accidental or false activation. All seats must have access to bell push button.	
491	25.2	At the rear five passenger seat, bus stop request buttons to be fitted on the left and right hand sides of the bus.	
492	25.3	Bus stop buttons must have a casing coloured as per Section 15, to provide conspicuity for the button and also provide contrast to identify the vertical handrails.	
493	25.4	Operation of any stop button must activate a Bus Stopping Sign, mounted at the front of the Bus, to illuminate until the door is opened.	
494	25.5	The Bus stop button must also provide an audible tone for all passengers and a warning light for the driver on the dashboard.	
495	25.6	The audio signal will cancel after the first activation and reset when the door has been opened and closed.	
496	25.7	The left hand side and right hand side bell push electric circuits must be separated to improve the reliability of the system.	
497	25.8	Refer to Section 10 for wheel chair Bus stop request button details.	
498	<b>26. SEATS</b>		
499	26.1	Except for folding seats in the wheelchair allocated spaces, seats shall be floor mounted with a vertical leg. (cantilever seats are Optional in Section 61)	
500	26.2	Seats must have vandal-resistant frames and backs. Full size cushions and squabs must be provided and must be easily removable for repair and replacement.	
501	26.3	Continuous seat rails must be incorporated in the body sides.	
502	26.4	A moulded grab handle must be fitted to the top of each seat back (exception for the rearmost row of seats).	
503	26.5	All passenger seats and the driver's seat must be trimmed in moquette over foam upholstery. See Section 11 for Fire Mitigation standards for seats.	
504	26.6	In addition to the seats in the wheelchair area, at least four (4) designated Priority Seats must be provided in the low floor area of the Bus and as close as possible to the accessible entrance.	
505	26.7	Priority Seating signage to be provided in accordance with TfNSW internal signage requirements.	
506	26.8	Particular attention must be paid to ensuring high levels of comfort for seated passengers, including contoured seat padding and adequate knee and leg room. (Refer ADR58/00 for minimum dimensions)	
507	26.9	Folding seats must be provided in the wheelchair allocated spaces for use when spaces not used by wheelchair passengers. All folding seats, when deployed, must meet the same mounting, strength and impact requirements as the fixed seats.	
508	26.10	All folding seats must be able to be deployed in both the raised and lowered positions and must not automatically spring back to the folded position.	
509	26.11	Seatbelted seats shall be fitted, forward facing, in the 2 for 3 format complying with ADR68/00 ( retractable lap sash belts) with current Component Registration Numbers (CRN). NB: In NSW this arrangement is permissible under Bus Seat Exemption Notice 2014 (New South Wales Government Gazette No 116) and National Heavy Vehicle Standards (2 for 3 Bus Seat) Exemption Notice 2015 No.1 (Government Notices Gazette C2015G00099).	
510	26.12	Bus structure to which the seats are mounted to have the same characteristics as the test platform used for the ADR68/00 tests. (Refer ADR68/00, Clause 7.1.2)	
511	26.13	All modesty panels or other structures such as driver cabin protection barriers in the head impact zone to comply with ADR68/00. (Refer Appendix 2, Clause 1 for HIZ).	

512	26.14	Six seat positions to be fitted with fittings for child restraints in accordance with the requirement of ADR68/00 Clause 5.6 and ADR34.	
513	26.15	To ensure an acceptable level of safety for all three occupants in the 2 for 3 arrangement, NSW has taken a position that the level of occupant protection provided by the centre position needs to have further safeguards and has imposed additional safety requirements. As such all 2 for 3 seats must meet the Australian Design Rule requirements specified below:	
514	26.15.1	The rear parts of the seat fitted directly in front of a centre seating position of a 2 for 3 Bus seat must comply with the Energy Dissipation Test of Australian Design Rule ADR 3/04 (Seats and Seat Anchorages) and	
515	26.15.2	The centre seating position of a 2 for 3 Bus seat must comply with Australian Design Rule ADR 4/05 (Seatbelts) and Australian Design Rule ADR 5/05 (Anchorages for Seatbelts).	
516	26.16	A label or sign fitted inside the Bus warning passengers that the 2 for 3 seat can only be used by children under 12 when used in a three seat configuration.	
517	26.17	In each ADR68/00 installation, seats are to be provided with an aisle side grab handle on every second seat, off-set from left to right so a person moving down the aisle has a hand hold at every seat	
518	26.18	The bus is to comply with ADR68/00	
519	<b>27. LUGGAGE RACKS</b>		
520	27.1	A luggage rack may be provided as per Options Section 61.	
521	<b>28. REAR VISION MIRRORS</b>		
522	28.1	All rear vision mirrors must be in accordance with the RMS Technical Specification 147, Field of View of the Passenger Entrance Doors on a Bus.	
523	28.2	All exterior rear vision mirrors must comply with ADR14/02 for Class II mirrors.	
524	28.3	To facilitate repair, all components must be separately replaceable and the mirror head must be mounted independently from the mounting bracket.	
525	28.4	All mirror mountings must be designed to minimise vibration to the mirror head, so the image seen by the driver is reasonably clear at all speeds up to 100km/hr. Refer to clauses 15.1.2 and 15.1.3 in ADR 14/02.	
526	28.5	Each exterior mirror must have an area of no less than 150cm <sup>2</sup> . As per clause 14.4 in ADR14/02.	
527	28.6	External mirrors must not project more than 230mm beyond the point of the overall width of the Bus and meet the collapse requirement of 28.7 (Refer clause 4.3 in ADR 14/02).	
528	28.7	External mirrors must be mounted on 'knock-back' arms that will move backwards in the event of impact, and project no more than 150mm from the side of the Bus when collapsed. (Refer clause 4.3 in ADR 14/02).	
529	28.8	The left-hand, exterior, rear-facing mirror must be a highly durable, impact resistant, heated, electrically adjusted, convex mirror (radius of curvature not less than 1,200mm, (Refer clause 4.5 in ADR14/02), mounted forward of the entrance doors and visible through the windscreen in the wiper-swept area.	
530	28.9	The left-hand exterior mirror housing material is to be coloured as per Section 14 to improve its visibility for pedestrians.	
531	28.10	To reduce the likelihood of impact with pedestrians, the lower edge of the left-hand mirror must be no less than 2,100mm from the ground with the Bus standing on level ground and at normal height.	
532	28.11	ADR14/02 15.2.4.2 Fig.4 specifies the required field of view to the rear and side of the Bus that the driver must be able to observe in the left-hand exterior mirror.	
533	28.12	The right hand side, exterior, rear- facing mirror must be a highly durable, impact resistant, heated, electronically-adjustable, flat mirror, visible through the driver's side window.	
534	28.13	The lower edge of the right hand side mirror shall be mounted as high as possible to reduce injury to pedestrians and minimise the driver's forward vision blind spot area.	
535	28.14	ADR14/02 15.2.4.2 Fig.4 specifies the required field of view the driver must be able to observe to the rear and side of the Bus in the right-hand exterior mirror.	
536	28.15	Interior mirrors must comprise:	
537	28.15.1	A convex mirror mounted centrally on the header panel, above the windscreen, for the driver to see the saloon space;	
538	28.15.2	A mirror mounted toward the left hand side of the front header; arranged to allow the driver to observe the mirror at item 3 NB: mirror must be easily adjustable from the front platform or be electronically adjustable;	
539	28.15.3	A convex mirror mounted near the centre door arranged to be observed by the mirror at item 2; and	
540	28.15.4	A convex mirror mounted near the left hand side to provide the driver with a view of the wheel chair area and the area behind the driver's cabin.	

541	28.16	It must not be necessary to move or adjust any interior mirrors to open any interior service doors or hatches (e.g. for destination or door equipment servicing).	
542	<b>29. INTERIOR LIGHTING</b>		
543	29.1	Interior lighting must ensure sufficient lighting for all passengers.	
544	29.2	The interior lighting must be LED and covered by diffusers.	
545	29.3	The layout must include lighting in each body bay, including the rearmost bay. In addition, with the exception of the front doorway, the layout must include an additional light mounted over the doorway (i.e. there must be two lights in each door bay), which must be illuminated whenever the interior lighting is switched on.	
546	29.4	All lighting elements must be readily replaceable.	
547	29.5	Light diffusers must be easily removable and replaceable.	
548	29.6	A separate driver's cab light must be fitted, illuminating the cab and the cash tray. This light must be activated whenever the front doors are open, and must also be operable at all other times by means of a separate switch.	
549	29.7	A document reading light must be provided in the drivers' cabin area and must be independently switched at all times.	
550	29.8	Interior lighting and any accessories must be so designed as to minimise reflections on the front windscreen and side windows adjacent to the driver and to reduce the glare in the driver's field of vision.	
551	29.9	To test for reflections at 29.8, turn off all lights and then progressively turn on internal lights, observing from the driver's position windscreen and mirror reflections that may interfere with driver vision.	
552	29.10	Adequate lighting must be provided in the engine compartment.	
553	<b>30. EXTERIOR LIGHTING AND RETROREFLECTORS</b>		
554	30.1	Any exterior lighting lamp locations, intensities, colours or signalling functions must comply with ADR13/00.	
555	30.2	In addition to the requirement of 30.1, the individual exterior lighting and retroreflectors on the Bus must comply with:	
556	30.2.1	ADR 1/00 Reversing Lamps;	
557	30.2.2	ADR 6/00 Direction Indicators;	
558	30.2.3	ADR 46/00 and ADR 77/00 Headlamps;	
559	30.2.4	ADR47/00 Retroreflectors;	
560	30.2.5	ADR48/00 Devices for Illumination of Rear Registration Plates;	
561	30.2.6	ADR 49/00 Front and Rear Position (Side) Lamps, Stop Lamps and End-outline Marker Lamps;	
562	30.2.7	ADR 74/00 Side Marker Lamps;	
563	30.2.8	ADR76/00 Daytime Running Lamps;	
564	30.2.9	ADR86/00)Parking Lamps; and	
565	30.2.10	RMS Technical Specification Warning signs and lights for school buses TS150.	
566	30.3	All exterior lights must be long life LED type.	
567	30.4	Side turn and marker lights to be located as close as possible to each front and rear wheel arch respectively to assist the driver when turning.	
568	30.5	A weather and pressure wash proof external light must be provided adjacent to the Front Door and Centre Doors, arranged to clearly illuminate the lowest door step edge, as well as the kerb and pavement or road surface, for at least 500 mm beyond the step edge and for at least the full width of the doorway.	
569	30.6	The light at 30.5 must be an LED type, must only illuminate when the respective doors are opened and the interior lights are on, and be extinguished when the respective doors are closed.	
570	30.7	Daytime running lamps to improve Bus conspicuity in daylight are to be provided in accordance with ADR 76/00.	
571	30.8	In addition to standard front direction indicators, high-mounted front direction indicators shall be provided in accordance with ADR13/00 and ADR6/00.	
572	30.9	In addition to standard rear direction indicators and stop lamps, high-mounted rear direction indicators and stop lamps shall be provided in accordance with ADR13/00, ADR6/00 and ADR49/00.	

573	<b>31. DRIVER CAB</b>		
574	31.1	Driver's seat is to be a non-swivel based, spring suspension/air adjustable, type, including a head rest and adjustable lumbar support, suitable for drivers ranging from the 5 <sup>th</sup> percentile female to the 95 <sup>th</sup> percentile male up to 150kg. Swivel	
575	31.2	The driver's seat must be fitted with lap/sash seatbelt with the seat buckle on the left-hand side of the seat.	
576	31.3	Adjustable blind mounted ahead of the driver to cover approximately 3/4 of screen width, refer to 5.10.	
577	31.4	Adjustable scissor type blind mounted to the right of the driver, refer to 5.10.	
578	31.5	Ticketing machine mounting details as per Section 19.	
579	31.6	Items such as PID interface, two-way radio, EBFSS panel and TPMS panel must be mounted in a position where they can be conveniently viewed and reached as necessary from the driver's normal seated position.	
580	31.7	Driver's coat hook.	
581	31.8	Personal driver's locker, with two other lockers to house equipment accessible by operations staff.	
582	31.9	A document holder capable of holding laminated A4 size documents.	
583	31.10	Emergency duress alarm radio buttons:	
584	31.10.1	A foot activated switch under a flip up foot rest at the driver's left foot location.	
585	31.10.2	A 2 <sup>nd</sup> hand activated switch on the dash riser near the driver's left knee.	
586	31.10.3	An additional switch and integration of the alarm with horn and headlight flashing functions are included in the Options Section 61.	
587	31.11	A cup holder arranged so as to minimise the risk of accidental spillage of any fluids over the driver, passengers or equipment.	
588	31.12	Driver authority card holder of metal material located on the front interior header.	
589	31.13	A driver's security half (½) screen shall be part of a driver's cabin door and shall open and close with the cabin door. The screen shall provide the driver with a degree of protection against passenger assault but without inhibiting the driver's vision, cause distracting reflections, restrict access for transactions with passengers, or restrict the driver from being able to easily enter and exit the cabin. (For higher risk areas, a ¾ screen may be fitted as per the Options Section 61.)	
590	31.14	The driver's cab door lock and striker must not present a safety hazard to the driver, particularly to their knees when exiting the cabin. Door locks and latches to be recessed where possible.	
591	31.15	The driver's cab raised platform shall not intrude into the passenger gangway, and shall be at a height not exceeding 350mm above the gangway.	
592	31.16	A lockable cash storage bin to allow storage of excess cash (both notes and coinage).	
593	31.17	Signage set out over bulkhead to include these items:	
594	31.17.1	Driver Authority Holder and sign	
595	31.17.2	Please do not speak to driver whilst Bus is in motion	
596	31.17.3	Bus Number	
597	31.17.4	Bus stopping sign	
598	31.18	At the driver's ear, the direction indicator sound level must be between 40 dB(A) and 50 dB(A).	
599	31.19	At the driver's ear the hand brake warning alarm sound level must be between 70 dB(A) and 80 dB(A).	
600	31.2	At the driver's ear the wheel chair ramp alarm sound level must be between 70 dB(A) and 80 dB(A).	
601	31.21	At the driver's ear any alarm sound level must be between 70 dB(A) and 80 dB(A).	
602	31.22	A rear vision camera must be supplied using the PID monitor when reverse gear is selected.	
603	<b>32. ENGINE CONTROLS AND PROTECTION</b>		
604	32.1	Engine start and stop controls must be provided both in the driver's cab and at the rear of the Bus in the engine bay.	
605	32.2	Engine start and stop controls must be clearly labelled with the words 'Engine Start' and 'Engine Stop', in English or acceptable pictograms.	

606	32.3	Each engine stop control must require only a simple action and must be effective immediately.	
607	32.4	An override switch must be provided near to the rear engine start and stop controls to enable maintenance staff to isolate the start and stop controls in the driver's cab.	
608	32.5	The dash console must give fingertip control of all switches and controls and must be ergonomically arranged to optimise access by the driver.	
609	32.6	The instrument cluster is to be that supplied by the chassis manufacturer and is to be incorporated in a dash riser which has removable panels fitted as required to provide access to components.	
610	32.7	A fuel and urea (if urea used) gauge(s) must be fitted to the dash panel.	
611	32.8	A voltmeter must be incorporated in the dash panel with a high/low voltage visual indicator.	
612	32.9	A system to prevent the engine from being started from the driver's cab when the engine door is open must be provided.	
613	32.10	It must still be possible to start the engine from the rear engine controls with the rear engine door open.	
614	32.11	Warning Indicators to show on drivers dash to include:	
615	32.11.1	Alternator Not Charging;	
616	32.11.2	Engine oil pressure and temperature;	
617	32.11.3	Low oil level	
618	32.11.4	Transmission oil pressure and temperature;	
619	32.11.5	High coolant temperature;	
620	32.11.6	Low coolant level;	
621	32.11.7	Maximum Road Speed Warning Device (above 60 km/hr) and can be connected with a chime directly;	
622	32.11.8	Top speed limiter to ensure set speed limit (A range of 60 km/hr to 100km/hr to allow operators to select maximum speed limits).	
623	32.11.9	A warning light will light once the set limit speed is attained.	
624	32.12	A removable 'engine start' key must be fitted or approved engine start system. All "Engine Start" keys and barrels supplied must be identical (subject to Operator agreement), so that any key can start any Bus supplied.	
625	32.13	Each Bus must be incapable of being started and or driven without the use of the 'engine start' key or some other approved engine start system.	
626	32.14	All instruments and controls must be clearly identified by means of pictograms and or signs written in the English language.	
627	32.15	In the event of only pictograms being supplied for the identification of any warning indicators, a suitable transparent sticker explaining in the English language the meaning of the symbols must be provided and must be fitted to the driver's side window.	
628	32.16	Where an audible warning is provided (e.g. for Bus malfunction, turn indicators, reverse gear, kneeling and lifting, wheelchair ramp operation) it must be loud enough to attract the driver's attention but not loud enough to cause discomfort or annoyance to passengers and in any event must be less than 80 dbA in cabin area.	
629	<b>33. AIR CONDITIONING HEATING AND VENTILATION</b>		
630	33.1	The air conditioning system is an very important component for passenger and driver comfort and shall be suitable for a sub-tropical environment. It shall be a heat/cool system. It should typically be 40kW for a single deck bus and 55 kW for a double deck bus.	
631	33.2	The system must include a fresh air intake with at least 10% fresh air makeup to ensure Carbon dioxide levels do not build up.	
632	33.3	When in the cooling mode, the system shall cool the air at the mid point of the Bus interior to 22°C within 15 minutes from a temperature of 38°C.	
633	33.4	Relative humidity inside the Bus shall not exceed 60% after fifteen minutes .	
634	33.7	When in heating mode, once the engine is warmed up to normal operating temperature, the system shall maintain an interior temperature of 23°C when the outside temperature is 5°C.	
635	33.8	Driver's controls must be limited to an 'on-off' switch. The system must be fully automatic in operation	
636	33.9	The ventilation system must provide an even distribution of controlled air throughout the passenger area and provide the driver with sufficient airflow so as to maintain comfort levels.	
637	33.1	The conditioned air supply to the driver's cab shall also be provided with a multi-speed booster fan to allow the driver to control air flow rates to the cab.	
638	33.11	A fault light must be incorporated to illuminate whenever there is a fault in the system. A comprehensive warning light panel, which also includes an indication of when the compressor is operating, must be provided in a locked area of the Bus (e.g. inside the recirculating grille), accessible to maintenance staff.	
639	33.12	The air conditioning system must <u>not be integrated</u> with the multiplexed on board computer, arranged to allow for air conditioning suppliers to independently re-program operating parameters.	

640	33.14	The ventilation fans must be electronically controlled so as to maintain passenger comfort. In heat mode the fans must only operate when the engine is at operating temperature and sufficient heat is available to heat the passenger	
641	33.15	The system is to incorporate an air distribution system that uses fixed grilles or slots in the passenger area. No air must flow directly onto passengers' heads and the flow is to be balanced down the Bus to allow even distribution of air. Three individual adjustable vents must be provided for the driver, designed so that small objects (rubbish) cannot be pushed into the vents.	
642	33.16	The system must be inhibited so that, even if the control switch is in the on position, the compressor and fans must not start until thirty seconds after the engine is started. This is to avoid the engine being started on load.	
643	33.17	All air must be filtered to trap particles greater than 60 micron, and filters must be easily removable for cleaning and at service intervals of no more than 60 days in operating conditions experienced in route services in NSW.	
644	33.18	Condensate must not precipitate or collect on any interior surface of the Bus, including the distribution ducts.	
645	33.19	All roof mounted air conditioning equipment and or pods must be sealed so that no water, from weather conditions, Bus washes or any other cause penetrates the interior of the Bus or contracts any structural members or internal panel surfaces or voids.	
646	33.20	A separate heating, windscreen demisting and driver's ventilation system must be provided at the front of the Bus. The system must:	
647	33.20.1	minimise the ingress of traffic fumes by drawing in fresh air at a height of not less than 1.8 metres from the ground;	
648	33.20.2	demist the front left hand side 'peep screen;'	
649	33.20.3	demist the front leaf of the front door;	
650	33.20.4	demist the driver's window; and	
651	33.20.5	have a multi-speed fan which can be controlled by the driver.	
652	33.21	The air conditioning system will not be operational when the alternator is not charging. A warning light will activate when the air conditioning system is not working.	
653	33.23	The evaporator and condenser fans must have brushless motors.	
654	33.24	The air conditioning system must have a low maintenance compressor.	
655	33.25	The air conditioning compressor is to be mounted on a robust mounting plate or bracket designed to isolate vibrations from the chassis.	
656	33.26	The compressor drive belt configuration must be carefully designed to ensure pulleys are precisely aligned and vibration minimized by appropriate belt length and/or by a belt stabilizing pulley.	
657	<b>34. ROOF HATCHES</b>		
658	34.1	The roof hatches must be capable of use as emergency exits, in accordance with ADR44/02 requirements.	
659	34.2	Roof hatches can be manually operated, non-transparent or bonded fixed glass (emergency break glass for use as emergency exit).	
660	34.3	Where manual hatch is used, the handles of the roof hatch must be operable by adult passengers in an emergency.	
661	34.4	The supplier must ensure that each roof hatch and its components are sealed so that no water, from weather or Bus washes is able to penetrate the interior of the Bus or contact any structural members or internal panel surfaces or voids.	
662	<b>35. DESTINATION EQUIPMENT</b>		
663	Destination Equipment refers to destination and route signage read from outside of bus.		
664	35.1	All destination equipment must conform to the Disability Standards for Accessible Public Transport (2002).	
665	35.2	Destination signs are to be white on black LEDs.	
666	35.3	The front destination sign unit must:	
667	35.3.1	be composed of a 96 or 98 x 16 matrix of 14mm or 15mm diameter pixels ;	
668	35.3.2	be capable of displaying four large route number alpha numeric digits and one large or two small lines of text;	
669	35.3.3	allow text to be shown as part screen or full screen or a mixture of both;	
670	35.3.4	Allow the text to be capable of scrolling with user-configurable timing. For example, the driver must be able to display Route ID and Destination/s and the ability to scroll other message such as "Set Down Only" at timing intervals that make it possible for customers to see both sets of information as Bus approaches the Bus stop; and	
671	35.3.5	read 19 x 160; 13.4 pitch	
672	35.4	The side unit must be:	
673	35.4.1	composed of a 96 or 98 x 16 matrix of 9mm or 10mm diameter pixels ;	

674	35.4.2	be capable of displaying four large route number alpha numeric digits and one large or two small lines of text;	
675	35.4.3	mimic information displayed on the front of the destination unit; and	
676	35.4.4	read 19 x 160 8.7 pitch	
677	35.5	The rear unit must be:	
678	35.5.1	composed of a 24 or 28 x 16 matrix of 14mm or 15 mm diameter pixels ;	
679	35.5.2	be capable of displaying four(4) large route number digits; and .	
680	35.5.3	read 24 x 60 8,7 pitch.	
681	35.6	Each destination unit must be legible within a field of view defined by a cone of angle 150 degrees, the axis perpendicular to the sign, and the vertex located at the centre point of the sign.	
682	35.7	The destination equipment controller must be capable of storing at least 2,000 separate displays and must be updated by means of a smart card, USB connection, or other easy electronic means.	
683	35.8	Special attention must be given to providing good access to the destination units for maintenance and repair.	
684	35.9	Each unit must allow sufficient access to remove display componentry without the need to move any other equipment.	
685	35.10	Any access door must be retained in such a manner to prevent the unit falling in the driver's field of vision in the event of a Failure.	
686	35.11	The programming software must be GUI based and must enable easy programming and modifications to the destination lists during programming.	
687	35.12	The software must emulate on screen what will be seen on the Bus destination signs.	
688	35.13	The destination control panel inside each Bus must mimic in real time on the screen what is displayed in the front and side destinations.	
689	35.14	The destination control panel shall be capable of interface and operation of the passenger information next stop visual and voice announcement program as specified in Section 38.	
690	<b>36. CCTV</b>		
691	36.1	A suitable Closed Circuit Television (CCTV) to be provided as per document: BC/14-23558 (2015) SMBSC and OSMBSC CCTV and Duress System Specifications, refer Appendix 6 .	
692	36.2	Tenderers are to provide certification that the system meets the requirements of the above document and undertake testing of the system to demonstrate compliance.	
693	36.3	Any external CCTV Cameras offered while complying with the Specification must remain within the 2,500mm maximum body width.	
694	<b>37. CORROSION PROTECTION</b>		
695	37.1	Suitable drainage and ventilation systems must be provided to prevent accumulation or retention of fluids within the Bus structure or panelling. Such systems shall be integral to the Bus structure and must be aesthetic.	
696	37.2	All closed steel section members, other than stainless steel and aluminium, must be injected with a suitable corrosion inhibitor.	
697	37.3	All coatings, corrosion inhibiting compounds, sealants and adhesives must be used in strict accordance with manufacturers' written instructions or specifications. All coatings and associated materials must be of such that they do not represent undue risk to operator's health when used in accordance with manufacturer's procedures.	
698	37.4	The chassis and underside of the body, and all associated equipment, must be designed to resist damage and corrosion caused by the use of high pressure water cleaning and steam equipment, using detergents or similar.	
699	37.5	The entire chassis, body and associated equipment must be sufficiently corrosion resistant to withstand regular automated washing using recycled washing water.	
700	<b>38. PASSENGER INFORMATION DISPLAY (PID)</b>		
701	To provide for next stop information to meet DDA requirements in this specification, a passenger information display (PID) is required:		
702	38.1	The PID is to comply with open system requirements as outlined in Appendix 3.	
703	38.2	an LED screen mounted in a purpose designed, aesthetically designed vandal resistant housing is required.	
704	38.3	The screen is to be of approximate dimensions: height 350 mm and width 820mm to provide visual information to all passengers. Typically the screen will be 60 to 80 mm thick.	
705	38.4	The housing is to be fitted at ceiling height above the passenger aisle, approximately over the front axle, on the vehicle centre line.	
706	38.5	The screen is to be tilted downwards at an approximate angle of 4° relative to a vertical transverse plane.	

707	38.6	This housing will integrate the passenger display screen and provide housing for the ETS and PID equipment.	
708	38.7	An ETS and PID equipment storage /mounting compartment is to be of minimum internal dimensions width 700 mm, height 300 mm and depth 150mm to allow the co-location of the ETS equipment and the PID equipment, noting the reserved space requirement for the ETS is as specified in Appendix 4.	
709	38.8	Pathways/conduits for the ETS are to be connected to this space as identified in Appendix 4	
710	38.9	Pathways/conduits for the PID are to be connected to this space as identified in Appendix 3.	
711	38.1	Screen is to be mounted to withstand 20g accelerations and accommodate the relatively large distortions of the Bus body under the maximum torsional load anticipated in service.	
712	38.11	The location of the passenger information screens is not to restrict driver's vision of mirrors or monitors used to observe passengers in the bus, particularly passengers using the Centre Door and wheelchair accessible area.	
713	38.12	The next stop passenger light and Bus number are to be located on this housing.	
714	38.13	The screens are to show as a minimum:	
715	38.13.1	Next Stop information	
716	38.13.2	Bus Route Number	
717	38.13.3	Bus Route Destination	
718	38.13.4	Bus Route information	
719	38.14	An audio version of next stop information is to be played over the Bus speakers.	
720	38.15	Communication is to be provided using an on-board SIM and the 4G network to receive updates to the route information sent from a remote location.	
721	38.16	A driver's interface touch screen of approximate dimensions height 120mm and width 185mm is to be mounted within comfortable reach of the driver.	
722	<b>39. CHASSIS</b>		
723	39.1	The engine shall be located in the bus at the:	
724	39.1.1	rear	
725	39.1.2	mid	
726	39.1.3	front	
727	39.2	The engine is to be powered by:	
728	39.2.1	diesel	
729	39.2.2	zero emission technology	
730	39.3	Each Bus must be designed to permit all mechanical and chassis related maintenance to be carried out via the interior floor hatches and access hatches on the exterior of the Bus using an under floor pit.	
731	39.4	Buses may not necessarily be maintained using hoists.	
732	39.5	A jacking point must be provided adjacent to each wheel, and each Bus must be designed to permit jacking without causing any structural or other damage.	
733	39.6	Provision must be made to support each axle of the Bus by means of axle stands when any portion of the Bus is lifted.	
734	39.7	Each Bus must be designed for emergency towing.	
735	39.8	A towing coupling, consistent with the Operator' must be fitted at the front and rear of each Bus.	
736	39.9	Two attachment points suitable for safety chains must be provided at the front of the vehicle.	
737	39.10	Each Bus must have a front end air coupling consistent with the Operator's standard coupling to release the spring brakes and to enable the air system to be fully charged so that all pneumatically operated equipment can be operated. This coupling shall be appropriately located and easily accessible in the proximity of the tow point.	
738	39.11	Each Bus must be geared for maximum economy in normal operation.	
739	39.12	Each Bus must have a programmable speed limiting device, and facilitate a programmable top-speed ranging from 60km/h to 100 km/h without affecting the engine performance. 100km/hr is the maximum allowable road speed ADR65/00 Clause 65.5.2.	
740	39.13	The top speed-limiting device including ECU shall be tamper-proof.	
741	39.14	If the engine fuel system governor is electronically controlled, the fuel system must incorporate an emergency engine cut-out device to shut off the fuel supply to eliminate the consequences of unintentional acceleration caused by a fault (electrical/mechanical) in the wiring between the control module and injection pump.	
742	39.15	Protection must be provided at the rear of the Bus for the engine, cooling system and all other mechanical and electrical equipment in order to minimise the effects of any rear end collision or under-run. Such protection must include under body and rear end protection.	

743	39.16	The front number plate is to be mounted in a position and manner to avoid damage when the Bus is being towed. It must not be necessary to use tools to remove the number plate for towing purposes.	
744	39.17	For 14.5m buses the tag axle is to be steerable.	
745	39.18	For zero emission buses, details of :	
746	39.18.1	key equipment on the bus	
747	39.18.2	energy/recharging systems	
748	39.19	For zero emission buses, suppliers shall provide the high level details of risk assessments for the systems proposed, covering aspects such as:	
749	39.19.1	high pressure storage of gas	
750	39.19.2	flammable gas (for example hydrogen)	
751	39.19.3	explosive mixtures (for example, hydrogen and oxygen)	
752	39.19.4	high voltage electric energy stored in batteries or produced on the bus	
753	39.19.5	charging and refuelling systems	
754	39.19.6	in service risks/emergency recovery	
755	39.19.7	collision risks- vehicles, overhead bridges	
756	39.19.8	detail the standards used for the significant risk items	
757	<b>40. ENGINE COMPARTMENT</b>		
758	40.1	The design of the engine compartment and the materials used within or near to it must be such that high pressure hot water and steam cleaning equipment using detergents will not cause damage nor affect the operation of the Bus. Refer Section 10.	
759	40.2	Insulating materials used in or near to the engine compartment must be suitably protected against accidental damage or wear and tear. In particular, any surface coatings and or coverings must be sufficiently robust so that they will not tear or be damaged easily. Refer Section 10.	
760	40.3	All fluid lines shall be rigidly supported to prevent chafing damage, fatigue Failures, degradation and tension strain. Lines shall be sufficiently flexible to minimise mechanical loads on the components. Lines passing through a panel, frame or bulkhead shall be securely protected to prevent chafing and wear. Pipes and fluid hoses shall not be bundled with or used to support electrical wire harness.	
761	40.4	All hoses, pipes, lines and fittings shall be specified and installed as per the manufacturer's recommendations.	
762	40.5	The engine compartment must be suitably sealed to prevent ingress of fumes or gases into the passenger compartment.	
763	40.6	A suitable smoke test is to be conducted to ensure the requirements of 40.5 are met.	
764	40.7	All hydraulic hoses to comply with AS3791 noting in particular that hoses shall be marked as per clause 1.6 in AS3791 be compliant with the pressure, temperature and performance ratings specific to the application, be provided with a stripe to indicate twisting and be installed without exceeding the minimum bend radius for the class of hose.	
765	<b>41. FUEL</b>		
766	41.1	Each fuel tank must be adequately baffled against surge.	
767	41.2	The fuel fill point must below the waist rail and be located on the right hand side of the bus	
768	41.3	A stainless steel panel must be fitted around and below the fuel fill point to prevent degradation of the Bus paint.	
769	41.4	If urea is used the fill point must incorporate an appropriate magnetic collar;	
770	41.5	Fill/charge/ points to be on the right hand side of the Bus;	
771	41.6	Fuel fill point have a quick release filler cap that is adequately secured so it cannot become detached; and	
772	41.7	A stainless steel panel must be fitted around and below the urea fill point to prevent degradation of the Bus paint.	
773	41.8	It is preferable that the fuel and urea fill points are within close proximity to each other, preferably within 1 metre.	

774	41.9	The fuel filler point and spout must be arranged so that a straight cylinder of 70mm diameter can be inserted for a distance of 200 mm.	
775	41.10	The fuel filler point and spout must be arranged for use with a high speed refuelling system nozzle which delivers fuel at a minimum rate of 100 litres / minute. At this rate of fill, no "blow back" of fuel must be experienced.	
776	41.11	The fuel filler shall have a quick release filler cap that is adequately secured so it cannot become detached	
777	41.12	No part of the fuel system to be located in the driver's cab or the passenger compartment.	
778	41.13	All parts of fuel system be protected from damage caused by contact with ground or from debris, and from fatigue or wear generated in normal service.	
779	41.14	Any fuel leaking from the system must be able to flow away freely onto the ground without coming into contact with the exhaust system or any other hot surfaces, or on brakes, wheels or tyres.	
780	41.15	All hoses and pipes and connections must be located to facilitate visual inspection, disconnection and re-connection without dismantling any covers, ducts or similar components, other than service hatches.	
781	41.16	Fuel hoses must be compliant with the relevant sections of SAE J30 .	
782	41.17	Fuel hoses, fuel lines must be routed away from any hot items like manifolds and turbo chargers to avoid fuel heating and risk of fire if a leak develops;	
783	41.18	Fuel hoses and lines be protected from abrasion and damage; and	
784	41.19	be supported at least every 600 mm with flexible mounts.	
785	41.20	A protection plate must be fitted under the fuel tank to prevent damage to the tank underside.	
786	41.21	Fuel tanks shall be manufactured from low carbon rolled steel.	
787	41.22	The Nominal Fuel Tank Capacity shall be sufficient to meet the operating requirements in Section 5. It is anticipated the fuel tank volume would be a minimum of 250 litres.	
788	<b>42. COOLING SYSTEM</b>		
789	42.1	Regardless whether a Bus is stationary or in motion, the cooling system must be designed so that the Bus does not overheat when in continuous operation under the operating conditions detailed in Section 4, with air conditioning on full power and the Bus fully laden.	
790	42.2	The cooling system must incorporate a suitable drive system that will require no adjustment between scheduled services.	
791	42.3	The radiator and fan drive must be located in such a way that they are protected from accident damage or damage shall be minimised in the event of a collision.	
792	42.4	Radiator air intake systems must be designed so as to minimise ingestion and accumulation or blockage by debris and particles normally encountered in road operations. The fitting of an additional filtering screen is permitted providing the screen can be easily removed or cleaned.	
793	42.5	Preference is for the radiator to be mounted on the driver's side of the Bus.	
794	42.6	Radiators and associated cooling equipment must be accessible, in order to provide for external cleaning of both sides of the cores. This must include easy separation of the radiator and any adjacent intercooler or other equipment or structure without the loss of any engine coolant.	
795	42.7	Where coolant lines/hoses pass over hot items, careful design is required to eliminate joints and ensure the materials of the coolant lines/hoses are made of materials suitable to withstand the heat generated and adequately shielded.	
796	42.8	The radiator must not require cleaning externally more frequently than once every 30,000 km with all coolant hoses being of the silicon type and pipes to be made of stainless steel or other materials which will not deteriorate.	
797	<b>43. TRANSMISSION</b>		
798	43.1	The Transmission must be an electronically controlled, automatic transmission, integrated into the engine management system. The transmission must be capable of effective control and adjustment of acceleration, deceleration and road speed in all gears and modes.	
799	43.2	The transmission must incorporate an integral hydraulic retarder. The operation of the retarder shall be controlled by the application of the brake pedal. The retarder settings shall be pre-set and the driver shall not be able to override the operation of the retarder.	
800	43.3	The transmission selector must be of the push button type located to the right of the steering wheel. Separate buttons for Reverse, Neutral and Drive movement are required.(RND)	
801	43.4	The transmission must be in neutral before the engine can be started, and cannot be started in Drive or Reverse.	
802	43.5	It must not be possible to:	
803	43.5.1	Engage reverse while the Bus is moving forward at speeds over 5 km/h;	
804	43.5.2	Engage forward while the Bus is moving backwards at speeds over 5km/h; and	

805	43.5.3	Reverse at a speed in excess of 5km/h.	
806	43.7	The transmission must be controlled to not suffer damage if:	
807	43.7.1	Reverse gear is selected while the Bus is moving forward; or	
808	43.7.2	Forward gear is selected while the Bus is moving backwards.	
809	43.8	An audible reversing alarm must be fitted, integrated with the on-board management system (where fitted) and arranged to sound whenever reverse is selected.	
810	43.9	The automatic transmission must be controlled to prevent engine over-revving in the intermediate gears and gear selection is not possible unless the engine is at idle.	
811	43.10	The transmission and oil specified shall be designed to minimise oil changes to at least 30,000 km.	
812	43.11	The transmission is not expected to require overhaul until 750,000km or greater.	
813	<b>44. STEERING</b>		
814	44.1	The Bus must be fitted with power-assisted steering which permits manual steering in the event of a Failure of the power-assistance.	
815	44.2	The steering wheel must be separately adjustable for height and angle to suit individual driver preference for drivers ranging in size from the 5 <sup>th</sup> percentile female to the 95 <sup>th</sup> percentile male.	
816	44.3	Clear vision of essential instruments in particular the speedometer must be maintained throughout any adjustments.	
817	<b>45. AIR SYSTEM</b>		
818	45.1	The design of the air system must be such that the air compressor is provided only with clean and filtered air.	
819	45.2	Compressed air must pass through an oil water separator with automatic drainage before entering the air system.	
820	45.3	The air system must be able to be fully charged from empty within three minutes.	
821	<b>46. BRAKING SYSTEM</b>		
822	46.1	The braking system must comply with ADR35/03 Commercial Vehicle Brake Systems	
823	46.2	The Bus must have Electronic Braking System (EBS).	
824	46.3	The Bus must have Electronic Anti-Lock Braking (ABS) on all wheels.	
825	46.4	The Bus must have disc brakes on all axles.	
826	46.5	All brake pad clearances must automatically adjust.	
827	46.6	A means of visually determining brake pad wear at each wheel must be provided. It must not be necessary to dismantle or remove any components to ascertain brake pad wear.	
828	46.7	Under normal operating conditions, there must be minimal brake noise from the discs or pads during service or emergency braking.	
829	46.8	Air pressure gauges must be fitted in the driver's instrument panel, showing brake circuit pressure for each axle.	
830		Alternatively, an air pressure gauge must be fitted to the driver's instrument panel that shows the lowest of the air pressures for each axle.	
831	46.9	A separate air reservoir must be provided which must be capable of releasing the brakes in the event of a general loss of air pressure. The brakes must be able to be released by appropriately trained staff in the event of a complete loss of air pressure.	
832	46.1	All disc pads must provide a minimum services life of 50,000 km when used in normal operations before replacement is necessary.	
833	46.11	A fail-safe parking brake must be fitted on each Bus.	
834	46.12	The parking brake control must be located to the right of the steering wheel and within easy reach of the driver.	
835	46.13	If the parking brake control is not in the applied position and the 'engine start' key is turned off or the engine has stopped rotating an audible and visual alarm must operate under all conditions. The alarm must continue to sound until either the ignition is turned on or the parking brake is placed in the applied position. The alarm must continue to sound if the battery master switch is switched off.	
836	46.14	An audible alarm must be activated whether the engine is running or stopped, when the driver's cabin door is open and/or or the driver's seat belt is unbuckled and the park brake is not applied.	
837		This alarm must be deactivated by the application of the park brake when the cabin door is closed.	
838	46.15	A separate driver operated 'Bus Stop' brake must not be fitted.	
839	46.16	A "Blocking" or "Broms" valve system must be fitted into the handbrake circuit to help prevent a Bus "run-away" or "roll-away" event while the Bus is charging the brake air system .	

840	46.17	The Supplier must provide details of offered "Broms" solution, or solutions, with system diagrams.	
841	<b>47. SUSPENSION</b>		
842	47.1	High quality ride characteristics typical of a multi air bag system per axle is required.	
843	47.2	A self-levelling electronically controlled suspension system must be fitted to each Bus.	
844	47.3	The suspension system must permit:	
845	47.3.1	'Kneeling' at the front doorway to achieve a maximum step height of 330mm;	
846	47.3.2	A 'suspension lift' setting to raise the Bus over obstructions (with a minimum of 80mm raising of the Bus from the normal ride height).	
847	47.4	Be prevented from moving with the suspension 'kneeling' and must be prevented from 'kneeling' while moving.	
848	47.5	Be restricted to moving at speed up to 30 km/h with the suspension in the 'lift' condition.	
849	47.6	The 'lift' function may be activated at any speeds up to 30km/h.	
850	47.7	It must not be necessary to stop the Bus to activate the 'lift' function.	
851	47.8	If the 'lift' setting is operated while the Bus is moving at a speed greater than 30 km/h it must not activate.	
852	47.9	If the lift function has been activated the Bus must return to normal height above 30km/h and not reactivate until the raise switch is operated again.	
853	47.1	The time to lower each Bus from the normal height to the 'kneeling' height must not exceed five seconds, and the time to raise the Bus from the 'kneeling' height to the normal height must not exceed five seconds.	
854	47.11	The time to raise the Bus from the normal height to the 'lift' height must not exceed five seconds, and the time to lower the Bus from the 'lift' height to the normal height must not exceed five seconds.	
855	47.12	Visual warnings must be provided to alert the driver that the Bus' suspension is either in the 'kneeling' or the 'lift' condition.	
856	47.13	To prevent passenger injury due to tripping or foot entrapment movements to the kneeling position must be in one constant movement and no adjustment of level (hunting) is permitted in the kneeled state.	
857	<b>48. WHEELS AND TYRES</b>		
858	48.1	All wheels may be fitted with 8.25 steel rims.	
859	48.2	Tyres to be Urban rated 295/80R 22.5. and minimum loading code of 152/148	
860		However, alternatives will be considered at zero additional cost.	
861	48.3	All wheels and tyres must be identical and interchangeable between all wheel positions.	
862	48.4	Each Bus to be delivered with one (1) spare wheel and tyre combination.	
863	48.5	All wheel arches to be designed and constructed to prevent damage to the Bus in the event of a tyre Failure. .	
864	48.6	Dress rims on single wheel hubs are required to provide for fitment of wheel nut retaining devices on all but two opposing wheel studs.	
865	<b>49. EXHAUST</b>		
866	49.1	The exhaust system must be suitably shrouded to prevent accidental contact with hot surfaces in areas where access is required to perform regular servicing and maintenance.	
867	49.2	Materials used to shroud the exhaust must not absorb or retain flammable or combustible material.	
868	49.3	The engine air intake must comply with the chassis manufacturer's recommendations in relation to the current emission standard and shall include a water trap.	
869	49.4	The exhaust must be complaint with ADR58/00. The outlet must be as near as practical to the rear of the vehicle and discharge rearwards or to the right of the Bus either horizontally or no more than 45 degrees downwards and must not extend beyond the perimeter of the bus.	
870	<b>50. ELECTRICAL</b>		
871	50.1	Each Bus must be provided with a 24 volt DC electrical system with electrical cables and wiring in accordance with SAE J1292 Automobile and Motor Coach Wiring specification and ASA standard T BU FL 01701 ST Mounting and Installation of Electrical Equipment.	
872	50.2	All electrical cables and wiring shall be in accordance with SAE J1292 and ECE R107, be well insulated and shall be able to withstand the temperature and humidity conditions to which they are exposed. In the engine compartment, particular attention shall be paid to their suitability to withstand the environmental temperature and the effects of all likely contaminants, including pressure cleaning.	

873	50.3	No cable used in an electrical circuit shall carry a current in excess of that acceptable for such a cable in the light of its mode of installation and the maximum ambient temperature. Refer SAE J1292 and ECE R107.	
874	50.4	Cable insulation is to be suitable for the vehicle's working environment, considering physical and environmental factors including flexing, heat, cold, bending, risk of oil and fuel contact, abrasion, short circuit and pinch resistance. Refer SAE J1292.	
875	50.5	All electrical cables shall be so located that no part can make contact with any oil, fuel line or brake air line or any part of the exhaust system, or be subjected to excessive heat, unless suitable special insulation and protection is provided, as for example to a solenoid-operated exhaust valve. Refer ECE R107.	
876	50.6	The routing of cable harnesses shall be designed to allow replacement without the need to cut terminals from the cables.	
877	50.7	The routing of cable harnesses shall be designed such that they are not adversely affected by fumes or heat and connectors are protected from areas of high water spray, dirt throw or under chassis cleaning.	
878	50.8	Cables shall be of fire, fuel and oil resistant material. They shall also meet SAE J1292 and resistant to flame propagation ISO 6722-2006 .	
879	50.9	Cables located adjacent to the engine shall be thermally insulated, shielded from oily deposits, and properly separated from possible heat source e.g. turbocharger, exhaust.	
880	50.10	Cable clamps and supports must be non-conductive. Coated steel P-clamps for example are not permitted.	
881	50.11	Cables that pass through openings or gaps shall be secured/protected with oil and heat-resistant grommet/protective edge sleeving.	
882	50.12	Cables shall be supported at intervals of not more than 600mm. ADR42/04.	
883	50.13	All cables within the engine compartment must be protected from crash damage to prevent imminent short-circuit and have easy access for maintenance.	
884	50.14	High amperage cabling:	
885	50.14.1	All high amperage cabling such as main starter cable and alternator cables shall be separated from each other and also from the other auxiliary cables.	
886	50.14.2	All high amperage cabling shall be protected by insulation which is highly abrasion resistant and fire retardant.	
887	50.15	Adhesives are not be used in any fastener supporting cables.	
888	50.16	Every electrical circuit feeding an item of equipment other than the starter, the ignition circuit (positive ignition), the glow plugs, the engine stopping device, the charging circuit and the battery earth connection shall include a fuse or circuit breaker. Circuits feeding other equipment may, however, be protected by a common fuse or circuit breaker, provided that their sum rated capacity does not exceed the capacity of the fuse or circuit breaker. In the case of multi-plexing, the manufacturer shall give all the relevant technical information. Fusible links to meet or exceed SAE J1656, Circuit Breakers SAE J553. Refer ECE R107.	
889	50.17	Where the voltage exceeds 100V RMS in one of more electrical circuits in the bus, a manually operated isolating switch which is capable of disconnecting all such circuits from the main electric supply shall be connected in each pole of that supply which is not electrically connected to earth, and shall be located inside the Bus in a position readily accessible to the driver, provided that no such isolating switch shall be capable of disconnecting any electrical circuit supplying the mandatory external lights and warning systems. This clause does not apply to high tension ignition circuits nor to self-contained circuits within a unit of equipment in the vehicle. Refer ECE R107.	
890	50.18	All body electric components shall be suitable for the chassis and match the functions of the chassis so the Bus operates efficiently and effectively.	
891	50.19	Design of the electrical, electronic and data communication systems shall be modular so that each electronic device, apparatus panel, or cable loom is easily separable from interconnected items by means of connectors.	
892	50.20	The battery capacity and alternator output must be sufficient that, with the engine running continually at idle speed, the full output of the air conditioning can be achieved and all interior and exterior lights plus ancillary equipment can be on without draining the battery, measured over a period of 30 minutes.	
893	50.21	The chassis shall have a reliable Bus Electrical Architecture or CAN system that allows the different control units to communicate with the various functions via a complete network or control unit network. The system provided shall consider;	
894	50.21.1	Minimal cabling;	
895	50.21.2	Standardised components (control units, hardware); and	

896	50.21.3	Flexibility to change by variant.	
897	50.22	Control units shall be positioned as close as possible to the functions they control in order to minimise the length of cable between control units and components.	
898	50.23	The system architecture shall be able to connect, but not limited, to the following control units;	
899	50.23.1	Panel instruments;	
900	50.23.2	Drive line;	
901	50.23.3	Engine;	
902	50.23.4	ABS/ECS;	
903	50.23.5	Retarder;	
904	50.23.6	Transmission;	
905	50.23.7	Chassis;	
906	50.23.8	Body builder Electrical Controls;	
907	50.23.9	Electronic Destination sign;	
908	50.23.10	GPS or Vehicle Location System;	
909	50.23.11	Fare collection equipment;	
910	50.23.12	Vehicle Management System with Cellular communications (3G/4G and WiFi);	
911	50.23.13	Intelligent Priority system (PTIPS) / Passenger Information Display System;	
912	50.23.14	Broadcasting devices;	
913	50.23.15	Air-conditioning system; and	
914	50.23.16	Auxiliary +24Vdc power supply.	
915	50.24	All serial communication data links shall conform to SAE J1708 and SAE J1939.	
916	50.25	The communication links are to be grouped in logical levels so that chassis drive line data is separate from operational body data and both are separated from information or accessory data. This hierarchy is to ensure the more important operations of the Bus are isolated from Failures in the less critical levels.	
917	50.26	Versatility and future expansion shall be provided for expandable system architecture. The multiplex system shall be capable of accepting new inputs and outputs through the addition of new modules and or/ the utilisation of existing spare inputs and outputs.	
918	50.27	All like components in the multiplex system shall be modular and interchangeable with self-diagnostic capabilities. The modules shall be easily accessible for troubleshooting electrical Failures and performing system maintenance. Multiplex input/output modules shall use solid-state devices to provide extended service life and individual circuit protection.	
919	50.28	Data access shall be made available via a communication port on the multiplex system. The location of the communication port shall be easily accessible.	
920	50.29	Diagnostic and Fault Detection – The multiplex system shall have a proven method of determining its status (system health and input/output status) and detecting either active (online) or interactive (offline) faults through the use of on/board visual/audible indicators.	
921	50.30	In addition, to the indicators, the system shall employ an advanced diagnostic and fault detection system, which shall be accessible via either a personal computer or handheld unit. Either unit shall have the ability to check logic function. The diagnostic data can be incorporated into the information level network or the central data access system.	
922	50.31	The multiplex system shall have security provisions to protect its software from unauthorised changes. This shall be achieved through any or all of the following:	
923	50.31.1	password protection;	
924	50.31.2	limited distribution of the configuration software;	
925	50.31.3	limited access to the programming tools required to change the software; and	
926	50.31.4	hardware protection that prevents undesired changes to the software.	
927	50.32	Provisions for programming the multiplex system shall be possible through a PC or laptop. The multiplex system shall have proper revision control to ensure that the hardware and software are identical on each vehicle equipped with the system. Revision control shall be provided by all of the following:	

928	50.32.1	hardware component identification where labels are included on all multiplex hardware to identify components;	
929	50.32.2	hardware series identification where all multiplex hardware displays the current hardware serial number and firmware revision employed by the	
930	50.32.3	software revision identification where all copies of the software in service displays the most recent revision number; and	
931	50.32.4	a method of determining which version of the software is currently in use in the multiplex system.	
932	50.33	Alternators shall be weather-resistant type with double sealed type long life bearings.	
933	50.34	Combined alternator output typically will be greater than 360 amps, however supplier shall provide design rationale for alternator selection .	
934	50.35	If multiple alternators are used, Supplier shall explain how the alternators will be regulated so no one alternator will be over worked.If multiple alternators are used, Supplier shall explain how the alternators will be regulated so no alternator is over worked.	
935	50.36	Charge regulators to be fully solid state, silicon based and transistorised with temperature compensation and complete with over voltage control protection.	
936	50.37	Engine starter motor shall have starter interlock to prevent engagement while engine is running.	
937	50.38	Batteries shall be maintenance free type with minimum capacity 200Ahr each. Alternative battery management system may be offered (for example to support I-Start or similar if offered).For State Transit, batteries to be 2 x 12 volt AGM HVT-225D.	
938	50.39	Battery safety:	
939	50.39.1	Battery terminals shall be protected to prevent short-circuit.	
940	50.39.2	There shall be sufficient clearance between the top of the battery terminals and the body to prevent accidental shorting due to movement of the battery crate	
941	50.39.3	Battery tray shall not corrode throughout the lifespan of the bus, and be provided with an insulating top cover.	
942	50.40	The battery compartment shall be separated from the passenger and driver compartment and ventilated to outside air.	
943	50.41	The batteries shall be mounted in a swing-out or pull out-crate for access and maintenance to allow the batteries to be individually replaced without disturbing the other battery.	
944	50.42	The crate and hatch shall be lockable when secured.	
945	50.43	Battery cables shall be supported to ensure that the cables do not chafe during the pulling out of the battery crate / tray.	
946	50.44	A battery isolating switch shall be provided adjacent to the batteries to isolate power to the Bus	
947	50.45	A manually operated battery master switch, which may be combined with the 'engine start' switch, must be provided on the driver's instrument panel, but retain power to essential safety systems such as park brake warning interlocks, fire warning systems, hazard lights .	
948	50.46	A 600amp Bus booster socket (part number 6.008.25) or similar interchangeable connector must be fitted, but not on the right-hand side of the Bus for safety reasons. The preferred position is in the dashboard riser.	
949	50.47	The main electrical box shall be installed inside the Bus with easy access for inspection and component replacement.	
950	50.48	The provision of each individual circuit shall be protected by fuses or circuit breakers to prevent overloading.	
951	50.49	For reverse polarity protection, fast fuse or equivalent devices are required.	
952	50.50	The digital output pulse signal of speedometer shall have sufficient signal strength to be used by other on board systems, or be supplied by multiple sources. Refer Section 19 and Appendix 4.	
953	50.51	The system shall either have a high amperage isolator to cut off the main supply from the battery or be fitted with an isolator switch control.	
954	50.52	The electrical system shall be designed such that sensitive electrical equipment such as radios, destination equipment, interior lighting and ticketing equipment are electrically isolated during engine cranking to avoid voltage spikes.	
955	50.53	All electrical equipment must conform to the requirements of the Australian Communications and Media Authority's (ACMA) electromagnetic compatibility regulation: Radio Communications (Electromagnetic Compatibility) Standard 2008. This is to reduce the potential to unintentionally emit radio frequency energy which may diminish the performance of other nearby electrical devices or disrupt essential communications.	
956	50.54	Operator nominated two-way radio equipment is to be supplied which is in accordance with ACMA regulations.	

957	50.55	Provision of bracketry, and wiring is required for the two-way radio equipment at 50.54.	
958	50.56	Installation for the two-way radio equipment nominated at 50.54.	
959	50.57	Wire and install an AM/FM radio with minimum 4 x 20W outputs (RH and LH for the driver and separate RH and LH channel for the passengers).with 8 x 8Ω speakers. AM/FM radio is not required for State Transit however 8 x speakers for on-board Customer Communication System is required.	
960	50.58	Electronic ticketing wiring provisions are to be installed as detailed in Section 19 and Appendix 4.	
961	50.59	All components and harnesses must be standardised in design to allow interchangeability between Buses for a Bus Type.	
962	50.60	Electric plugs on harnesses are to be designed to prevent their incorrect installation using varying sizes and shapes enhanced by colour-coding. (poka –yoke).	
963	50.61	Soldered cable connections to components are not permitted.	
964	50.62	Connections are to be connected to components using post terminals or where appropriate, push-on terminals, conforming with a relevant international automotive standard such as SAE J163, SAE J858, SAE J561 and SAE J928.	
965	50.63	To enable repairs to terminals to be effected at minimal cost, sufficient cable length is to be provided to allow at least two terminal replacements.	
966	50.64	All terminal posts shall be mounted to prevent accidental shorting by conductive items falling on them	
967	50.65	Positive terminal posts must be protected with an appropriate insulation to protect from accidental shorting during maintenance.	
968	50.66	All terminal posts shall be assembled without intervening nuts, washers or spacers.	
969	50.67	Termination of more than four (4) cables at any single terminal is not permitted	
970	50.68	It is preferred cables are to be joined at terminals. Cables joined within a cable run must be in accordance with SAE J1292 Automobile and Motor Coach Wiring specification.	
971	50.69	Terminal boxes shall be arranged such that any water collecting in conduits or channels does not drain into the terminal box.	
972	50.70	A connection diagram shall be provided at each terminal box	
973	50.71	During manufacturing of the Bus body, any electrical components including cabling shall be removed if stray currents or welding spatter during welding could damage those components.	
974	50.72	During manufacturing of the Bus body, all cables, electronic control units, electronic instruments, batteries, electronic components removed from the chassis, must be individually labelled with part identifier and Bus build number or VIN identifier and stored in purpose designed storage boxes marked with the corresponding Bus build number or VIN identifier. The boxes must be stored in a controlled inventory area.	
975	50.73	During manufacturing of the bus, any component or part of the chassis must be protected by mats, weld curtains, weld spatter cloths or other suitable means to protect the entire chassis and components remaining on the chassis during build phase from damage.	
976	50.74	All swarf, grinding materials, off-cuts and debris shall be removed from cable trays, air conditioning ducts and cable conduits, prior to reassembly of components and cables.	
977	50.75	Fire-retardant, non-conductive, non-corrosive fastenings shall be used at the start and finish of any bend in a cable run to ensure the cable does not droop in a fire.	
978	<b>51. FLOOR, STEP AND FLOOR EDGES</b>		
979	51.1	The floor must be covered in a material which is, slip resistant and durable.	
980	51.2	The floor colour shall be as specified in Section 15.	
981	51.3	All flooring covering joints must be welded and or fully sealed to prevent water ingress.	
982	51.4	The front entry non-standing area to the point no further forward than the rearmost point of the driver's partition must be covered in a contrasting colour specified in Section 15.	
983	51.5	The same contrasting colour specified above must also be used in the Centre door non-standing area.	
984	51.6	If plywood is used for the floor structure it shall be:	
985	51.6.1	structural marine grade ply in accordance with AS2272 or BS1088;	
986	51.6.2	preservative treated to Class H3 in accordance with AS 1604; and	
987	51.6.3	meet structural grade F14 (working stress 14MPa).	
988	51.7	The floor structure material shall be fit for the intended life of 25 years for the intended operational service of the bus. Details to be provided at Section 55.	
989	51.8	The front entry floor area must have a set of 70 mm high yellow 'No Standing Area' lettering inlaid or appropriate signage.	

990	51.9	Painted lettering is not accepted.	
991	51.10	The second entry door floor area must have a set of 70 mm high yellow 'No Standing Area' lettering inlaid or appropriate signage.	
992	51.11	Painted lettering is not acceptable.	
993	51.12	The floor structure and flooring material must be impervious to moisture penetration.	
994	51.13	The floor profile must be designed to eliminate pooling of water when the Bus is parked on a level surface.	
995	51.14	The floor covering must continue up the sides of the Bus as far as the underside of the body side seat rails.	
996	51.15	Sharp corners, both horizontal and vertical, must be avoided.	
997	<b>52. ON BOARD SYSTEMS INTEGRATION &amp; COMMUNICATION</b>		
998	In addition to the mandatory integration and communication requirements of the Passenger Information Display Section 38, TfNSW is seeking proposals to further integrate the Supplier provided on-board systems and enhanced communications to allow large amounts of data to be retrieved from the Bus and information to be sent to the bus. The system is to interface with:		
999	52.1	CCTV (Section 36);	
1000	52.2	Destination Equipment (Section 35);	
1001	52.3	Passenger Information Display (Section 38);	
1002	52.4	Bus Chassis CAN systems, and Multiplexed vehicle systems; and	
1003	52.5	Engine Bay Fire Suppression Systems (EBFSS) Section 12.	
1004	52.6	The system is to send the status of any of the interfaced items to the Passenger Information Display (PID).	
1005	52.7	Items on the initial PID list include: Centre Door Closing, Wheelchair ramp deployed, and scrolling CCTV camera views.	
1006	52.8	Communication is to be provided using an on-board SIM and the 4G network with sufficient capacity to:	
1007	52.9	send the status of any of the interfaced items to a remote location;	
1008	52.10	Items on the initial remote list include: EBFSS status, Bus location, duress alarm, and Bus speed;.	
1009	52.11	provide live streaming from the CCTV system to a remote location; and	
1010	52.12	provide "push-to-talk" communications with other buses within the same Bus fleet or back to base to computer terminal using software rather than radio.	
1011	<b>53. SPARE PARTS</b>		
1012	53.1	Chassis and body spare parts must be generally available ex-stock within 24 hours to any site in the purchaser's operating area.	
1013	53.2	Copies of the Bus catalogue of spare parts must be made available to the principal of the Deed where required.	
1014	53.3	The catalogue must include part description and part number. Any updates to the catalogue must be made available upon request.	
1015	<b>54. SERVICING AND TRAINING</b>		
1016	54.1	The Supplier must provide suitable and sufficient service and repair facilities within the purchaser's operating area. Such capabilities must be provided for both the chassis and the body and will be available from the date of delivery of the first Bus.	
1017	54.2	The Supplier must provide detailed service and maintenance instructions for the Bus to ensure the Operator can perform correct service and maintenance as per procedures set out by the manufacturer and any componentry sub-supplier. This information includes all Fire Mitigation process and procedures as they relate to ongoing maintenance, servicing, cleaning, upkeep and component change out programs.	
1018	54.3	During the warranty periods, the supplier must provide sufficient staff and facilities to enable, as a minimum, an inspection of any service problem affecting either the chassis or the body in a timely manner of any service problem becoming apparent.	
1019	54.4	Full service, maintenance and workshop information, and spare parts lists, must be provided by the supplier before the first Bus is delivered (to the Bus operator). All information, manuals and drawings must be written in the English language.	

1020	54.5	Provide the Bus operator and TfNSW with all OEM documentation, which includes but is not limited to all instructions, manuals, service, maintenance and repair bulletins, information instructions or similar, training materials and other documentation to be prepared by the supplier to enable the operator to operate and maintain the Buses in accordance with the supplier's guidelines. These documents must be provided in a manner that is auditable and understood by both the operator and supplier. Documentation must be provided in hard and or soft copy.	
1021	<b>55. BUS TYPE APPROVAL DESIGN REVIEW</b>		
1022	As part of the evaluation, a Bus Type Approval Design Review will be conducted to determine if the Bus complies with the Specification. All documentation must be provided in electronic Excel, Word or PDF documents, or information provided via Supplier's portal. No hard copies are to be provided.		
1023	55.1	Supplier shall provide a general arrangement drawing, showing the key dimensions of the Bus including overhangs, wheel base, overall length, width, height, door dimensions, ground clearances (Refer ADR 43/04, ADR58/00).	
1024	55.2	Supplier shall provide a drawing showing the location and size of the emergency exits, including foot holes, and roof hatches for the bus. (Refer ADR 44/02).	
1025	55.3	Supplier shall provide a general arrangement drawing in plan and elevation, showing the seating layout for each of the seat types offered. (Refer ADR 58/00, TS148, ADR68/00)	
1026	55.4	For each variant offered, Supplier to provide weight distribution forms with a diagram detailing driver and passenger seat locations, standing areas, battery location and luggage areas. Bus to be Fully Laden.	
1027	55.5	Supplier shall provide a drawing showing the Exterior Lighting with dimensions to demonstrate compliance with the lighting ADRs. (Refer ADR 13/00).	
1028	55.6	Supplier to provide drawing of hearing augmentation loop installation providing 100% coverage of the total area of the enclosed internal passenger space of the Bus.	
1029	55.7	The supplier must provide evidence that recognised design and evaluation techniques, such as finite element analysis (FEA), have been used in the design of the body frame.	
1030	55.8	The Supplier must provide an ADR compliance summary for each variant of bus, including Component Registration Numbers (CRNs) and relevant report numbers for supporting information, and the chassis SARN (Sub Assembly Registration Number) for each variant.	
1031	55.9	The Supplier must provide a DDA compliance summary for each variant of bus. The DDA compliance summary will list how the Bus complies with all relevant requirements of the Disability Standards for Accessible Public Transport 2002 and associated standards.	
1032	55.10	Chassis repair and workshop manual;	
1033	55.11	Body repair and workshop manual including paint codes and	
1034	55.12	All proprietary equipment manuals (e.g. destination equipment, air conditioning, radio, door systems, etc.);	
1035	55.13	a full set of electrical wiring diagrams for both chassis and body;	
1036	55.14	a full set of pneumatic circuit diagrams for both chassis and body	
1037	55.15	a full set of hydraulic circuit diagrams	
1038	55.16	an electronic system integration and architecture manual detailing system break points defining segregation between the equipment supplied	
1039	55.17	an electrical load schedule indicating ampere draw of each item.	
1040	55.18	For the purpose of evaluation, access to review electronic diagnostic software and maintenance systems used to support the Bus.	
1041	55.19	Supplier shall supply its standard schematics showing the Passenger Information Display installation and wiring	
1042	55.20	Suppliers shall provide details on how the fire rating of the engine and wheel well areas were determined as per clauses 11.19 and 11.36.	
1043	55.21	Supplier shall provide a general arrangement drawing of the paint scheme for each Bus type offered. Refer Section 14 for livery standard.	
1044	55.22	Supplier shall supply Quality Assurance Certification for the complete Bus and chassis sub-assembly manufacturing facilities referred to in Section 7.	
1045	55.23	Supplier shall supply its standard schematics showing the radio installation and wiring. NB: Radio systems are Operator dependent and Suppliers are to modify and record any configuration changes for each Operator.	
1046	55.24	Supplier shall supply its standard schematics showing the duress alarm / OCC amplifier installation and wiring. NB: Duress / OCC Amplifier installations are Operator dependent and Suppliers are to modify and record any configuration changes for each Operator.	
1047	55.25	Supplier shall supply its standard schematics showing the ticketing system installation and wiring.	

1048	55.26	Supplier shall supply its standard schematics showing the air conditioning installation and wiring. NB: Air conditioning systems are usually sub-supplier dependent and Suppliers are to modify and record any configuration changes for each Operator.	
1049	55.27	Supplier shall supply its standard schematics showing the fire suppression and tyre pressure monitoring installation and wiring. NB: These systems are usually sub-supplier dependent and Suppliers are to modify and record any configuration changes for each Operator.	
1050	55.28	Supplier shall supply its standard schematics showing the CCTV installation and wiring as detailed in Section 36 . NB: CCTV systems are usually Operator dependent (based on risk) and Suppliers are to modify and record any configuration changes for each Operator.	
1051	55.29	The Supplier must provide evidence that the Bus is designed, constructed and commissioned such that it satisfies the Fire Risk Management and Fire Risk Reduction requirements of AS 5062-2016.	
1052	55.30	The Supplier provide evidence that it has considered the information contained in the Bus Industry Confederation (BIC) Fire Mitigation Advisory, published in 2014 in its design.	
1053	55.31	Supplier shall supply its standard schematics showing any ancillary equipment such as fuelling, door actuation or any other systems fitted by the Supplier on behalf of Operators.	
1054	55.32	Details of the floor structure material used and the properties associated with those materials shall be provided.	
1055	55.33	For buses required to meet ADR59/00, certification that the superstructure meets the standards for rollover strength.	
1056	55.34	For buses with ADR68/00 seats, certification that the seats and modesty panels meet ADR68/00 and the floor structure meets the strength requirements of ADR68/00.	
1057	55.35	The Supplier shall supply details of the the materials, such as: C3R12 stainless steel; 304 stainless steel; galvanised steel or 6000 series aluminium alloy, that are used in the Bus frame, chassis extension, wheel arches, steps and floor support framework.	
1058	55.36	The Supplier shall supply the quality assurance processes used to demonstrate manufacturing compliance for body frame welded or bolted joints.	
1059	55.37	To demonstrate the Supplier's Engineering Management Capability, suppliers are to <b>briefly</b> describe how it meets the following requirements in a separate document titled Supplier's Engineering Management Capability.	
1060	55.37.1	The Supplier shall outline its engineering and management capability to provide support during procurement, manufacturing, construction, integration, testing, commissioning, and maintenance stages of the bus life cycle.	
1061	55.37.2	The Supplier shall provide details of its management system used to ensure the bus specifications' requirements are addressed by appropriate processes, allocation of responsibilities and stating deliverables.	
1062	55.37.3	The Supplier shall demonstrate the capability to trace the performance of the bus in meeting the specifications' requirements throughout the life cycle of the bus.	
1063	55.37.4	The Supplier shall outline its capability to design, develop and support complete Buses in accordance with global industry best practice.	
1064	55.37.5	The Supplier shall detail its interface management capabilities in relation to the design and version control of the various electronic sub-system interfaces such as the chassis CAN, body multiplexing, electronic ticketing, destination and various safety systems.	
1065	55.37.6	The Supplier shall detail its capability to plan and carry out the integration of all the bus sub-systems to ensure the safety and reliability performance of the Bus during its life. Such sub-systems include chassis, body, air-conditioning systems, door systems, hand brake warning systems and fire safety systems.	
1066	55.37.7	The Supplier shall demonstrate, by an example, that it has the capability to develop a framework architecture used for detailed system design	
1067	55.37.8	The Supplier shall detail its "cradle-to-grave" design considerations in the Bus design to meet the environmental, social and economic aspects of sustainability. This includes the potential to recycle and re-use components and the disposal considerations at the economic life end.	
1068	55.37.9	The Supplier shall detail its arrangements in place to ensure that Reliability, Availability and Maintainability (RAM) properties of the Buses are achieved.	
1069	55.37.10	The Supplier shall incorporate relevant human factors design in the development of the buses to ensure passengers, drivers, mechanics and other people coming in contact with the bus are safe and comfortable	
1070	55.37.11	The Supplier shall detail how it validates how its Buses meet the statutory, and design standards required.	
1071	55.37.12	The Supplier shall describe its engineering and production quality assurance processes, which may use such techniques such as gateway reviews or quality gates.	

1072	55.37.13	The Supplier shall provide details of its risk-based approach to engineering systems assurance in design and in running changes.	
1073	55.37.14	The Supplier shall detail its system safety assurance process that describes how it has mitigated safety risks So Far As Is Reasonably Practical (SFAIRP).	
1074	55.37.15	It shall also support risk-based decision-making with records to show traceability of all decisions made.	
1075	55.37.16	The Supplier shall provide fire assurance reports for each bus type.	
1076	55.37.17	The Supplier shall describe their configuration management system that is suitably aligned with ISO 10007 – Quality Management – Guidelines for Configuration. This shall cover the complete Bus including suppliers and sub-contractors.	
1077	55.37.18	The Supplier shall have comprehensive documented system for managing the qualifications and competence of its staff and third party suppliers, relevant to the scope of work of this Deed.	
1078	55.37.19	The Supplier shall detail its methods to identify the training and development needs for staff delivering the contracted engineering services.	
1079	55.37.20	The Supplier shall have demonstrated and documented system in place to manage selection, acquisition, evaluation and monitoring of products and services delivered by internal and external suppliers over the contract life cycle.	
1080	55.37.21	The Supplier shall have demonstrated and documented system in place for continual and systematic process improvement based on the company measured processes improvement KPIs and the bus systems performance over the assets life cycle.	
1081	55.38	For all the component options offered in Section 2, provide the manufacturers specification sheets for each unique option. Provide as a single package.	
1082	55.38	For Buses made from black steel, the Supplier must provide a detailed description of the corrosion protection provided.	
	55.39	ADAS details, certification documents and training package	
1083	<b>56. BUS TYPE APPROVAL – SPECIFICATION TESTS AND FULLY LADEN TESTING</b>		
1084	As part of the evaluation, Bus Type Approval Testing may be conducted on a sample of a Bus type to determine if the Bus complies with this complete Specification. Buses undergoing this test will have reached acceptable desk-top compliance with the specification. To demonstrate laden performance, the Supplier is to also provide a fully laden Bus (with weigh bridge ticket to conform weights) and driver to conduct the following tests:		
1085	56.1	Acceleration performance	Refer 5.3
1086	56.2	Gear up smooth changes fully laden	Refer 5.5
1087	56.3	Gear down smooth changes fully laden	Refer 5.5
1088	56.4	Handbrake and stop start test fully laden	Refer 5.6
1089	56.5	Road speed limiter and top speed fully laden	Refer 5.7
1090	56.6	Engine/transmission noise level at rear 5 seat, engine idle, fully laden.	Refer 5.9
1091	56.7	Engine/transmission noise level at rear 5 seat, full throttle, fully laden	Refer 5.9
1092	56.8	L <sub>eq</sub> (one hour)	Refer 5.9
1093	56.9	Door brake pre-set speed	Refer 20.2
1094	56.1	Door brake retardation fully laden	Refer 20.3
1095	<b>57. WHOLE OF LIFE COSTS</b>		
1096	To assess the whole of life costs for the bus, Suppliers must provide the following information for evaluation. :		
1097	57.1	Appendix 7 and Appendix 8 contains templates which list the major components used in the life of the Bus for the chassis and the body respectively. Suppliers are to provide the service life and the hours required to effect the replacement or overhaul as indicated.	
1098	57.2	For the purpose of evaluation, the annual distance travelled is standardised to 50,000 km per year.	
1099	57.3	Where the service life is for the 25 year life of the bus, 1,250,000 km, set the service life to (25 years x 50,000 km).	

1100	57.4	The Supplier must provide fuel consumption figures in accordance with UITP SORT TEST 1, 2, and 3 for the chassis and expected similar Bus body configuration.	
1101	57.5	In addition to the information provided in Appendix 7, Supplier must provide details of the work that is expected for the engine overhaul, the components and materials that are expected to be replaced and the associated hours expected to complete the overhaul.	
1102	57.6	In addition to the information provided in Appendix 7, Supplier must provide details of the work that is expected for the transmission overhaul, the components and materials that are expected to be replaced and the associated hours expected to complete the overhaul.	
1103	57.7	a chassis specific maintenance service schedule nominating parts required and estimated labour hours.	
1104	57.8	a body specific maintenance service schedule nominating parts and estimated labour hours.	
1105	<b>58. PRE- DELIVERY BUS TESTING AND ACCEPTANCE</b>		
1106	Prior to the delivery of each bus, Bus Operators will conduct a Pre-Delivery Inspection with the Supplier in accordance with the template in Appendix 9.		
1107	58.1	Bus to be fueled/charged to at least 25% of its full rated capacity .	
1108	58.2	Bus batteries to be fully charged.	
1109	58.3	Documentation and certification plates provided in accordance with Section 59.	
1110	58.4	Pre-Delivery inspections and road tests as per Appendix 9 will be conducted by the TfNSW Contracted Bus Operator with the Supplier.	
1111	58.5	The Purchaser may, prior to signing for acceptance of each bus, test, examine, measure or take such other action as is necessary to determine whether the Bus is in accordance with this Specification and any other mutually agreed documentation considered and agreed as appropriate between the Bus Operator and the Supplier, which will include but not limited to; ADR, DDA, RMS TS, and the Standards set out for Fire Mitigation compliances.	
1112	<b>59. PRE-DELIVERY DOCUMENTS / PLATES REQUIRED</b>		
1113	At the Pre-Delivery Inspection the following documents and certifications must be provided by the Supplier:		
1114	59.1	Weigh bridge ticket detailing Bus VIN and individual axle masses provided by Supplier for each Bus	
1115	59.2	Wheel alignment figures provided by Supplier for each bus	
1116	59.3	Certification plate: TS147 - Field of view of the passenger entrance doors of a bus	
1117	59.4	Certification plate: TS148 - Padding for seatback, hand rails and partitions on buses.	
1118	59.5	Certification plate: TS150 – Warning signs and lights for school buses.	
1119	59.6	Certification plate: TS155 - Bus door safety systems.	
1120	59.7	NSW Registration plates front and rear	
1121	59.8	NSW Registration papers	
1122	59.9	Manufacturer's Compliance plate fitted	
1123	59.10	Chassis SARN plate fitted	
1124	59.11	Pre-delivery chassis completed and signed	
1125	59.12	Pre-delivery body completed and signed	
1126	59.13	Pre-delivery air conditioning completed and signed air-conditioning commissioning document	
1127	59.14	Pre-delivery destination signs completed and signed	
1128	59.15	Pre-delivery transmission completed and signed	
1129	59.16	Pre-delivery door certification completed and signed.	
1130	59.17	Fire suppression (EBFSS) commissioning report.	
1131	59.18	Tyre Pressure Monitoring (TPMS) commissioning report	
1132	59.19	Electronic Ticketing System commissioning document	
1133	<b>60. SCHEDULE OF KEYS TO BE SUPPLIED</b>		
1134	At the Pre-Delivery Inspection the following keys must be provided by the Supplier:		

1135	60.1	Ignition key	
1136	60.1	Body access keys	
1137	60.2	Budget lock key	
1138	60.3	Driver's locker key	
1139	60.4	Retarder key and barrel	
1140	60.5	Security keys	
1141	<b>61. OPTIONS</b>		
1142	The Following options for Buses following business case approval to TfNSW by individual operator.		
1143	61.1	Single leaf door at the Centre Door, minimum clear width of 850mm.	
1144	61.2	USB charge points at seat base or other approved location as set out in a drawing provide by Supplier.	
1145	61.3	Integrated Fleet Management System, with main parameters not limited to:	
1146	61.3.1	Driver performance;	
1147	61.3.2	Vehicle performance;	
1148	61.3.3	Data logging for vehicle operating parameters;	
1149	61.3.4	Accident analysis capabilities;	
1150	61.3.5	Download and upload through wireless or cable link;	
1151	61.3.6	Security features; and	
1152	61.3.7	Software compatible to latest Microsoft Operating System.	
1153	61.4	A3 Notice Board (snap lock) to rear of driver's compartment.	
1154	61.5	Stainless steel backs on the 3 last rear seat rows.	
1155	61.6	Modular seating.	
1156	61.7	Door locks on the Front and Centre Doors	
1157	61.8	Driver's broom clip.	
1158	61.9	To allow the safe deployment of the portable fire extinguisher for fires in the rear engine bay, an extinguisher port hole of approximate dimension 50 mm radius is to be provided in the engine door centrally at a height of 1.0 m to 1.4 m from the ground or in accordance with the operator's requirements.	
1159	61.10	Bus livery as set out in document: BC/14-2632 SMBSC and OSMBSC Transport for NSW Bus Livery or any later revision released by TfNSW. Refer Appendix 1.	
1160	61.11	An external gauge or sight glass or similar device be provided for checking level of coolant fluid without need to open a door or hatch.	
1161	61.12	Cantilever passenger seat frames as an option.	
1162	61.13	A swivel based, spring suspension/air adjustable, driver's seat, including a head rest and adjustable lumbar support, suitable for drivers ranging from the 5 <sup>th</sup> percentile female to the 95 <sup>th</sup> percentile male up to 150kg. The seat must be fitted with lap/sash seatbelt with the buckle on the left-hand side.	
1163	61.14	A driver's security ¾ or Full Screen can be provided and shall be part of a driver's cabin door and shall open and close with the cabin door. The screen shall provide the driver with a degree of protection against passenger assault but without inhibiting the driver vision, access to passengers for collection of fares and issuing of tickets, or access to and from the cabin.	
1164	61.15	Interior Decals and Exterior Logos as per Clause 16.	
1165	61.16	For emergency duress alarm, a 3 <sup>rd</sup> hand switch near the right hand cabin wall	
1166	61.17	For emergency duress alarm, integration with horn and headlight flashing functions.	
1167	61.18	A transmission selector that enables gear holding in Drive in a particular gear, offered with 123RND configuration.	
1168	61.19	Opening roof hatches fitted with "do not open - emergency only" decal and alarmed to warn driver hatch has been opened.	
1169	61.20	A luggage rack may be provided	
1170	61.21	The design of the luggage rack must prevent small items from rolling out. The aisle face of the rack is to be lower than the surrounding rail to allow large items to be easily lifted out.	

1171	61.22	The design of the luggage rack must not intrude on circulation spaces to access the allocated spaces for wheelchairs.	
1172	61.23	Where luggage could come into contact with any windows, suitable protection bars must be fixed to the body side to prevent damage to the window.	
1173	61.24	Vehicle Frontal Protection Systems (VFPS) or bull bars according to the following requirements:	
1174	61.24.1	Shall comply with the requirements AS 4876.1 - 2002 Motor vehicle frontal protection systems Part 1: Road user protection (except Clause 3.2, "Road user protection criterion"). It is acknowledged this standard applies for vehicles up to 3.5 tonnes, however TfNSW is applying this standard on Buses to reduce injury to any person.	
1175	61.24.2	Shall comply with the requirements of Bull bar tolerances and conditions - Technical Specification applicable in NSW during the exemption period (Extended until September 2019). It is acknowledged this Technical Specification applies for vehicles up to 3.5 tonnes, however TfNSW is applying this standard on Buses to reduce injury to any person.	
1176	61.24.3	The maximum allowable overall length of the bus shall not be exceeded due to the fitment of the VFPS. (ADR43/04)	
1177	61.24.4	The bull bar mass shall be accounted for in the Unladen and Fully Laden Mass for the Bus and hence the passenger capacity calculations for the Bus.	
1178	61.24.5	The bull bar shall: be fitted to follow the Plan view profile of the Bus to prevent hooking of pedestrians;	
1179	61.24.6	be designed, built and fitted to the Bus in a way that minimises the likelihood of injury to a person making contact with the bus (refer ADR42/04);	
1180	61.24.7	have edges which are de-burred and rounded, with a minimum radius of 5mm;	
1181	61.24.8	have no open-ended sections;	
1182	61.24.9	not slope forward more than 9° or have an offset of more than 75mm;	
1183	61.24.10	have accessory brackets which do not project forward of the bull bar;	
1184	61.24.11	not project wider than the width of the bus;	
1185	61.24.12	not obscure the front number plate (entire plate to be visible from 20 metres at an arc of 45° above and to the left and right hand side of the plate);	
1186	61.24.13	not reduce the approach angle defined in this specification;	
1187	61.24.14	not obscure any lights breaching the lighting rules including: ADR13/00, ADR6/00, ADR46/00 and ADR 49/00; and	
1188	61.24.15	not interfere with the field of view of the driver.	
1189	61.25	Deletion of seatbelts	
1190	61.26	ETS ticketing as per Section 19.	
1191	61.27	Rubber-mounted glazing as an alternative to direct bonded glazing	
1192	61.28	An Advanced Driver Assist System (ADAS) with the following requirements:	
	61.28.1	Headway Monitoring and tailgate Warning shall provide visual time to collision with vehicles in front of bus and warns audibly and visually when this becomes less than 3 seconds.	
	61.28.2	Forward Collision Warning shall provide the driver with visual and audible warning of imminent collision up to 2.7 seconds ahead.	
	61.28.3	Pedestrian and Cyclist collision Warning: provides visual and audible warning of time to collision up to 2 seconds ahead, and provide limitations of when this system is active (such as in poor light conditions). It is preferable the detection system can operate in poor light conditions.	
	61.28.4	Lane Departure Warning shall provide visual and audible warning and to be active above 55km/hr.	
	61.28.5	The console and camera shall be mounted in a tamper proof housing and conduit to prevent drivers or passengers switching the unit off, damaging wiring or adjusting the unit settings.	
	61.28.6	Signoff by the chassis manufacturer shall be provided to confirm the system does not adversely affect the vehicle or warranties.	
	61.28.7	Details of any alteration to the system for specific bus models, such as special cables to replace existing CAN cables, to be provided in full and included in the cost of the system.	

61.28.8	A suitable training package shall be provided for each Operator so their trainers can deliver training to drivers.	
61.28.9	The system shall have the capability to record activation history for analysis.	
61.28.10	Local service and support shall be provided to ensure the system is tuned to suit the operating environment of the Operator and the system is supported.	

## 62. REFERENCES

The Following references were used in this specification:

62.1	Motor Vehicle Standards Act 1989
62.2	Heavy Vehicle (Mass , Dimension and Loading) National Regulation
62.3	Disability Discrimination Act 1992
62.4	Disability Standards for Accessible Public Transport 2002
62.5	Australian Standard AS1428.1-2001 Design for access and mobility – General requirements for access – new building work
62.6	Australian Standard AS1428.2-1992 Design for access and mobility – Enhanced and additional requirements – Buildings and facilities
62.7	Australian Standard AS 3856.1-1998 Hoists and ramps for people with disabilities- Vehicle mounted –Product Requirements
62.8	Australian Standard AS 3856.2-1998 Hoists and ramps for people with disabilities- Vehicle mounted –Installation Requirements
62.9	Australian Standard AS 5062 -2016 Fire protection for mobile and transportable equipment
62.10	Swedish SPCR 183 Certification Rules regarding Fire Suppression Systems in Engine Compartments of buses and coaches
62.11	British Standard BS 476: Part 7:1997 Fire tests on building materials and structures – Part 7 – Method of test to determine the classification of the surface spread of flame of products.
62.12	British Standard BS 5852:2006 Methods of test for assessment of the ignitability of upholstered seating by smouldering and flaming ignition sources (Crib 7)
62.13	European Standard ECE/324, Regulation 118, Uniform technical prescriptions concerning the burning behaviour and/or the capability to repel fuel or lubricant materials used in the construction of certain categories of motor vehicle.
62.14	Australian Standard AS 1530.4 – 2005 Methods for fire tests on building materials, components and structures Part 4: Fire-resistance test of elements of construction.
62.15	Australian Standard AS 2444 – 2001 Portable Fire Extinguishers and Fire Blankets – Selection and Location
62.16	European Standard ECE/324, Regulation 107, Uniform Provisions Concerning the Approval of Category M <sub>2</sub> or M <sub>3</sub> Vehicles with regard to their General Construction
62.17	Road Transport (Vehicle Registration) Regulation 2017 NSW
62.18	Vehicle Standard (Australian Design Rule Definitions and Vehicle Categories) 2005
62.19	Vehicle Standard (Australian Design Rule 1/00 – Reversing Lamps) 1991
62.20	Vehicle Standard (Australian Design Rule 3/03 – Seats and Seat Anchorages) 2008
62.21	Vehicle Standard (Australian Design Rule 4/04 – Seatbelts) 2008
62.22	Vehicle Standard (Australian Design Rule 5/05 – Anchorages for Seatbelts) 2008
62.23	Vehicle Standard (Australian Design Rule 5/05 – Anchorages for Seatbelts) 2008
62.24	Vehicle Standard (Australian Design Rule 6/00 – Direction Indicators) 1991
62.25	Vehicle Standard (Australian Design Rule 8/01 – Safety Glazing Materials) 1994
62.26	Vehicle Standard (Australian Design Rule 14/02 – Rear Vision Mirrors) 1993
62.27	Vehicle Standard (Australian Design Rule 14/02 – Rear Vision Mirrors) 1993
62.28	Vehicle Standard (Australian Design Rule 18/03 – Instrumentation) 2006
62.29	Vehicle Standard (Australian Design Rule 35/03 – Commercial Vehicle Brake Systems) 2011

62.30	Vehicle Standard (Australian Design Rule 42/04 – General Safety Requirements) 2005
62.31	Vehicle Standard (Australian Design Rule 43/04 – Vehicle Configuration and Dimensions) 1998
62.32	Vehicle Standard (Australian Design Rule 43/04 – Vehicle Configuration and Dimensions) 1998
62.33	Vehicle Standard (Australian Design Rule 44/02 – Specific Purpose Vehicles) 1998
62.34	Vehicle Standard (Australian Design Rule 46/00 – Headlamps) 1991
62.35	Vehicle Standard (Australian Design Rule 47/00 – Retroreflectors) 1991
62.36	Vehicle Standard (Australian Design Rule 48/00 – Devices for Illumination of Rear Registration Plates) 1991
62.37	Vehicle Standard (Australian Design Rule 49/00 – Front and Rear Position (Side) Lamps, Stop Lamps and End-Outline Marker Lamps) 1991
62.38	Vehicle Standard (Australian Design Rule 58/00 – Requirements for Omnibuses Designed for Hire and Reward) 2006
62.39	Vehicle Standard (Australian Design Rule 61/02 – Vehicle Markings) 1995
62.40	Vehicle Standard (Australian Design Rule 65/00 – Maximum Road Speed Limiting for Heavy Goods Vehicles and Heavy Omnibuses) 1995
62.41	Vehicles Standard(Australian Design Rule 68/00 - Occupant Protection in Buses) 2006
62.42	Vehicle Standard (Australian Design Rule 74/00 – Side Marker Lamps) 2000
62.43	Vehicle Standard (Australian Design Rule 76/00 – Daytime Running Lamps) 2000
62.44	Vehicle Standard (Australian Design Rule 80/03 – Emission Control for Heavy Vehicles) 2010
62.45	Vehicle Standard (Australian Design Rule 83/00 – External Noise) 2005
62.46	AS 3791-1991 Hydraulic Hose
62.47	Society of Automotive Engineers, SAE J30: Fuel and Oil Hoses
62.48	Australian Standard AS 4506 – 2005 Metal finishing – Thermoset powder coatings
62.49	Australian Standard AS 4833 – 2007 Pressure sensitive labels for stock-paper, stock plastic and general purpose use
62.50	Australian Standard AS 1288-2006 Glass in buildings – Selection and installation
62.51	Australian Standard AS 1604-2010 Specification for preservative treatment
62.52	Australian Standard AS/NZS 1906.2:2007 (Retro-reflective Materials and Devices for Road Traffic Control)
62.53	Australian Standard AS 2272-2006 Plywood Marine
62.54	British Standard BS 1088-1:2003 Marine Plywood
62.55	ISO 6722:2006 Road vehicles – 60 V and 600 V single-core cables – Dimensions, test methods and requirements
62.56	Transport Asset Standards Authority T BU FL 01701 ST – Mounting and Installation of Electrical Equipment - DRAFT
62.57	Society of Automotive Engineers, SAE J1292: Automobile and Coach Wiring
62.58	Society of Automotive Engineers, SAE J156: Fusible Links
62.59	Society of Automotive Engineers, SAE J553: Circuit Breakers
62.60	Society of Automotive Engineers, SAE J163: Low Tension Wiring and Cable Terminals and Splice Clips
62.61	Society of Automotive Engineers, SAE J858: Electrical Terminals – Blade Type
62.62	Society of Automotive Engineers, SAE J561: Electric Terminals – Eyelet and Spade Type
62.63	Society of Automotive Engineers, SAE J928: Electric Terminals – Pin and Receptacle Type
62.64	Society of Automotive Engineers, SAE J1708: Serial Data Communications Between Microcomputer Systems in Heavy Duty Vehicle Application 2016
62.65	Society of Automotive Engineers, SAE J1939: Recommended Practice for a Serial Control and Communications Vehicle Network 2018.
62.66	Roads and Maritime Services NSW Technical Specification Sheet TS147 – Field of view of the passenger entrance doors of a bus
62.67	Roads and Maritime Services NSW Technical Specification Sheet TS148 – Padding for seat backs handrails and partitions on buses

62.68	Roads and Maritime Services NSW Technical Specification Sheet TS150 – Warning signs and lights for school buses
62.69	Roads and Maritime Services NSW Technical Specification Sheet TS155 – Bus door safety systems
62.70	Transport Asset Standards Authority T MU TE 61003 ST – Public Address Systems 2015
62.71	BC/14-23562 (2018) SMBSC and OSMBSC Transport for NSW Bus Livery
62.72	BC/14-23560 (2019) SMBSC and OSMBSC Transport for NSW Interior Decals and Exterior Logos
62.73	Emergency Break Glass Signage on buses to meet Specifications.
62.74	Electronic Ticketing Equipment (ETS) OPAL Coachbuilder Instruction. TfNSW ETS SOW v 7.1.pdf Dated 27 March 2018.
62.75	BC/14-23558 (2015) SMBSC and OSMBSC CCTV and Duress Alarm System Specifications
62.76	Passenger Information Display Appendix 3
62.77	ISO 9001:2015 Quality Management Systems
62.77	Bus Seat Exemption Notice 2014 (New South Wales Government Gazette No 116) and National Heavy Vehicle Standards (2 for 3 Bus Seat) Exemption Notice 2015 No.1 (Government Notices Gazette C2015G00099).
62.78	Australian Fuel Standard(Automotive Diesel) Determination 2001.
62.79	Australian Standard AS 4876.1-2002 Motor vehicle frontal protection systems Part 1: Road user protection
62.80	Bull bar tolerances and conditions - Technical Specification applicable in NSW during the exemption period (Extended until September 2019)
62.81	EN 45545:2013 Fire Protection on Railway Vehicles
62.82	ISO 5658-2:2006 Reaction to fire tests - spread of flame-Part2: Lateral spread on building and transport products in vertical configuration
62.83	ISO 5659-2:2107 Plastics-smoke generation-Part 2: Determination of optical density by single-chamber test.
62.84	ISO 5660-1:2015 Reaction to fire tests-heat release, smoke production and mass loss rate-Part 1: Heat release rate(cone calorimeter method) and smoke production rate(dynamic measurement)
62.85	ISO 9239-1:2010 Reaction to fire tests for floorings-Part 1: Determination of the burning behaviour using a radiant heat source.
62.86	ISO 11925-2:2010 Reaction to fire tests - Ignitability of products subjected to direct impingement of flame - Part 2: Single flame source test.
62.87	ISO 9705-2: 2001 Reaction to fire tests-Full scale room tests for surface products-Part 2: Technical background and guidance.
62.88	ISO 60332-1-2:2004 Test on electric and optical fibre cables under fire conditions-Part 1-2: Test for vertical flame propagation for a single insulated wire or cable - Procedure for 1 kW pre-mixed flame.
62.89	ISO 60332-3-24:2018 Tests on electric and optical fibre cables under fire conditions - Part 3-24: Test for vertical flame spread of vertically bunched wires or cables - Category C.
62.90	Transport Asset Standards Authority T BU FL 17010 ST – Bus Materials: Fire Performance Requirements - DRAFT
62.91	BS EN 50305:2002 Railway applications. Railway rolling stock cables having special fire performance. Test methods.