

Partner Assist

Acoustic Conspicuity

Buses shall be fitted with a reversing alarm that issues an audible warning of “white sound” whenever reverse gear is selected, and the vehicle is in motion. The system shall incorporate a driver’s cab time delayed isolation override. This requirement is in addition to the reversing requirements of UNECE Regulation 138.

All quiet running buses of categories M3 are to be fitted with a front emitting Acoustic Vehicle Alerting System (AVAS) which is fully compliant with UNECE Regulation 138. This includes electric, hybrid and other alternative powertrains that are quiet running. This is required even if the bus already meets the minimum sound requirements of Regulation 138 without the AVAS; an AVAS sound is required on all buses to achieve a uniformity of sound across London. The reversing operation requirements of Regulation 138 are to be achieved as a minimum with no further enhancement necessary.

TfL has designed a unique Urban Bus Sound to be used by quiet running buses in London and buses belonging to other organisations at TfL’s discretion.

System Performance

The Urban Bus Sound consists of two components, the Core sound and the Beacon sound. TfL will provide Wave (.wav) files containing these components. Playback of the sound components must be representative of the original files in all specified operating conditions to comply with this standard.

The Core sound shall be played at all times on bus start up, including when stationary.

The Beacon sound is to be played whenever the bus is in motion regardless of whether the bus is moving forwards or backwards. The Beacon sound shall continue playing until the vehicle comes to a stop.

Seamless transition between the Core and Beacon sounds shall be achieved through synchronised playback of the two Wave files.

Sound Amplitude

When the Core sound is playing the AVAS must achieve the sound levels ($L_{AMAX, FAST}$) defined in Attachment 30, Appendix B when measured at the positions outlined.

When both the Core and Beacon sounds are playing the AVAS must achieve both the sound levels ($L_{AMAX, FAST}$) defined in Attachment 30, Appendix B when measured at the positions outlined, as well as meet the minimum requirements set in Appendix 3 of UNECE Regulation 138.

Responsive AVAS (Geo-fencing)	For speeds up to 22 km/h the amplitude of the Urban Bus Sound will be determined by the location of the bus as well as the time of day. This is to be achieved through the AVAS interfacing with the ISA system, which will set the appropriate AVAS Step level profile defined in Appendix B (Attachment 30) between 0 and 22 km/h. AVAS Step level profiles range
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	<p>between 1 to 5. Please note that the AVAS Step level range may be subject to minor changes prior to final revision.</p> <p>The amplitude shall transition smoothly between roads taking no more than 3 seconds to transition from one value to another.</p>
<p>Non-Responsive AVAS</p> <p>(For Retrofit programme vehicles without ISA capability only)</p>	<p>For speeds up to 22 km/h the amplitude of the Urban Bus Sound will be set to AVAS Step level 3 profile defined in Appendix B (Attachment 30) between 0 and 22 km/h.</p>

From 22 km/h the sound must attenuate, decreasing linearly so that the AVAS stops sounding at 28 km/h.

At all times, the Driver's Cabin must not be exposed to sound levels above those set out in Attachment 30, Appendix B, as a result of sound from the AVAS sounders. Manufacturers are encouraged to further reduce the level of sound ingress to the Cabin from the AVAS sounders by system configuration, placement, equipment, sound insulation, or other means, below the maximum levels set out in Attachment 30.

Frequency Modulation

The frequency content of the Urban Bus Sound must increase at a rate of 0.8% per km/h, for the full speed range of operation, as the bus accelerates and decrease at the same rate as the bus decelerates.

Frequency Profile

The Urban Bus Sound must achieve the minimum frequency profile in Attachment 30.

The AVAS shall be capable of shaping the frequency content output by the sounders in order to achieve the desired frequency profile. This can be implemented either as a hardware or software component of the system.

Sounder technologies for in harsh operating environments are continually evolving. Manufacturers are encouraged to develop improved frequency response at low and high frequencies for suitable weatherproof sounders in order to improve fidelity of the Urban Bus Sound operating across the TfL bus fleet. The minimum frequency profile in Attachment 30 shall be updated at regular intervals to respond to improvements in weatherproof sounder performance and improve fidelity of the Urban Bus Sound operating across the TfL bus fleet.

AVAS Hardware Requirements

All AVAS sounders shall be selected for their suitability in terms of achieving the specified performance and for their ability to withstand the environment in which they are located (including protection against ingress of liquids and solids, corrosion/oxidisation erosion, vandalism, heat/fire resistance). The AVAS sounder/s shall be rated to IP67 standard or above and located in the area defined in Figure 1.

The system hardware shall be E mark to meet current automotive EMC standards.

A complete functionality self-check of the AVAS must take place on bus start-up, testing hardware and software functionality. The system shall provide the driver with a notification that it is operative and free of defects. The Driver shall be informed should the AVAS fail at any time while the bus is switched on by means of a notification.

The AVAS system shall incorporate a failure mode to allow it to operate at the minimum designed sound level, as set out in Attachment 30, Appendix B, in the event that external signals necessary for setting the output amplitude are not received. The UN ECE Regulation 138 requirements shall be maintained at all times. Careful consideration must be given to both the layout to ensure an ergonomic design, and choice of audio/visual alerts/notifications used, to reduce driver movement and conflicts with other audio/visual systems used.

It shall be possible for TfL or the bus operators to upload new sounds into the AVAS hardware, either remotely or with minimal intrusion of the bus so as to prevent buses being unnecessarily taken out of service.

All sound reproduction shall be of a good quality and free from system noise including audible artefacts such as clicks, gaps, hum, distortion effects or clipping. Audio cables shall be separated and suitably shielded from control and power cabling to avoid audible artefacts. Sounder/s shall be positioned at the front of the vehicle as a minimum, in the area noted in Figure 1. Sounder locations are to be selected by the manufacturer to comply with regulatory and Attachment 30 requirements.

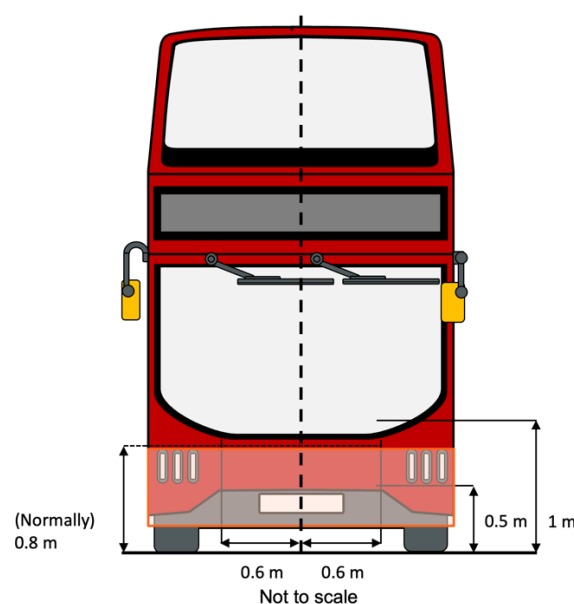


Figure 1 – Diagram indicating the area at the front of the vehicle that must include at least one AVAS sounder to meet regulatory and Attachment 30 performance requirements.

The AVAS shall be assessed according to Attachment 30 and be shown to be compliant.

