



The voice of blind and partially sighted people in Europe

# Silent Cars and AVAS

## Questions and Answers

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Background: EBU is unequivocally supportive of reducing carbon emissions through usage of electric vehicles. At the same time, EBU has spent the last decade lobbying for a solution to the dangers of their low sound emissions. This document summarises key points and achievements of the EBU Silent Cars campaign.

### 1) **What is the problem with electric vehicles?**

At low speeds, electric vehicles are almost silent, which makes them hard to detect for pedestrians. This is especially problematic for blind and partially sighted (BPS) pedestrians, who require acoustic input to be aware of crossing vehicles and parallel traffic to safely cross a street. Without this input, BPS persons face enormous traffic safety issues that limit their ability to independently move around on a daily basis.

Silent cars are a problem for all other vulnerable road users too. This includes among others children, cyclists, elderly persons and pedestrians that are momentarily distracted, for instance by using their smartphone. These groups all rely on acoustic information to supplement their visual input on traffic situations. In fact, sounds play a core role in the main slogan of road safety education, for example in the UK: “Stop, Look, Listen, Think” [[Department for Transportation 2018](#)]

### 2) **Are there numbers to back up these claims?**

According to a study by the United States National Highway Traffic Safety Administration (NHTSA), electric vehicles are 37% and 56% more likely to be involved in accidents with pedestrians and cyclists

respectively [[Wu, Austin & Chen 2011](#)]. A study commissioned by the UK Department for Transport shows that electric and hybrid vehicles “were far more difficult to detect” than conventional vehicles at the lowest steady speed [[Morgan et al. 2011](#)]. Research by the British NGO “Guide Dogs” highlights that “hybrid vehicles had to be 65 per cent closer to a pedestrian before they could be audibly detected” [[Guide Dogs 2015](#)]. The British Newspaper “The Guardian” references a study that 93% of all BPS persons have had problems with electric vehicles [[Doward 2018](#)].

### **3) What have BPS organisations done so far?**

The European Blind Union (EBU) has worked on silent cars since 2009. These efforts have intensified at the level of the World Blind Union (WBU) after a blind pedestrian and his guide dog died as the result of an accident with an electric vehicle in Japan in October 2015. In their campaign, the different BPS organisations have advocated for a mandatory “Acoustic Vehicle Alert System” (AVAS) in all silent cars.

### **4) What is an AVAS?**

AVAS is an additional element to electronic vehicles that artificially creates a sound. This happens either through loudspeakers or through a vibration of structural elements of the vehicle. As such, AVAS is an important safety feature to address the problems created by silent cars.

### **5) What is the European Union doing about this?**

In April 2014, the European Union agreed on its Regulation 540/2014. It mandates all manufacturers to equip their electric and hybrid vehicles with an AVAS. By 1 July 2019, all new types of vehicles must have an AVAS. By 1 July 2021, all new vehicles regardless of their type must have an AVAS [[EU 540/2014, Art. 8](#)]. In practice, this means that all electric vehicles sold in or imported to the EU need to have an AVAS.

Annex VIII of Regulation 540/2014 specifies the technical details for AVAS solutions. This Annex was substantially amended and expanded in June 2017 through the Commission Delegated Regulation 2017/1576 [[EU 2017/1576](#)]. The European Commission is currently preparing another Delegated Regulation to ban the pause switch in Europe (see Point 11 below).

These Acts are directly binding for all Member States of the EU as well as Iceland, Norway and Liechtenstein. Switzerland is voluntarily adopting the same safety protocol for electric and hybrid vehicles.

## **6) What are the United Nations doing about this?**

In parallel, the United Nations Economic Commission on Europe (UNECE) started working on an international standard for AVAS. In October 2016, its World Forum for Harmonisation of Vehicle Regulations (WP29) adopted the UN Regulation 138, titled “Uniform Provisions Concerning the Approval of Quiet Road Transport Vehicles with Regard to their Reduced Audibility” [[UN R138](#)]. In November 2017, WP29 updated this standard to the current version of UN Regulation 138.01 [[UN R138.01](#)]. This standard, while not mandatory, gives guidance to vehicle manufacturers in Europe, Asia and North America.

## **7) Which vehicles will be equipped with an AVAS?**

The rules on AVAS apply to all electric and hybrid vehicles of the categories M and N, meaning all private and commercial vehicles for four and more wheels. Consequently, the AVAS rules apply to cars, transporters, busses and trucks [[EU 540/2014, Art 2](#); [UN R138.01, §1](#)].

## **8) When will AVAS be activated?**

AVAS will be activated if a car drives with a speed of up to 20km/h [[EU 2017/1576, Annex VIII, §II.2.a](#); [UN 138.01, §6.2](#)]. This applies also for backward movement [[EU 2017/1576, Annex VIII, §II.2.a](#); [UN 138.01, §6.2.2](#)]. It is hypothesised that for higher speeds the tyres and air generate a sufficient sound level. The vehicle may additionally emit a sound in stationary mode, i.e. when it is not moving, but this is not mandatory [[EU 2017/1576, Annex VIII, §III.3.a\(ii\)](#); [UN 138.01, §6.2.4](#)].

## **9) What kind of sound will AVAS make?**

The EU is clear that “the sound shall be similar to the sound of a vehicle of the same category equipped with an internal combustion engine” [[EU 2017/1576, Annex VIII, §III.3.a](#)]. Therefore, AVAS will neither make the “beep” sound commonly associated with warning sounds, nor any “spaceship” or “nature” sounds. Manufacturers can offer multiple sounds in the vehicle that drivers can then choose from [[UN 138.01, §6.2.5](#)].

Moreover, the sound generated by AVAS needs to be continuous and “shall be easily indicative of vehicle behaviour, for example, through the automatic variation of sound level or characteristics in synchronisation with vehicle speed” [[EU 2017/1576, Annex VIII, §III.3.a](#)]. This means in practice that most manufacturers will change the sound level and the pitch of the sound to indicate acceleration.

## 10) What are the sound levels for AVAS?

At speeds of 20 km/h, the minimum sound level for AVAS is 56 dB(A) [[EU 2017/1576, Annex VIII, §III.3.a\(i\)](#); [UN 138.01, §6.2.8](#)]. This is roughly equivalent to the noise of a fridge. The maximum sound level for AVAS is defined as the noise level of a conventional vehicle [[EU 2017/1576, Annex VIII, §III.3.c](#)] or alternatively of 75 dB(A) [[UN 138.01, §6.2.7](#)]. At speeds of less than 20km/h, the sound levels should be progressively lower [[UN 138.01, §6.2.8](#)]. Manufacturers appear to orient their AVAS towards these minimum values. This means that electric vehicles with AVAS solutions will not make streets louder than they are at the moment.

## 11) How is AVAS tested?

The EU defers to the UN regarding the conditions, under which compliance of AVAS with its rules is tested [[EU 2017/1576, Annex VIII, §III.4](#)]. The UN specifies, among other rules, that there should be no large elements or humans in a radius of 50m between the AVAS and the test microphone [[UN 138.01, Annex III, §2.1.2](#)]. The microphone is located at a height between 2cm and 120cm above ground level [[UN 138.01, Annex III, §3.1](#)]. Background noise is factored into the calculation [[UN 138.01, Annex III, §2.3](#)].

## 12) Are pause switches allowed in Europe?

The current version of the EU Regulation 540/2014 as updated by Delegated Regulation 2017/1576 allows a pause switch for drivers to disengage the AVAS [[EU 2017/1576, Annex VIII, §III.2.b](#)]. By default, AVAS needs to be switched on when starting the engine.

However, the UN Standard clearly bans the pause switch [[UN 138.01, §6.2.6](#)]. The European Commission is currently working on another Delegated Regulation to mandatorily ban the pause switch in Europe. This Delegated Regulation is expected to enter into force in 2019 and will

ban a pause switch from 2021 onwards. Already now, manufacturers in the EU should feel encouraged to follow the UN-Standard and leave out the pause switch.

### **13) Are there no vibration-based alternatives to AVAS?**

Throughout the campaign and until today, it has been suggested that there could be a vibration transponder for affected people to alert them of approaching cars through a specific device. The advantage of this system would be the absence of sound. However, there are two problems with this approach.

First, the human ear is a sophisticated and trained sense, which suitably indicates direction, distance and acceleration of a vehicle. Vibration cannot convey this information adequately. Second, not every affected person will always carry a specific device. Silent cars are a potential danger to all traffic participants. Vibration transponders are of no help to children, if they are carried only by blind and partially sighted persons.

### **14) What is the role of national governments?**

The EU Regulation is immediately applicable to all EU Member States. Therefore, national governments do not need to act on AVAS. However, they can play a role in retrofitting existing electric vehicles without AVAS. The Swedish industry analysts "EV-Volumes" estimates that there will be around 1.350.000 electric vehicles on the road in Europe by the end of 2018 [[Vaughan 2018](#)]. Only a tiny minority of these will be equipped with an AVAS. National governments can provide special funds to retrofit these vehicles with AVAS and make AVAS mandatory for electric and hybrid vehicles purchased with public funds. This might be particularly relevant for electric busses and transporters that were purchased with public subsidies or by public authorities.

### **15) Is EBU satisfied with the European rules?**

The agreement of a binding requirement for AVAS on a European level is a major achievement for EBU. However, EBU sees three areas for improvement in the EU legislation. The European Commission has to evaluate the rules in 2021 [[EU 540/2014, Art 11](#)]. EBU will advocate for targeted and evaluation-driven improvements in these three areas.

First, AVAS should be activated for speeds of up to 30km/h. In the United States, studies by the NTHSA have determined that AVAS has to be activated for speeds up to 18.6 mph (30km/h). Across Europe, 30km/h is a benchmark speed limit for many residential zones, in which the safety issues related to silent cars is particularly relevant.

Second, the minimum sound level of AVAS should be raised. Informal tests with members of the German Federation of the Blind and Partially Sighted in 2018 have shown that the minimum threshold is too low to ensure detection in most traffic situations, especially for persons of advanced age. While 56 dB(A) might be sufficiently audible in the unrealistic testing conditions prescribed by the UN, real-life traffic situations require a higher minimum sound level for AVAS.

Third, there should be a mandatory stationary sound. BPS persons need this input to be aware of vehicles that are about to start driving, especially in traffic situations or parking areas or residential zones. The rapid acceleration of electric vehicles compounds this issue further.