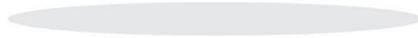
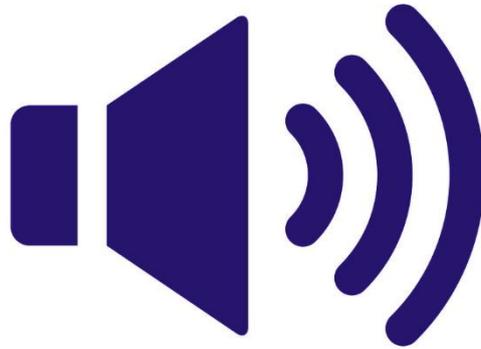




**ESPL/ESQL Judgebook
2018/2019**



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Welcome to the European Mobile Media Association

Preface

This manual is designed to describe the exact procedure, used for judging the ESPL and ESQJ of a vehicles audio system, according to EMMA Rules and regulations and will be continuously updated.

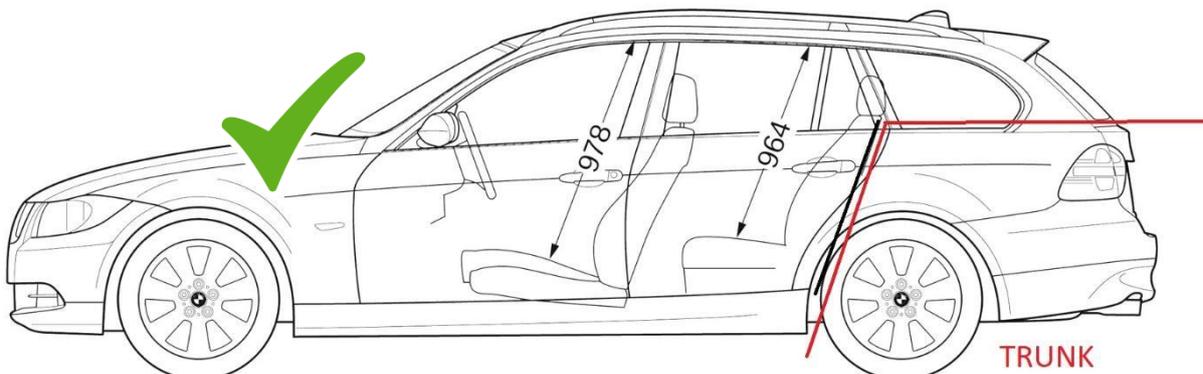
6.0 ESPL judging manual

6.0.1 How to correctly classify a car

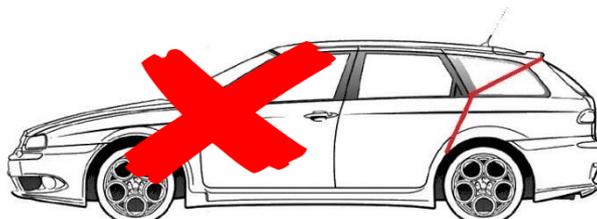
Competitors are always grouped together so that they are all on an equal playing field and should be able to challenge one another for the victories. This first check is always to see if they can meet the requirements for the Trunk class.

TRUNK:

- Trunk means that the subwoofers, enclosure and port must be in the trunk.
- This must NOT be higher than the original backseat without headrests, when the headrests are fixed to the backseat then you need common sense and count them as headrests and not as the backseat.
- The backseats must be able to be fixed in the upright position as specified by the Manufacturer. However, during the measurements, the backseats can be down or up, this is the decision of the competitor.
- All the sound producing equipment, including the power supply (e.g. battery's, capacitors, etc.) can be installed anywhere in the car, as long as it does not conflict with the normal use of vehicle.
- The backseats must be usable as seats in a way that was intended by the factory. (NO BATTERY'S ETC. IN THE FOOTROOM OR IN FRONT OF THE BACKSEAT)
- A Maximum of 14.6 Volts is allowed
- A maximum of 4 woofers is allowed.
- No fixed obstructions are allowed within in the door openings.
- The competitor can add sound dampening behind the OEM panels as long the OEM panels are fitted.



When checking to see if the enclosure is in the trunk you must use a line parallel to the ground, the example below although exaggerated is wrong.



Once we know if the competitor can meet the installation requirements for Trunk we then split this down into the 4 possible classes as per the breakdown below:

- ESPL Trunk 1000€
 - max. value of Subwoofers + Amplifiers = €1.000
 - no professionals, no judges/EMMA officials
 - only one battery in the OEM-location allowed
- ESPL Trunk- 1 Woofer
- ESPL Trunk- 2 Woofer
- ESPL Trunk- 4 Woofer

The number of woofers is based on the following matrix.

Subwoofer Matrix					
	Subwoofer size	Trunk 1 Woofer	Trunk 2 Woofers	Trunk 4 Woofers	B/R, Wall 16 Woofers
	6,5"	2	4	8	32
	8"	1	3	6	24
	10"	1	2	4	16
	12"	-	1	2	8
	15"	-	-	1	5
	18"	-	-	1	4
	21"	-	-	-	2
	33"	-	-	-	1

Explanation of woofer size:

Number of woofers	Size of woofer		Classification	Circumference (No longer than)
1x	25cm = 10"	Equals	1 woofer	78,5cm
1x	30cm = 12"	Equals	2 woofer	94,2cm
3x	20cm = 8"/6"x9"	Equals	2 woofer	62,8cm (per 8")
1x	38cm = 15"	Equals	3 woofers	119,3cm
1x	46cm = 18"	Equals	4 woofers	144,4cm

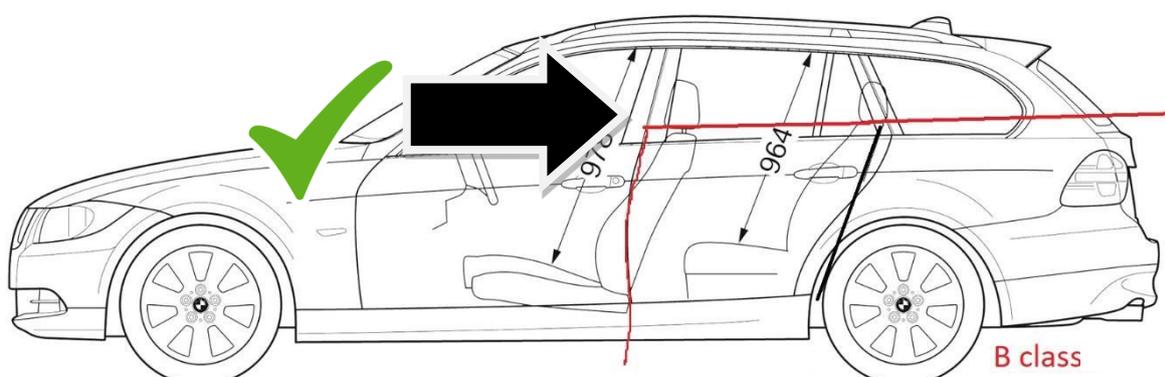
If the competitor cannot meet the criteria for the Trunk class then we look at B / R Unlimited.

B / R Unlimited

B / R Unlimited are grouped together as the size of the woofer enclosures would be comparable for the same car.

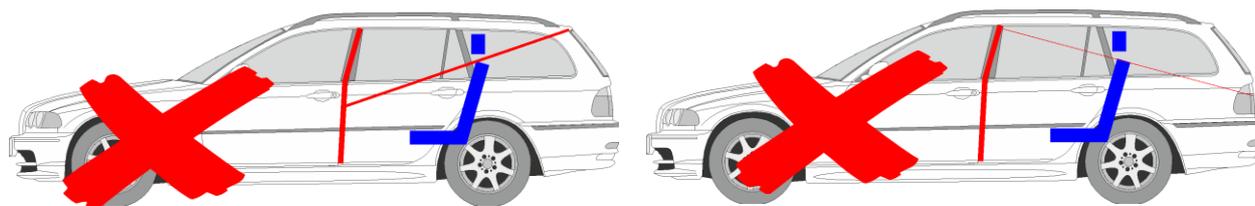
B Unlimited

- B means that the subwoofers, enclosure and port must be behind the (front) of the B-pillar and no higher than the original backseats without headrests.
- There is no specific point for measuring, just follow the line of the B-pillar.
- If the B-pillar has a curve, simply follow the curve as your measurement point.
- All the sound producing equipment including power supply (battery's, capacitors, etc.) can be installed anywhere in the car, so long as it does not affect the normal use of the car and passenger legroom rules ("Normal use of Vehicle").
- A Maximum of 14.6 Volts is allowed
- A maximum of 16 woofers is allowed.
- No fixed obstructions are allowed within in the door openings.
- The car need to be OEM looking from A to B pillar.
- Behind the panels you can add sound dampening and from B to C pillar it can be heavily damped.
- A stripper pole with a max diameter of 10 cm is allowed as long as it is not fixed to the enclosure.



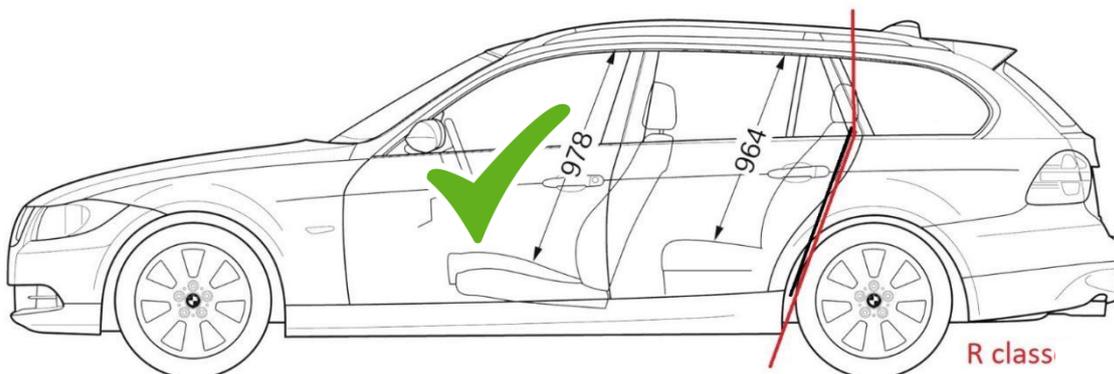
In the sketch the backseat is very high, just to give you an impression. As long as the backseat is original.

When checking to see if the enclosure is valid for B / R Unlimited you must use a line parallel to the ground as shown above, the two examples below although they are exaggerated are both wrong.

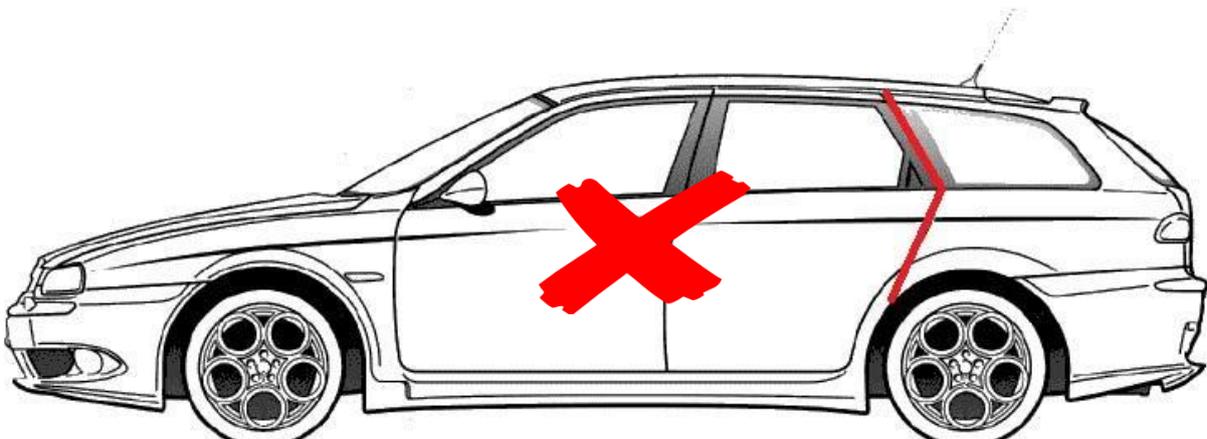


R Unlimited

- R means that the subwoofer, enclosure and port must be installed behind the back seats and can be installed up to the roof.
- The rear seat needs to be in the OEM locked position. If the OEM position has more one locked angle, then the competitor is free to use any position.
- All the sound producing equipment including power supply (battery's, capacitors, etc.) can be installed anywhere in the car, so long as it does not affect the normal use of the car and passenger legroom rules ("Normal use of Vehicle").
- From the top most point of the rear seat, the enclosure should form a vertical line and should NOT encroach onto the passenger cabin space.
- A Maximum of 14.6 Volts is allowed
- A maximum of 16 woofers is allowed.
- No fixed obstructions are allowed within in the door openings.
- The car need to be OEM looking from A to B pillar.
- Behind the panels you can add sound dampening and from B to C pillar it can be heavily damped.
- A stripper pole with a max diameter of 10 cm is allowed as long as it is not fixed to the enclosure.



The diagram below shows a car that would not be allowed in R as the enclosure encroaches on the passenger cabin.



The number of woofers for B and R Unlimited, both of which have a 16 woofer limit, is based on the following matrix:

Subwoofer Matrix					
	Subwoofer size	Trunk	Trunk	Trunk	B/R, Wall
		1 Woofer	2 Woofers	4 Woofers	16 Woofers
	6,5"	2	4	8	32
	8"	1	3	6	24
	10"	1	2	4	16
	12"	-	1	2	8
	15"	-	-	1	5
	18"	-	-	1	4
	21"	-	-	-	2
	33"	-	-	-	1

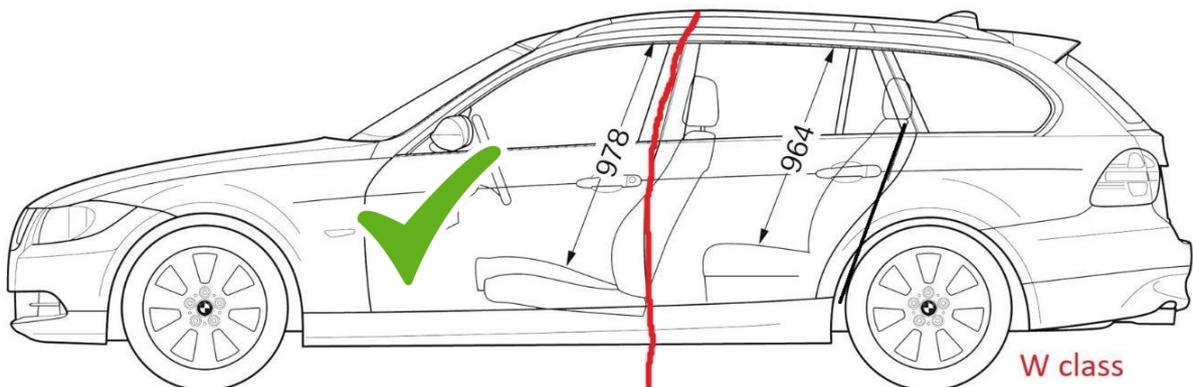
Explanation of woofer size:

Number of woofers	Size of woofer		Classification	Circumference (No longer than)
1x	25cm =10"	Equals	1 woofer	78,5cm
1x	30cm = 12"	Equals	2 woofer	94,2cm
3x	20cm = 8"/6"x9"	Equals	2 woofer	62,8cm (per 8")
1x	38cm =15"	Equals	3 woofers	119,3cm
1x	46cm =18"	Equals	4 woofers	144,4cm

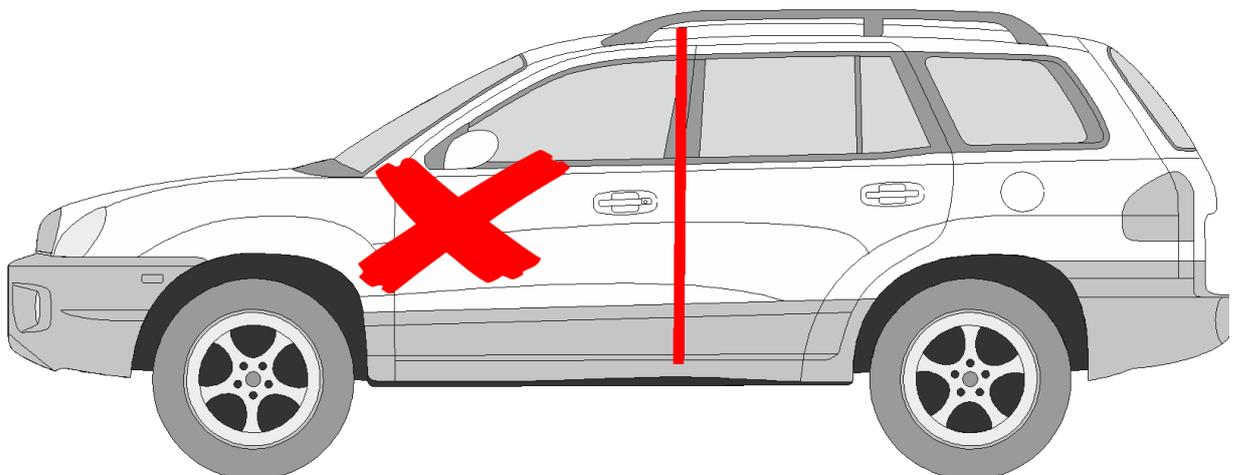
If a car cannot fit in B / R Unlimited we then check to see if it meets the criteria for W Unlimited or it will be placed in Expert.

W Unlimited

- W means that the subwoofers, enclosure and port must be installed behind the front of the B-pillar and can be up to the roof.
- There is no specific point for measuring, just follow the line of the B-pillar.
- If the B-pillar has a curve, simply follow the curve as your measurement point.
- All the sound producing equipment including power supply (battery's, capacitors, etc.) can be installed anywhere in the car, so long as it does not affect the normal use of the car and passenger legroom rules ("Normal use of Vehicle").
- The competitor is not allowed to remove the front seats.
- A maximum of 14.6 Volts is allowed.
- A maximum of 16 woofers is allowed.
- No fixed obstructions are allowed within in the door openings.
- A stripper pole with a max diameter of 10 cm is allowed as long as it is not fixed to the enclosure.
- The roof can be heavily damped as long as door panels, dash and floor look like OEM.



The diagram below shows a car that would not be allowed in W as they have not followed the line of the B pillar



The number of woofers for W Unlimited, which has a 16 woofer limit, is based on the following matrix. If a car cannot fit in W Unlimited, then it will need to compete in Expert.

Subwoofer Matrix					
	Subwoofer size	Trunk	Trunk	Trunk	B/R, Wall
		1 Woofer	2 Woofers	4 Woofers	16 Woofers
	6,5"	2	4	8	32
	8"	1	3	6	24
	10"	1	2	4	16
	12"	-	1	2	8
	15"	-	-	1	5
	18"	-	-	1	4
	21"	-	-	-	2
	33"	-	-	-	1

Explanation of woofer size:

Number of woofers	Size of woofer		Classification	Circumference (No longer than)
1x	25cm =10"	Equals	1 woofer	78,5cm
1x	30cm = 12"	Equals	2 woofer	94,2cm
3x	20cm = 8"/6"x9"	Equals	2 woofer	62,8cm (per 8")
1x	38cm =15"	Equals	3 woofers	119,3cm
1x	46cm =18"	Equals	4 woofers	144,4cm

Expert

- In Expert you are free to build anything within the car as long as there are No fixed obstructions within in the door openings.

6.0.2 What is a stripper pole

All classes except Trunk are allowed the use of a stripper pole. A stripper pole is a pole (with a max diameter of 10cm) which can be used in order to reduce the flexing of the car body by bracing between the floor and the roof. This pole should not be connected to the enclosure as per the example below.

If a vehicle has a strut brace larger than 10cm or it is fitted to the enclosure, it can be removed by the competitor or the competitor is moved to Expert.



6.1 Installation

Once the Competitor is assigned to the correct class, the install judging can take place. The installation judging procedure follows the standard EMMA installation judging process in accordance with the matrix below.

Matrix ESPL => ESPL T 1000€ has now simplified rules:			
	T 1000€	T1-4 / R / B / W	Expert
	60+	112+	122+
Measurement with open doors			
Measurement with closed doors			
Install Max. points	60	112	122
Presentation to the public	10	10	10
Cleanliness	6	6	6
Main fuse(s) present y/n	10	10	10
Are all wires to the components fused?		15	15
Is the fuse value appropriate to the wire size?		20	20
Any interior wires visible?		5	5
Are all components securely mounted?	24	24	24
Does the vehicle allow a normal use?		6	6
Visibility		6	6
First Optic impression	10	10	10
Overall design of vehicle			10

Presentation to the public

The competitor should:

- 'Show off' their vehicle & installation to the public during the event time/s.
- Allow spectators to listen to the system.
- Please note: This will be checked several times a day
- If it is an outdoor event and the weather is poor, the car can be closed but system details should still be visible. (E.g. displayed on the dashboard etc.)
- Exception: at the event active judges / back office staff's cars can remain closed due to safety reasons.

Points will be deducted as appropriate, i.e. commensurate to the time the car is not being shown to the public.

Cleanliness

Cars should be clean and presentable, the Car exterior should be "car-wash-clean" and interior should be vacuumed (not perfect but reasonably clean). The criteria you should check against are as follows:

- Car Wash clean y/n
- Passenger compartment clean y/n

- Dedicated components (e.g. Batteries or fuse holders etc) of the system installed in the engine component and trunk clean y/n
- No items i.e.: clothing, tools, and food wrappers on display?

Deduct 2 points per not cleaned area, Minimum 0 Points

Main Fuse present y/n

Check if a 'Main Fuse' has been installed onto the (or each) main power wire within 40cm from any positive battery post and/or before passing any metal panel. This should include all wires from the battery post.

Any permanent wires installed into the car for battery charging even if they are not in use shall also be judged for fusing.

NOTE: If more than one battery is installed, each battery needs a main fuse from its battery post. If batteries are joined to each other within 40cm of each battery post, it will be considered as one big battery. At this point the fuse rating is not checked.

If any main fuse is not present, 0 points will be awarded

Are all wires to the components fused

Check, if a fuse is installed on the positive power wire for every component belonging to the audio/multi-media system.

All fuses connected to the components must be visible within three minutes (for all fuses in total, not three minutes for every fuse!!!). The judge should check to ensure the following components are fused:

- Head Unit
- Other devices
- Amplifiers

Deduct 2 points per component that is NOT fused or whose fuse is not visible within the 3 minutes. Minimum 0 Points

NOTE: The fuse rating is not checked at this point.

Fuse of appropriate value

Check every fuse that belongs to the audio system is of an appropriate size for the wire it is protecting (according to the VW75212 - Dimensionierung von Leitungen und Sicherungen im Kraftfahrzeug):

When checking the fuse rating this should be appropriate for the smallest size cable in the circuit used to power the component, Positive or Negative, according to the table below:

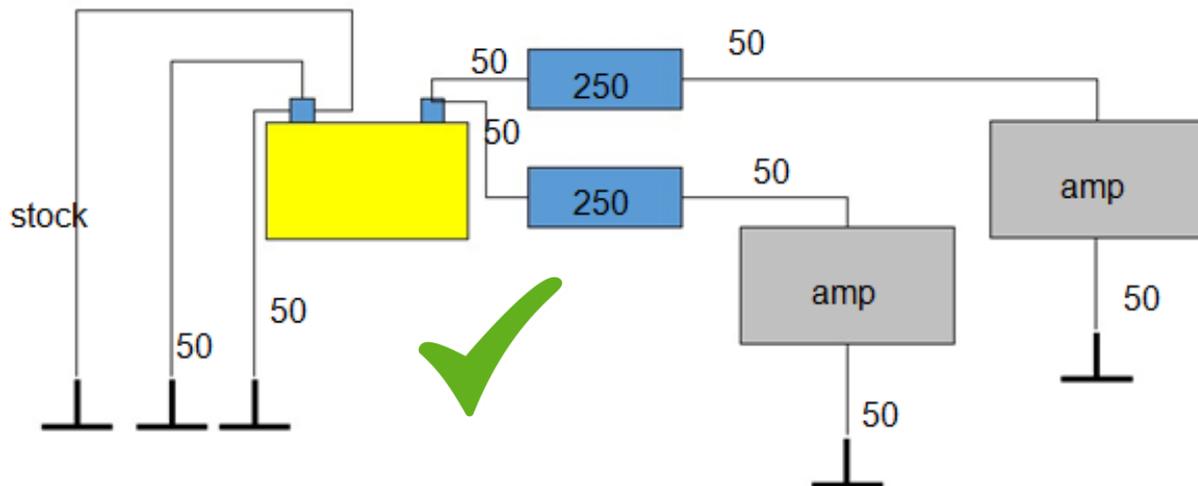
NOTE: Fuse rating is based on mm², the AWG sizes are just for reference.

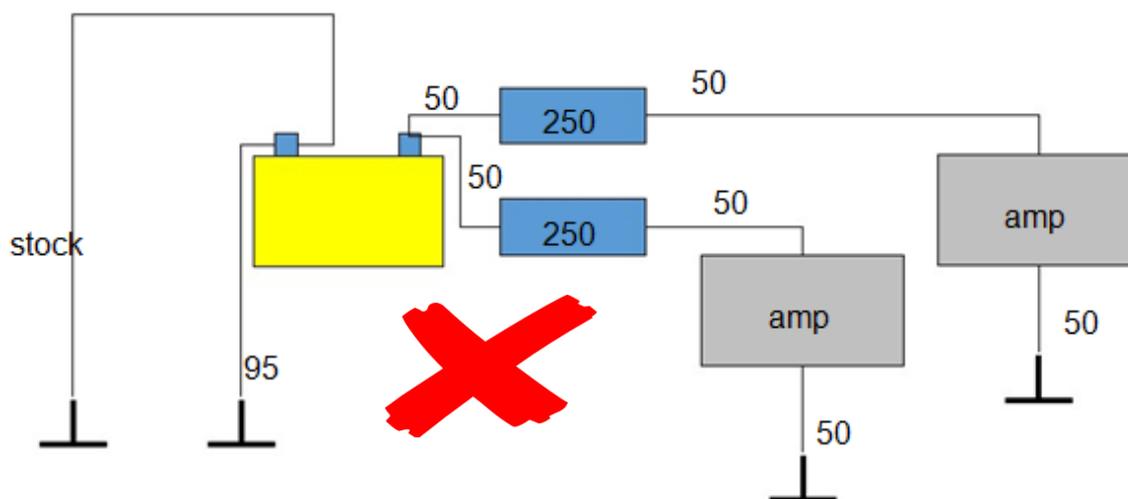
Fuse Size Matrix			
	Cable size	AWG	Fuse Rating
	0,5mm ²	20	10 Ampere
	1,0mm ²	17	15 Ampere
	1,5mm ²	15	20 Ampere
	2,5mm ²	13	20 Ampere
	4,0mm ²	11	30 Ampere
	6,0mm ²	9	50 Ampere
	10mm ²	7	60 Ampere
	16mm ²	5	100 Ampere
	25mm ²	4	125 Ampere
	35mm ²	2	175 Ampere
	50mm ²	0	250 Ampere
	70mm ²	2/0	300 Ampere

Alternatively, wire sizes and fuse ratings can be calculated with the formulas in the “**How to calculate wire sizes**” section below. If the competitor chooses to use a fuse rating for a cable not shown in the standard table above, the calculations must be documented and provided to the judges for checking.

NOTE: All of these fuses should be visible within three minutes, not three minutes per fuse.

Deduct 2 points per incorrect or NOT fused component, minimum 0 Points





**NOTE FOR COMPETITORS:
How to calculate wire sizes**

How to check, if the wire size is appropriate (e.g. IF the OEM ground cable is not upgraded):

Calculate wire size:

$$A = (I \times 0,0175 \times L \times 2) / (fk \times U)$$

A= wire size in sqmm

I = max amperage

0,0175 specific resistance of OFC copper in Ohm x mm² / m (for CCAW the factor must be 0,0283)

L = cable length (of entire circuit including positive & ground wire) in m

fk = factor of loss, E.g.: 2%, is 0,02

U = voltage

Factor of loss should be no higher than 2%

If the calculated wire size is not available, step up to next available wire size

Important info:

In case CCAW-cable is used, there must be 1,6x more sqmm or it can handle 0,625x the current of OFC-cable. It is assumed that the OEM-ground wire is OFC.

Competitor/installer needs to calculate the appropriate wire sizes for his installation and document it to the judges.

If the calculation is not available for the judges, the published table for wire sizes and fuse values will be used for judging

Formula changed to I do determine capability of a given ofc cable:

$$I = (A \times fk \times U) / (0,0175 \times L \times 2)$$

Guidance for cars equipped with Intelligent Battery Sensor (IBS) / Smart Charge Alternator / Stop Start Technology.

When a vehicle has a sensor on the OEM Chassis ground wire to the battery, all current must pass through the sensor to maintain a fully functioning Intelligent Battery System. E.g. "Stop/start" technology.

It is up to the competitor to design and install the audio system to the current rulebook.

EMMA is aware of two ways to maintain the function of the (IBS) sensor and comply with the rulebook, (there may be more):

1. Fuse the main power cable for the audio system to the maximum value the OEM Ground wire would allow (using the calculations above).
2. Add an extra (appropriate size) ground wire from the IBS sensor to the chassis or audio system.

If in doubt, please consult your vehicle manufacturer for further advice.

Interior wires invisible

Check if any wires of the audio system installation are visible. This is judged from 'the drivers seating position'. This should be done with the doors closed.

- Any cables behind the B pillars are not judged.
- Cables under the dash should not be judged unless these are visible whilst sitting on the drivers' seat.

NOTE: Mobile devices such as smartphones that are connected by a cable to a connector on the HU/Car AND the device itself will be operated at the head unit, the mobile device is treated as a storage device and no attention will be given to this cable.

If the mobile device is used to operate the system (e.g. to change the track would be enough), there should be no wire visible (however the connector being visible is ok)!

Hint: This could also mean that the device does not need be fixed / installed - because it streams...

Deduct 2 points for any visible system wire, Minimum 0 Points



All components securely mounted

Check all components by physical inspection to ensure they are fixed. Each component (shown below) should be checked to ensure they are secure. The security of the component should be proportionate with its size and weight. An 18" sub will need more securing than a tweeter would.

The judges should look for:

- Head Unit (if it is outside the car , it must be fixed)
- Other devices
- Amplifiers
- Speakers

NOTE: If any of the above items are not installed then no deduction will take place.

Deduct 2 points per not fixed component, minimum 0 Points

Does the vehicle allow a normal use.

EMMA is allowing modifications to the vehicles interior (except in OEM) to install audio components. The driver/ passenger should be able to sit comfortably and be able to operate the controls of the car without obstruction (look for sub/speakers up front or too high raised floor).

As the OEM designers have given the most safety and comfort in the limited available space of the passenger cabin, EMMA will use the OEM surfaces as references.

The passenger foot room must not be smaller than the OEM foot room on the driver side between seat and pedals.

Judging will be done in the regular driving position of the vehicles operator.

The Judge should check that the space deemed necessary, to correctly operate the car, by the manufacturer has not been encroached upon and that this same amount of space is available for the front seat passenger.

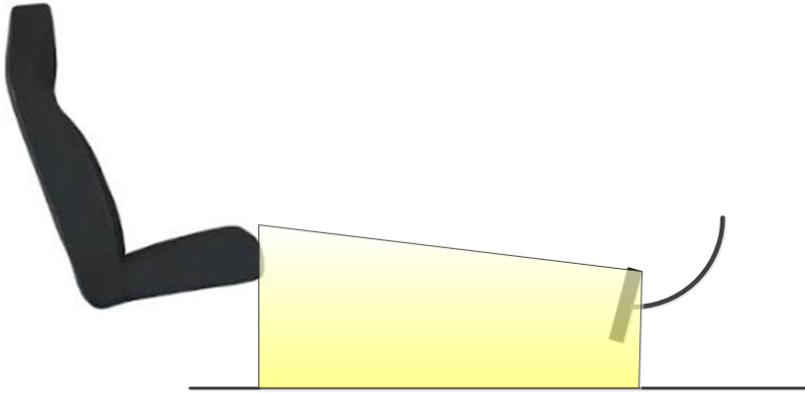
When checking this space the two front seats should be parallel so as to ensure the same space is available. To ensure the same space is available you should check the height width and depth as illustrated below.



There are three things to check for height.

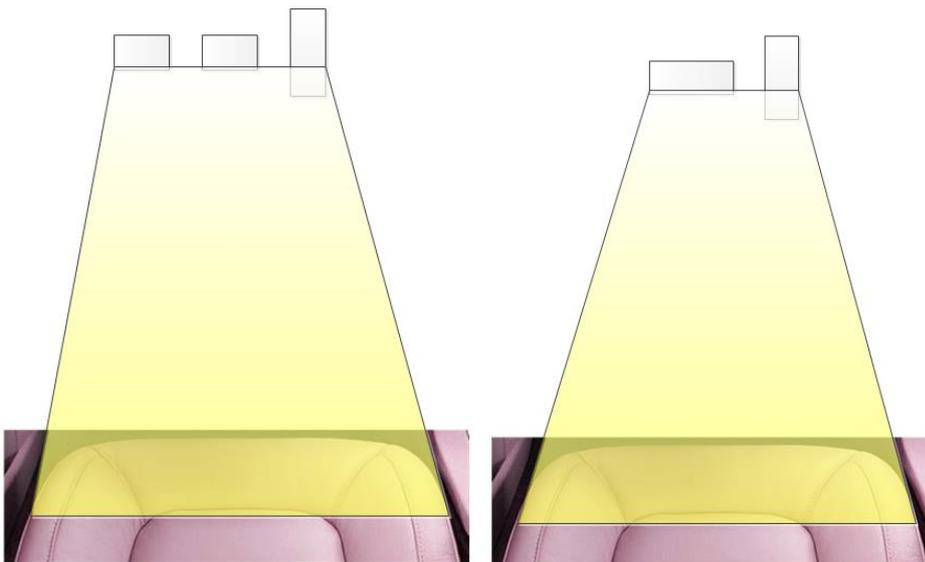
1. The height from the floor to the top of the seat
2. The height from the floor to the top of the uppermost pedal
3. An unrestricted line should be able to be drawn between both of vertical lines.

Note: If the floor of the passenger side has been raised (to a MAX of 4 CM) then these heights need to be maintained.



When checking the width you should ensure the following:

- Width from left most to right most peddle is maintained.
- When checking the left and right most peddle these should include all of the following (if fitted)
 - Accelerator
 - Brake
 - Clutch
- The width of the seat is maintained
- An unrestricted line should be able to be drawn between both of width lines as below.



Note: The width at the pedals could move one way or the other but this width must be maintained and a straight line from the side of the seat to each side of the foot well needs to be maintained.

Deduct 2 points per element that is restricting the OEM standards. Maximum -6 Points

First Optic impression

Check all components to ensure they create the impression of "a finished installation" and not an "under construction" impression. You will need to look at the following items:

- Head Unit
- Other devices
- Amplifiers
- Speakers / Speaker enclosures
- Cover and trim panels.

Deduct 1 point per "under construction" component, Minimum 0 Points

Overall design of car

To score full points, the car itself and the components installed in it must show a design theme that was followed throughout the car; inside, outside and to the trunk compartment. It should be immediately clear that the car was designed as a project from beginning to end, with a clear statement to the judges and the viewers.

The kind of design theme is of no matter; but the competitor should be aware that an original looking car will not able to score any points on the areas where no effort for design was taken.

Deduct 1 point per element not following the design idea, Minimum 0 Points

6.2 Measurement

The measurement will be taken using the ESPL tracks on the official EMMA disc.

The competitor is allowed to start the track wherever he wants to, for example he wants to start at 1.32 from the start of the track chosen for your competition day this is allowed.

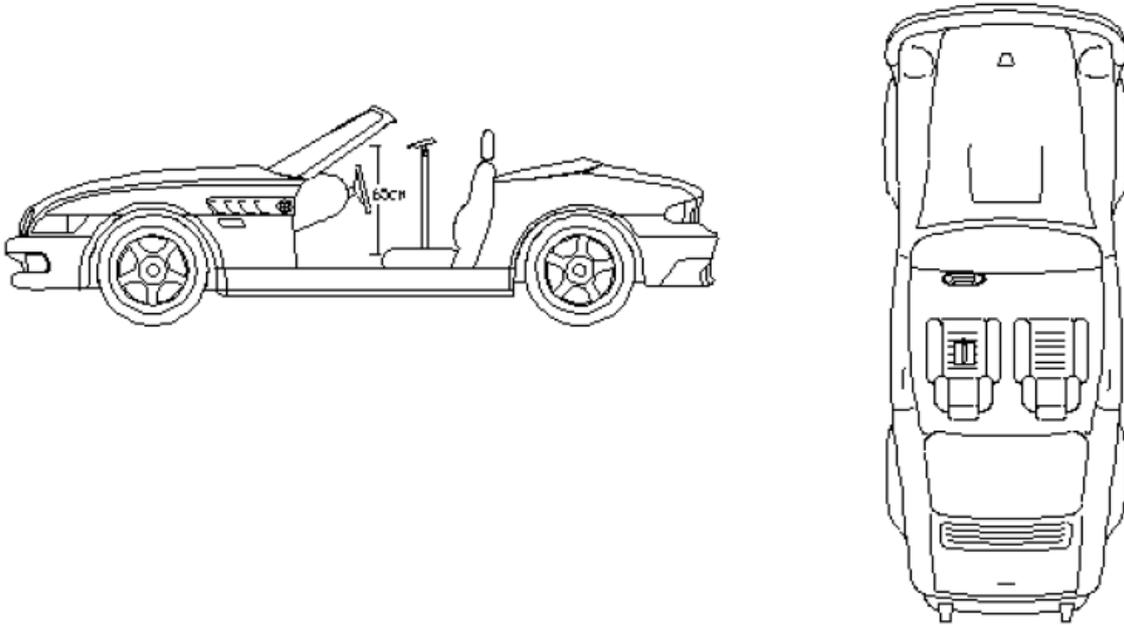
The competitor himself needs to prove it is the normal driving position and is only allowed One helper.

It's not allowed to skip front or back in the track during the measurement, once you start to play the track you should allow it to play uninterrupted.

All the competitors will be playing the same track during the competition.

6.2.1 How to place the sensor in the car.

The Sensor Mount, as shown in section 6.2.2, should be placed on the driver's seat base pushed as far back as possible. This is to emulate as closely as possible the position of the driver's head.



With the sensor in place, two measurements will be taken as follows:

- Measurement with the doors open will be measured as the average of 30 sec.
- Measurement with the door closed will be measured as the peak.

If the competition takes place outdoors, the engine can be running during the measuring but must not exceed 2000 RPM.

6.2.2 SPL Sensor Stand.



The winners

The Competitor with the highest total points wins. In case of a tie, it will be decided in order by:

- Total SPL score WINS. If still a tie
- Highest Score of Open door measurement WINS.

8.0 ESQL judging manual

The ESQL competition format was formed by EMMA Philippines and EMMA Thailand to open a competition arena for those who enjoy listening to good sound quality outside their cars. The competition consists of an SPL measurement with open doors like in EMMA ESPL and will be measured in 30 sec.

Installation judging is also required but with less degree than ESPL and as well as sound quality judging outside the car. The Sound Quality judging contains Tonal Accuracy and Spectral Balance according to the EMMA SQ requirements. In addition, the Listening Pleasure will also be judged but with a track chosen by the competitor.

8.0.1 Class and Categories

1. ESQL Limited
2. ESQL Unlimited

The rules for classification are identical to ESPL, described in the official EMMA Rulebook. On a National level or with the agreement of EMMA headquarters the ESQL Categories can be divided and extended along the lines of the ESPL Categories and Classes (T-1W, T-2W, T-4W, T-Unlimited, B/R-Unlimited, W- Unlimited).

8.0.2 Tracks used for competition

1. The EMMA ESPL CD Track will be used for the SPL section and will be decided at the beginning of the competition day or earlier. (Except for the Grand Final where the tracks to be used will be announced at least 1 week before the competition day).
2. Use at least EMMA SQ CD track 6 for Tonal accuracy score and for Spectral balance. Track 8 can be used additionally as an option.
3. An extra Musical track will be used for Listening Pleasure scoring and public enjoyment. The Competitor is allowed to choose any musical track, but this musical track must be in good taste. It must not be lewd or have suggestive lyrics. The Competitor can provide a performance to the crowd whilst this extra track is being played if they so wish. The length of the extra track/performance is limited to 5 minutes unless otherwise announced prior to the start of the judging process.
4. This extra Musical track will receive scores for Listening pleasure and also for Public enjoyment up to a total of 6 points. The competitor may earn max of 2 points for originality, 2 points for effects and coordination, 2 points for overall effort.

8.1 SPL Judging

The SPL readings are taken just as they are for ESPL. Both doors must be completely open and only one helper / blocker is allowed.

If the competition takes place outdoors, the engine can be running during the measuring but must not exceed 2000 RPM.

The Microphone or sensor will be placed by the judges as per the process laid out in section 6.2.1 of this book, and must be certain that it is facing to the middle of the car. The Competitor is not allowed to touch it.

The Voltage should be checked at the amplifiers before starting the measurement and should not be higher than 14.6V except in unlimited class.

Some SPL readings can be capped as per the table below:

ESQL Limited (T-1W, T-2W, T-4W if divided)	135 dB
ESQL Unlimited (T-Unlimited, B/R- Unlimited, W- Unlimited if divided)	145 dB

8.2 Installation

The Competitor will show the judge their installation of the Car Media system. The judge will score as per the normal installation process, covering the install sections below, and will explain immediately the scores to the competitor.

Matrix ESQL	L	U
Install Total	106	106
Presentation to the public	10	10
Cleanliness	6	6
Main fuse(s) present y/n	10	10
Are all wires to the components fused?	15	15
Is the fuse value appropriate to the wire size?	20	20
Any interior wires visible?	5	5
Are all components securely mounted?	24	24
Does the vehicle allow a normal use?	6	6
First Optic impression	10	10

Presentation to the public

The competitor should:

- 'Show off' their vehicle & installation to the public during the event time/s.
- Allow spectators to listen to the system.
- Please note: This will be checked several times a day
- If it is an outdoor event and the weather is poor, the car can be closed but system details should still be visible. (E.g. displayed on the dashboard etc.)
- Exception: at the event active judges / back office staff's cars can remain closed due to safety reasons.

Points will be deducted as appropriate, i.e. commensurate to the time the car is not being shown to the public.

Cleanliness

Cars should be clean and presentable, the Car exterior should be "car-wash-clean" and interior should be vacuumed (not perfect but reasonably clean). The criteria you should check against are as follows:

- Car Wash clean y/n
- Passenger compartment clean y/n
- Dedicated components (e.g. Batteries or fuse holders etc) of the system installed in the engine component and trunk clean y/n
- No items i.e.: clothing, tools, and food wrappers on display?

Deduct 2 points per not cleaned area, Minimum 0 Points

Main Fuse present y/n

Check if a 'Main Fuse' has been installed onto the (or each) main power wire within 40cm from any positive battery post and/or before passing any metal panel. This should include all wires from the battery post.

Any permanent wires installed into the car for battery charging even if they are not in use shall also be judged for fusing.

NOTE: If more than one battery is installed, each battery needs a main fuse from its battery post. If batteries are joined to each other within 40cm of each battery post, it will be considered as one big battery. At this point the fuse rating is not checked.

If any main fuse is not present, 0 points will be awarded

Are all wires to the components fused

Check, if a fuse is installed on the positive power wire for every component belonging to the audio/multi-media system.

All fuses connected to the components must be visible within three minutes (for all fuses in total, not three minutes for every fuse!!!). The judge should check to ensure the following components are fused:

- Head Unit
- Other devices
- Amplifiers

Deduct 2 points per component that is NOT fused or whose fuse is not visible within the 3 minutes. Minimum 0 Points

NOTE: The fuse rating is not checked at this point.

Fuse of appropriate value

Check every fuse that belongs to the audio system is of an appropriate size for the wire it is protecting (according to the VW75212 - Dimensionierung von Leitungen und Sicherungen im Kraftfahrzeug):

When checking the fuse rating this should be appropriate for the smallest size cable in the circuit used to power the component, Positive or Negative, according to the table below:

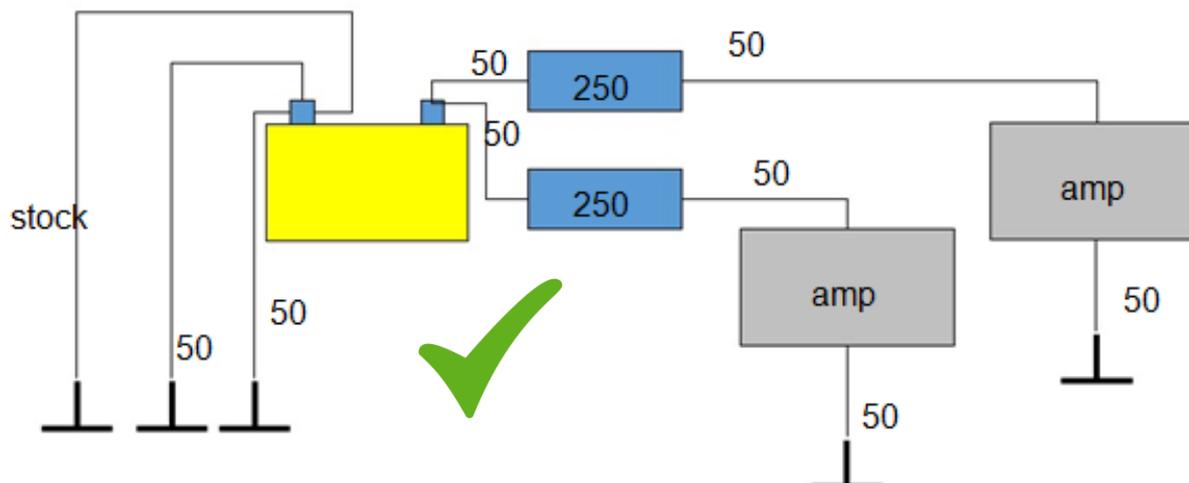
NOTE: Fuse rating is based on mm² the AWG sizes are just for reference.

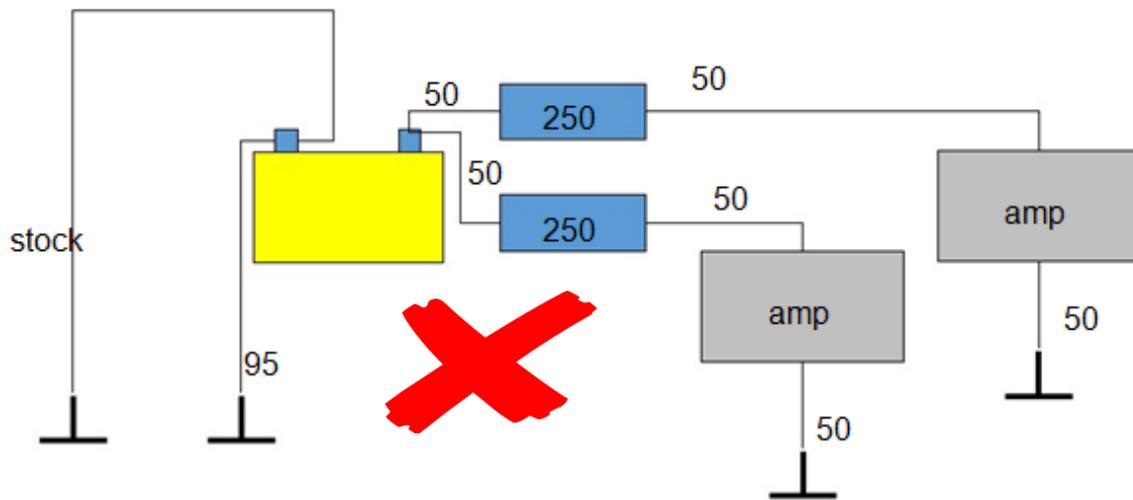
Fuse Size Matrix			
	Cable size	AWG	Fuse Rating
	0,5mm ²	20	10 Ampere
	1,0mm ²	17	15 Ampere
	1,5mm ²	15	20 Ampere
	2,5mm ²	13	20 Ampere
	4,0mm ²	11	30 Ampere
	6,0mm ²	9	50 Ampere
	10mm ²	7	60 Ampere
	16mm ²	5	100 Ampere
	25mm ²	4	125 Ampere
	35mm ²	2	175 Ampere
	50mm ²	0	250 Ampere
	70mm ²	2/0	300 Ampere

Alternatively, wire sizes and fuse ratings can be calculated with the formulas in the “**How to calculate wire sizes**” section below. If the competitor chooses to use a fuse rating for a cable not shown in the standard table above, the calculations must be documented and provided to the judges for checking.

NOTE: All of these fuses should be visible within three minutes, not three minutes per fuse.

Deduct 2 points per incorrect or NOT fused component, minimum 0 Points





**NOTE FOR COMPETITORS:
How to calculate wire sizes**

How to check, if the wire size is appropriate (e.g. IF the OEM ground cable is not upgraded):

Calculate wire size:

$$A = (I \times 0,0175 \times L \times 2) / (fk \times U)$$

A= wire size in sqmm

I = max amperage

0,0175 specific resistance of OFC copper in Ohm x mm² / m (for CCAW the factor must be 0,0283)

L = cable length (of entire circuit including positive & ground wire) in m

fk = factor of loss, E.g.: 2%, is 0,02

U = voltage

Factor of loss should be no higher than 2%

If the calculated wire size is not available, step up to next available wire size

Important info:

In case CCAW-cable is used, there must be 1,6x more sqmm or it can handle 0,625x the current of OFC-cable. It is assumed that the OEM-ground wire is OFC.

Competitor/installer needs to calculate the appropriate wire sizes for his installation and document it to the judges.

If the calculation is not available for the judges, the published table for wire sizes and fuse values will be used for judging

Formula changed to I do determine capability of a given ofc cable:

$$I = (A \times fk \times U) / (0,0175 \times L \times 2)$$

Guidance for cars equipped with Intelligent Battery Sensor (IBS) / Smart Charge Alternator / Stop Start Technology.

When a vehicle has a sensor on the OEM Chassis ground wire to the battery, all current must pass through the sensor to maintain a fully functioning Intelligent Battery System. E.g. "Stop/start" technology.

It is up to the competitor to design and install the audio system to the current rulebook.

EMMA is aware of two ways to maintain the function of the (IBS) sensor and comply with the rulebook, (there may be more):

1. Fuse the main power cable for the audio system to the maximum value the OEM Ground wire would allow (using the calculations above).
2. Add an extra (appropriate size) ground wire from the IBS sensor to the chassis or audio system.

If in doubt, please consult your vehicle manufacturer for further advice.

Interior wires invisible

Check if any wires of the audio system installation are visible. This is judged from 'the drivers seating position'. This should be done with the doors closed.

- Any cables behind the B pillars are not judged.
- Cables under the dash should not be judged unless these are visible whilst sitting on the drivers' seat.

NOTE: Mobile devices such as smartphones that are connected by a cable to a connector on the HU/Car AND the device itself will be operated at the head unit, the mobile device is treated as a storage device and no attention will be given to this cable. If the mobile device is used to operate the system (e.g. to change the track would be enough), there should be no wire visible (however the connector being visible is ok)!

Hint: This could also mean that the device does not need be fixed / installed - because it streams...

Deduct 2 points for any visible system wire, Minimum 0 Points





All components securely mounted

Check all components by physical inspection to ensure they are fixed. Each component (shown below) should be checked to ensure they are secure. The security of the component should be proportionate with its size and weight. An 18" sub will need more securing than a tweeter would.

The judges should look for:

- Head Unit (if outside the car, must be fixed)
- Other devices
- Amplifiers
- Speakers

NOTE: If any of the above items are not installed then no deduction will take place.

Deduct 2 points per not fixed component, minimum 0 Points

Does the vehicle allow a normal use?

EMMA is allowing modifications to the vehicles interior (except in OEM) to install audio components. The driver/ passenger should be able to sit comfortably and be able to operate the controls of the car without obstruction (look for sub/speakers up front or too high raised floor).

As the OEM designers have given the most safety and comfort in the limited available space of the passenger cabin, EMMA will use the OEM surfaces as references.

The passenger foot room must not be smaller than the OEM foot room on the driver side between seat and pedals.

Judging will be done in the regular driving position of the vehicles operator.

The Judge should check that the space deemed necessary, to correctly operate the car, by the manufacturer has not been encroached upon and that this same amount of space is available for the front seat passenger.

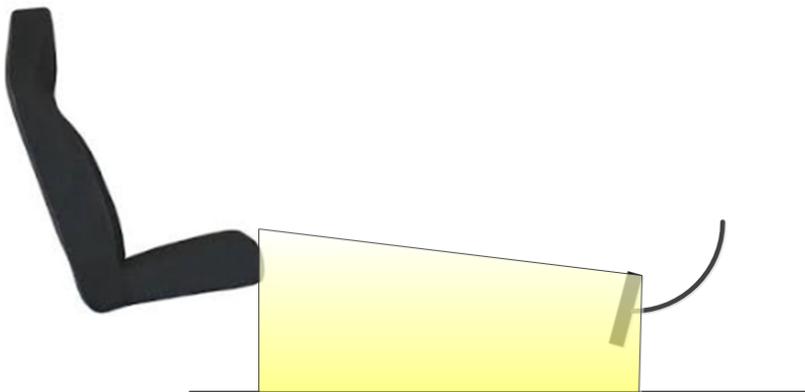
When checking this space the two front seats should be parallel so as to ensure the same space is available. To ensure the same space is available you should check the height width and depth as illustrated below.



There are three things to check for height.

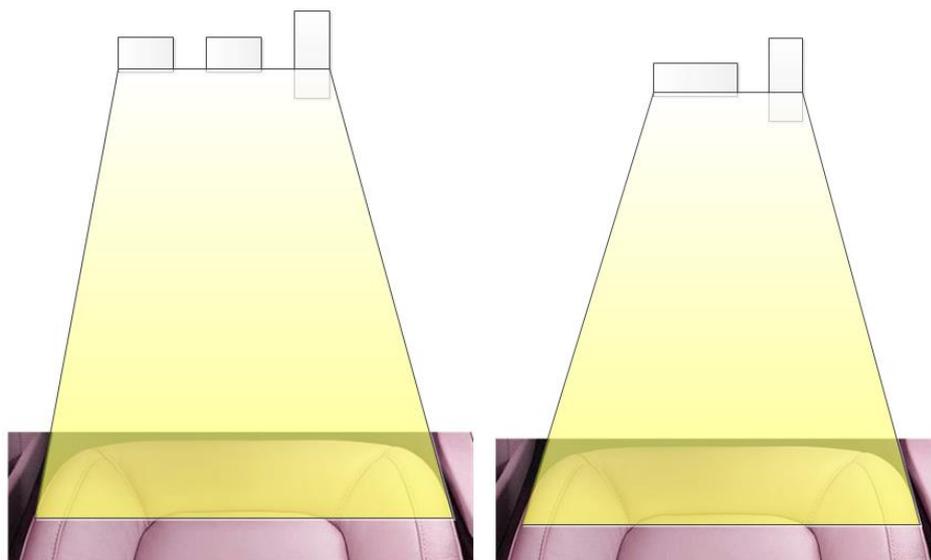
1. The height from the floor to the top of the seat
2. The height from the floor to the top of the uppermost pedal
3. An unrestricted line should be able to be drawn between both of vertical lines.

Note: If the floor of the passenger side has been raised (to a MAX of 4 CM) then these heights need to be maintained.



When checking the width you should ensure the following:

- Width from left most to right most peddle is maintained.
- When checking the left and right most peddle these should include all of the following (if fitted)
 - Accelerator
 - Brake
 - Clutch
- The width of the seat is maintained
- An unrestricted line should be able to be drawn between both of width lines as below.



Note: The width at the pedals could move one way or the other but this width must be maintained and a straight line from the side of the seat to each side of the foot well needs to be maintained.

Deduct 2 points per element that is restricting the OEM standards Maximum -6 Points

First Optic impression

Check all components to ensure they create the impression of "a finished installation" and not an "under construction" impression. You will need to look at the following items:

- Head Unit
- Other devices
- Amplifiers
- Speakers / Speaker enclosures
- Cover and trim panels.

Deduct 1 point per "under construction" component, Minimum 0 Points

8.3 SQ Judging

The judge will score as per the normal SQ judging process, covering the SQ sections below. This will however NOT be done from the driver's seat. In ESQL the position of the judges is set as per section 8.3.1.

Matrix ESQL	L	U
Sub-Bass	30	30
Mid-Bass	30	30
Midrange	30	30
High Freq.	30	30
Overall spectral balance	30	30
Listening pleasure	30	30
Bonus for enjoyment to public	6	6

Judge Tonal Accuracy by using track 6

Every instrument & voice should sound very natural & distinct, without affecting the sound of another.

GENERAL THINGS ABOUT RECORDINGS

The Bass Drum, the Bass and the Lead Vocals of all tracks are mostly at center position. The Bass Drum is always behind the Bass.

Bass Drum has a quite big focus; Double Bass has bigger focus in lower tones, but smaller size & more precise focus on higher tones.

Electric Bass is about the same size with bass drum on low tones, & has more focus on higher tones.

When Bass Drum sounds, Bass sounds at the same time. You should be able to distinguish these 2 different sounds very clearly & easily.

Train your ears: Focus on the Bass Drum alone. Focus on the Double Bass alone.

Now focus on both of them.

The Lead Vocals are in front

Track 6: Gigi

General Track for tonal accuracy and spectral balance

Use the general rules for Tonal Accuracy

This track is good for scoring the sub-woofer, but also the complete soundrange (e.g. ESQL)

The female voice is recorded in a separate room to avoid the instruments interfering with her studio microphone. The singer moves a lot (no live recording possible). There were some overdubbing applied on the vocals. The voice was dynamic and dirty so that the fader had to be used constantly to level match.

Little compression was used on her voice and the double bass to avoid being boomy, besides that the instruments are as linear as possible.

Listen to double bass, Jazz Bass drum, the female voice with many tone variation.

Generally it is a good sounding recording, nothing stands out

Track 8: Night & Days (Optional)

This is good for scoring the Midrange and the Highs.

Live recording, that's also why the tempo changes.

The voice is constant. The guitar sounds brilliant and has some EQ to prevent boominess. The same tambourine as in previous tracks is used but it sounds different because it was laying on the floor stomped with the feet like a one man band. The tambourine has no separate microphone and is recorded from the vocal- and the stereo-guitarmicrophone (because those are the fundamental frequencies of this recording), Because of that, it is constantly changing position and is not perfect to locate..

The guitar sounds out of tune at 10''.

No frequency stands out.

Acoustic guitar in the center

Male voice is in the center, but a little higher than the guitar

Tambourine is not exact to locate.

The room information contains less decay than the recordings in the big recording room.

Tonal accuracy (0 - 120 points)

Sub-bass - Section 1 10 to 60 Hz (0 - 15 points) **Section 2** 30-100hz (0-15 points)

Instruments: Double Brass, Tuba, Trombone, French Horn, Woodwinds, Electric Bass, Bass Clarinet, Contrabass, , Bass Violin, Cello, Harp, Big Drums, Piano, Organ, Viola, Harp

Mid bass - 60 to 200 Hz (0 - 30 points)

Instruments: Voices, Bass, Brass, Tuba, Trombone, French Horn, Trumpet, Woodwinds, Clarinet, Oboe, English Horn, Alto Sax, Bass, Bass Clarinet, Contrabass, Tympani, Bass Violin, Cello, Guitar, Viola, Violin, Harp, Piano, Organ, tambourine, Drums, Floor Tom, Harp

Midrange - 200 to 3000 Hz (0 - 30 points)

Instruments : Voices, Bass, Brass, Tuba, Trombone, French Horn, Trumpet, Woodwinds, Flute, Clarinet, Oboe, English Horn, Alto Saxophone, Bass, Strings, Cello, Guitar, Viola, Violin, Harp, Piano, Organ, Piccolo, Bells, Drums, Tambourine, Cymbals, High Hat, Ride, Shaker, Rattle Snake, Tom Tom, Floor Tom, Harp

High Frequencies - 3000 Hz to inaudibility (0 - 30 points)

Instruments: Voices, Woodwinds, Piccolo, Flute, Clarinet, Strings, Violin, Triangle, Brushes, Harp, Piano, Organ, Bells, Tom Tom, Cymbals, High Hat, Ride, Shaker, Rattle Snake, Harp

Use the following scoring guide to score Sub-Bass, Mid-Bass, Midrange, Highs, & Overall Spectral Balance.

- A 29 to 30 points. 98% to 99%** Joyful, amazing, wonderful, shuddering, unbelievable tuneful, substantial, sexy, full of emotion
Life Like - Completely Natural & Clear, Generate full feelings, emotions, shuddering, warm, inviting, relaxing sound, Voices/instruments breath, with space around them,99% Harmonically & Musical,
All details are there, All Instrument tones are 100% Distinct & Separate, The s,x,f,c sound perfect,
The hardware disappears; nothing comes between you & the music, completely effortless sound
Full of endless Energy & Dynamics, All tones start & stop with great precision & energy.
Perfect Instrument Size, Real Vocals in full body with flesh and blood
- B 27 to 28 points. 95% to 97%** it feels extremely close to, but just a little bit less than the above
Very Close to Completely Natural & Clear, Generate almost full feeling, shuddering,
Extremely close to the above, Almost 99% Harmony & Musicality
Almost all details are there, All Instrument tones are almost 100% Distinct & Separate, The s,x,f,c sound almost perfect
The hardware almost disappears, Almost Effortless,
Almost full of Energy & Dynamics, Almost all tones start & stop with great precision & energy. Very close to Perfect Instrument size, Real vocals with almost full body
- C 24 to 26 points. 90% to 94%** Everything is there in very good proportion, but just not good enough
A great deal of Naturalness & Clarity, generate a lot of feelings, no shuddering, a lot of space & atmosphere, but not enough, a great deal of Harmony & Musicality.

Most of the details are there, Most tones are very Distinct & Separate, The s,x,f,c sounds a little bit thicker or thinner than normal,
Wide open window to the sound, the hardware adds tiny coloration, little effort in a few tones,
A great deal of Energy & Dynamics, Most tones starts & stop with great precision & energy,
A little smaller or bigger Instrument size, Close to real vocals with close to full body

D 21 to 23 points. 85% to 89%. Almost everything is there in good proportion, but something is obviously missing, or is too much.

Fair Naturalness & Clarity, Generate fair feelings, Space is medium or little larger than normal, Fair Harmony & / or Musicality

A few details are missing, Most tones are almost very Distinct & Separate, The s,x,f,c sound thicker or thinner than normal

Almost open window to the sound, the hardware adds little color, Little Effort in a lot of tones.

Fair Energy & Dynamics, Some tones start & stop with great precision & energy

Fairly smaller or bigger instrument size, Close to real vocals with little less body.

E 18 to 20 points. 80% to 84% Sounds correct, but there are missing things or does not give much music feeling

Little Naturalness & Clarity, Generate little feelings, little space & atmosphere, little Harmony & / or Musicality,

A few details are there, a lot of tones are very Distinct & Separate, the s, x,f,c sound a lot thicker or thinner than normal.

A couple of tones behind a curtain, colorations more obvious, Fair Effort in a few tones, Little Energy & / or Dynamics, only a couple of tones start & stop with great precision & energy.

A few Instruments smaller or bigger size, Good vocals with half size body.

F 15 to 17 points. 75% to 79% Sounds nice but some tracks sound nicer than others.

Only some tones Natural & / or Clear, Generate feeling only in a few tones, Space & atmosphere only in some notes & / or instruments, Harmony & / or M in a few tones

Details only in few tones, a lot of tones are almost very Distinct & Separate, the s,x,f,c sound a little blur or whistling.

Some tones behind a curtain, colorations quite obvious, Fair Effort in a lot of tones

Energy & / or Dynamics in only a few tones, Acceptable transients.

A lot of Instruments smaller or bigger size, good vocals with very small or very big body.

G 12 to 14 points. 70% to 74% Sounds acceptable, nothing annoying but not so clear.

Not Natural but clean, generate feeling only in little tones, too much space, Harmony & / or M musicality in little tones,

Very little details, A few tones are Distinct & / or Separate, the s,x,f,c sound blur or whistling.

A lot of tones behind a curtain, many colorations, a lot of effort in a few tones

Energy & / or Dynamics only in a couple of tones, acceptable transients only in a specific range.

Quite smaller or bigger Instrument size, Acceptable vocals with no body.

H 9 to 11 points. 50% to 69% Sounds acceptable, almost nothing annoying

Not Natural but almost clean, no Feelings, no Space, or enormous Space, Almost No Harmony & / or Musicality

Almost no details, Little tones are Distinct & / or Separate, The s,x,f,c sound blur or whistling a lot.

The curtain is quite obvious, A lot of effort in a lot of tones,
Almost no Energy & / or Dynamics, Poor transients.
Half or Double size Instruments, almost acceptable vocals with no body.

- I** **5 to 8 points. 30% to 49%** Sounds annoying in only some tones or tunes
Not Natural, some tones clean, some opposite feelings, Space & Atmosphere not easy to detect, No Harmony & / or Musicality
Hard to detect details, Almost no Distinction & / or Separation, the s,x,f,c sound harsh,
The curtain is heavy, Big effort in a few tones,
No Energy or Dynamics, Very poor transients,
Very big differences in instrument size, poor vocals with no or enormous body
- K** **1 to 4 points. 1% to 29%** Sounds annoying in almost all tunes and tracks
Not Natural, bad feelings, Space not detectable, No Harmony & / or Musicality
No details, No distinction & separation, Hard to listen to,
The curtain is very thick & heavy, Big effort in a lot of tones,
No Energy & Dynamics, No transients,
Cannot detect instrument size, Cannot detect vocal size.
- L** **0 points. No Sound 0%**

Additional hints:

Mistakes or miss-adjustments in the crossover area should result to lower score on both e.g. Midrange and High Frequency sections
Never score 0 if there is a sound, and avoid going lower than (5 to 8) unless it is absolutely necessary.

Overall spectral balance

Here we judge all the above (Sub, Mid-Bass, Midrange, & Highs) as a whole - as one thing. How all the frequencies - the entire bandwidth - are blended/combined together. How is the sound as a total? Are they well linked together, or not?

Track 6: Gigi

Description see above

Overall Spectral Balance at higher volume (0 - 30 points)

Additional hints:

Although it appears so, Overall Spectral Balance is not a point average, given to Sub-bass, Mid-Bass, Midrange & High frequencies
Small point differences between Sub-bass, Mid-Bass, Midrange & Highs, gives a point result in Overall SB that looks like a point average of the above.
Big point differences between Sub-bass, Mid-Bass, Midrange & High frequencies can give a lot lower points in Overall Spectral Balance
Overall Spectral Balance scoring can never be higher than the highest point in Tonal Accuracy
Overall Spectral Balance scoring can be lower than the lowest point in Tonal Accuracy

Never score 0 if there is a sound, and avoid going lower than (5 to 8) unless it is absolutely necessary.

Listening pleasure

It's the pleasure and joy that music can generate to the listeners.

Considering all musical tracks, score the following:

Naturalness	0 to 3 points
Harmony & Musicality	0 to 3 points
Atmosphere & Emotions	0 to 3 points
Clarity	0 to 3 points
Effortless sound	0 to 3 points
Dynamics & Energy	0 to 3 points
Distinction & Separation	0 to 3 points
Body of Voice & Instruments	0 to 3 points
Transparency	0 to 3 points
Details	0 to 3 points

How to score:

- 0 points for no Naturalness at all
- 1 points for little Naturalness
- 2 points for fair Naturalness
- 3 points for perfect Naturalness

Hints:

The scoring here seems to have a connection with the Overall Spectral Balance scoring. These 2 scorings are not directly connected, but the actual scorings cannot be far away from OSB under normal circumstances.

You must score listening pleasure from a different point of view.

Do you get pleasure from the music you are listening to? Or you do not?

Under most cases listening pleasure will score proportional to Overall Spectral Balance points at higher level. E.g. SB=20 points LP=18 to 20 points

It can be that a system not so good in SB gives some listening pleasure & can score proportionally a little higher. E.g. SB=18 points, LP=20 to 22 points

It is not realistic to score 18 on the Overall Spectral Balance and score 25 on listening pleasure.

It is not realistic to score 28 on the Overall Spectral Balance, and score 12 on listening pleasure.

A sound system that sounds very good or excellent, should be able to show it throughout the whole score sheet.

On a sound system that does not sound so good, you have to point this out in detail throughout the score sheet.

Never score 0 and avoid scoring below 5, unless it is absolutely necessary.

Even a bad (not a very bad) sounding car should score around 10 points.

Bonus for enjoyment to public

The Competitor is allowed to choose any music track, but this musical track must be in good taste. It must not be lewd or have suggestive lyrics. The Competitor can provide a performance to the crowd whilst this extra track is being played if they so wish. The length of the extra track/performance is limited to 5 minutes unless otherwise announced prior to the start of the judging process.

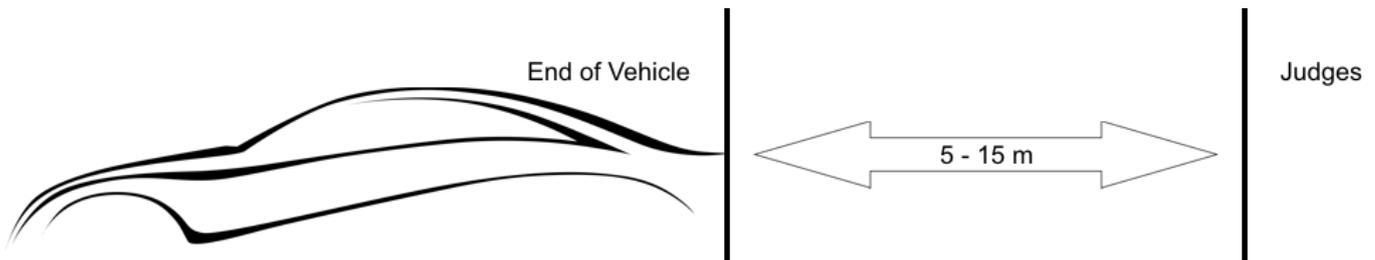
During the extra track the competitor will receive scores for Listening pleasure and also for Public enjoyment up to a total of 6 points.

These 6 points are earned as follows.

- Max of 2 points for originality.
- Max of 2 points for effects and coordination.
- Max of 2 points for overall effort.

8.3.1 Position of SQ judge

The Sound Quality Judge(s) should stand between 5 and 15 meters from the car, the exact distance is the decision of the competitor. If the competitor does not advise the judges to keep a defined distance the distance will automatically be 5 meters. The position of the car is decided by the competitor and does not necessarily need to be behind the car.



General Rules to be aware of:

1. Only the owner of the car or competitor can operate the volume control
2. The judges will not adjust any volume control, track selection control and head unit power switch.
3. Other than the bonus track, Only the official EMMA judging CD is to be used for the judging process and the announced track will be played
4. The maximum voltage is 14.6 Volts with engine running.
5. A maximum of two (2) physical amplifier-channels for each physically installed woofer is allowed, except in Unlimited Class
6. Cars with modified active equipment must compete in Unlimited Class
7. In some EMMA ESPL/ESQJ categories it is requested that subwoofers including enclosures, ports, etc. must be installed in the trunk area (rear seat can't be taken out).
8. A front system must be installed and play audible music during measurement, if the front system is not audible there will be a 10 point deduction. It should be installed according to the official EMMA Rulebook. If the front system is installed in another or even dangerous way the car has to compete in Unlimited
9. The competitor is responsible for his/her equipment and EMMA takes over no responsibility or guarantees in case of any damage to the sound system or the vehicle.
10. It is the competitor's decision if he/she sits inside the car during the judging process. EMMA is not responsible for damages to the health of the competitor but strongly recommends being careful!!!
11. The vehicle must be shown to the public after the measurement is finished. The organizers will point out an area for presentation. In that case the cars must be presented to the public. If the presentation does not happen the judge or Event Director will take back the 10 points from presentation to the public.
12. Only officially registered cars are allowed to compete and they must be able to be driven inside and outside the judging area by using their own engine.
13. No additional power supplies are allowed to be connected to the mains during the measurement process => no external power supply
14. All competitor cars must have driver and passenger side seats installed in original condition or similar (sport seats, etc.).
15. All components of the audio-system have to be installed into the vehicle – trailers etc. are not allowed
16. During the measurement only the person that would operate the volume is allowed inside the car.
17. Additional batteries are allowed to be installed and must be properly mounted and fused.
18. The source unit must be installed properly into the car or mounting rack outside the car is accepted.
19. If during measurement the head unit stops/blocks/jumps, the system or a component of the system fails/breaks down, etc. the competitor has a second chance to start over after 2 minutes. The same if he used accidentally another
20. Only the official designated EMMA ESPL tracks will be used for measuring SPL
21. A Passive membrane is not counted as speaker.

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