ECE R 10.05
Specifics of ESA

EMC Type Approval of
Vehicles and Electronic Sub-Assemblies

Who am I?

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- **Experience:** **12 years experience in EMC, ECE and wireless compliance, covering multiple product types. Extensive knowledge of the EMC and RE Directive and Regulation ECE R 10.05**
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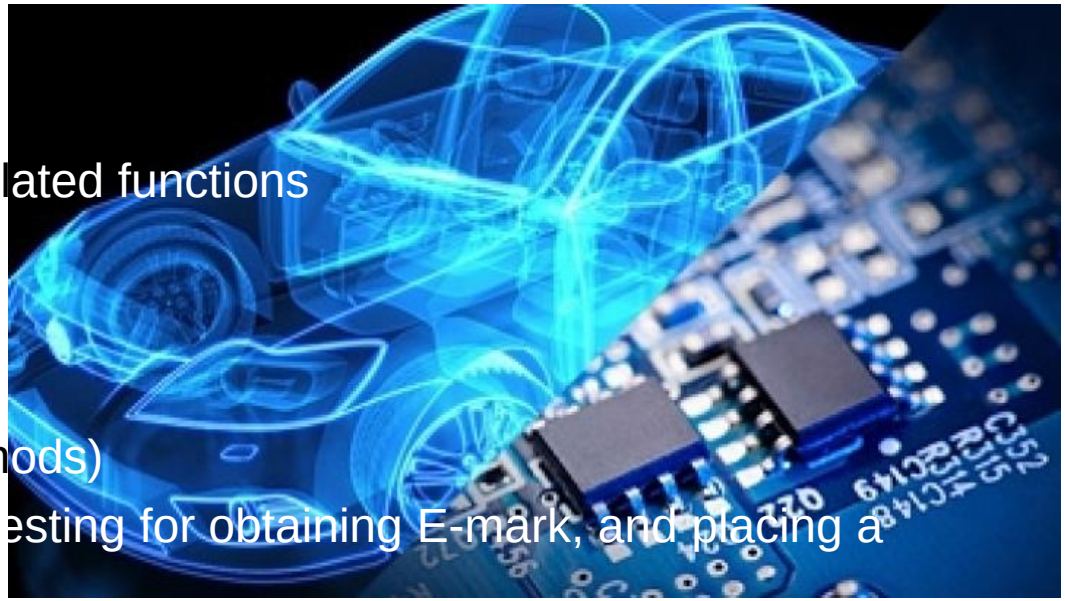
Topics

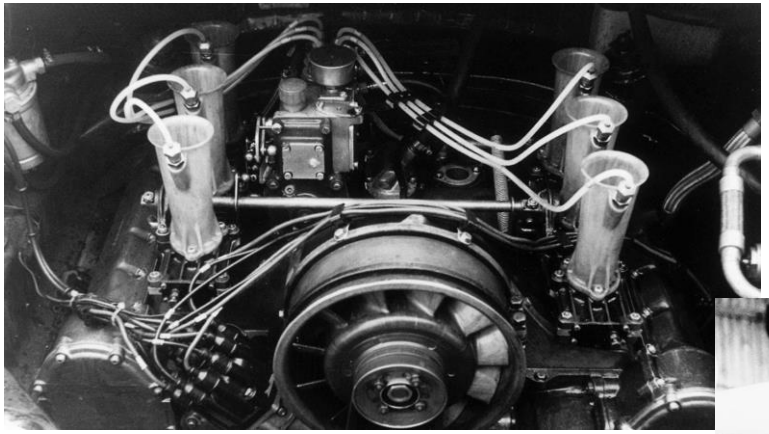
- Development
- REESS and non REESS
- Is ECE R 10.05 required or not (Coverage)
  - E-mark, CE, other Directives
  - ESA with built in RF module
- Focus on ESA
  - Immunity vs non immunity related functions
  - Aftermarket equipment
  - Surprise topic
  - Procedures
  - Test coverage (different methods)
  - Finally – requirements after testing for obtaining E-mark, and placing a product on the market



Development

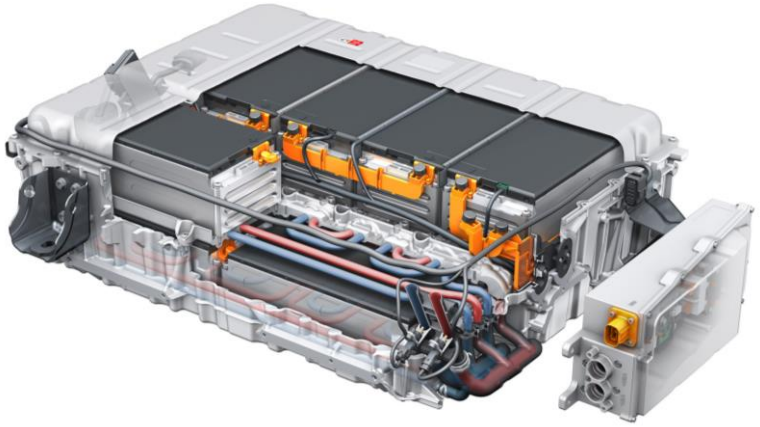
In just 50 years, we have gone

From:

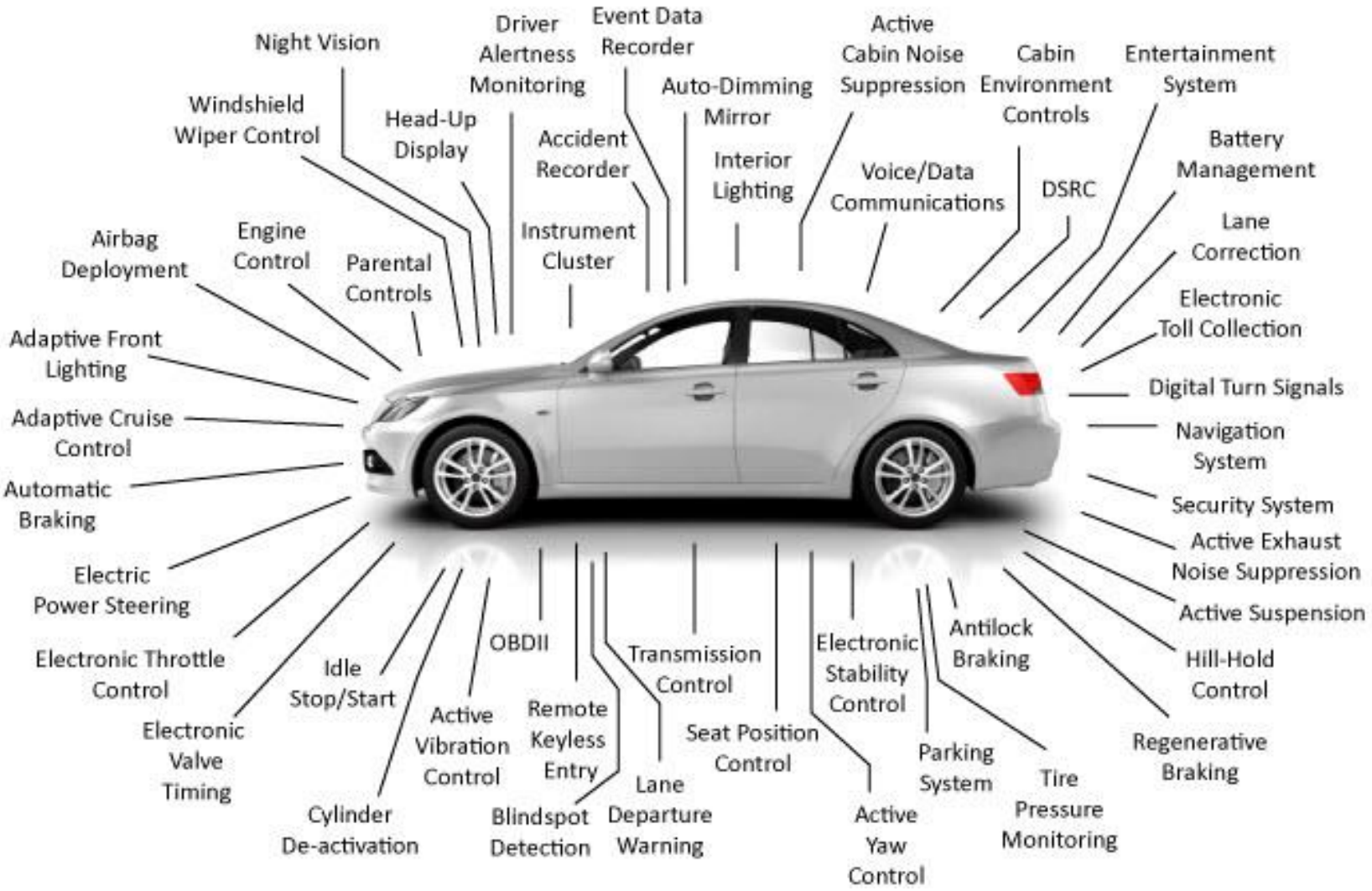


Development

To:



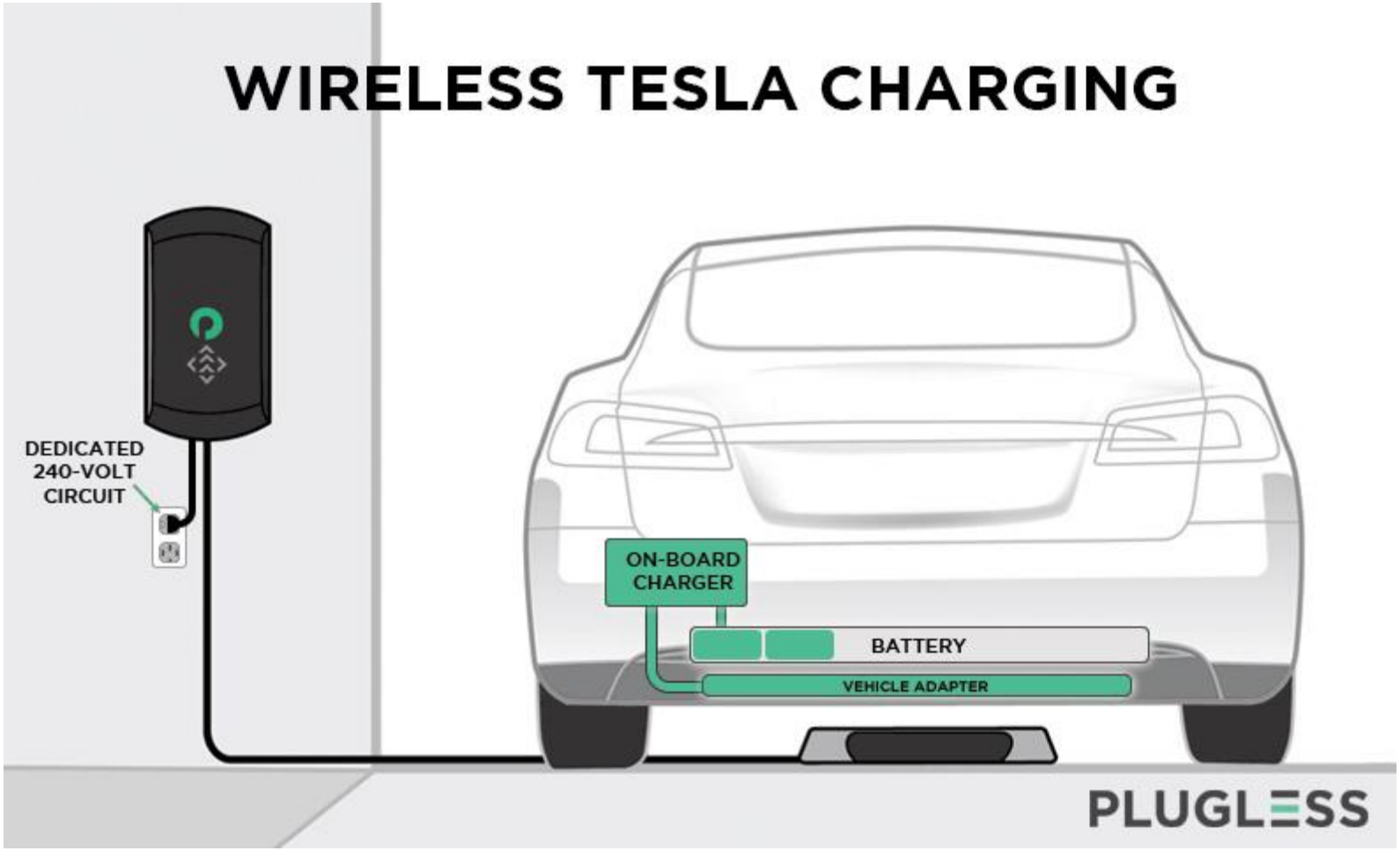
Before we start



REESS and non REESS

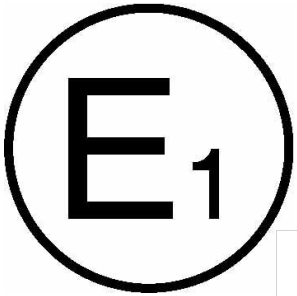
What are REESS

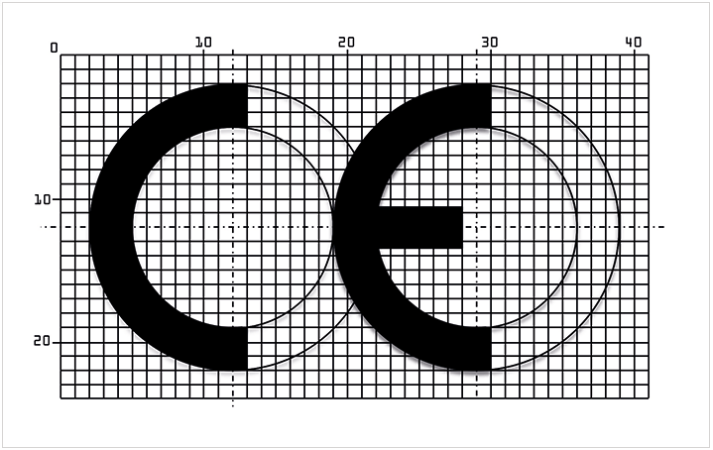
REESS and non REESS



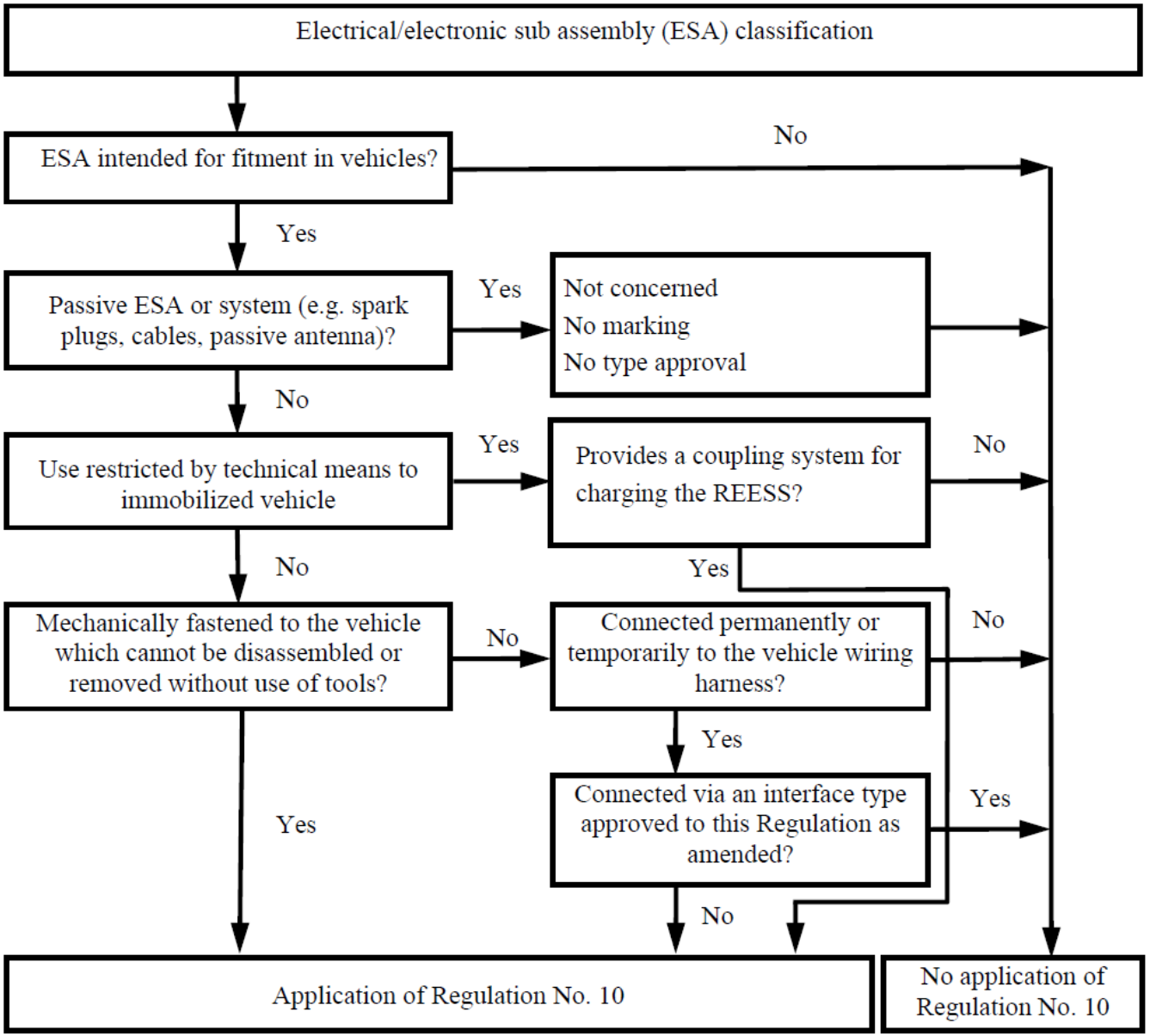
ECE R 10.05 - required or not?

- ECE R 10.05
- CE
- Other Directives for “vehicles”
- ESA with built in RF module





ECE R 10.05 - required or not?



ECE R 10.05 - required or not?

Special case

In case of an ESA is (part of) a light source, the applicant shall:

(a) Specify the approval number according to Regulation No. 37, Regulation No. 99 or Regulation No. 128, granted to this ESA;

or

(b) Provide a test report by a Technical Service designated by the Type Approval Authority, stating that this ESA is not mechanically interchangeable with any light source according to Regulation No. 37, Regulation No. 99 or Regulation No. 128.

In case of an ESA is (part of) a light source and if the documentation as specified left is missing, approval of this ESA according to Regulation No. 10 shall not be granted.

ESA

immunity related (E-mark)

What are im. rel. functions non-immunity related (CE mark)

How to approach

What about aftermarket equipment?

And if they have a wireless module or CAN?

Immunity related functions

HOW TO KNOW?

Some of the functions considered are:

- Degradation or change in: e.g. engine, gear, brake, suspension, active steering, speed limitation devices;
- Affecting drivers position: e.g. seat or steering wheel positioning;
- Affecting driver's visibility: e.g. dipped beam, windscreen wiper.

Functions related to driver, passenger and other road user protection

- E.g. airbag and safety restraint systems.

Functions which, when disturbed, cause confusion to the driver or other road users:

- Optical disturbances: incorrect operation of e.g. direction indicators, stop lamps, end outline marker lamps, rear position lamp, light bars for emergency system, wrong information from warning indicators, lamps or displays related to functions in subparagraphs (a) or (b) which might be observed in the direct view of the driver;
- Acoustical disturbances: incorrect operation of e.g. anti-theft alarm, horn.

Functions related to vehicle data bus functionality:

- Blocking data transmission on vehicle data bus-systems, which are used to transmit data, required to ensure the correct functioning of other immunity related functions

Functions which when disturbed affect vehicle statutory data: e.g. tachograph, odometer.

Function related to charging mode when coupled to the power grid:

- For vehicle test: by leading to unexpected vehicle motion;
- For ESA test: by leading to an incorrect charging condition (e.g. over-current, over-voltage).

Immunity related functions

Module Division
1.Chassis Module
2.Cockpit Module
3.Front End Module

Safety Products
1.Airbags
2.Windshield Airbag
3.Active Seatbelt

Steering Parts
1.Motor Driven Power Steering
2.Gear Box

Driver Assistance System Parts
1.Lane Keeping Assistance System
2.Smart Cruise Contral
3.Autonomous Emergency Braking
4.In-wheel

Brake System
1.MOBIS Electronic Brake
2.Electronic Parking Brake

Eco-friendly Parts
1.Motor
2.Hydrogen Fuel Supply
3.Starter-Generator
4.Battery System

Lighting Products
1.Head Lamp
2.Rear Lamp

Mechatronics
1.Airbag Control Unit
2.Around View Monitoring System
3.Smart Parking Assist System
4.Smart Key

Multimedia
1.AVN (Audio-Video-Navigation)
2.Standard Audio

Aftermarket equipment

Two options:

- Immunity related
  ECE R 10.05 and homologation is required
  different functions

- Non-immunity related
  ECE R 10.05 and homologation are **NOT** required
  EN 50498 required
  different functions

ESA – Type approval

Two options:

1. ESA to be fitted either to any vehicle type (component approval)
2. to a specific vehicle type or types requested by the ESA manufacturer (separate technical unit approval).

DIFFERENT FUNCTIONS

The Connected Highway

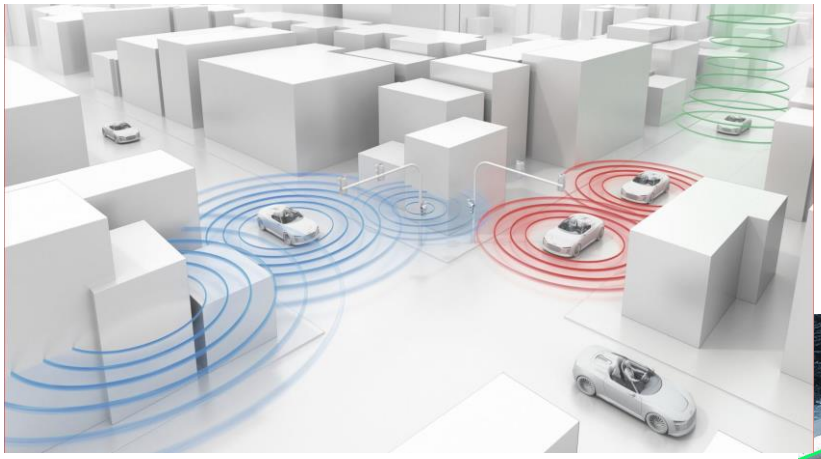
ESA with built in RF module

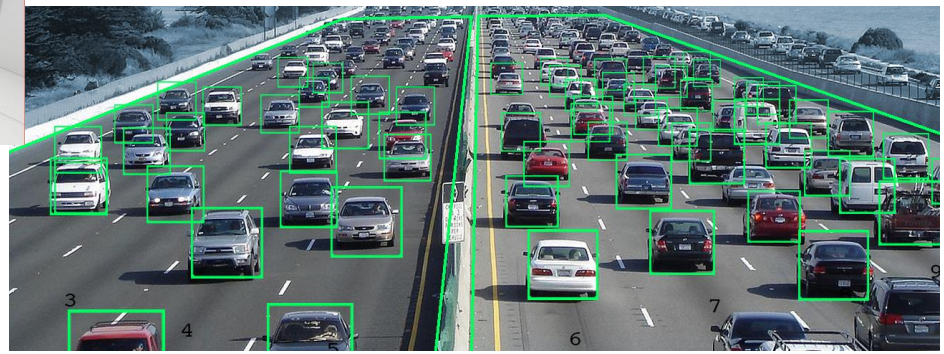
The Connected Highway

ESA with built in RF module

Compliance:

- E-mark
- RED (CE mark)





RED – definitions

- The **RED is applicable** to the combination of the **non-radio product** and the **radio equipment**, if the radio equipment is:
  - incorporated into the non-radio product; and
  - permanently affixed to the non-radio product.

  - If the **radio equipment** is incorporated in a fixed and permanently way in the **non-radio product** at the moment of its placing on the market, as specified above, this product is deemed to be a **single product**.

Combined Equipment

- Non-radio products which function with radio equipment

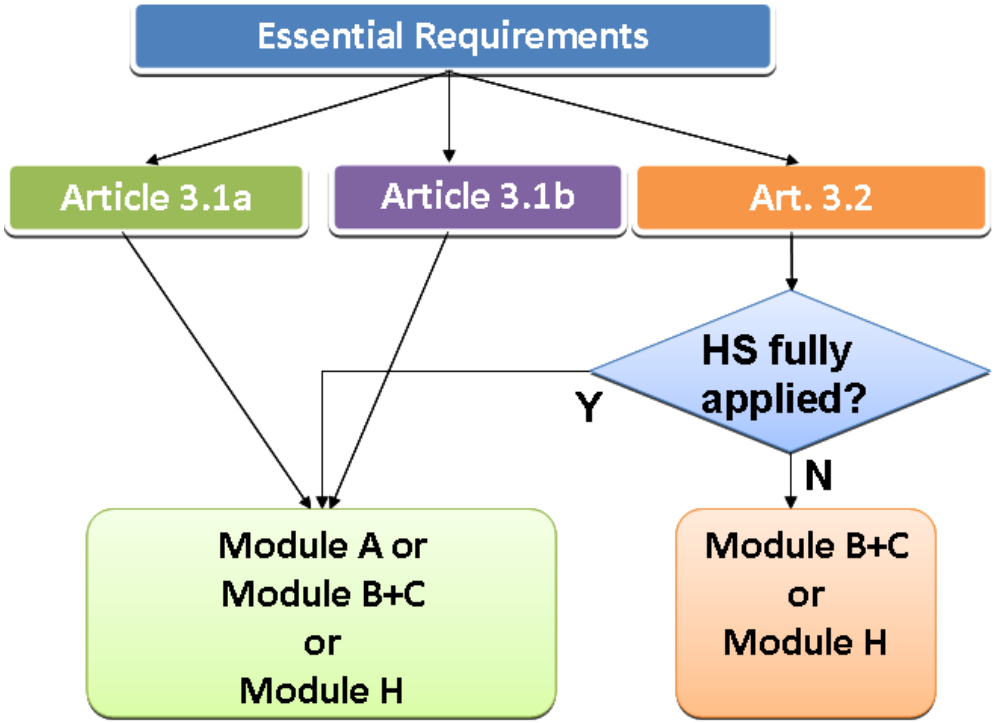
Additional Directive(s)

Radio **E**quipment (**RE**) Directive (**2014/53/EU**)

Additional Directive(s)

Essential requirements

- **Art. 3.1(a):** Health and Safety requirements as LVD, **but with no lower voltage limit**
- **Art. 3.1(b):** EMC requirements as EMCD
- **Art. 3.2:** effective and efficient use of radio spectrum to avoid harmful interference



EMC testing - Combined Equipment

Standard EN 303 446-1 only applies if:

- applicable non-radio EMC standard
- applicable radio EMC standard

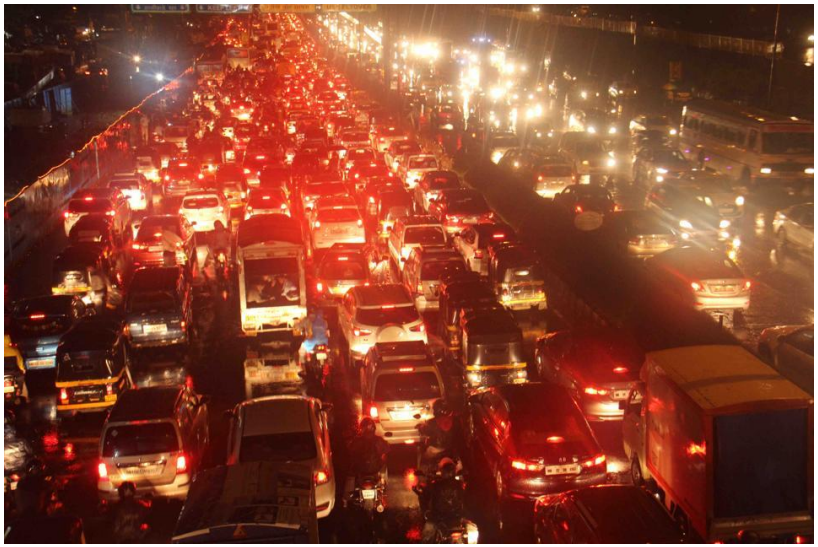
is stated in normative references.

- **Informative references**

ETSI EG 203 367: "Guide to the application of harmonised standards covering articles 3.1b and 3.2 of the Directive 2014/53/EU (RED) to multi-radio and combined radio and non-radio equipment".

The Connected Highway

And if one of the components does not work due to disturbances?



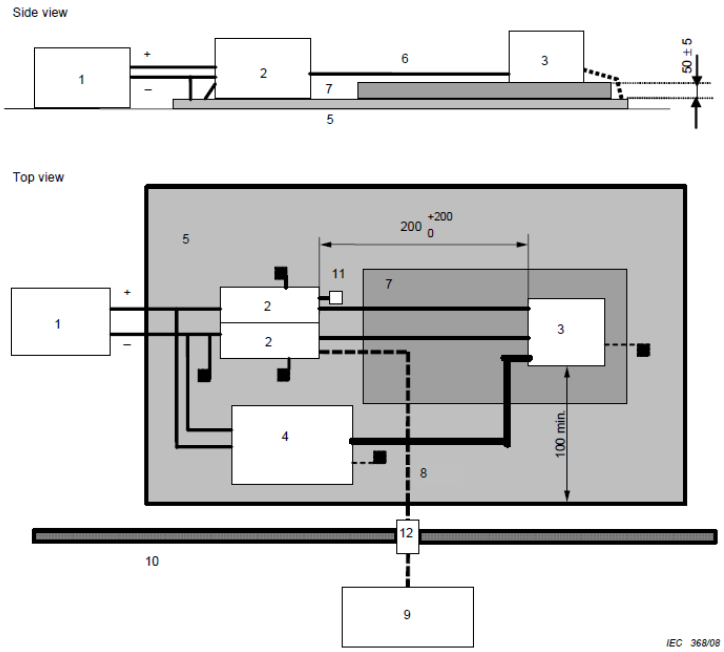
Let’s do some testing

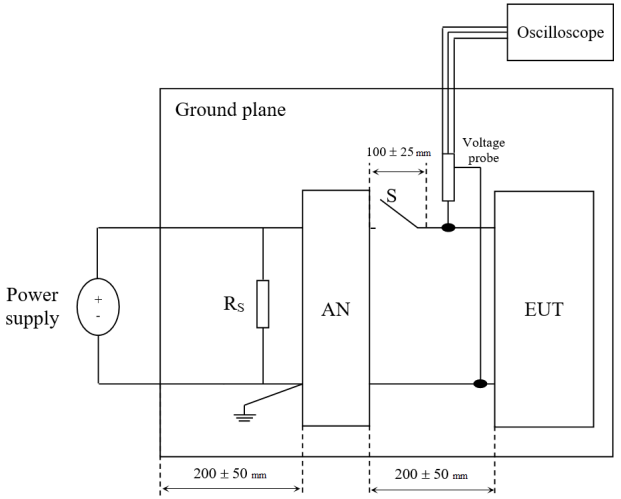
- **EMISSION:**
- Conducted emission
- Transient emission
- Radiated emission
- Harmonics and current test
- Flicker and voltage fluctuations
- **IMMUNITY:**
- Radiated immunity
- EFT
- Surge
- Surges and transients

Procedures

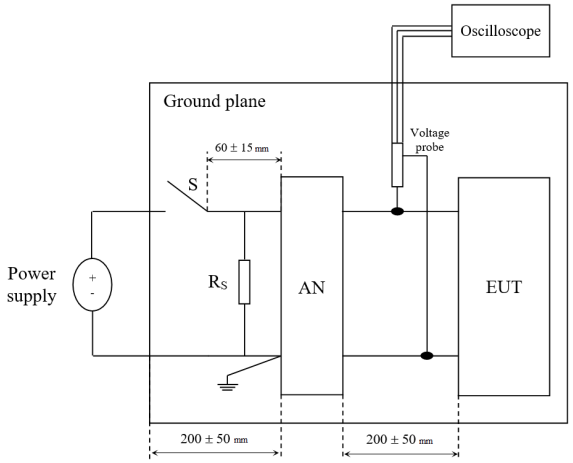
Conducted emission:

- Conducted emission - REESS
- Transient emission - NON-REES





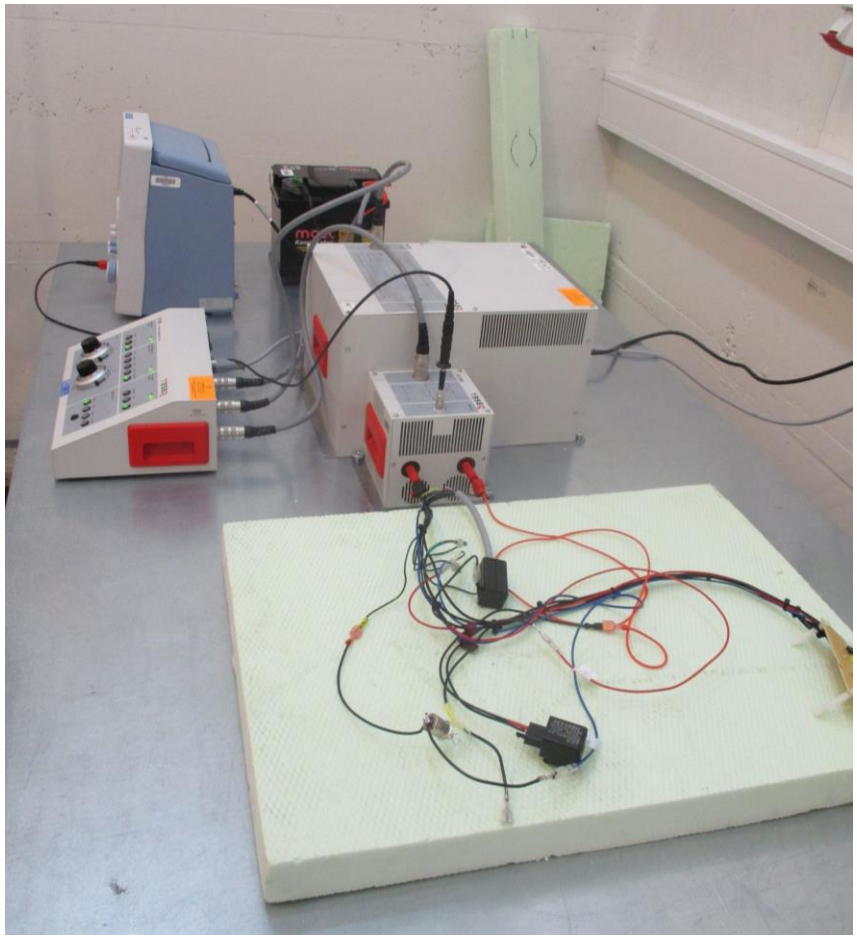
Test setup – Fast setup



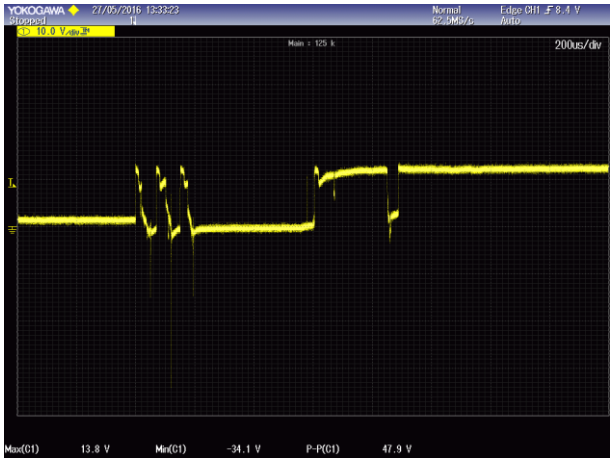
Test setup – Slow setup

Procedures

- Transient emission - NON-REES



Slow start up:

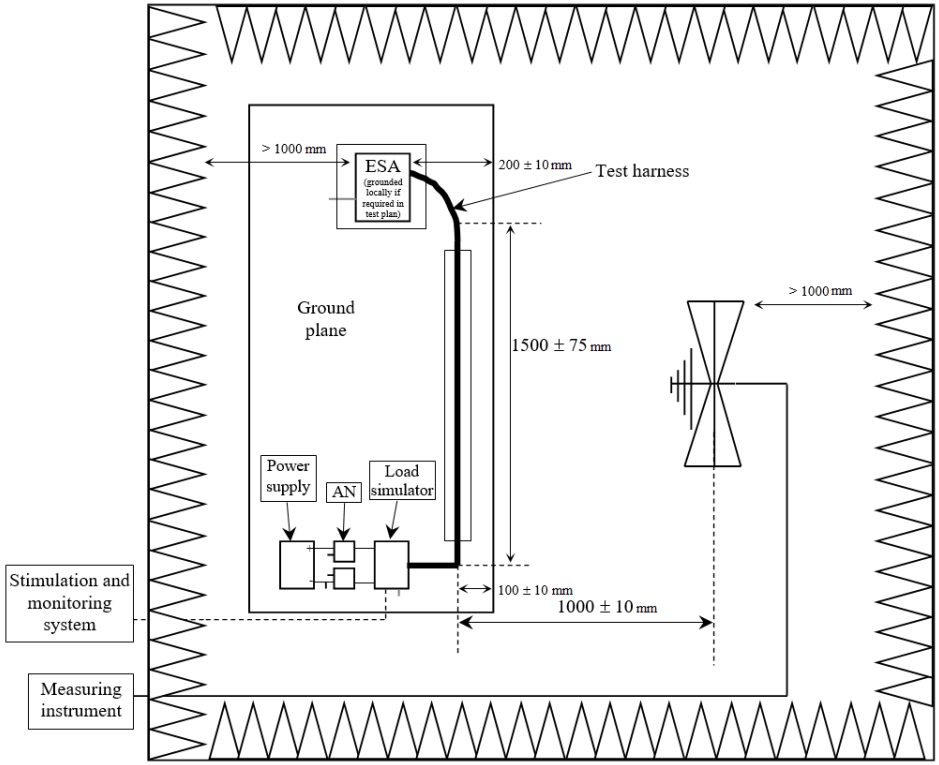


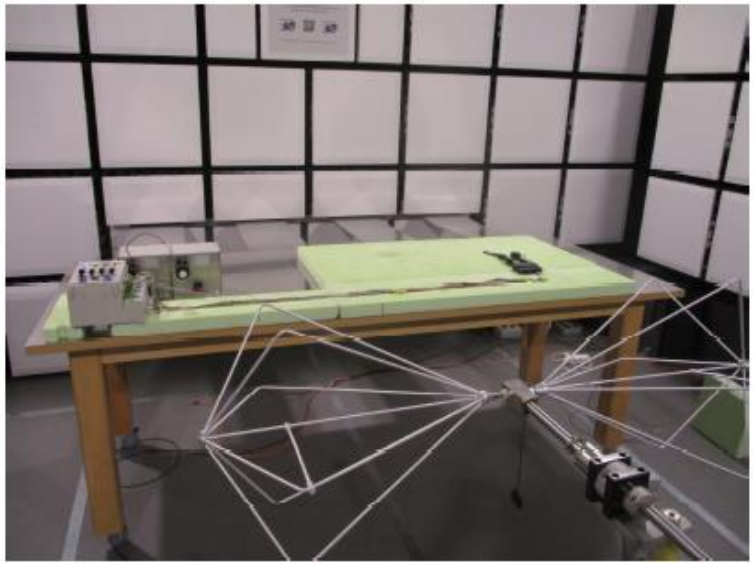
Fast start up:

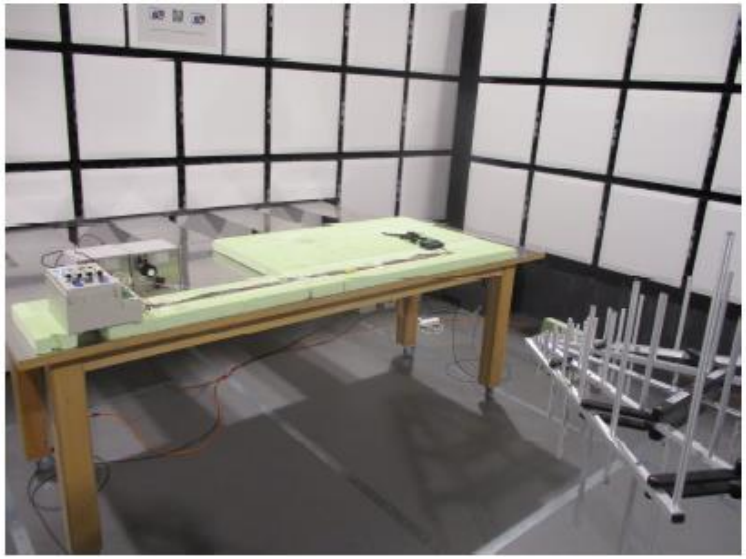
Procedures

Radiated emission:

- Both



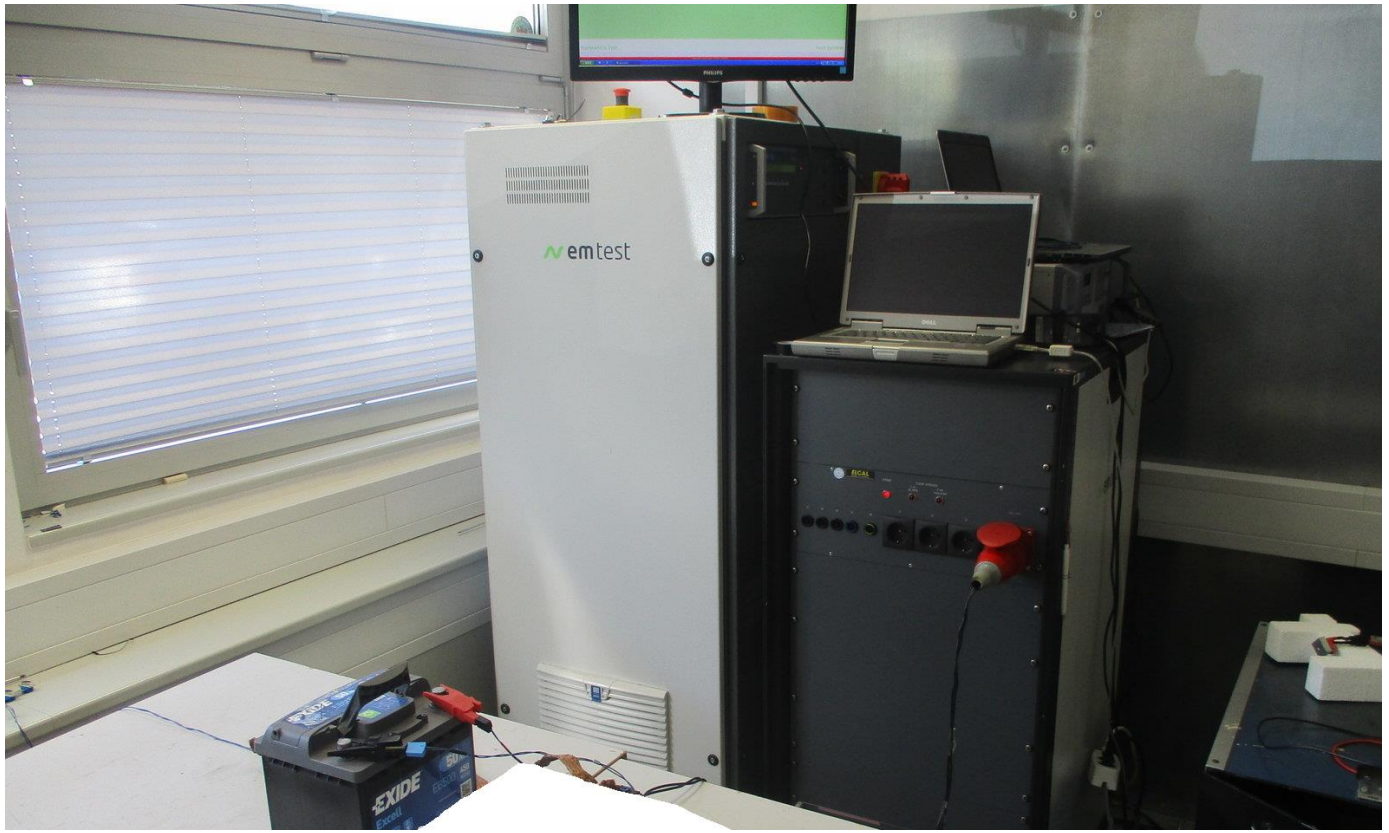




Procedures

Harmonics and current test – REESS

Flicker and voltage fluctuation test – REESS



Procedures

Radiated immunity:

- REESS
- NON-REES
- Possible methods:
    (a) Absorber chamber test according to ISO 11452-2;
    (b) TEM cell testing according to ISO 11452-3;
    (c) Bulk current injection testing according to ISO 11452-4;
    (d) Stripline testing according to ISO 11452-5;
    (e) 800 mm stripline.

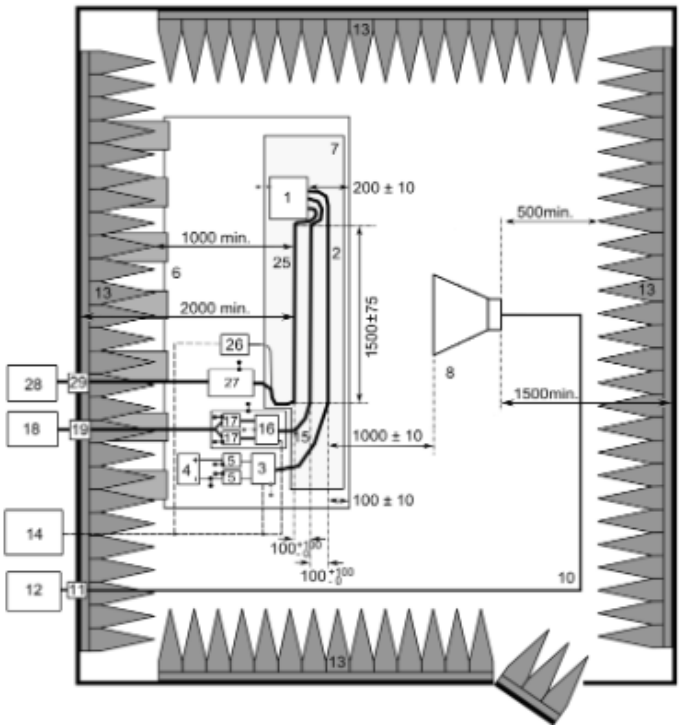
- Are they aligned?

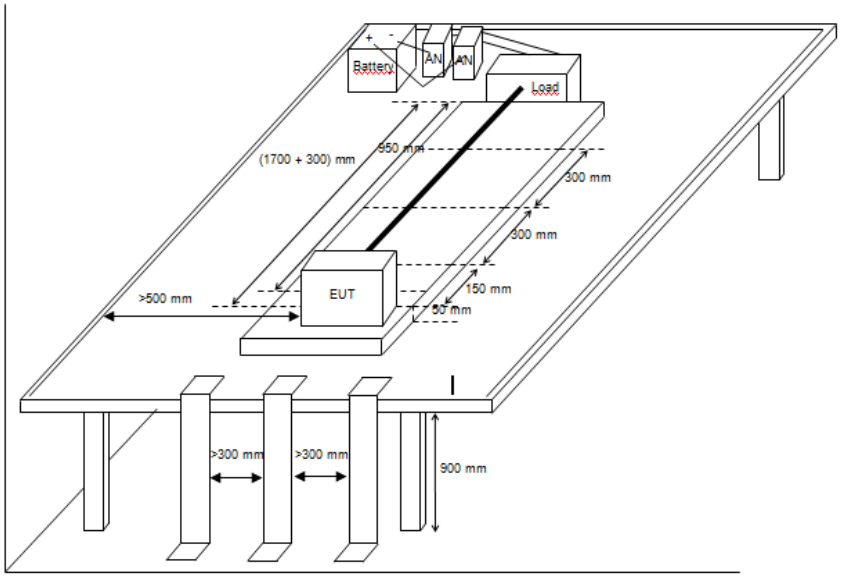
Procedures

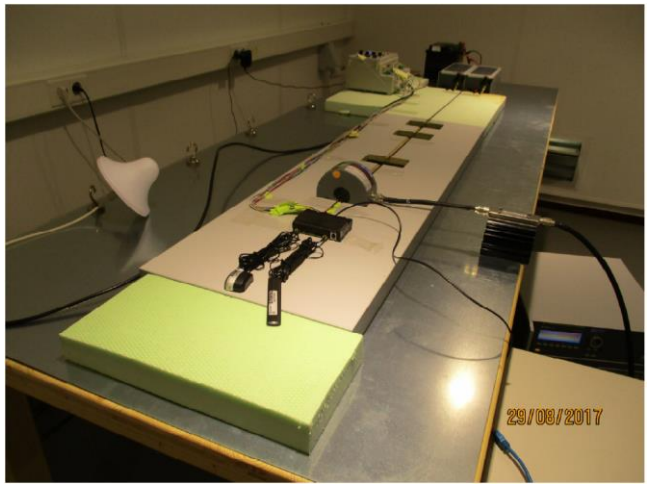
Absorber chamber test

Test configuration for ESA's involved in "REESS charging mode coupled to the power grid". The test shall be performed according to ISO 11452-2.

Top view (Vertical polarization)



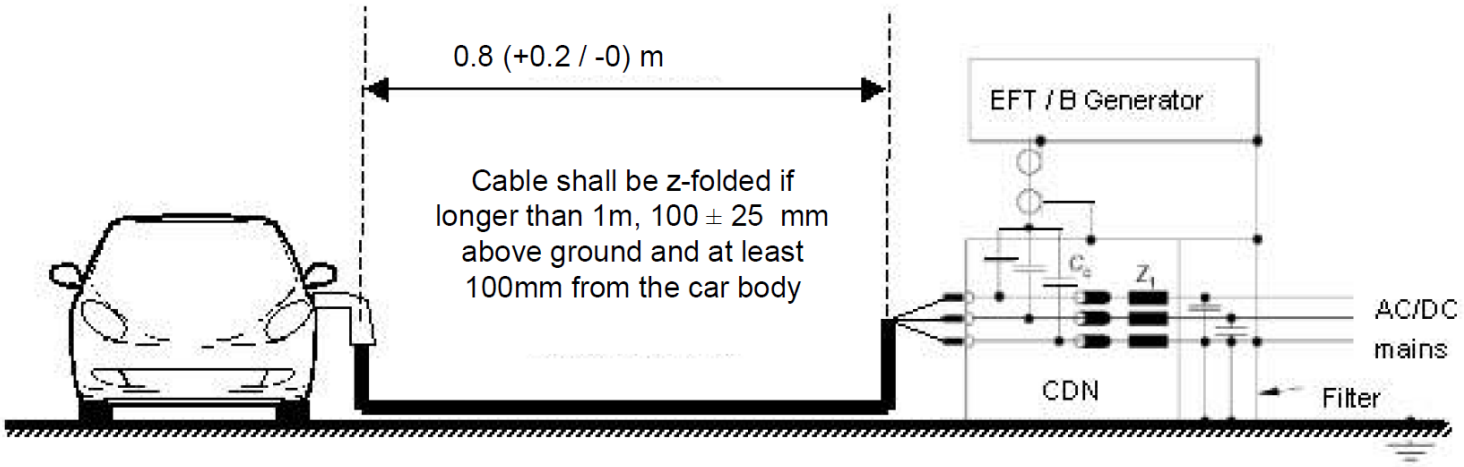




Procedures

Burst:

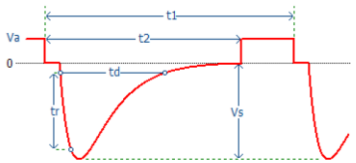
- REESS



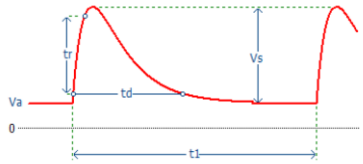
Procedures

Transient immunity:

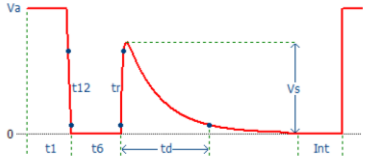
Test Setup		ECE R10 (Revision 5, 2012-03) : Pulse 1
Vs:	-450	V
t1:	0.5	s
t2:	200	ms
tr:	3	us
td:	1000	us
Ri:	50	Ohm
Coupling:	Battery	
Events:	5000	
Test duration:	00:41:40	h



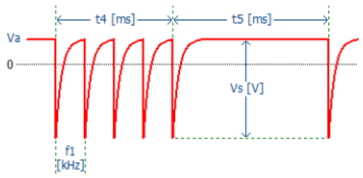
Test Setup		ECE R10 (Revision 5, 2012-03) : Pulse 2a
Vs:	+37	V
t1:	0.2	s
tr:	1	us
td:	50	us
Ri:	2	Ohm
Coupling:	Battery	
Events:	5000	
Test duration:	00:16:40	h



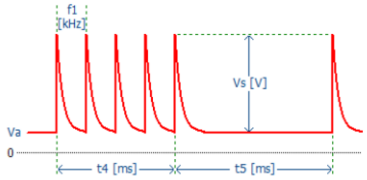
Test Setup		ECE R10 (Revision 5, 2012-03) : Pulse 2b
Vs:	20.0	V
t1:	1.0	s
t6:	1	ms
td:	200	ms
Int:	1.0	s
Ri:	0.05	Ohm
t12:	1	ms
tr:	1	ms
Events:	5	
Test duration:	00:00:14	h



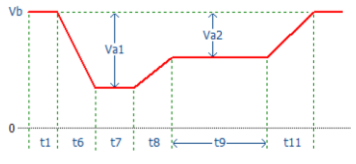
Test Setup		ECE R10 (Revision 5, 2012-03) : Pulse 3a
Vs:	-150	V
f1:	10	kHz
t4:	10	ms
t5:	90	ms
tr:	5	ns
td:	150	ns
Ri:	50	Ohm
Coupling:	Battery	
Test duration:	1	h



Test Setup		ECE R10 (Revision 5, 2012-03) : Pulse 3b
Vs:	+150	V
f1:	10	kHz
t4:	10	ms
t5:	90	ms
tr:	5	ns
td:	150	ns
Ri:	50	Ohm
Coupling:	Battery	
Test duration:	1	h



Test Setup		ECE R10 (Revision 5, 2012-03) : Pulse 4
Va1:	-12.0	V
Va2:	-5.0	V
t1:	1.0	s
t6:	10	ms
t7:	50	ms
t8:	50	ms
t9:	0.5	s
t11:	10	ms
Events:	5	
Test duration:	00:00:10	h



Procedures test coverage

Surges:

- REESS

Vehicle in configuration "REESS charging mode coupled to the power grid"

Figure 1

Vehicle in configuration "REESS charging mode coupled to the power grid" – Coupling between lines for DC or AC (single phase) power lines

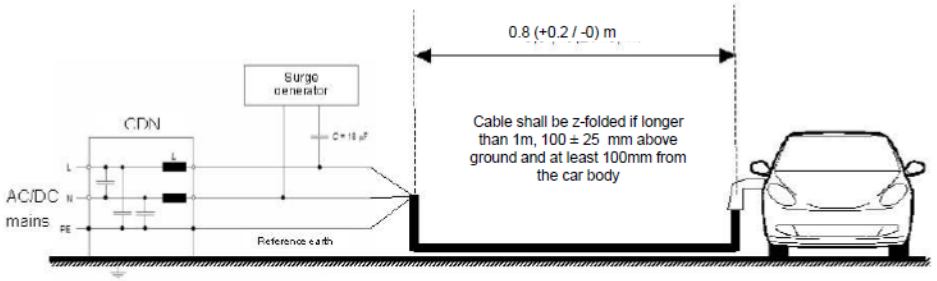
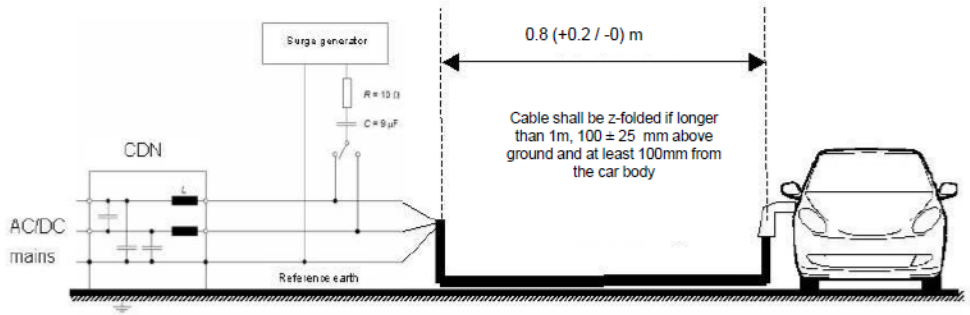


Figure 2

Vehicle in configuration "REESS charging mode coupled to the power grid" – Coupling between each line and earth for DC or AC (single phase) power lines



Procedure for obtaining E-mark in Slovenia

Required documents for E-mark procedure:

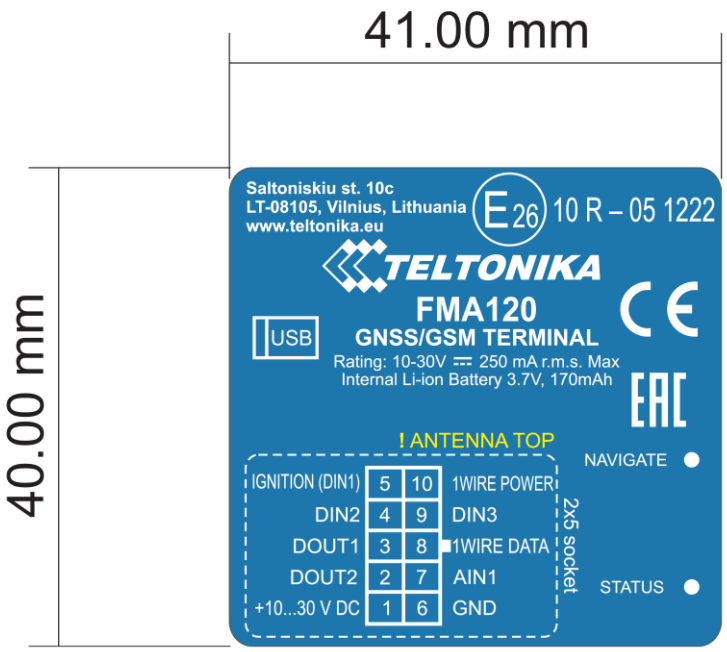
- Electrical schematics
- PCB layouts
- BOM
- User manual
- Signed application form (E26 Application)
- Picture of device with visible label
- Label with visible placement of E26 mark and place for the number of homologation
- ISO 9001
- Out print of national company registry (proof of company existence)
- PASS test report

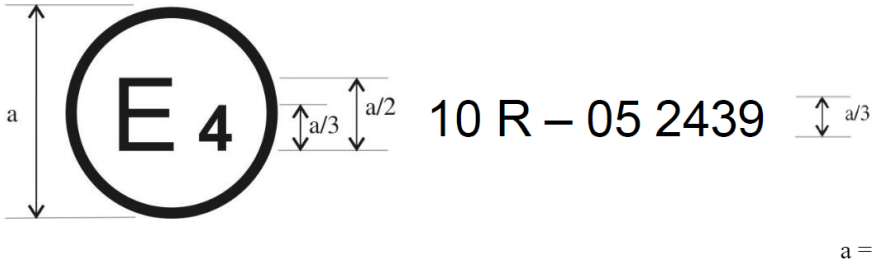
And if it is also RED applicable?

Technical Documentation

- Description of the apparatus,
- General Arrangement drawing,
- List of standards applied,
- Wiring and circuit diagrams,
- Records of risk assessments and assessments to standards,
- Datasheets for critical sub-assemblies,
- Part list (BoM),
- Copies of any markings and labels,
- Copy of instructions (user, maintenance, installation),
- Test reports and certificates,
- Quality control & commissioning procedures,
- EU - Declaration of Conformity.

After Compliance - Product Labelling





Manufacturer's Trade Name/Mark:

Full Postal Address:

Web Address: (recommended but not mandatory)

Importer's Label; Trade Name/Mark:
Full Postal Address:

Product Name/Type:
Batch/Serial Number:

CE

Other Directives may require further data

Where can you go with this


danke
謝謝
ngiyabonga
teşekkür ederim
спасибо
dank je
thank you
gracias
tapadh leat
bedankt
hvala
mauruuru
mochchakkeram
dziękuję
go raibh maith agat
sagolun
sukriya
kop khun krap
arigatô
takk
dakujem
obrigado
grazie
terima kasih
мерси
감사합니다
ευχαριστώ
merci