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UN Regulation No. 116 (Anti-theft and alarm systems)**Proposal for draft amendments to the document
ECE/TRANS/WP.29/GRSG/2019/20 (Draft new UN
Regulation on Immobilizers)****Submitted by the expert from the International Organization of Motor
Vehicle Manufacturers***

The text reproduced below was prepared by the expert from the International Organization of Motor Vehicle Manufacturers (OICA) to amend the draft new UN Regulation dedicated to the approval of immobilizers and approval of a vehicle with regard to its immobilizer, in the frame of the process of splitting the UN Regulation No.116 into three separate regulations. It is based on document ECE/TRANS/WP.29/GRSG/2019/21.

* In accordance with the programme of work of the Inland Transport Committee for 2020 as outlined in proposed programme budget for 2020 (A/74/6 (part V sect. 20) para 20.37), the World Forum will develop, harmonize and update UN Regulations in order to enhance the performance of vehicles. The present document is submitted in conformity with that mandate.



I. Proposal

Paragraph 5.3., amend to read:

"5.3. Operations parameters and test conditions

All components of the immobilizer shall be submitted to the tests described in Annex 6."

Paragraphs 5.3.1. to 5.3.3.9. should be deleted

Annex 6, amend, to read:

"Annex 6

~~SPECIFICATIONS FOR MECHANICAL KEY SWITCHES~~

Operation parameters and test conditions for an immobilizer

1. Operation parameters

The requirements below do not apply to:

- (a) Those components that are fitted and tested as part of the vehicle, whether or not an immobilizer is fitted (e.g. lamps, alarm system, device to prevent unauthorized use by mean of a locking system); or
- (b) Those components that have previously been tested as part of the vehicle and documentary evidence has been provided.

1.1. All components of the immobilizer shall operate without any failure under the following conditions.

1.1.1. Climatic conditions

Two classes of environmental temperature are defined as follows:

- (a) -40°C to +85°C for parts to be fitted in the passenger or luggage compartment,
- (b) -40°C to +125°C for parts to be fitted in the engine compartment unless otherwise specified.

1.1.2. Degree of protection for installation

The following degrees of protection in accordance with IEC Publication 529 1989 shall be provided:

- (a) IP 40 for parts to be fitted in the passenger compartment,
- (b) IP 42 for parts to be fitted in the passenger compartment of roadsters/convertibles and cars with moveable roof-panels if the installation location requires a higher degree of protection than IP 40,
- (c) IP 54 for all other parts.

The immobilizer manufacturer shall specify in the installation instructions any restrictions on the positioning of any part of the installation with respect to dust, water and temperature.

1.1.3. Weatherability

7 days according to IEC 68-2-30-1980.

- 1.1.4. Electrical conditions**
- Rated supply voltage: 12 V**
- Operation supply voltage range: from 9 V to 15 V in the temperature range according to paragraph 5.3.1.1.1**
- Time allowance for excess voltages at 23°C:**
- U = 18 V, max. 1 h**
- U = 24 V, max. 1 min.**
- 2. Test conditions**
- All the tests shall be carried out in sequence on a single immobilizer. However, at the discretion of the test authority, other samples may be used if this is not considered to affect the results of the other tests.**
- 2.1. Normal test conditions**
- Voltage U = (12 ± 0.2) V**
- Temperature T = (23 ± 5)°C**
- 3. Operation test**
- All components of the immobilizer shall comply with prescriptions given in paragraphs 5.3.3.2. to 5.3.3.9. of this Regulation.**
- 3.1. Upon completion of all the tests specified below, the immobilizer shall be tested under the normal test conditions specified in paragraph 5.3.2.1. of this Regulation to check that it continues to function normally. Where necessary, fuses may be replaced prior to the test.**
- If some of the tests required in each of these paragraphs prior to the operation tests are performed in series on a single immobilizer, the operation test may be carried out one time only after the chosen tests are completed instead of performing the operation tests required in the paragraphs after each of the chosen tests. Vehicle manufacturers and suppliers have to guarantee satisfactory results only on non-accumulated procedures.**
- 3.2. Resistance to temperature and voltage changes**
- Compliance with the specifications defined under paragraph 5.3.3.1 shall also be checked under the following conditions:**
- 3.2.1. Test temperature T (-40 ± 2)° C**
- Test voltage U = (9 ± 0.2) V**
- Storage duration 4 hours**
- 3.2.2. For parts to be fitted in the passenger or luggage compartment:**
- Test temperature T = (+85 ± 2)° C**
- Test voltage U = (15 ± 0.2) V**
- Storage duration 4 hours**
- 3.2.3. For parts to be fitted in the engine compartment unless otherwise specified:**
- Test temperature T = (+125 ± 2)° C**
- Test voltage U = (15 ± 0.2) V**
- Storage duration 4 hours**
- 3.2.4. The immobilizer, in both set and unset state, shall be submitted to an excess voltage equal to (18 ± 0.2) V for 1 hour.**

- 3.2.5.** The immobilizer, in both set and unset state, shall be submitted to an excess voltage equal to (24 ± 0.2) V for 1 min.
- 3.3.** **Safe operation after foreign body and water-tightness testing**
- After the test for tightness to foreign body and water according to IEC 529-1989, for degrees of protection as in paragraph 5.3.1.1.2., the operation tests according to paragraph 5.3.3.1. shall be repeated.
- With the agreement of the Technical Service this requirement need not apply in the following circumstances:
- (a) **Type Approval of an immobilizer which is to be type approved as a separate technical unit**
- In this case, the manufacturer of the immobilizer shall:
- (i) Specify in item 4.5. of the information document (Annex 1, Part 2), that the requirement of this paragraph was not applied to the immobilizer (in accordance with paragraph 7. of this Regulation), and
- (ii) Specify in item 4.1. of the information document, the list of vehicles to which the immobilizer is intended to be fitted and the relevant installation conditions in item 4.2.
- (b) **Type approval of a vehicle in respect of an immobilizer**
- In this case, the manufacturer shall specify in item 3.1.3.1.1. of the information document (Annex 1a), that the requirement of this paragraph does not apply to the immobilizer due to the nature of installation conditions and the vehicle manufacturer shall prove it by submitting related documents.
- (c) **Type approval of a vehicle in respect of the installation of an immobilizer which is type approved as a separate technical unit.**
- In this case, the vehicle manufacturer shall specify in item 3.1.3.1.1. of the information document (Annex 1a), that the requirement of this paragraph does not apply to the installation of the immobilizer where the relevant installation conditions are met.
- This requirement does not apply in cases where the information required in item 3.1.3.1.1. of Annex 1a has already been submitted for the approval of the separate technical unit.
- 3.4.** **Safe operation after condensed water test**
- After a resistance-to-humidity test to be carried out according to IEC 68 2 30 (1980) the operation tests according to paragraph 5.3.3.1. shall be repeated.
- 3.5.** **Test for safety against reversed polarity**
- The immobilizer and components thereof shall not be destroyed by reversed polarity up to 13 V during 2 min. After this test the operation tests according to paragraph 5.3.3.1. shall be repeated with fuses changed, if necessary.
- 3.6.** **Test for safety against short-circuits**
- All electrical connections of the immobilizer must be short-circuit proof against earth, max. 13 V and/or fused. After this test the operation tests according to paragraph 5.3.3.1. shall be repeated, with fuses changed if necessary.
- 3.7.** **Energy consumption in the set condition**

The energy consumption in set condition under the conditions given in paragraph 5.3.2.1. shall not exceed 20 mA on average for the complete immobilizer including status display.

With the agreement of the Technical Service this requirement need not apply in the following circumstances:

- (a) Type Approval of an immobilizer which is to be type approved as a separate technical unit

In this case, the manufacturer of the immobilizer shall:

- (i) Specify in item 4.5. of the information document (Annex 1, Part 2), that the requirement of this paragraph was not applied to the immobilizer (in accordance with paragraph 7. of this regulation), and
- (ii) Specify in item 4.1. of the information document, the list of vehicles to which the immobilizer is intended to be fitted and the relevant installation conditions in item 4.2.

- (b) Type approval of a vehicle in respect of an immobilizer

In this case, the manufacturer shall specify in item 3.1.3.1.1. of the information document (Annex 1a), that the requirement of this paragraph does not apply to the immobilizer due to the nature of installation conditions and the vehicle manufacturer shall prove it by submitting related documents.

- (c) Type approval of a vehicle in respect of the installation of an immobilizer which is type approved as a separate technical unit.

In this case, the vehicle manufacturer shall specify in item 3.1.3.1.1. of the information document (Annex 1a), that the requirement of this paragraph does not apply to the installation of the immobilizer where the relevant installation conditions are met.

This requirement does not apply in cases where the information required in item 3.1.3.1.1. of Annex 1a has already been submitted for the approval of the separate technical unit.

3.8. Safe operation after vibration test

3.8.1. For this test, the components are subdivided into two types:

Type 1: components normally mounted on the vehicle,

Type 2: components intended for attachment to the engine.

3.8.2. The components/immobilizer shall be submitted to a sinusoidal vibration mode whose characteristics are as follows:

3.8.2.1. For Type 1

The frequency shall be variable from 10 Hz to 500 Hz with a maximum amplitude of ± 5 mm and maximum acceleration of 3 g (0-peak).

3.8.2.2. For Type 2

The frequency shall be variable from 20 Hz to 300 Hz with a maximum amplitude of ± 2 mm and maximum acceleration of 15 g (0-peak).

3.8.2.3. For both type 1 and type 2

The frequency variation is 1 octave/min.

The number of cycle is 10, the test shall be performed along each of the 3 axes.

The vibrations are applied at low frequencies at a maximum constant amplitude and at a maximum constant acceleration at high frequencies.

3.8.3. During the test the immobilizer shall be electrically connected and the cable shall be supported after 200 mm.

3.8.4. After the vibration test the operation tests according to paragraph 5.3.3.1. shall be repeated.

3.9. Electromagnetic compatibility

The immobilizer shall be submitted to the tests described in Annex 7

1. ~~The cylinder of the key switch shall not protrude by more than 1 mm from the casing, and the protruding part shall be conical.~~
2. ~~The joint between the cylinder core and the cylinder casing shall be capable of withstanding a tensile force of 600 N and a torque of 25 Nm.~~
3. ~~The key switch shall be provided with a cylinder drill obstruction.~~
4. ~~The key profile shall have at least 1,000 effective permutations.~~
5. ~~The key switch shall not be operable by a key which differs by only one permutation from the key matching the key switch.~~
6. ~~The key aperture to an external key switch shall be shuttered or otherwise protected against the penetration of dirt and/or water.~~

(Reserved)"

Annex 7, amend, to read:

"Annex 7

Electromagnetic compatibility

~~Note: To test the electromagnetic compatibility, either paragraph 1. or paragraph 2. shall be used, depending on the test facilities.~~

1. ~~ISO Method~~ Immunity against disturbances conducted along supply lines

Tests shall be performed according to the technical prescriptions and transitional provisions of Regulation No. 10.06 series of amendments and according to the test methods described in Annex 10 for an Electrical/Electronic Sub-Assembly (ESA).

The immobilizer shall be tested in unset state and in set state.

~~Apply the test pulses 1, 2a/2b, 3a, 3b, 4 and 5a/5b according to the International Standard ISO 7637 2:2004 to the supply lines as well as to other connections of immobilizer which may be operationally connected to supply lines.~~

~~Concerning pulse 5, pulse 5b shall be applied on vehicles which include an alternator with internal limitation diode and pulse 5a shall be applied for others cases.~~

~~Concerning the pulse 2, pulse 2a shall always be applied and pulse 2b could be performed with the agreement between the vehicle manufacturer and the technical approval services.~~

~~With the agreement of the Technical Service, Test pulse 5a/5b need not be applied in the following circumstances:~~

- (a) ~~Type Approval of a immobilizer which is to be type approved as a separate technical unit and intended for the fitment to vehicles without any alternators;~~

~~In this case, the manufacturer of the immobilizer shall:~~

- (i) ~~Specify in item 4.5. of the information document (Annex a1, Part 2), that the requirement of this paragraph was not applied to the immobilizer (in accordance with paragraph 5. of this Regulation); and~~
- (ii) ~~Specify in item 4.1. of the information document, the list of vehicles to which the immobilizer is intended to be fitted and the relevant installation conditions in item 4.2.;~~
- (b) ~~Type approval of a vehicle in respect of an immobilizer intended for fitment to vehicles without alternators.~~
- ~~In this case, the manufacturer shall specify in item 3.1.3.1.1. of the information document (Annex 1a, Part 1), that the requirement of this paragraph does not apply to the immobilizer due to the nature of installation conditions.~~
- (c) ~~Type approval of a vehicle in respect of the installation of a immobilizer which is type approved as a separate technical unit and intended for the fitment to vehicles without any alternators~~
- ~~In this case, the vehicle manufacturer shall specify in item 3.1.3.1.1. of the information document (Annex 1a, Part 1), that the requirement of this paragraph does not apply to the installation of the immobilizer where the relevant installation conditions are met.~~
- ~~This requirement does not apply in cases where the information required in item 3.1.3.1.1. of Annex 1 has already been submitted for the approval of the separate technical unit.~~

Immobilizer in unset state and set state

The test pulses 1 through 5 shall be applied with a degree of severity III. The required functional status for all applied test pulses are given in table 1.

Table 1
Severity/functional status (for supply lines)

Test pulse number	Test level	Functional status
1	III	C
2a	III	B
2b	III	C
3a	III	A
3b	III	A
4	III	B
5a/5b	III	A

Immunity against disturbance coupled on signal lines

Leads which are not connected to supply lines (e.g. special signal lines) shall be tested in accordance with the International Standard ISO7637-3:1995 (and Corr.1). The required functional status for all applied test pulses are given in table 2.

Table 2
Test level / functional status (for signal lines)

Test pulse number	Test level	Functional status
3a	III	C
3b	III	A

2. Immunity against radiated high frequency disturbances

Testing of the immunity of an immobilizer in a vehicle may be performed according to the technical prescriptions and transitional provisions of

Regulation No. 10, 06 series of amendments and test methods described in Annex 6 for the vehicles or Annex 9 for an Electrical/Electronic Sub-Assembly (ESA).

The immobilizer shall be tested with operating conditions and failure criteria as defined in table 1

Table 1
Operating conditions and failure criteria for immobilizer”

Test type	Immobilizer operating conditions	Failure criteria
Vehicle test	Immobilizer in unset state Key ON or Vehicle at 50 km/h (1)	Unexpected activation of the immobilizer
	Immobilizer in set state Key OFF	Unexpected deactivation of the immobilizer
	Immobilizer in set state Vehicle in charging mode (if applicable)	Unexpected deactivation of the immobilizer
ESA Test	Immobilizer in unset state	Unexpected activation of the immobilizer
	Immobilizer in set state	Unexpected deactivation of the immobilizer
: this test can be covered by the ECE R10 50 km/h mode		

3. Electrical disturbance from electrostatic discharges

Immunity against electrical disturbances shall be tested in accordance with Technical ISO 10605-2008 + corrigendum:2010 + AMD1:2014 using the test severity levels from table 2.

ESD tests shall be performed either at vehicle level or at Electrical/Electronic Sub-Assembly (ESA) level.

Table 2
ESD Test levels

Discharge type	Discharge points	Immobilizer state	Discharge network	Test Level	Failure criteria
Air discharge	Points that can easily be accessed only from the inside of the vehicle	Immobilizer in unset state (if test performed on vehicle then vehicle shall be Key ON or Vehicle at 50 km/h or engine in idle mode)	330 pF, 2 k Ω	± 6 kV	Unexpected activation of the immobilizer
	Points that can easily be touched only from the outside of the vehicle	Immobilizer in set state (if test performed on vehicle then vehicle shall be locked and Key OFF)	150 pF, 2 k Ω	± 15 kV	Unexpected deactivation of the immobilizer without reactivation, within 1s, after each discharge

Contact discharge	Points that can easily be accessed only from the inside of the vehicle	Immobilizer in unset state (if test performed on vehicle then vehicle shall be Key ON or Vehicle at 50 km/h or engine in idle mode)	330 pF, 2 kΩ	± 4 kV	Unexpected activation of the immobilizer
	Points that can easily be touched only from the outside of the vehicle	Immobilizer in set state (if test performed on vehicle then vehicle shall be locked and Key OFF)	150 pF, 2 kΩ	± 8 kV	Unexpected deactivation of the immobilizer without reactivation, within 1s, after each discharge
Each test shall be performed with 3 discharges with a minimum of 5 s interval between each discharge					

4. Radiated emissions

Tests shall be performed according to the technical prescriptions and transitional provisions of Regulation No. 10, 04 series of amendments ~~prescriptions~~ and according to the test methods described in Annexes 4 and 5 for vehicles or Annexes 7 and 8, for **an Electrical/Electronic Sub-Assembly (ESA)**.

The immobilizer shall be in set state."
