

Report of Special Interest Group on Automated Vehicle Regulation Screening (SIG AVRS)

The text reproduced below has been prepared on request of GRVA & GRBP by experts of the Special Interest Group on Automated Vehicle Regulation Screening (SIG AVRS) in order to identify the impact of automated driving vehicles on the regulations, GRBP is responsible for.

I. Background

Under the leadership of GRVA, standards and regulations for Automated Vehicles (AVs) are being developed. The nature of these AVs differ from human driven vehicles to such extent that a screening of the impact of AV on existing regulation are deemed necessary.

On behalf of GRVA, WP29 request GR's to screen the regulations and GTR's under their responsibility on the effects of AVs.

Documentation:

- Reports of the World Forum for Harmonization of Vehicle Regulations on its [187th session](#) pg.8/9
- 19. AC.2 received an update on the work of GRVA and automated vehicles related activities:
....
- (e) AC.2 recommended the GRs to consider using the template in [GRVA-13-18](#) when screening UN GTRs and UN Regulations with regards to ADS.
- https://unece.org/sites/default/files/2022-07/ECE-TRANS-WP29-1166e_0.pdf
- <https://unece.org/sites/default/files/2022-05/GRVA-13-18e.pdf>

II. Procedure of work

For a structural approach of the screening the below procedure will be followed with some preceding assumptions:

1. Component regulations that need a manual driven vehicle for the component test method might need attention in the future when manual vehicles are less available (components specifically made for Avs). In this assessment the availability of the manual driven vehicles was assumed.
2. Certain components might not be necessary on a AV of a certain category. In that case that regulation could exclude the specific category of AVs.
 - a. For now the categorization is not clear and the assessment assumes a worst case.
 - b. The SIG requests GRVA to consider to define AV-categories to support the scoping of regulations for different AV-categories
3. Powered 2 Wheelers (P2Ws), motorcycles and mopeds of the vehicle categories L1 and L3 are likely not soon automated. However, there are examples of autonomous P2Ws on exhibitions. Related regulations should have a lower priority if updates would be needed.

The screening of GTR's and regulations contains the following assessment:

1. Impact on definitions
2. Relevance of regulation for AVs
 - a. The subject of the regulation is relevant to the AVs
 - b. The test method needs reconsideration for AVs
 - i. For driverless AVs (Level 5, shuttles)
 1. With passenger
 2. Without passengers (cargo)
 - ii. For AVs with driver (Level 3/4, fallback driver/user)
 - iii. Bi-directional AV's
3. Requirement to AVs to fulfill the GTR or Regulation that is screened.
4. The template of GRVA will be used for the screening
5. The results are listed in the ANNEX and summarized in section III.

III. List of UN Regulations for screening for Automated Vehicles

The secretariat referred to the list of regulations annexed to the 1958 Agreement contained in the ECE/TRANS/WP.29/343/Rev.30. This table is detailed in an EXCEL worksheet. Below is the summary of the list of regulations and the result of the screening.

Table

Assessment of UN Regulations under the purview of GRBP with regards to AVs

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<i>UN Regulations</i>	<i>Title</i>	<i>Topic</i>	<i>Vehicle and/or Component</i>	<i>category</i>	<i>to be checked</i>	<i>changes required</i>
UN R 9	Noise of three-wheeled vehicles	Noise	Vehicle	L2, L4, L5	YES	YES
UN R 28	Audible warning devices	Noise	Component & Vehicle	M, N, L3, L4, L5	YES	YES
UN R 30	Tyres for passenger cars and their trailers	Tyres	Component	M, O	No	
UN R 41	Noise emissions of motorcycles	Noise	Vehicle	L3	YES	??**
UN R 51	Noise of M and N categories of vehicles	Noise	Vehicle	M, N	YES	YES
UN R 54	Tyres for commercial vehicles and their trailers	Tyres	Component	N, O	No	
UN R 59	Replacement silencing systems	Noise	Component & Vehicle	M1, N1	YES	copy UN R 51
UN R 63	Noise emissions of mopeds	Noise	Vehicle	L1	YES	??**
UN R64	Temporary use spare unit, run flat tyres	Tyres	Component & Vehicle	M, N	YES	??*
UN R 75	Tyres for motorcycles/mopeds	Tyres	Component	L1, L3	No	
UN R 92	Replacement exhaust silencing systems (RESS) for motorcycles	Noise	Component & Vehicle	L	YES	copy UN R 41**
UN R 106	Tyres for agricultural vehicles	Tyres	Component	T, R, S	No	
UN R 108	Retreaded tyres for passenger cars and their trailers	Tyres	Component	M, O	No	
UN R 109	Retreaded tyres for commercial vehicles and their trailers	Tyres	Component	N, O	No	

<i>UN Regulations</i>	<i>Title</i>	<i>Topic</i>	<i>Vehicle and/or Component</i>	<i>category</i>	<i>to be checked</i>	<i>changes required</i>
UN R 117	Tyres, rolling resistance, rolling noise and wet grip	Tyres	Component*	M, N, O	No	
UN R 124	Replacement wheels for passenger cars	Tyres	Component	M	YES**	YES
UN R 138	Quiet Road Transport Vehicles (QRTV)	Noise	Vehicle	M, N	YES	YES
UN R 141	Tyre Pressure Monitoring Systems (TPMS)	Tyres	Component & Vehicle	M1, N1	YES	YES
UN R 142	Tyres installation	Tyres	Component & Vehicle	M1	YES	?
UN R 164	Studded tyres with regard to their snow performance	Tyres	Component*		No	
UN R 165	Audible reverse warning devices and audible reverse warning signals	Noise	Component & Vehicle	M2, N2, M3, N3	YES	?
GTR No. 16	Tyres	Tyres	Component*		No	
<i>Sum of "YES"</i>					13	

* needs any non-fully automated vehicle for testing

** usecase questionable

IV. Standardized wording and concepts

In the GRVA taskforce FADS, session 1, a further standardization of terminology to be used was proposed. This standardization refers to the concepts mentioned in the table below from GRVA document FADS-01-06

GRVA used an AV-concept approach for the assessment of their own regulations.

Relevant concepts for scanning Regulations and GTRs				
Concept	Description <small>Concrete, high-level explanation of use cases related to automated driving</small>	Sub concepts <small>If necessary, a more detailed distinction of specific concepts to consider</small>	Consequences on UNR/GTR <small>Explicit consequences of the concepts on existing Regulations, ideally with references to examples of prescriptions</small>	Priority (example) <small>The opinion of your country or organization on the importance of handling this concept in our review</small>
Dual mode	The vehicle may be equipped for both manual and automated driving			High
No driver / cockpit	The vehicle may have no equipments installed for manual driving: no driving seat, no commands, no telltales...	No steering wheel / steering control No pedal cluster No tell-tales No warnings No windshield No driving seat / front row seats	R13 Annex 13.5.3.7. R13 Annex 4.1.4.1.2.2.	High
No occupants	The vehicle may have no occupants, e.g. in the case of vehicles dedicated to the transport of goods	No seats No seatbelts No doors No passenger compartment	An automated vehicle only designed for the transport of goods may not require doors in their traditional definition.	High Low Low
On-board operator	A designated person inside the vehicle may be able to activate/deactivate the ADS, manage manoeuvres and give information to passengers			High
Remote supervision	The vehicle may be under constant or intermittent supervision from a remote location; it may be able to report incidents, request manual validation of a manoeuvre, etc.		Notions to modify: important information, warnings etc. may be sent to the remote supervision center.	High
Remote intervention	A situation where an operator in a remote supervision centre validates a manoeuvre by the vehicle equipped with ADS, or provides high-level guidance for the manoeuvre. The actuation of steering and braking is done by the ADS			High
Remote control	The vehicle may be remotely controlled by an operator during manoeuvres etc.		While all driver controls may be present, they may not be in the same location as the vehicle	Low / out of scope?
Bidirectional	The vehicle may have no distinguishable front or back, and may be driven in both directions		Notions no longer applicable: "back of the vehicle", "rearmost row of seats", "rear windshield", "rear wheels", "rear axle"... Ex: R13.5.2.1.11.1. New notions to consider: tests should be conducted in both driving directions	High
Sensors	The vehicle may gather information about its environment through sensors such as cameras, RADAR, LIDAR, microphones, etc.		Notions to modify: visibility conditions depend on the type of sensor, e.g. fog will have more impact on signals with higher frequencies Ex: R79 Annex 8.2.1 "visibility conditions that allow safe driving"	High
Seat orientation and inclination	Automated vehicles may be equipped with rear-facing seats, fully reclining seats, etc.	Sensor calibration / fusion	Despite good visibility conditions, sensors may not work correctly due to poor calibration or sensor fusion. Despite the presence of a driver in a driving seat, the seat might be set in a position where the driver may not see visual warning signals, etc.	Low
Operational Design Domain (ODD)	Automated vehicles may be designed to work only within a specific operational domain. Dual-mode vehicles may be driven manually outside their ODD, while fully automated vehicles may never be allowed to leave their ODD			

The following AV-concepts are considered for the GRBP regulations:

1. Dual Mode AV's
2. No driver/cockpit
3. No occupants
4. Bi-directional

Specific wording and concepts should be considered for extending the list of definitions in the regulations.

ANNEX I: Template from GRVA-13-18



TEMPLATE FOR REVIEW

UN Regulation No. XXX / GTR No. XX		UN Group: GRxx	Regulation applicable to Automated Vehicles/driverless vehicles: [] yes [] no
		Potential approach for application: no amendment required amendment new Regulation	
<i>Content Summary</i>		<i>Summary of required changes</i>	
<i>Content relevant for FAV's / driverless vehicles</i>		<i>Specifics for vehicles can be driven manually and driverless:</i>	
<i>Content to be transferred to ADS Regulation</i>			



EXAMPLE

UN Regulation No. 79		UN Group: GRVA	Regulation applicable to Automated Vehicles/driverless vehicles: [X] yes [] no
		Potential approach for application: no amendment required amendment new Regulation	
<i>Content Summary</i> <ul style="list-style-type: none"> • Ensure that all components of the steering system are designed properly to ensure high level of safety: • No physical breakage of mechanical components (well dimensioned) • Steering forces are at level which can be handled by the driver, even in case of failure • Steering performance in nominal cases • Steering performance in failure cases • Warnings to be issued to warn the driver • ADAS specific requirements 		<i>Summary of required changes</i> <ul style="list-style-type: none"> • Replacing the driver actuating the steering control with the steering demand generated by the ADS • Testing section to be updated • ... 	
<i>Content relevant for FAV's / driverless vehicles</i> <ul style="list-style-type: none"> • System robustness (well dimensioned) • Steering performance under nominal conditions • Steering performance under failure conditions • Steering performance in „maintenance mode“ • Warnings to be issued to warn the operator/control tower/occupants • Performance considering max design speed of the vehicles 		<i>Specifics for vehicles can be driven manually and driverless:</i> <ul style="list-style-type: none"> • Consider that the steering demand can be requested by the actuation of manual controls (driver) or by generation of the ADS • ... 	
<i>Content to be transferred to ADS Regulation</i> <ul style="list-style-type: none"> • Generation of steering demand by the ADS • HMI intended for communication with driver ? 			

ANNEX II: Screening per Regulation and GTR

GRBP UN/ECE R 009	Regulation applicable to Automated Vehicles/driverless vehicle : <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO
Sound Emission for L2, L4, L5-cat vehicles	
Content summary	Summary of required changes <ul style="list-style-type: none"> - AVs need a test mode to support the test method - Track standard might need adaption to support AV path planning/navigation
Content relevant for AV's/driverless vehicles: <ul style="list-style-type: none"> - Driverless vehicles need to have a test mode fitting to the test method and preparations of the test - The test track might need adaptations to support navigation and path planning of the AV. - Vehicles that will not reach the 50km/h (Urban shuttles) need adapted requirements - Bi-direction vehicles to be tested bi-directional - L2 use cases could be Riksjä / mini cab - L4 an asymmetric 3-wheel configuration for small goods delivery - L5 like L2 above 50km/h 	Specifics for vehicles that can be driven manually and driverless: <ul style="list-style-type: none"> - These vehicles can be driven manually in the test, when the manual mode is representative for the automated driving. Else, see driverless remarks.
Content to be transferred to ADS regulation: TBD	

GRBP UN/ECE R 028	Regulation applicable to Automated Vehicles/driverless vehicle : <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO
Audible warning devices	
Content summary	Summary of required changes
Content relevant for AV's/driverless vehicles: <ul style="list-style-type: none"> - Driverless vehicles need to have a test mode fitting to the test method and preparations of the test 	Specifics for vehicles that can be driven manually and driverless: <ul style="list-style-type: none"> - These vehicles can be operated manually in the test, when the manual mode is representative for the automated driving. Else, see driverless remarks.
Content to be transferred to ADS regulation: TBD	

GRBP UN/ECE R 030	Regulation applicable to Automated Vehicles/driverless vehicle : <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO
Tyres for Passenger Cars and their trailers	
Content summary	Summary of required changes
Content relevant for FAV's/driverless vehicles: <ul style="list-style-type: none"> - ... 	Specifics for vehicles that can be driven manually and driverless: <ul style="list-style-type: none"> -
Content to be transferred to ADS regulation: ...	

GRBP UN/ECE R 041	Regulation applicable to Automated Vehicles/driverless vehicle : <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO
Motorcycle Noise (L3-cat)	Low priority
Content summary <i>L3-cat will likely not be automated</i>	Summary of required changes
Content relevant for AV's/driverless vehicles: - Driverless vehicles need to have a test mode fitting to the test method and preparations of the test - The test track might need adaptations to support navigation and path planning of the AV.	Specifics for vehicles that can be driven manually and driverless: - These vehicles can be operated manually in the test, when the manual mode is representative for the automated driving. Else, see driverless remarks.
Content to be transferred to ADS regulation:	

GRBP UN/ECE R 051	Regulation applicable to Automated Vehicles/driverless vehicle : <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO
Vehicle Sound (M, N)	
Content summary	Summary of required changes
Content relevant for FAV's/driverless vehicles: - Driverless vehicles need to have a test mode fitting to the test method and preparations of the test - The test track might need adaptations to support navigation and path planning of the AV. - Vehicles that will not reach the 50km/h (Urban shuttles) might need additional requirements - Bi-direction vehicles to be tested bi-directional	Specifics for vehicles that can be driven manually and driverless: - These vehicles can be operated manually in the test, when the manual mode is representative for the automated driving. Else, see driverless remarks.
Content to be transferred to ADS regulation: TBD	

GRBP UN/ECE R 054	Regulation applicable to Automated Vehicles/driverless vehicle : <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO
Tyres for Commercial Vehicles and their trailers	
Content summary	Summary of required changes
Content relevant for FAV's/driverless vehicles: -	Specifics for vehicles that can be driven manually and driverless: -
Content to be transferred to ADS regulation:	

GRBP UN/ECE R 059	Regulation applicable to Automated Vehicles/driverless vehicle : <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO
Replacement Silencers (M1/N1)	
Content summary See remarks on R51	Summary of required changes
Content relevant for FAV's/driverless vehicles: -	Specifics for vehicles that can be driven manually and driverless: -
Content to be transferred to ADS regulation: ...	

GRBP UN/ECE R 063	Regulation applicable to Automated Vehicles/driverless vehicle : <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO
Vehicle Sound (L1)	Low priority
Content summary	Summary of required changes
Check the likelihood of relevance Content relevant for FAV's/driverless vehicles: - Driverless vehicles need to have a test mode fitting to the test method and preparations of the test - The test track might need adaptations to support navigation and path planning of the AV.	Specifics for vehicles that can be driven manually and driverless: - These vehicles can be operated manually in the test, when the manual mode is representative for the automated driving. Else, see driverless remarks.
Content to be transferred to ADS regulation:	

GRBP UN/ECE R 075	Regulation applicable to Automated Vehicles/driverless vehicle : <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO
Motorcycle Tyres	
Content summary	Summary of required changes
Content relevant for FAV's/driverless vehicles: -	Specifics for vehicles that can be driven manually and driverless: -
Content to be transferred to ADS regulation:	

GRBP UN/ECE R 092	Regulation applicable to Automated Vehicles/driverless vehicle : <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO
Motorcycle Replacement Silencers Systems	Low priority
Content summary See remarks on R41 <i>will likely not be automated</i>	Summary of required changes
Content relevant for FAV's/driverless vehicles: - ...	Specifics for vehicles that can be driven manually and driverless: -
Content to be transferred to ADS regulation: ...	

GRBP UN/ECE R 106	Regulation applicable to Automated Vehicles/driverless vehicle : <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO
Tyres for Agricultural vehicles	
Content summary	Summary of required changes
Content relevant for FAV's/driverless vehicles: -	Specifics for vehicles that can be driven manually and driverless: -
Content to be transferred to ADS regulation:	

GRBP UN/ECE R 108	Regulation applicable to Automated Vehicles/driverless vehicle : <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO
Retreaded Tyres for Passenger Cars and their trailers	
Content summary	Summary of required changes
Content relevant for FAV's/driverless vehicles: -	Specifics for vehicles that can be driven manually and driverless: -
Content to be transferred to ADS regulation:	

GRBP UN/ECE R 109	Regulation applicable to Automated Vehicles/driverless vehicle : <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO
Retreaded Tyres for Commercial Vehicles and their trailers	
Content summary	Summary of required changes
Content relevant for FAV's/driverless vehicles: -	Specifics for vehicles that can be driven manually and driverless: -
Content to be transferred to ADS regulation:	

GRBP UN/ECE R 117	Regulation applicable to Automated Vehicles/driverless vehicle : <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO
RR, noise, WG and future WGWT	
Content summary	Summary of required changes
Content relevant for FAV's/driverless vehicles: -	Specifics for vehicles that can be driven manually and driverless: -
Content to be transferred to ADS regulation:	

GRBP UN/ECE R 124	Regulation applicable to Automated Vehicles/driverless vehicle : <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO
Replacement wheels for passenger cars	
Content summary	Summary of required changes
Content relevant for FAV's/driverless vehicles: - The potential use of a spare tyre on AV's should be considered including requirements related to this.	Specifics for vehicles that can be driven manually and driverless: - Safety of the potential use of a spare tyre needs to be considered for both manual and automated modes.
Content to be transferred to ADS regulation:	

GRBP UN/ECE R 138	Regulation applicable to Automated Vehicles/driverless vehicle : <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO
Quiet Road Transport Vehicle	
Content summary	Summary of required changes
Content relevant for FAV's/driverless vehicles: - Driverless vehicles need to have a test mode fitting to the test method and preparations of the test - The test track might need adaptations to support navigation and path planning of the AV. - Bi-direction vehicles to be tested bi-directional	Specifics for vehicles that can be driven manually and driverless: - These vehicles can be operated manually in the test, when the manual mode is representative for the automated driving. Else, see driverless remarks.
Content to be transferred to ADS regulation:	

GRBP UN/ECE R 141	Regulation applicable to Automated Vehicles/driverless vehicle : <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO
Tyre Pressure Monitoring Systems	
Content summary	Summary of required changes
Content relevant for FAV's/driverless vehicles: - One might consider other limits if tyre pressure would be more critical than in manual driving condition due to f.ex. vehicle dynamic change or asymmetric behavior that leads to false adaptive behavior of the automated system. - The response of the ADS to a TPMS warning might need to be considered in this regulation	Specifics for vehicles that can be driven manually and driverless:
Content to be transferred to ADS regulation:	

GRBP UN/ECE R 142	Regulation applicable to Automated Vehicles/driverless vehicle : <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO
Tyre Installation	
Content summary	Summary of required changes
Content relevant for FAV's/driverless vehicles: - Vehicle dynamic aspects of tyres might influence the stability of the control systems - One might consider stricter specification than available in the TA-regulation. - Bi-directional use of tyres	Specifics for vehicles that can be driven manually and driverless:
Content to be transferred to ADS regulation:	

GRBP UN/ECE R 164	Regulation applicable to Automated Vehicles/driverless vehicle : <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO
Studded tyres	
Content summary	Summary of required changes
Content relevant for FAV's/driverless vehicles: -	Specifics for vehicles that can be driven manually and driverless: -
Content to be transferred to ADS regulation:	

GRBP UN/ECE R 165	Regulation applicable to Automated Vehicles/driverless vehicle : <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO
Reversed Warning Sound	
Content summary	Summary of required changes
Content relevant for FAV's/driverless vehicles: - Driverless vehicles need to have a test mode fitting to the test method and preparations of the test - The test track might need adaptations to support navigation and path planning of the AV. - Bi-direction vehicles to be tested bi-directional - Alternative requirements might be needed	Specifics for vehicles that can be driven manually and driverless: - These vehicles can be operated manually in the test, when the manual mode is representative for the automated driving. Else, see driverless remarks.
Content to be transferred to ADS regulation:	

GRBP UN/ECE GTR 16	Regulation applicable to Automated Vehicles/driverless vehicle : <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO
Tyres	
Content summary	Summary of required changes
Content relevant for FAV's/driverless vehicles: -	Specifics for vehicles that can be driven manually and driverless: -
Content to be transferred to ADS regulation:	

ANNEX 3: First suggestions for further steps and to reflect the considerations during the screening

UN Regulations	Title	Topic	Vehicle and/or Component	category	to be checked	changes required	First suggestions of the SIG-AVRS				
							Issue	Issue for fully automated vehicles?	Issue for dual mode vehicles?	Issue for vehicles without occupants?	Issue for other use cases?
UN R 9	Noise of three-wheeled vehicles	Noise	Vehicle	L2, L4, L5	YES	YES	measurement procedure	YES	No	YES	Test mode
UN R 28	Audible warning devices	Noise	Component & Vehicle	M, N, L3, L4, L5	YES	YES	requirements for courtesy horn, actuation	YES	YES	YES	new requirements
UN R 30	Tyres for passenger cars and their trailers	Tyres	Component	M, O	No						
UN R 41	Noise emissions of motorcycles	Noise	Vehicle	L3	YES	??**	measurement procedure	YES	No	?	Test mode
UN R 51	Noise of M and N categories of vehicles	Noise	Vehicle	M, N	YES	YES	measurement procedure	YES	No	YES	Test mode
UN R 54	Tyres for commercial vehicles and their trailers	Tyres	Component	N, O	No						
UN R 59	Replacement silencing systems	Noise	Component & Vehicle	M1, N1	YES	copy UN R 51	measurement procedure	YES	No	YES	Test mode
UN R 63	Noise emissions of mopeds	Noise	Vehicle	L1	YES	??**	measurement procedure	YES	No	?	Test mode
UN R 64	Temporary use spare unit, run flat tyres	Tyres	Component & Vehicle	M, N	YES	??**	measurement procedure	?	No	?	
UN R 75	Tyres for motorcycles/mopeds	Tyres	Component	L1, L3	No						
UN R 92	Replacement exhaust silencing systems (RESS) for motorcycles	Noise	Component & Vehicle	L	YES	copy UN R 41**	measurement procedure	YES	No	?	Test mode
UN R 106	Tyres for agricultural vehicles	Tyres	Component	T, R, S	No						
UN R 108	Retreaded tyres for passenger cars and their trailers	Tyres	Component	M, O	No						
UN R 109	Retreaded tyres for commercial vehicles and their trailers	Tyres	Component	N, O	No						
UN R 117	Tyres, rolling resistance, rolling noise and wet grip	Tyres	Component*	M, N, O	No						
UN R 124	Replacement wheels for passenger cars	Tyres	Component	M	YES	YES	application in Avs	YES	YES		new requirements
UN R 138	Quiet Road Transport Vehicles (QRTV)	Noise	Vehicle	M, N	YES	YES	measurement procedure	?	No	?	new requirements, Test procedure
UN R 141	Tyre Pressure Monitoring Systems (TPMS)	Tyres	Component & Vehicle	M1, N1	YES	YES	warning strategy, actions?	YES	YES	YES	new requirements
UN R 142	Tyres installation	Tyres	Component & Vehicle	M1	YES	?	vehicle dynamic aspects?	YES	YES	YES	new requirements
UN R 164	Studded tyres with regard to their snow performance	Tyres	Component*		No						
UN R 165	Audible reverse warning devices and audible reverse warning signals	Noise	Component & Vehicle	M2, N2, M3, N3	YES	?	warning strategy	YES	YES	YES	new requirements
GTR No. 16	Tyres	Tyres	Component*		No						
					<i>Sum of "YES"</i>	<i>13</i>					

* needs any non fully automated vehicle for testing

** usecase questionable