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**ECONOMIC COMMISSION FOR EUROPE**

**INLAND TRANSPORT COMMITTEE**

**Working Party on the Transport  
of Dangerous Goods**

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Geneva, 19-23 January 2004)

**PROPOSALS FOR AMENDMENT TO ANNEXES A AND B OF ADR**

**Part 9 of ADR**

**Chapter 9.2: Requirements concerning the construction of vehicles**

**Transmitted by the Government of Germany**

**SUMMARY**

Executive Summary:	The installation of electronically controlled stabilizing systems will increase the safety of dangerous goods transports on roads to a high extent.
Action to be taken:	Definitions for such systems or functions to be incorporated into ECE-Regulation 13. Amend Chapter 9.2 of the ADR by a reference to ECE-Regulation 13 in order to make such systems mandatory for dangerous goods vehicles.
Related documents:	./.

**Introduction**

Many accidents with heavy goods vehicles occur, because the driver is not able to react correctly or quickly enough on critical road or traffic situations (e.g. violent lane change manoeuvres when obstacles appear suddenly or are detected too late, cornering with excessive speed, unexpected movements on low adhesion surfaces). The consequences often are skidding, jack-knifing or rolling over. In order to reduce these risk situations, industry has developed electronically controlled stabilizing systems which can prevent such accidents to a great extent.

The following definitions for electronically controlled stabilizing systems have been elaborated in cooperation between experts from industry and from Technical Services:

-“Vehicle Stability Function” means a function for a power-driven vehicle which improves the dynamic stability of the vehicle by actively controlling the individual wheel speeds based at least on the evaluation of the actual vehicle behaviour in comparison with the vehicle behaviour demanded by the driver. This includes at least the possibility to actuate individual brakes independently of the driver and to increase and decrease individually their braking torques and the possibility to modify engine torque. The actual vehicle behaviour is derived at least from measured values of its yaw speed, lateral acceleration and wheel speeds. The vehicle behaviour demanded by the driver is derived at least from the driver’s control input to the service braking system, the steering system and the engine.

- “Trailer Roll Stability Function” means a function for a trailer which reduces the tendency of the vehicle to roll over during dynamic manoeuvres by actively controlling the wheel speeds based at least on the evaluation of the actual vehicle behaviour in comparison with predefined or estimated limits. This includes at least the possibility to actuate the brakes independently of the driver and to increase or decrease their braking torque side wise or axle wise. The actual vehicle behaviour is derived at least from measured wheel speed and additional measured values for the determination of its lateral dynamics.

The terms “Vehicle Stability Function” and “Trailer Roll Stability Function” have been chosen as they are believed to be unconnected with a specific organization. Organization specific terminology includes – Vehicle Dynamics Control (VDC), Electronic Stability Control (ESC), Electronic Stability Program (ESP), Electronic Stabilization Program (ESP), Porsche Stability Management (PSM), Dynamic Stability Control (DSC), Dynamic Stability Program (DSP), Roll Stability Program (RSP), Trailer Roll Stability Program (TRSP), Roll Over Protection (ROP), Roll Stability Control (RSC), and Roll Stability Support (RSS).

WP.15 should have an exchange of views about the above definitions and then transmit them to WP.29/GRRF for further consideration and incorporation into ECE-Regulation 13 (eventually as new paragraphs 2.28 and 2.29).

### **Proposal**

The mandatory equipment of ADR-vehicles with electronically controlled stabilizing systems will be achieved by a reference in Chapter 9.2 of the ADR to the respective paragraphs [2.28, 2.29] in ECE-Regulation 13, whereby Germany proposes to proceed in 2 steps. In the first step vehicles of category N<sub>3</sub> (motor vehicle with a gross vehicle weight > 12 t) and semi-trailers of category O<sub>4</sub> (gross vehicle weight > 10 t) for which the systems are available on the market should be included. Other vehicles for which the systems are still in the development stage (full trailers) should be included in a second step.

Amend Chapter 9.2 of the ADR as follows:

Add the following new section:

“9.2.7 Electronically controlled stabilizing systems

9.2.7.1 Vehicles of category N<sub>3</sub> except vehicles with more than 3 axles and off-road vehicles of category N<sub>3G</sub> as defined in Annex 7 to the Consolidated Resolution on the Construction of Vehicles (R.E.3) shall be fitted with a stability function according to paragraph [2.28] of ECE-Regulation 13.

9.2.7.2 Semi-trailers of category O<sub>4</sub> shall be fitted with a trailer roll stability function according to paragraph [2.29] of ECE-Regulation 13.”

Amend the table in section 9.2.1 as follows:

	EX/II	EX/III	AT	FL	OX	Comments
9.2.7 Electronically controlled stabilizing systems						
9.2.7.1 Vehicle Stability Function	x	x	x	x	x	<i>Applicable to motor vehicles with a maximum permissible mass exceeding 12 tonnes registered as from [1 July 2006]</i>
9.2.7.2 Trailer Roll Stability Function	x	x	x	x	x	<i>Applicable to semi-trailers with a maximum permissible mass exceeding 10 tonnes registered as from [1 July 2006]</i>

### Justification

Advances in the electronic control of braking systems resulting from the development and introduction into series production of the electronically controlled braking system (EBS) enables corrective actions to be taken in critical situations with regard to longitudinal and lateral vehicle dynamics – sliding, jack-knifing, rolling over – independent of the driver. The evaluation and response times of such systems are far in excess of those of the most skilled driver, such that corrective action can be taken before the driver is even aware that a critical situation is approaching. Additionally a driver can only operate all the wheel brakes collectively while the vehicle stabilization function can brake an individual wheel or any combination of wheels and thereby better control the total vehicle in critical situations. Therefore, while such systems cannot overcome the basic physical laws that govern human life they can significantly improve vehicle safety and thereby reduce accidents.

In a step-by-step approach, advantage can be taken of this improvement in vehicle control by introducing the vehicle stability function and the trailer roll stability function for reduction of risks on the most frequently used type of ADR vehicles – the tractor and semi-trailer combination – and to provide optimal active passenger protection on long distance touring coaches.

A ‘system definition’- method of specifying the vehicle stability function and the trailer roll stability function has been chosen in preference to a ‘functional requirement’ method so as to

- (a) minimize homologation testing and
- (b) to ensure ongoing system enhancement.

By setting a minimum performance standard (functional requirement), a very substantial amount of work would be required to establish a consistent and uniform test method together with pass/fail criteria – either

- (a) single test for all power-driven vehicle and trailer types (probably not possible),
- (b) a separate test for each vehicle type, e.g. M1, M2, M3, N1, ..... & O4 (may be possible)
- or
- (c) a separate test for each vehicle type and vehicle configuration, e.g. N<sub>3</sub> 4x2, 6x2, 6x4, .... (most probable)

– that would be acceptable to all Technical Services and would not require additional test facilities. Also, once the minimum standard had been set there would be little incentive for the suppliers of such systems to have a higher performance system.

With a ‘system definition’ method for specifying the minimum requirements, the seeking of ‘commercial advantage’ would bring systems that would provide ongoing performance improvements. Additional high levels of vehicle testing – compared with today – would not be required at the homologation stage. Approval would be based on (a) meeting the definition, (b) an evaluation of the system in accordance with Annex 18 and (c) an ‘on/off’ test – specified by the vehicle manufacture – to demonstrate the functioning of the system and its advantages.

Unlike the ‘upgrading’ of conventional suspension systems to meet higher requirements or the introduction of semi-active/active suspension control, vehicle stability and trailer roll stability functions do not encourage the driver to drive faster. The operation of the vehicle stability function and the trailer roll stability function apply the brakes to significantly slow the vehicle, thereby encouraging the driver to drive without bring the function into operation.

### **Safety implications**

Electronically controlled stabilizing systems will increase road safety to a high extent. They will reduce the number of accidents by enabling the driver to keep control over the vehicle in critical situations. Especially rollover accidents, which according to the German research project THESEUS form a great part of all dangerous goods accidents, will be prevented by the rollover protection function.

### **Feasibility**

The systems are available on the market for vehicles which are cited in the proposal.

If, for any reason, WP.29/GRRF should not be in the position to incorporate the definitions for electronically controlled stabilizing systems into ECE-Regulation 13 in due time, these definitions could also be incorporated into the ADR and the references in Chapter 9.2 would have to be changed accordingly.

### **Enforceability**

The new requirement should be introduced with the ADR-version coming into force on [1 January 2005] giving industry a lead time of 18 months. Vehicles registered before 1 July 2006 may continue to be used for the transport of dangerous goods even if they are not equipped with electronically controlled stabilizing systems.

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