

**Informal Document No. GRRF-58-17**  
**(58<sup>th</sup> GRRF, 20-23 September 2005,**  
**agenda item 6.4.)**

*Test Methods for Evaluation of  
Vehicle Handling and Stability  
Applied in Russian Federation*

Presented at the 58<sup>th</sup> GRRF Session  
by the Expert from Russian Federation

*Geneva, 2005*



*In regards to vehicle handling and stability, the regulatory activities of Russian Federation include this subject into the mandatory requirements since early 1980<sup>th</sup>*

# *National Standard GOST R 52302-2004*



*By this time the National Standard of Russian Federation related to vehicle handling and stability, GOST R 52302-2004 has been approved.*

*The standard sets the test procedures and the related results that are considered corresponding to the acceptable level of handling and stability of modern vehicles.*

*National Standard GOST R 52302-2004*



**Test procedures  
and requirements**

# *Test Procedure: Steering Effort*



- **Vehicle categories concerned:** *M, N*
- **Reference document, describing the procedure:**  
*ECE Regulations No. 79*
- **Test results and requirements:**  
*The requirements are set to the steering effort measured on stopped vehicle and at speed 10 km/h with and without power assistance*

# *Test Procedure: Releasing the steering wheel when a vehicle is driven in a circle*

- **Vehicle categories concerned:** *M, N*
- **Reference document, describing the procedure:**  
*ECE Regulations No. 79 (vehicle speed 10 km/h)*
- **Test results and requirements:**  
*Vehicle speed 50 or 40 km/h. The steering wheel shall return to the position of straight driving without driver's assistance and oscillations. The residual steering wheel angle shall be not more than 30% of the initial value.*

# *Test Procedure:*

## *Static tilting on a test platform*

- **Vehicle categories concerned:**

*M1G, M2, M3, N, O, N+O (semi-trailers)*

- **Reference document, describing the procedure:**

*ECE Regulations No. 111, Annex 3*

- **Test results and requirements:**


*Tilting table angle at the time when one wheel of a vehicle lifts off the tilting table and the corresponding roll angle of the vehicle sprung mass. The requirements to the both angles depend on the level of the static stability coefficient, which is a ratio between a half of vehicle track and vehicle height of the center of mass.*

*Photo:*  
*Static tilting on a test platform*





*Test Procedure: Straight driving  
on a line of limited width*

- 
- **Vehicle categories concerned:** *M3, N, N+O*
  - **Reference document, describing the procedure:** *N/A*
  - **Test results and requirements:**  
*The angular velocity of steering input shall not exceed the level set by the standard.*


# *Test Procedure: Step steering input*



- **Vehicle categories concerned:** *M, N*
- **Reference document, describing the procedure:** *ISO 7401*
- **Test results and requirements:**

*Characteristics of lateral acceleration and yaw rate in response to the step steering input. The requirements are set to the range of steering wheel angles, yaw rate overflow and time of yaw rate response depending on the level of the vehicle lateral acceleration.*

# *Techniques for avoiding stability loss (rolling over) when testing*



- Static tilting angle on the test platform can be corresponded with the critical value of lateral acceleration for the conditions of steady-state driving on a circle, when vehicle rolling over can be occurred.
- For the conditions of steady-state driving on a circle the steering wheel angle corresponding with the value of lateral acceleration can be determined.
- Such steering wheel angle is used as the steering input for the step steering test.

# *Test Procedure: Turning*



- **Vehicle categories concerned:**  $M$ ,  $N$ ,  $M+O$ ,  $N+O$
- **Reference document, describing the procedure:**  $N/A$
- **Test results and requirements:**  
*Determination of the maximum speed of the test maneuver (entering the circle of 35-m radius) and the factors that limit the said speed.  
The requirements are set to the maximum speed of a vehicle at the test maneuver.*

# *Test Procedure: Lane Change*



- **Vehicle categories concerned:** *M, N, M+O, N+O*
- **Reference document, describing the procedure:**  
*Informal Document GRRF-55-20*
- **Test results and requirements:**  
*Determination of the maximum speed of the test maneuver (lane change at the distance 16 or 20 m) and the factors that limit the said speed. The requirements are set to the maximum speed of a vehicle at the test maneuver.*



*Closed-loop tests are considered necessary as they allow to evaluate behavior of the “Driver-Vehicle” system more realistically*

## *Techniques for reducing driver's influence and increasing safety for the Lane-change test*



- *Recording of the driver's steering inputs corresponding with the position of vehicle on the trajectory. The test runs with the incorrect inputs are excluded from the further consideration.*
- *Outside observer informing the driver by radio in regards to vehicle behavior on the test trajectory.*

# Photos: *Measuring Instrumentation*



*Longitudinal  
Speed  
Sensor*

*Light  
Barrier*

*Height  
Sensor*

*Measuring  
Steering  
Wheel*

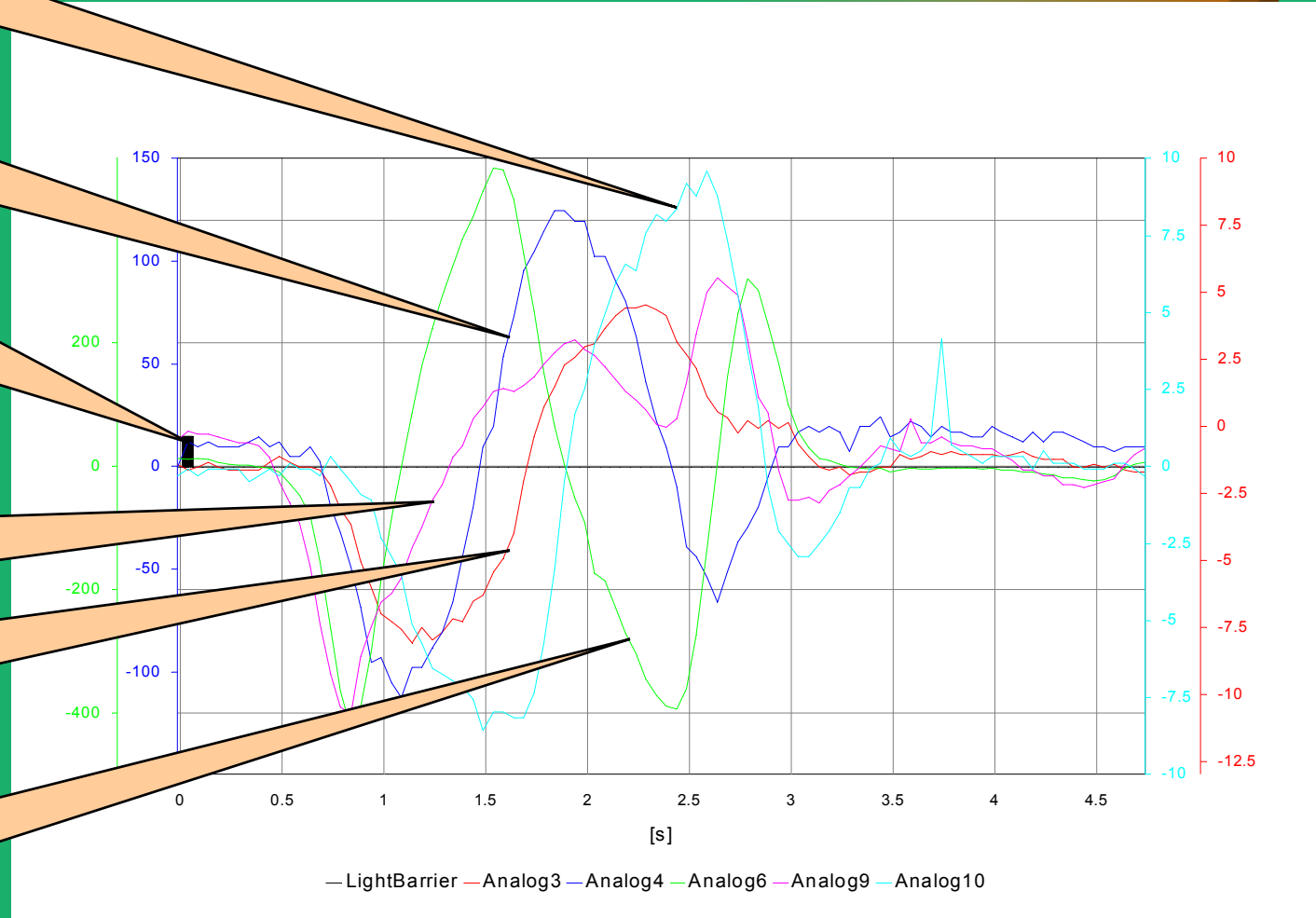


# *Photo: Lane Change Test Run*



# Lane Change Test Run Recorded Data Sample

- Lateral Acceleration Front
- Steering Wheel Angle
- Light Barrier
- Steering Torque
- Lateral Acceleration Rear
- Steering Wheel Angular Velocity



# *Test Procedure: Driving in regular conditions (like on public roads)*

- **Vehicle categories concerned:** *M, N, M+O, N+O*
- **Reference document, describing the procedure:** *N/A*
- **Test results and requirements:**

*Determination of recommendable maximum speed of driving in regular conditions by expert evaluation in case if the requirements to the maximum speed of a vehicle at the test maneuvers of lane change and turning had not been met*

## *Further development of the test procedures*



- *Development of the test methods on the roads with low adhesion coefficient*
- *Development of the new evaluation methods for the vehicles equipped with the modern control systems like auxiliary steering equipment (ASE) or electronic vehicle stability control systems (EVSC)*

# *ASE and EVSC Specific Concerns*



- *We shall check by the tests what kind of improvements were reached by application of ASE or EVSC*
- *We shall ensure by the tests that in case of malfunction of ASE or EVSC vehicle handling and stability performance will not be significantly deteriorated*
- *We shall ensure by the tests that in case of application of EVSC vehicle handling performance will not become worse*

## *Conclusive Notes*



- **In Russian Federation the system for vehicle handling and stability evaluation is well developed and set by the National Standard GOST R 52302-2004**
- **Development of the international provisions on the level of the ECE Regulations for evaluation of vehicle handling and stability now becomes necessary, taking into account expansion of application of ASE or EVSC systems on modern vehicles**
- **Such international provisions may be developed on the basis of test methods being applied in Russian Federation for many years**



*Thank you for your attention!*