



New CEMA Approach to EU Draft “Braking Regulation for Agricultural Vehicles”

03 July 2013



CEMA Ad hoc Group Braking

Dedicated group to review Rev17 of „EU draft Braking Regulation“

Composition and workload of this group:

- **9 experts** from tractor-, trailer- and component-manufacturers and associations plus Mr Gaupp as legislative expert
- totally more than **33 meeting-days** starting October 2012
- challenging time schedule

Development of Agricultural Braking Regulations

■ 76/432 EEC

(14 pages of regulation text)

- no towed vehicles considered
- only speeds up to 40 km/h considered

■ EU COM Draft for Agricultural Braking Regulation Rev17

(approx. 160 pages of regulation text)

- based on 71/320 EEC and ECE-R13 reflecting the level of the 1990s
- several “state of the art” requirements are missing

■ New CEMA Draft for EU Agricultural Braking Regulation

(approx. 250 pages of regulation text)

- updated as close as possible to current ECE-R13
- considering future technologies for agricultural vehicles



Complexity of current and future technology on the market is more and more reflected in the text

Results (Major Items)

■ Annex I: Definitions

- New definitions for towed vehicle categories
- Amendment for inertia brakes on towed vehicles
- Incorporation of future technologies
- Modification of secondary braking system
- Same safety level for compressed-air and hydraulic trailer braking systems

Results (Major Items)

■ Annex II: Braking Tests

- Revised formula for stopping distance and mean fully deceleration
- Revised compatibility requirements
- Introduction of adhesion utilization requirements
- Additional fade tests for fast and heavy vehicles

■ Annex III: Measurement of the response time

- hydraulic braking systems considered

■ Annex VII: Alternative Test Procedures for Hot Performance Tests

- updated to ECE-R13

Results (Major Items)

- Annex VIII: Inertia Brakes
 - updated to ECE-R13
- Annex IX: Hydrostatic Drive
 - updated
- Annex XII: EBS requirements for tractors and towed vehicles
 - new Annex added

Results (Details)

Annex I:

■ New definitions for towed vehicle categories:

- **“draw bar towed vehicle”** instead of “full towed vehicle”

Definition taken from EU Directive 97/27/EC

- **“rigid draw bar towed vehicle”** instead of “semi-mounted towed vehicle”

Definition taken from Framework Directive 2007/46/EC:

- transmits a significant static load to the towing vehicle
- the coupling shall not consist of a king pin and fifth wheel

Results (Details)

Annex I:

■ Inertia Brakes:

For vehicles of category R3a \leq 8000 kg:

- max. design speed \leq 30 km/h when the brakes act not on all wheels
- max. design speed \leq 40 km/h when the brakes act on all wheels

(considering trailers for harvesting implements)

Results (Details)

Annex I:

■ Incorporation of future technologies:

- **Vehicle Stability functions:**

Automatic application of the towed vehicle brakes alone is permitted up to 5 seconds. To reduce different kinds of coupling forces between towing and towed vehicle

- **Coupling force control:**

To reduce the difference between the dynamic braking rates of towing and towed vehicles. Controls only coupling forces generated by the service braking system.

Results (Details)

Annex I:

■ Modification of secondary braking system:

For T.b and C.b vehicles:

- With the secondary braking system applied,
- There shall be a graduated braking action on the towed vehicle

Results (Details)

Annex I:

■ Safety level of hydraulic trailer braking systems:

- dual line hydraulic system
- optional electrical connector acc. to ISO 7638 for warning, ABS, etc.
- same safety level as for compressed-air systems required
- emergency functions
 - break-away/leakage of only one connection-line considered
- consideration of environmental aspects
(break-away with insignificant hydraulic leakage)

Results (Details)

Annex II:

- Stopping distance and mean fully developed deceleration:

$\leq 30 \text{ km/h: } s = 0.15v + v^2/92$

$d_m \geq 3.55 \text{ m/s}^2$

$> 30 \text{ km/h: } s = 0.15v + v^2/130$

$d_m \geq 5 \text{ m/s}^2$

Both conditions must be fulfilled. MFDD necessary to ensure rolling road dynamometer testing for PTI

Results (Details)

Annex II:

■ Compatibility requirements for vehicles > 30 km/h:

Intention:

- ensure best practice compatibility with new tractors and legacy vehicles within all speed > 30 km/h
- ensure compatibility with current truck trailers
- no consideration of truck semi-trailers

➡ **CEMA proposal for compatibility requirements:**

- New diagram for agricultural tractors > 30 km/h
- Towed vehicles acc. to ECE-R13 (> 30 km/h)

Results (Details)

New Tractor Diagram

> 30 km/h

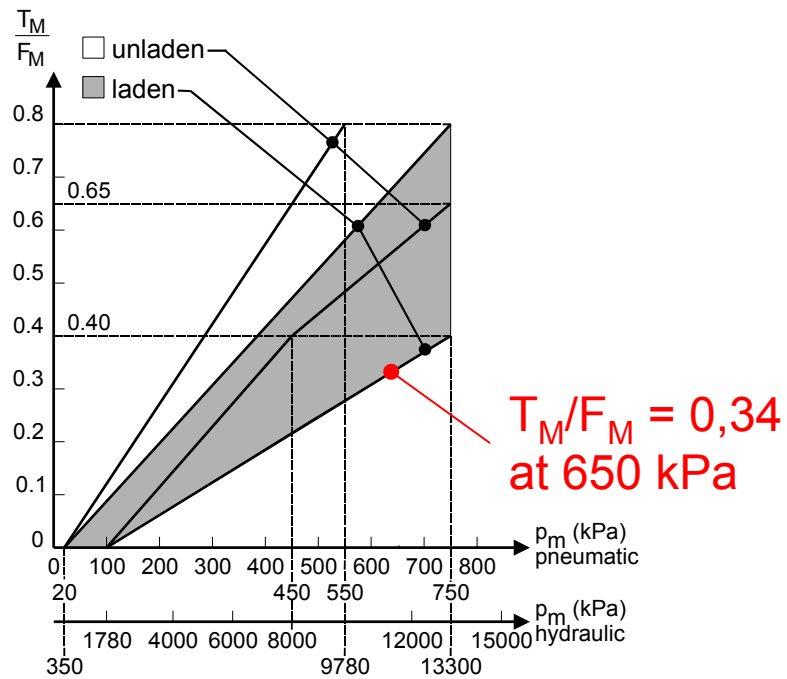
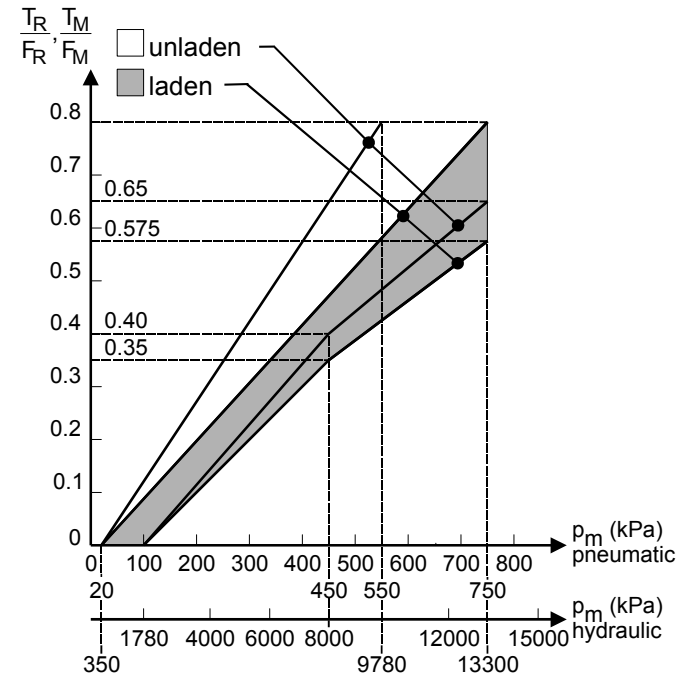


Diagram 2 (from ECE-R13, Annex 10):

- Drawbar Towed Vehicles
- Rigid Drawbar Towed Vehicles (x 0.95)
- Centre-Axle Towed Vehicles (x 0.95)



Results (Details)

Annex II:

■ Introduction of Adhesion Utilization Requirements > 40 km/h:

- load dependent distribution of braking among the axles
- reduces skidding on all surfaces
- reduced stopping distances
- increased driving stability for tractors

➡ CEMA proposal for increased driving stability for tractors and towed vehicles > 40 km/h

Technical Solutions:

- engagement of All-Wheel-Drive during braking
- installed braking force on front axle higher than on rear axle
- introduction of load sensing devices for tractors (future technology)

Results (Details)

Annex II:

- Additional fade tests for fast and heavy vehicles > 40 km/h:

Acc. to ECE-R13; Annex 4:

- ensure increased thermal capability of vehicles (hot performance)
- Typ-II Test (downhill behavior) for tractors > 40 km/h and 12 tons; ensures continuous braking performance
- Typ-III Test for towed vehicles > 40 km/h and sum of permissible masses per axle exceeding 10.000kg
repeated braking test similar to the Type-I for tractors

Results (Details)

Annex III:

■ Measurement of the response time

- hydraulic braking systems for tractors and towed vehicles considered
- new philosophy for the measurement of hydraulic systems by using:
 - towed vehicle simulator to test the tractor
 - towing vehicle simulator to test the towed vehicle
- defined interface for hydraulic systems:
 - tractors provide a defined oil volume
 - towed vehicles must fulfill the response time requirement with this defined volume

Results (Details)

Updated to ECE-R13:

■ Annex V:

Spring brakes

≤ 30 km/h spring brakes allowed to be used for service braking system

■ Annex VII:

Cases in which Type-I-and/or Type-II or Type III tests do not have to be carried out

Rolling resistance of agricultural tyres considered

■ Annex VIII:

Inertia Brakes

Results (Details)

■ Annex IV:

Braking system for vehicles with hydrostatic drive
updated with German StVZO

■ Annex XII:

EBS requirements for tractors and towed vehicles:

- new added Annex for homologation of EBS systems for agricultural vehicles
- at the moment, restricted to compressed-air systems:
ISO 11992 protocol (data communication) not defined for hydraulics.

Regarding All Revised Annexes:

- editorial and technical corrections were done
- updated with current requirements from ECE-R13, if applicable

Results (Summary)

Conclusion:

- New CEMA Draft Braking Regulation provides a well-balanced regulatory approach with a similar level of safety as for road vehicles
- Big increase in safety of agricultural braking compared to current legislation
- Manufacturers of agricultural machinery will take the opportunity to demonstrate the effectiveness of the new proposed safety measures for braking

Thank you

