



Overview on Proposal

ECE/TRANS/WP.29/GRSP/2009/6

Thomas Herpich
May 2009

safety.

Cut Out of Actual Regulatory Text on Strap Extraction



7.6.2. Locking of emergency locking retractors

The design of any such test apparatus shall ensure that **the required acceleration** is given **before the webbing is withdrawn** out of the retractor **by more than 5 mm** and that the withdrawal takes place at an **average rate of increase of acceleration of at least 25 g/s and not more than 150 g/s.**

6.2.5.3.1.2. **It must not lock** for values of acceleration of the strap measured in the direction of the extraction of the strap **of less than 0.8 g** in the case of type 4 or less than 1.0 g in the case of type 4N retractors.

6.2.5.3.2. When tested in accordance with paragraph 7.6.2., an emergency locking retractor with multiple sensitivity, including strap sensitivity, shall comply with the specified requirements and also **lock up when strap acceleration** measured in the direction of unreeling **is not less than 2.0 g.**

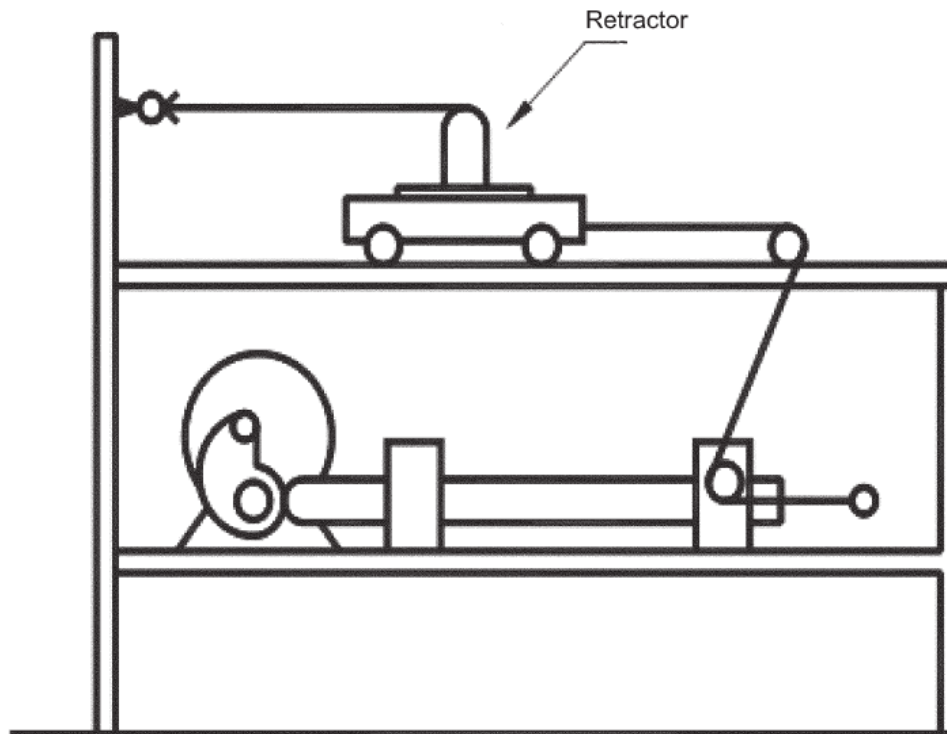
6.2.5.3.3. In the case of the tests mentioned in paragraphs 6.2.5.3.1. and 6.2.5.3.2. above **the amount of strap movement** which may occur before the retractor locks **shall not exceed 50 mm** starting at the length given in paragraph 7.6.2.1. In the case of the test mentioned in paragraph 6.2.5.3.1.2. above locking must not occur during the 50 mm of strap movement starting at the length given in paragraph 7.6.2.1.

Cut Out of Regulatory Text



ECE R 16 – Annex 4

DIAGRAM OF AN APPARATUS TO TEST LOCKING OF EMERGENCY LOCKING RETRACTORS



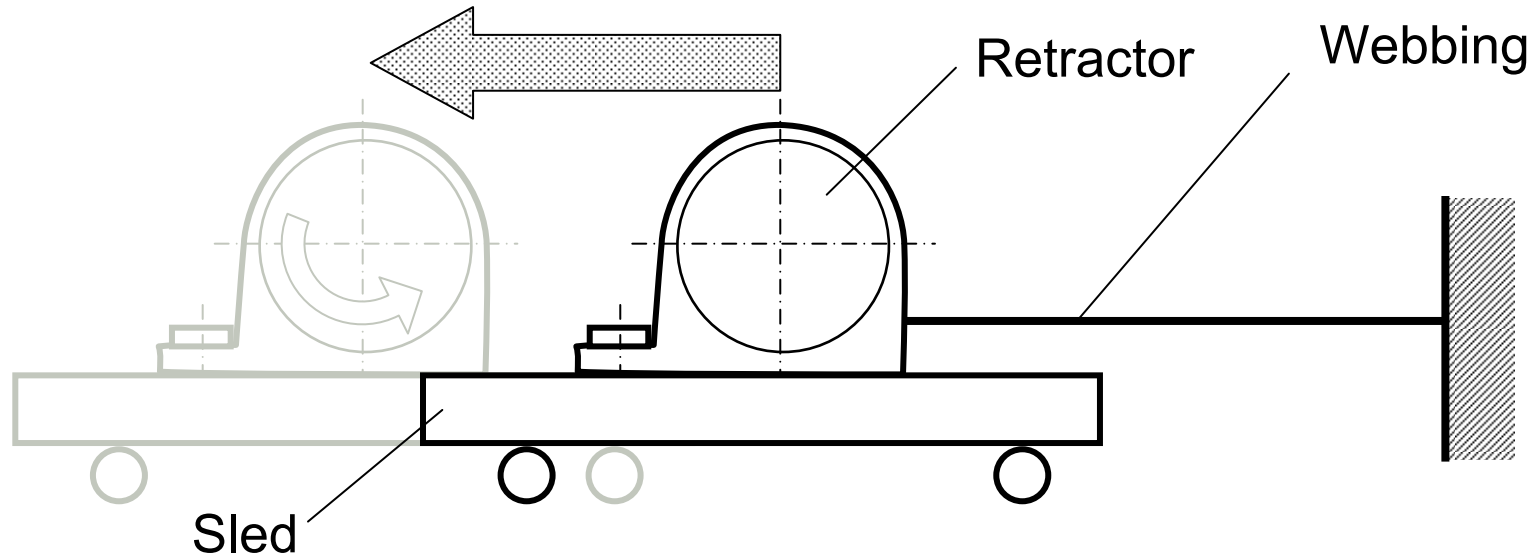
Set-up shows the configuration to test sensitivity on vehicle acceleration

© TRW Automotive Inc. 2009

Scheme to Test Locking of ELRs



Testing sensitivity for vehicle deceleration



© TRW Automotive Inc. 2009

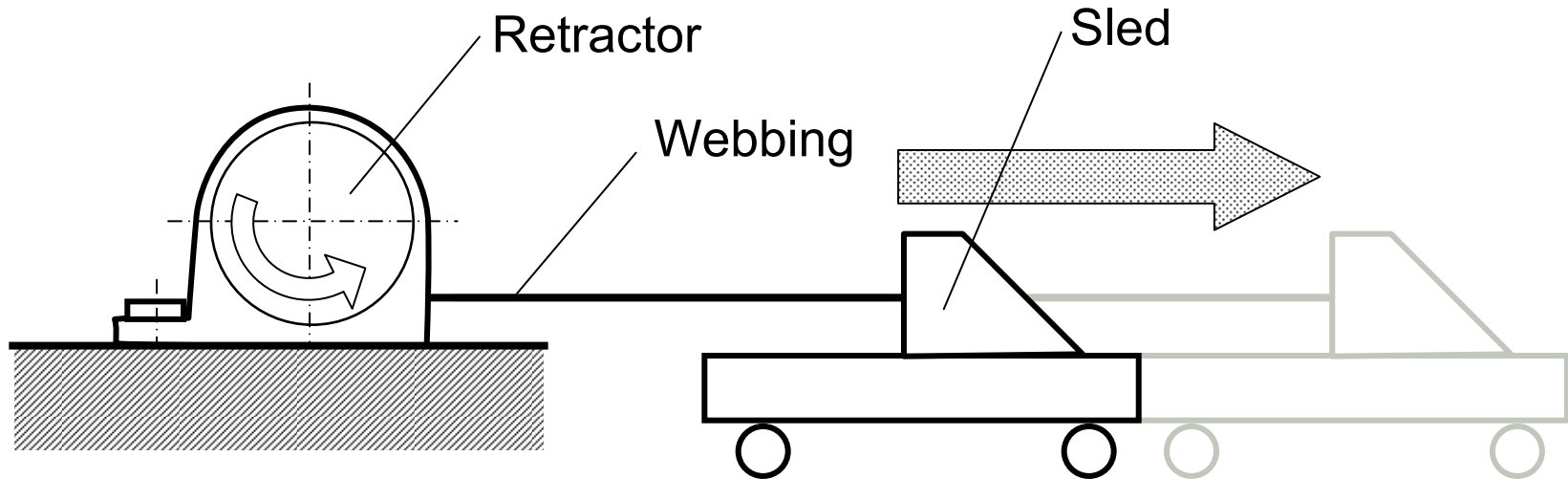
- o Spool storage 300 mm
- o To be tested in two horizontal, perpendicular axes
- o Test acceleration to be reached within 25g/s and 150g/s before 5 mm webbing is withdrawn
- o Locking must have occurred at $0.45g / 0.85g^* < 50 \text{ mm}$

* In the case of 4N retractors

Scheme to Test Locking of ELRs



Testing sensitivity for strap movement



© TRW Automotive Inc. 2009

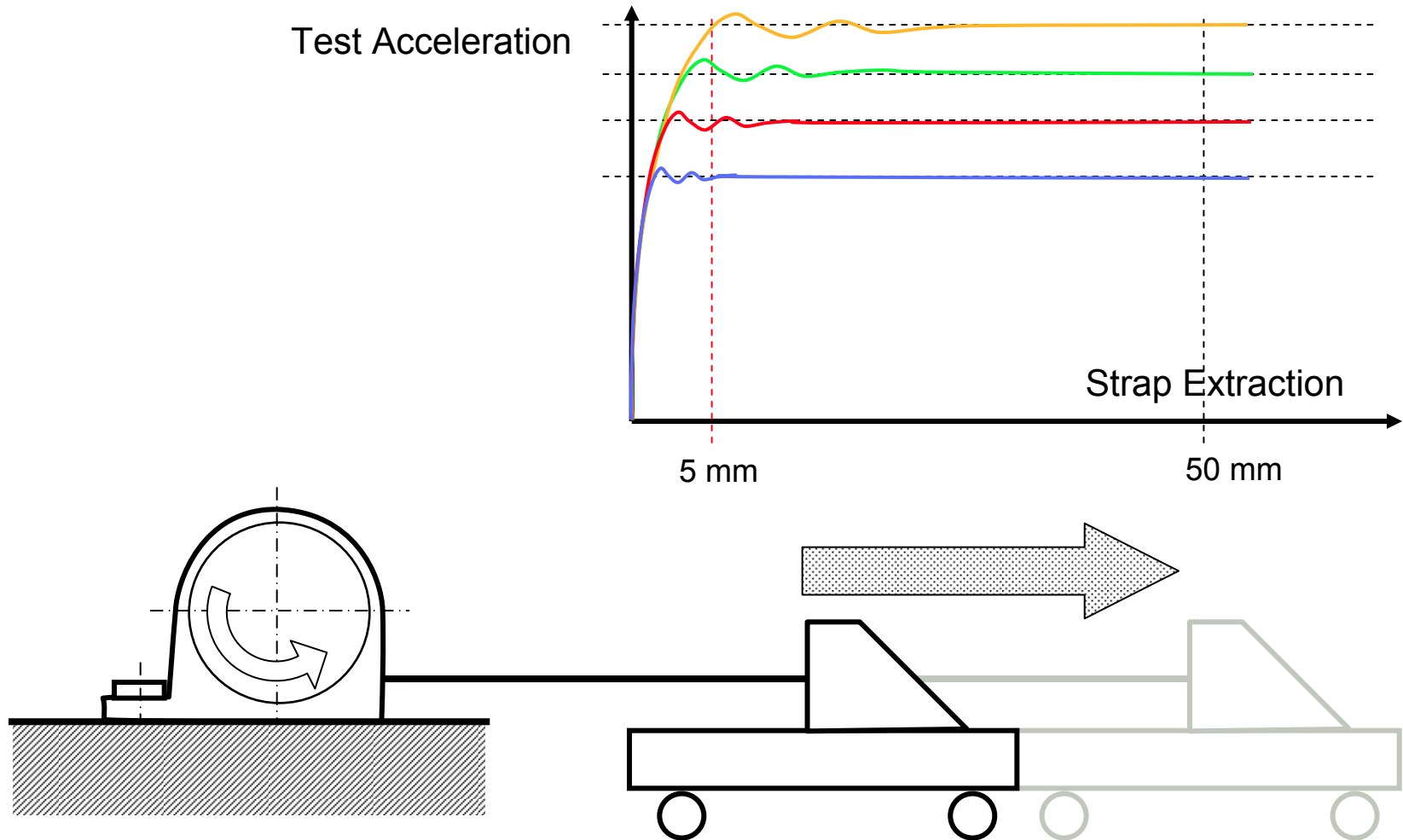
- o Spool storage 300 mm
- o To be tested in the direction of installation
- o Test acceleration to be reached within 25g/s and 150g/s before 5 mm webbing is withdrawn
- o Locking must have occurred between 0.8g / 1.0g* and 2.0g

* In the case of 4N retractors

Scheme to Test Locking of ELRs



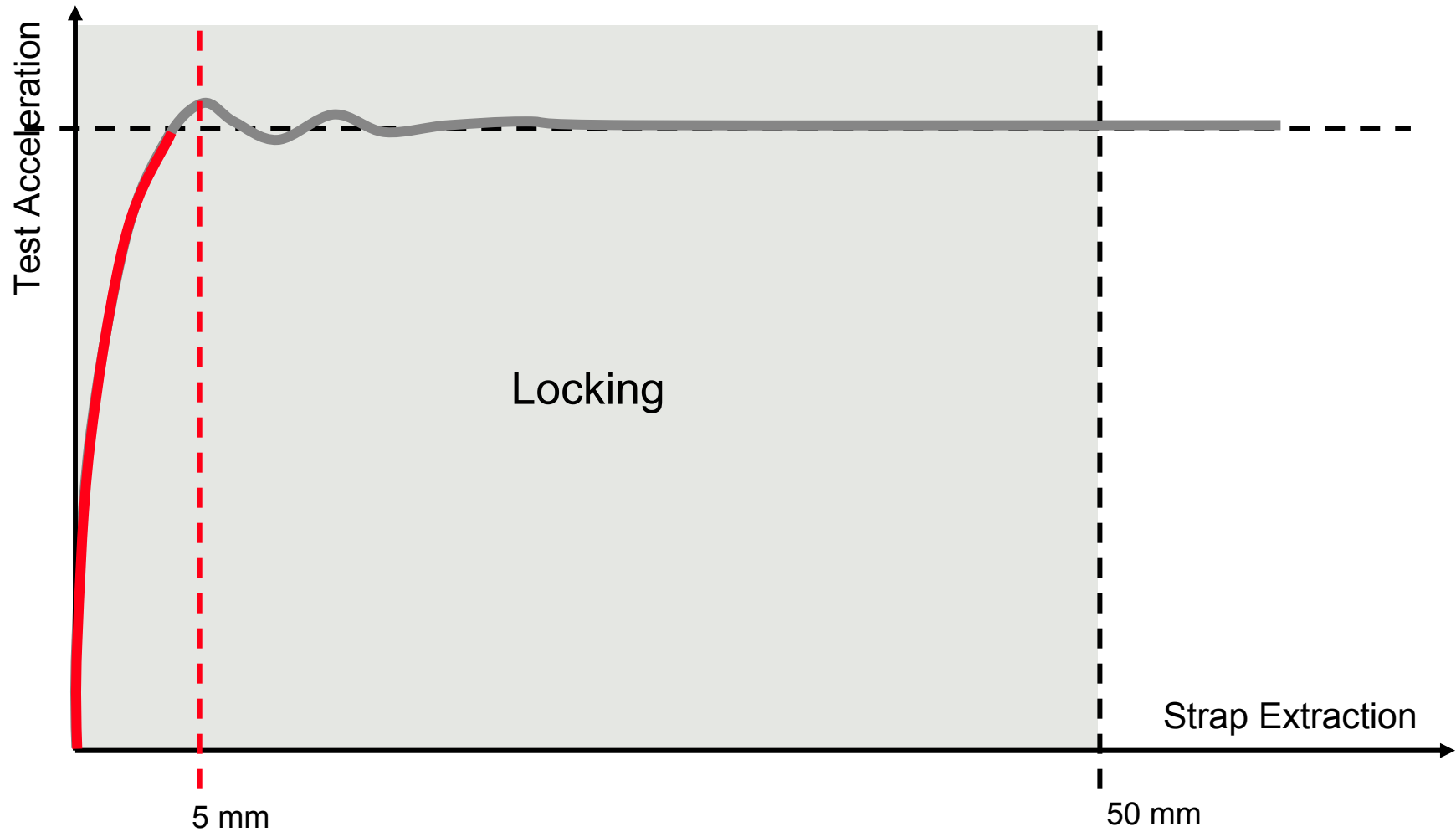
© TRW Automotive Inc. 2009



Scheme to Test Locking of ELRs



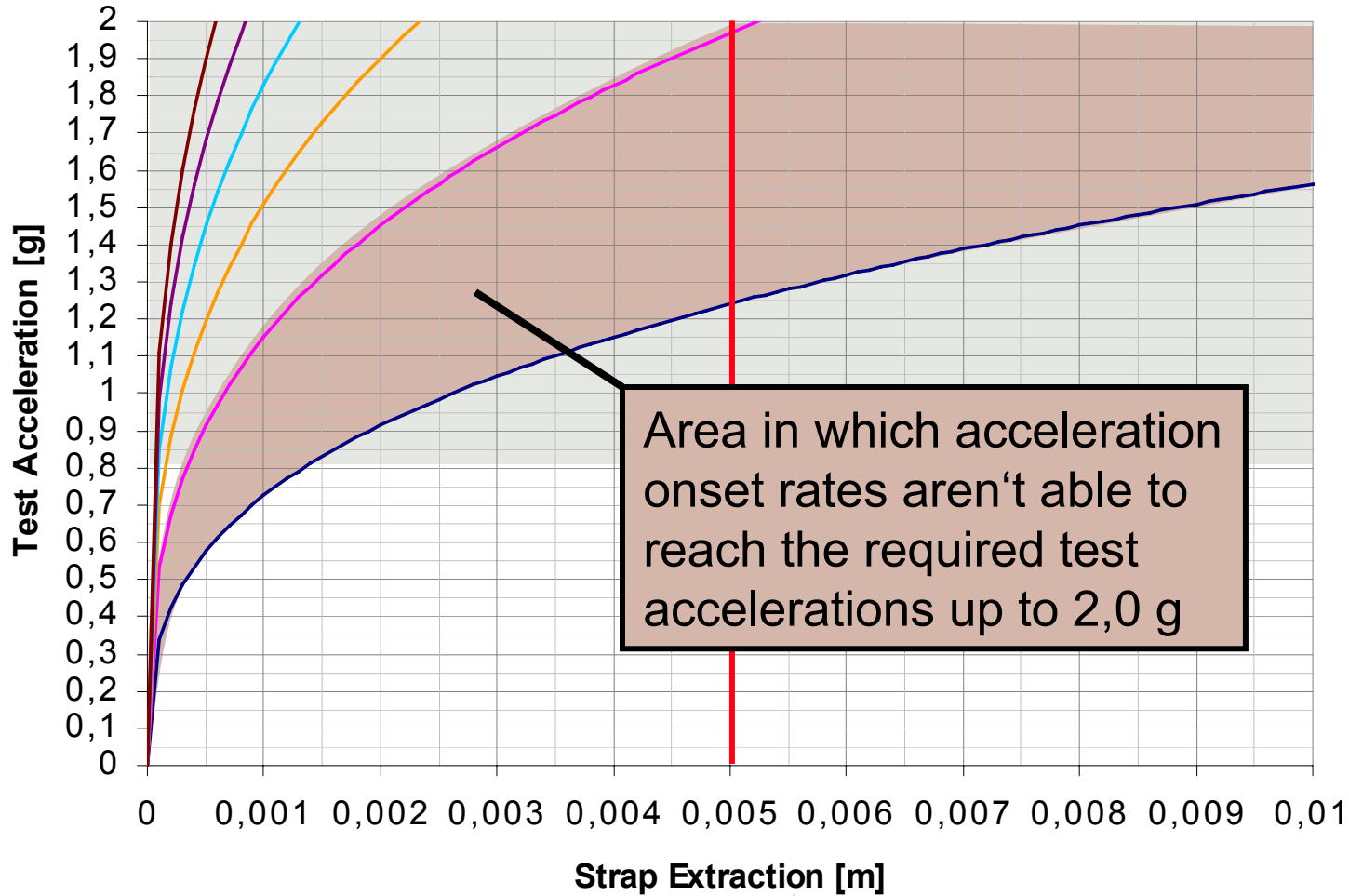
© TRW Automotive Inc. 2009



Inconsistency in Testing Strap Extraction



Strap extraction when test acceleration has been reached after acceleration onset phase.



$$a_{test}(s, \dot{a}) = \sqrt[3]{6\dot{a}^2 s}$$

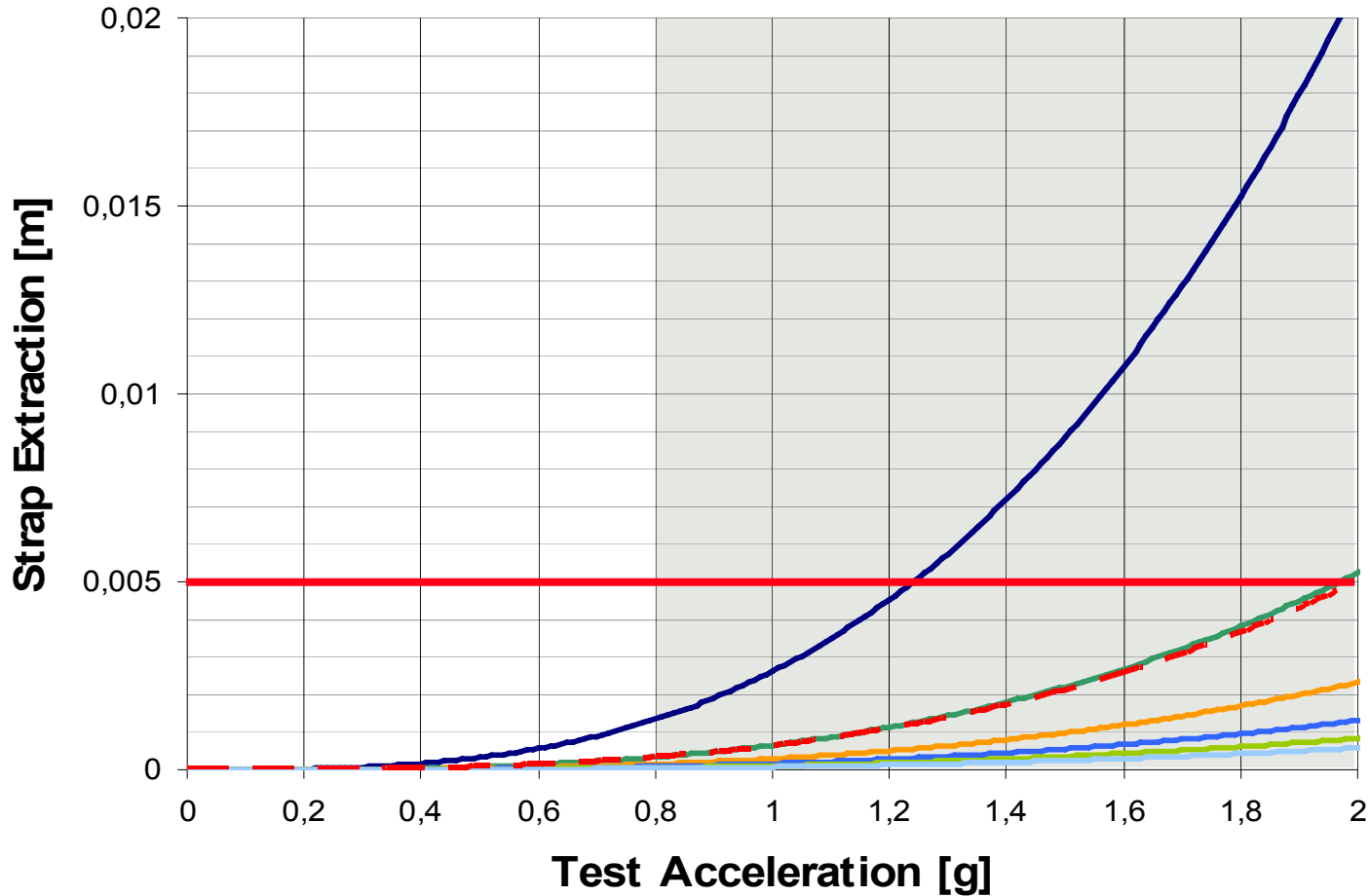
- $a(s, 25\text{g/s})$
- $a(s, 50\text{g/s})$
- $a(s, 75\text{g/s})$
- $a(s, 100\text{g/s})$
- $a(s, 125\text{g/s})$
- $a(s, 150\text{g/s})$

© TRW Automotive Inc. 2009

Inconsistency in Testing Strap Extraction



Strap extraction when test acceleration has been reached after acceleration onset phase.



$$s(a_{test}, \dot{a}) = \frac{1}{6} \frac{a_{test}^3}{\dot{a}^2}$$

- s(a, 25g/s)
- s(a, 50g/s)
- s(a, 75g/s)
- s(a, 100g/s)
- s(a, 125g/s)
- s(a, 150g/s)
- - s(a, 51,147g/s)

© TRW Automotive Inc. 2009

Proposal



...to be read:

The design of any such test apparatus shall ensure that the required acceleration is given before the webbing is withdrawn out of the retractor by more than 5 mm and that the withdrawal takes place at an average rate of increase of acceleration

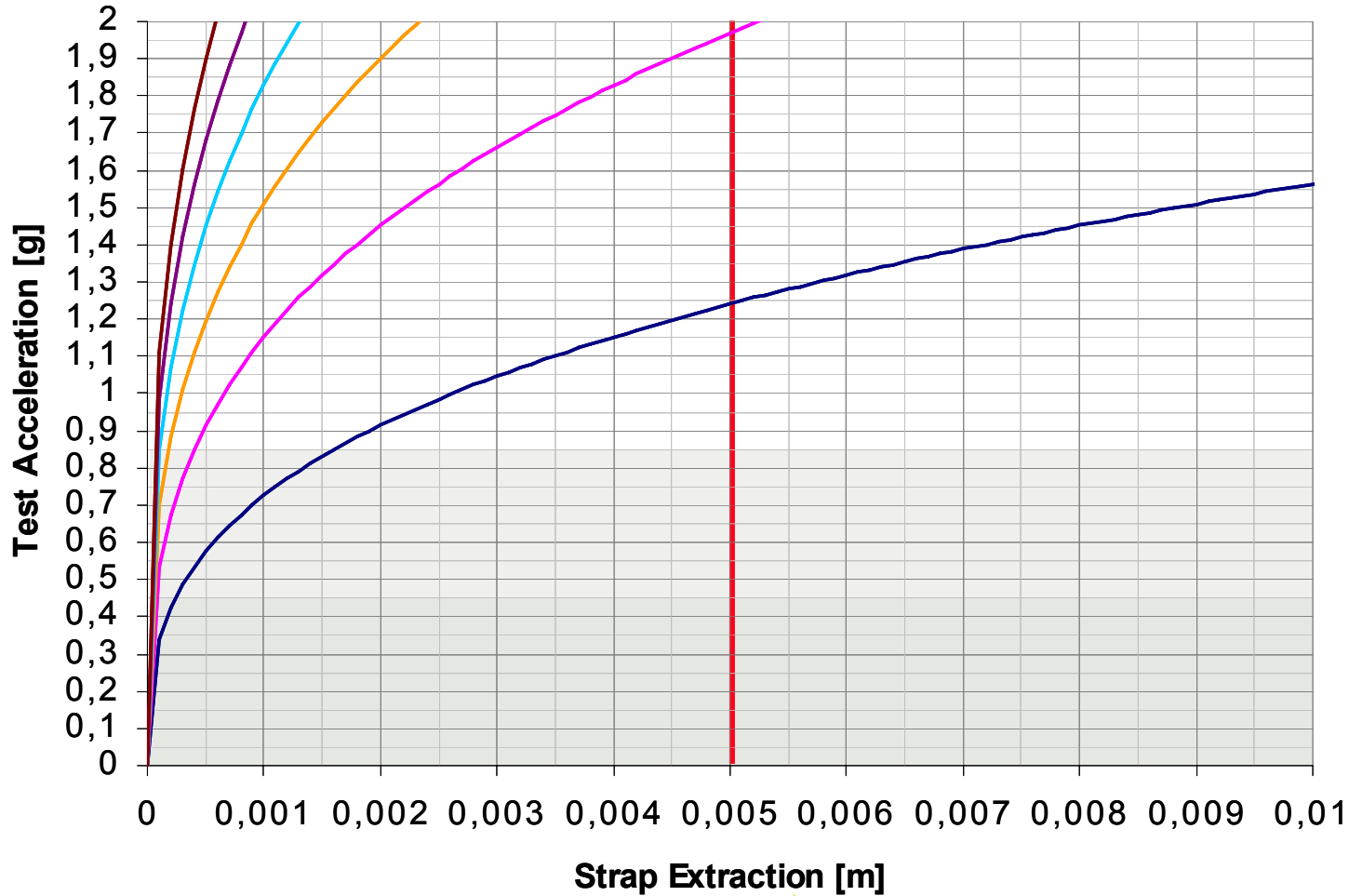
of at least **55 g/s 4** and not more than 150 g/s 4
in testing **sensitivity for strap movement** and

of at least **25 g/s 4** and not more than 150 g/s 4
in testing **sensitivity for vehicle deceleration.**

Consistency in Testing Vehicle Acceleration



Strap extraction when test acceleration has been reached after acceleration onset phase.



$$a_{test}(s, \dot{a}) = \sqrt[3]{6\dot{a}^2 s}$$

- a(s, 25g/s)
- a(s, 50g/s)
- a(s, 75g/s)
- a(s, 100g/s)
- a(s, 125g/s)
- a(s, 150g/s)

© TRW Automotive Inc. 2009