

## **Amendments to R78**

Documents: ECE/TRANS/WP.29/2008/64 and GRRF-64-15

### 1. The measurement of PBC

#### 1.1 The issue under discussion

The paragraph under discussion is the proposed amendment to the PBC requirements, i.e.:

Annex 3, paragraph 1.1.1.(c), amend to read (inserting a new footnote \*/):

"(c) The surface has a nominal peak braking coefficient (PBC) of  $\geq 0.9$  unless otherwise specified. \*/

If rear wheel lift occurs, a surface with a peak braking coefficient (PBC) lower than 0.9 may be used in that case.

---

\*/ The term "nominal" means the target value for the surface when it is certified."

#### 1.2 Germany's arguments

Germany's argument is that surfaces with a 0.9 K value are hard to find and that there is a possibility of the rear wheel lifting under heavy braking.

#### 1.3 IMMA points on the proposal

##### 1.3.1. Surfaces

- The NHTSA tests had surfaces of more than 0.9 (*Annex 1*) and 0.9 is considered normal in the industry
- The text would allow testing on any surface, so the surface would not be harmonised.
- R78 would no longer be harmonised with the GTR.
- Allowing a lower PBC surface would require a discussion of the performance requirements, as these are linked to the surface value. For example, the requirement is, "MFDD shall be 6.17 m/s<sup>2</sup>". If the surface PBC is (for example) 0.62, to prevent rear-wheel lift with ABS fully cycling the ABS effectiveness would have to be 100%. If a wider range of PBC surfaces can be used it is necessary to review/change the performance requirements
- It is impractical to repeat tests on a new track if rear-wheel lift occurs.

##### 1.3.2. Rear-wheel lift (not defined)

- This was not a problem for the USA test work for developing the new ABS method
  - An ABS system is for preventing wheel lock-up, not for preventing the rear-wheel leaving the ground. (R78-03 DEFINITIONS states that: "'ABS" means a system which senses wheel
-

slip and automatically modulates the pressure producing the braking forces at the wheel(s) to limit the degree of wheel slip.)”

- If rear wheel lift is a problem, IMMA proposes that the front wheel brake actuation force be reduced, even if it means that the front wheel ABS might not cycle fully. Of course, in such a case, it is necessary to meet the performance requirement and the ABS on the rear brake has to cycle fully.

A reduced actuation force is already allowed in the GTR and R78 in relation to wheels without ABS. e.g. R78-03 Annex 3, paragraph 9.3.1.(e) states:

“If one wheel is not equipped with ABS, the control for the service brake on that wheel shall be actuated with a force that is lower than the force that will cause the wheel to lock.”

The proposed text would become R78-03 Annex 3, new paragraph 9.3.1.(h), as follows:

“(h) If the rear wheel lifts from the ground during a test, the control for the service brake on the front wheel may be actuated with a force that is lower than the force that will cause the wheel to lift. In this case the front wheel ABS need not cycle fully.”

## 2. The vehicle condition for the K method for determining PBC

### 2.1 The issue under discussion

At 63/GRRF, in February 2008, the following text was agreed as an amendment:

“1.2. Vehicle condition:

.....

- (b) The anti-lock system shall be either disconnected or inoperative, between 40 km/h and 20 km/h

.....”

### 2.2 The original argument in favour of the amendment

The original argument in favour of allowing the option of an “inoperative” brake system was that it could produce a better K value

### 2.3 IMMA points

IMMA discussions on this have lead to the following points:

- although this may be true for other vehicles e.g. trucks, it is not true for motorcycles. The ABS system cycles too frequently for this to work (example traces of a truck and a motorcycle are shown in *Annex 2*)
- in the “inoperative ABS” method, the setting value of the limiting valve when carrying out the k measurement is set “slightly above ABS operative pressure”. It is therefore likely that the ABS will influence the result if it cycles

The industry considers that this text may lead to confusion and incorrect test results. IMMA therefore requests that this text be returned to the original:

“(b) The anti-lock system shall be disconnected”

Dr NM Rogers

Annex 1: NHTSA test results

Dynamic Research, Inc.

## TEST RESULTS

---

Kawasaki ZZR 1400  
Peak Braking Coefficient measurements  
K method and ASTM method

Rider	High friction surface	Low friction surface
1	1.04	0.56
2	1.18	0.42
3	1.12	0.56
4	1.14	0.53
ASTM PBC	0.90	0.49

Dynamic Research, Inc.

## TEST RESULTS

---

Suzuki Bandit 1200  
Peak Braking Coefficient measurements  
K method and ASTM method

Rider	High friction surface	Low friction surface
1	1.09	0.61
2	1.11	0.58
3	1.14	0.53
4	1.03	0.63
ASTM PBC	0.92	0.47

Dynamic Research, Inc.

## TEST RESULTS

---

Honda VFR 800  
Peak Braking Coefficient measurements  
K method and ASTM method

Rider	High friction surface	Low friction surface
1	1.02	0.56
2	1.08	0.52
3	1.02	0.39
4	1.09	0.49
ASTM PBC	0.91	0.49

Dynamic Research, Inc.

## TEST RESULTS

---

Yamaha FZ6  
Peak Braking Coefficient measurements  
K method and ASTM method

Rider	High friction surface	Low friction surface
1	1.08	0.56
2	1.00	0.58
3	1.09	0.43
4	1.02	0.34
ASTM PBC	0.93	0.47

## TEST RESULTS

BMW F650GS  
Peak Braking Coefficient measurements  
K method and ASTM method

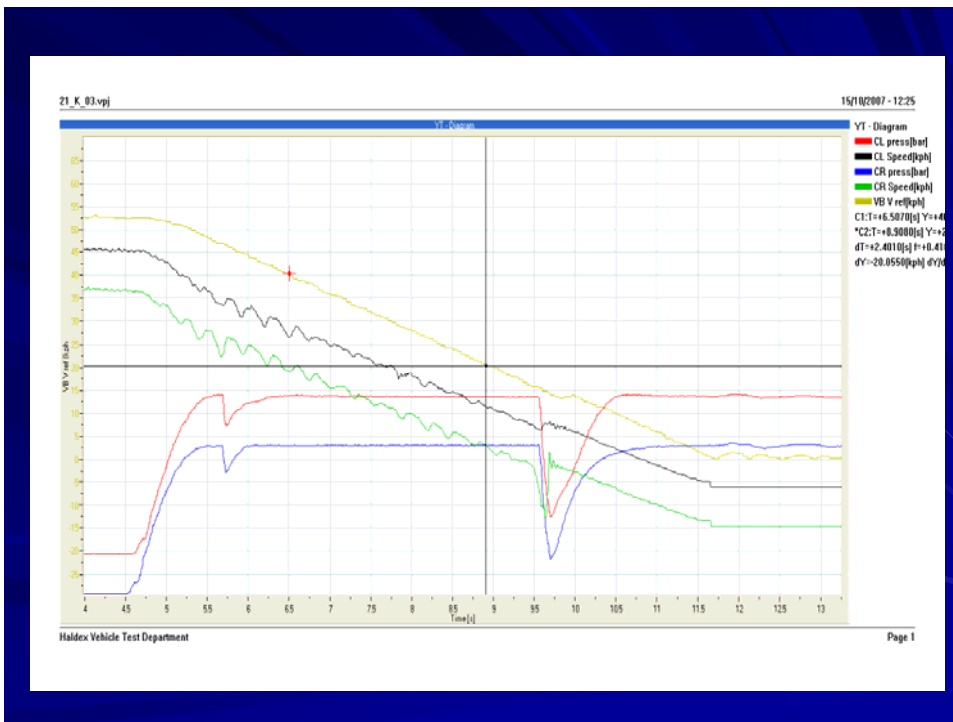
Rider	High friction surface	Low friction surface
1	1.06	0.51
2	1.07	0.54
3	0.98	0.50
4	0.85	0.48
ASTM PBC	0.93	0.49

## IMMA proposal in the event of rear wheel lift

- The front wheel brake actuation force may be reduced, even if the front wheel ABS might not cycle fully. The performance requirement must be met and the ABS on the rear brake has to cycle fully.
- A reduced actuation force is already allowed in the GTR and R78 in relation to wheels without ABS. e.g. R78-03 Annex 3, paragraph 9.3.1.(e)
- The proposed text would become R78-03 Annex 3, new paragraph 9.3.1.(h), as follows:  
**“(h) If the rear wheel lifts from the ground during a test, the control for the service brake on the front wheel may be actuated with a force that is lower than the force that will cause the wheel to lift. In this case the front wheel ABS need not cycle fully.”**

### Annex 2: ABS traces

Truck trace



### Motorcycle trace

