



FÉDÉRATION INTERNATIONALE
DE MOTOCYCLISME

CCR 002/2019

- FMNs & CONUs
- FIM Homologated Racing Circuits
- FIA
- Protective Devices manufacturers
- CCR Members

11 January 2019

New FIM CCR (Homologated) Additional Protective Devices

Dear Sir or Madam,

Further to the tests carried out recently at the Impact Laboratory (University of Zaragoza), a new system has been successfully tested and homologated by the FIM-CCR Bureau. [This Bridgestone Urethane Barrier is homologated Type B.](#)

The 2019 FIM Standards for Circuits are therefore amended as follows:

4.10.1 CCR/FIM ADDITIONAL PROTECTIVE DEVICES

The following additional protective devices are used by the CCR/FIM (see manufacturers' and/or distributors' details in Appendix).

Type A (homologated devices)

Air Active Protective Devices

- Alpina Air-Module AA

Air Protective Devices Alpina Air-Module

- Airfence Type IS and Airfence IIS
- Liski Air Safety Mattress
- SPM AirPADS
- Trackcare Inflatable Barrier

Foam Protective Devices

- Alpina Super Defender and Alpina Super Defender 2
- Airfence Bike and Airfence Bike Evo
- Bridgestone Module 1000 and Bridgestone Module 1300
- Liski Safety 1
- Recticel Safeguard barrier 1 and Recticel Safeguard RR
- SPM Energy Absorber Type A
- Trackcare Hi-Lite
- PKS Modele 1



Type B (homologated devices)

- Airfence Type I and Airfence Bike B
- Alpina Defender Barrier
- **Bridgestone Urethane Barrier**
- Liski Safety 3
- Recticel Safeguard barrier 2
- SPM Energy Absorber Type B1

Type C (homologated devices)

- Air Protek - Racing Safety Wall
- Alpina Synthetic bales and "Big bales"
- Filling Italiano Protection System (ONDA 27/33 - 20/26)
- Liski Safety 4
- PKS Modele 5
- Recticel Safeguard barrier 3 and Safeguard barrier 4
- SPM Energy Absorber Type C2
- Trackcare barrier
- **Horizontal tyre barrier built and installed according to FIM Specifications and assembly instructions for tyre barriers (available on request to the FIM Secretariat)**
- **Vertical tyre barrier built and installed according to FIM Specifications and assembly instructions for tyre barriers (available on request to the FIM Secretariat)**

All additional protective devices must be placed against the rigid obstacle (no free space).
All additional protective devices must be used and installed according to the manufacturer's indications and requirements.

The homologation report may require non-homologated contingency protective devices to be available at each FIM event.

It is recommended that screws securing conveyor belts to tires, barriers or walls have a round and flat head.





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You will find enclosed the results of the tests carried out for these new (homologated Type B) protection.

We remain at your disposal for any additional information you may require.

With best regards,

Paul DUPARC
CCR COORDINATOR

ENCLOSURES: Report of the Dynamic and crash Tests carried out for the Bridgestone Urethane Barrier

CO-ORDINATES OF MANUFACTURERS & SUPPLIERS OF ADDITIONAL PROTECTIVE DEVICES:

Airfence I, I S, IIS, Bike, Bike B & Bike Evo

AIRFENCE SAFETY SYSTEMS

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Airprotek - Racing Safety Wall Type C

AIRPROTEK SAS

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Bridgestone Module 1000, Module 1300 & Urethane Barrier

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Filling Italiano Protection System (ONDA 27/33-20/26)

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Liski Air Safety Mattress, Safety 1, 3 and 4

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PKS Modele 1 & Modele 5

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Dynamic Test of Protective Devices: Barrier

Barrier: BRIDGESTONE URETHANE BARRIER

References: S-167 - S-169

Testing Date: 14/DEC/2018

Applicant:

Bridgestone Diversified Chemical Products Co Ltd

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1. Goal

Dynamic test of stopping barrier according to FIM rules: “*Duties and criteria for barriers homologation*”:

Duties and Criteria

The tests must be carried out with a hanging body block, which comes off just before the impact.

- Depth of the module: 120 cm (for type A)
- Weight of the body block: 35 kg
- Body block surface that comes into contact with the tested sample: 0.24 m²
- Velocity at the instant of impact: 24 km/h (+/- 1 km/h)

Classification criteria:

- Peak deceleration (g number): the maximum deceleration.
 - Type A: $G \leq 10$
 - Type B: $10 < G \leq 20$
 - Type C: $G > 20$
- Deformation distance:
 - Maximum 50% of the width of the module, for all the types.

2. Description of the Test

Tests were performed using the Universal Impactor Machine shown in Figure 1. The universal impactor is capable of throwing different body forms up to a nominal speed of 15 m/s, either in free or guided flight. The upper boundary of the impactor is a throwing energy of 3 000 J.



Figure 1. Universal impactor machine.

The tests of the stopping barriers were done using a certified body block with a nominal mass of 34-36 kg and a moment of inertia of $2.26 \pm 0.23 \text{ kgm}^2$. The body block was launched in free flight at a nominal speed of 6.66 m/s (24 km/h). The body block was instrumented with two accelerometers (Measurement, Model 64C) and one angular rate sensor (DTS, Model ARS-8K).

Location	Sensor	Ref.
Center of gravity of the body block (X Local Axis)	Accelerometer	ACE-027
Center of gravity of the body block (Y Local Axis)	Angular rate	ARS-119
Center of gravity of the body block (Z Local Axis)	Accelerometer	ACE-026

The local coordinate system and the polarities for the sensors were defined according to the standardized sign convention in SAE J211. Data were recorded at 10 000Hz and were filtered using a 180 Channel Frequency Class (180 CFC).

Therefore, the global reference system is defined as:

- X global axis perpendicular to the impact face of the barrier (horizontal).
- Z global axis pointing downward (vertical).
- Y global axis defines a right-handed coordinate system.

Two high-speed video cameras (1 000 Hz) were used to track the motion of the body block during the flight (lateral and zenithal planes). To calculate the test results, a two-dimensional (2D) analysis was carried out.

3. Description of the Samples

Model: Bridgestone Urethane Barrier
Depth of the module: 800 mm

Reference: S-167; S-168; S-169
Height of the module: 1300 mm



Figure 2: Bridgestone Urethane Barrier module.



Figure 3. Connection between two modules.

4. Tests Configuration

Test	Configuration
S-167	Guardrail + Bridgestone Urethane Barrier. Centered impact. First impact.
S-168	Guardrail + Bridgestone Urethane Barrier. Centered impact. Second impact (15 min later).
S-169	Guardrail + Bridgestone Urethane Barrier. Impact at the union of two modules ¹ .

¹ This test is included just as additional information about the connection between modules.

5. Test Results

The 2D analysis of the data allowed calculating the following specifications:

- Impact velocity [km/h]: velocity in the X global axis at the instant of the body block impact with the barrier.
- Rebound distance/velocity [km/h]: the return velocity in the X global axis (calculated from the deceleration curve).
- Absorbed energy [%]: the percentage of total impact kinetic energy absorbed by the tested sample (calculated from velocity in X global axis).
- Peak acceleration [g]: the maximum deceleration in the X global axis.
- Average acceleration [g]: mean deceleration in the X global axis. Calculated from the beginning of the event up to the instant when the maximum deformation distance is reached.
- Event duration [ms]: time-frame of the impact event, taken from the beginning of the event up to the instant when the maximum deformation distance is reached.
- Deformation distance [mm]: the maximum distance reached by the impacting body block penetrating into the tested sample.

Table 1 summarizes the results of the tests.

Sample identification no.	S-167	S-168	S-169
Impact velocity (Angle)	23.0 km/h (-1.5°)	23.8 km/h (-1.5°)	23.9 km/h (-1.4°)
Rebound distance/velocity	13.4 km/h	13.0 km/h	11.5 km/h
Absorbed energy	65.8%	70.4%	76.9 %
Peak acceleration	19.4 g	19.9 g	17.3 g
Average acceleration	14.8 g	14.7 g	13.8 g
Event duration	44 ms	46 ms	49 ms
Deformation distance (Angle*)	167 mm (-1.5°)	183 mm (-1.5°)	189 mm (-2.5°)
Deformation [%]	20.9%	22.9%	23.6%

***Note:** The value of the deformation distance corresponds to the center of gravity of the body block, as the orientation of the body block, at the instant of maximum deformation, is not perpendicular to the ground. This inclination value is indicated in brackets (°).

Table 1. Results of the tests.

Deceleration Graphs:

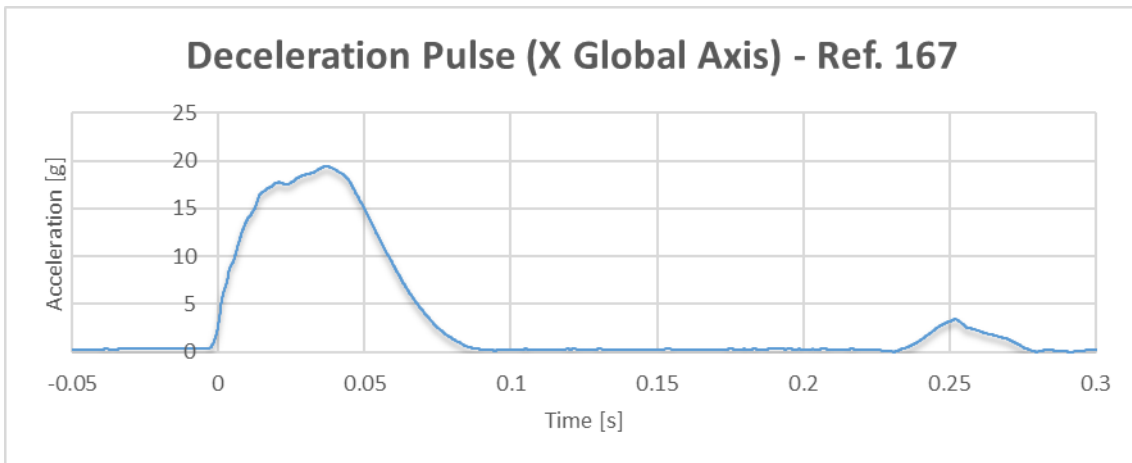


Figure 4. Deceleration pulse of S-167 test.

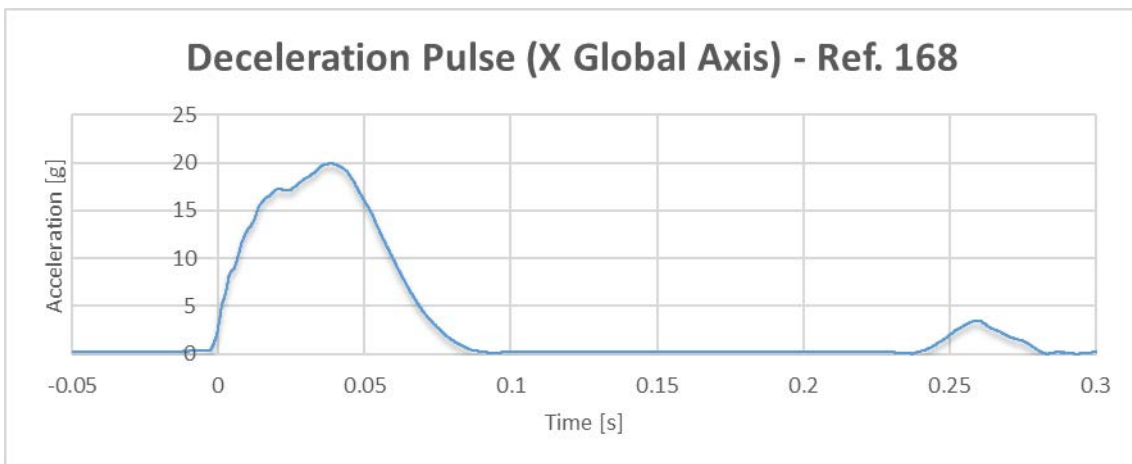


Figure 5. Deceleration pulse of S-168 test.

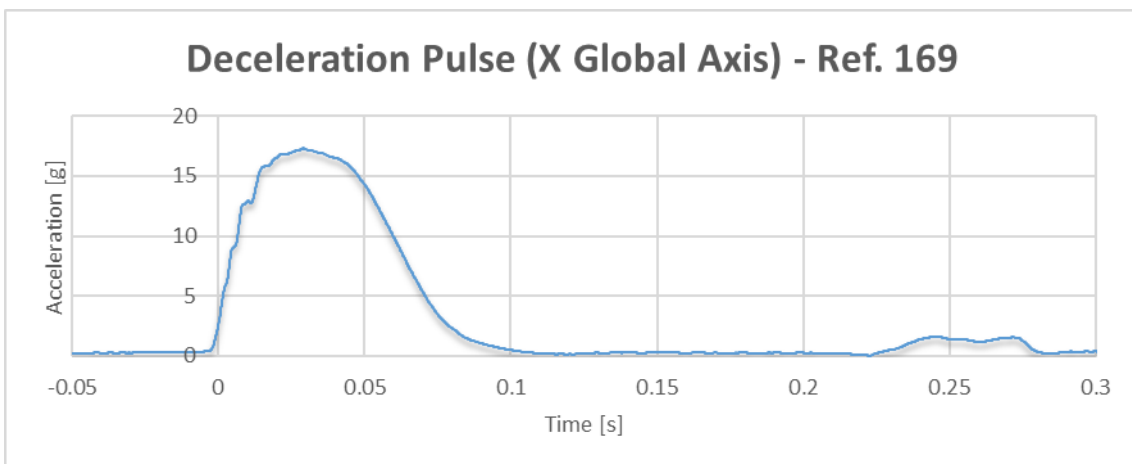


Figure 6. Deceleration pulse of S-169 test.



6. Conclusions

According to the classification criteria described in section 1, test results lead to the following conclusions:

- Peak acceleration obtained is: 19.4 g (1st shot); 19.9 g (2nd shot). These values classify the barrier as a **type B** stopping barrier.
- Deformation obtained is: 20.9% (1st shot); 22.9% (2nd shot). The **deformation values do not exceed the 50%** of the width of the module.

Final conclusion: These values classify the **barrier** as a **type B** stopping barrier.

7. Notes and Comments

- 1) For the test, the module was installed leaning against a triple guard rail as it is defined by FIA for circuits.
- 2) The classification criteria is as described in section 1, with the following inclusion: for type C, maximum g threshold of 30.
- 3) The height of the barrier is 1300 mm.
- 4) There was not anti-sliding “skirt” in the tested samples.
- 5) It was appreciated that the protective device did not contain any metal rings on the impact surface (ex. For attaching advertising panels).
- 6) It was appreciated that the protective device did not present a connection between modules robust enough to prevent the rider to slide in between modules.
- 7) The replacing time was not checked as it is a foam barrier.

The following product specifications were provided by the manufacturer:

— Product Standard —

Material : Polyurethane foam + Sheet Cover

Product Size : High1.3m × wide2.0m × depth0.8m

Weight : 49 kg (about)

【Polyurethane foam Physical Property】

Density : 20 kg/m³

Hardness : 95 N

【Sheet Cover Physical Property】

Tensile strength : warp over 457 N/cm ▪ fill over 408 N/cm

Breaking elongation : warp under 30% ▪ fill under 40%

Tearing strength : warp over 78 N ▪ fill over 88 N