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our reference
2-3551

contact person
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Liège le 13/12/2012

Dear Sir,

Please find here enclosed the results on the impact tests performed on the bicycle wheels with the following references:.

Reference : Gimari bvba / Close2 : **Reference Wheels Close 2 :** Carbon rim ± 50mm – Tubular tyre – 20 Steel spokes length: 255mm – Diameter 2.00mm – Total weight tires included 0.950kg

If you need some complementary information, please do not hesitate to contact us.
Yours Sincerely,

F. Schoumaker
Responsible for the project

M. Gasparini
Laboratory manager

Remarks

The here-above tests results may be published or communicated provided 'test realised in Sirris' is mentioned.

Test results are valid only for the tested samples.

TESTS REPORT Ref : 2-3551

Company : Gimari

CONCERNING : *IMPACT TEST ON BICYCLE WHEELS*

Receipt date : 2012/12/10

Client reference: **Reference** : Gimari bvba / Close2 : **Reference Wheels Close 2 :** Carbon rim ± 50mm - Tubular tyre - 20 Steel spokes length: 255mm - Diameter 2.00mm - Total weight tires included 0.950kg

Sirris Reference: Idem

Samples conditioning:

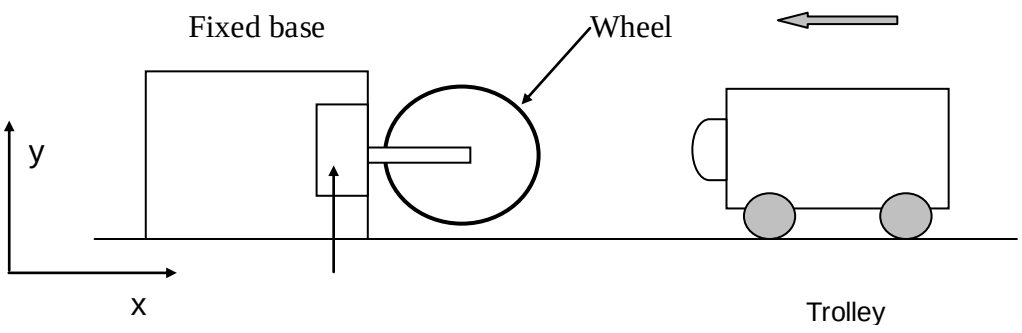
According to the laboratory normal atmosphere: European standard EN-62
Temperature: 23°C

Analysis

1. Principle

The aim of the test is to assess the behaviour of bicycle wheels under impact conditions.

The testing facilities is made up of a little trolley moving at controlled speed and impacting the wheel to be tested. The wheel is fixed on the testing machine base.



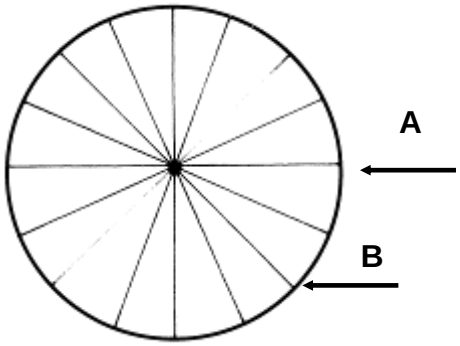
Methodology

2. Testing conditions

Two configurations are foreseen for the test :

- The trolley touches the wheel at mid-height. This represents a front impact (A).

- The trolley touches the wheel in a lower position (B). This position is chosen to simulate what happens during an impact with the edge of a sidewalk, or in a big hole in the road. The impact point is located on a straight line making an angle of 45° with the horizontal and joining the centre of the wheel.



Positions of the impact point in the two types of tests

The trolley moves horizontally at a controlled speed of 10km/h when it meets the wheel. The weight of the trolley is 100 kg.

-The movement is horizontal.
- The speed at the moment of the impact is 10km/h.
-The total weight of the trolley is 100kg.
-The material and structure of the trolley is such that no significant deformation of the trolley occurs when it impacts the wheel.
-The contact surface between the wheel and the hammer is limited. At the front end of the hammer, the buffer will impact the wheel with its vertical edge (impact test) or with its rounded edge (edge test) .
-The machine is equipped with two bumpers, places on both sides of the contact point between the wheel and the hammer. Those bumpers have two functions : they stop the trolley in order to avoid the damaging of the clamping devices of the wheels, and they limit the amount of energy to be absorbed by the wheel itself. The wheel is fixed vertically by the

-hub on the base of the impact tester. The wheel is free to turn around its axis, and is equipped with tyres.

-The wheels are tested in two different positions, the impact point being situated either on the spoke, or between two spokes.
-The wheel must be equipped with a tyre, with a pressure of 7 bars.

Global view of the impact machine	*Edge impact : the hammer meets the wheel .*
	

3. Specifications

The three criteria hereunder have been accepted by the UCI, and must be fulfilled during an impact test performed in the conditions described in this document, by a « neutral » laboratory, in order for the wheels to be accepted by UCI in race conditions.

1. During the impact, no part or piece of the wheel will be ejected.

2. The fracture must not show free broken sharp parts, that could injure the rider or any other rider in contact with the wheel during the impact.
   Remark on the mode of application of this criterion : an “open” fracture of the rim (when the two edges of the fracture are no more in contact after the impact) should be considered as non valid.

3. After the impact, the coherence of the wheel must be kept. The link between the hub and the rim must be kept, the rim and the hub must stand together.

4. Traceability

The laboratory will take all the necessary measures to keep a reliable description of the tested wheels. For the due purposes, a sample of the rim material will be cut out of the wheel. Also, the characteristics of the wheel will be registered:

Dimensions of the rim and of the hub – Description of the materials used – Shape and number of spokes – Weight of the wheel – Pictures of the fractures observed – and all elements that the laboratory will consider to be relevant for further investigations.

The objectives of those measures are to be able, in the future, to assess the reproducibility of the manufacturing process.

Tests date
2012/12/10 with the customers

Sampling

Reference : Gimari bvba / Close2
Reference Wheels Close 2
Carbon rim ± 50mm
Tubular tyre
20 Steel spokes length: 255mm – Diameter 2.00mm
Total weight tires included 0.950kg
Diameter 635mm

Hub : Steel / Aluminum : No reference

Operator
F. Schoumaker

Results :

Reference : Gimari bvba / Close2 : **Reference Wheels Close 2 :** Carbon rim ± 50mm – Tubular tyre – 20 Steel spokes length: 255mm – Diameter 2.00mm – Total weight tires included 0.950kg

The results are valid only for the tested assembly: the assembly is made of : The rim, the spokes and the hub. These components are described as precisely as possible in the report core.

Reference : Gimari bvba / Close2 : **Reference Wheels Close 2 :** Carbon rim ± 50mm – Tubular tyre – 20 Steel spokes length: 255mm – Diameter 2.00mm – Total weight tires included 0.950kg

Front position

Impact on the spoke	Impact between 2 spokes
	
The rim is crushed. The carbon part presents some cracks and failures on the height of the rim.	The rim is crushed. The carbon part presents some cracks along the rim.

Results : Edge position

Impact on the spoke	Impact between 2 spokes
	
The rim is crushed. The carbon part does not present any opening. The different carbon layers stay bonded together.	The rim is crushed. The carbon part does not present any opening. The different carbon layers stay bonded together.

The results are valid only for the tested assembly: the assembly is made of : The rim, the spokes and the hub. These components are described as precisely as possible in the report core.

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CONCLUSIONS :

Reference : Gimari bvba / Close2 : **Reference Wheels Close 2 :** Carbon rim ± 50mm – Tubular tyre – 20 Steel spokes length: 255mm – Diameter 2.00mm – Total weight tires included 0.950kg

Specifications UCI	**Results**
During the impact, no part or piece of the wheel will be ejected.	*YES*
The fracture must not show free broken sharp parts, that could injure the rider or any other rider in contact with the wheel during the impact.	*YES*
After the impact, the coherence of the wheel must be kept. The link between the hub and the rim must be kept, the rim and the hub must stand together.	*YES*

Reference : Gimari bvba / Close2 : **Reference Wheels Close 2 :** Carbon rim ± 50mm – Tubular tyre – 20 Steel spokes length: 255mm – Diameter 2.00mm – Total weight tires included 0.950kg comply with the requirements of the UCI.

The results are valid only for the tested assembly: the assembly is made of : The rim, the spokes and the hub. These components are described as precisely as possible in the report core.

Remark: Test results are valid only for the tested samples