

1. IMPACT TEST ON BICYCLE WHEELS

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.

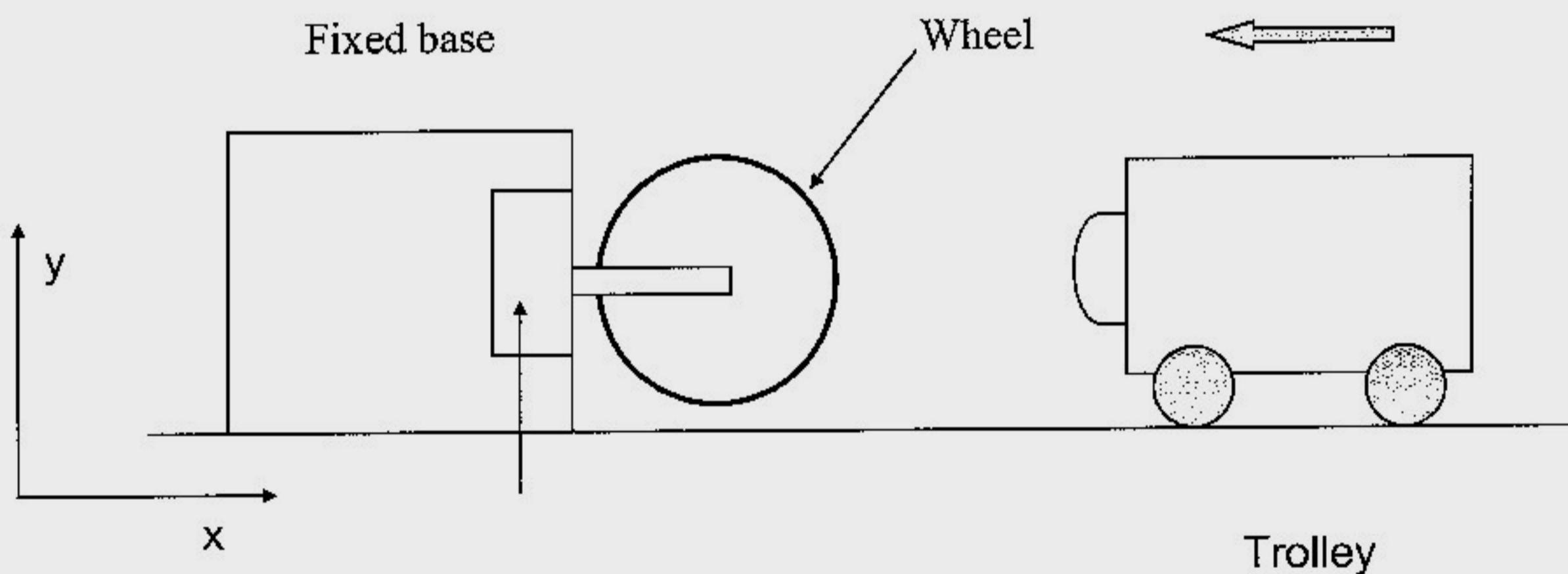
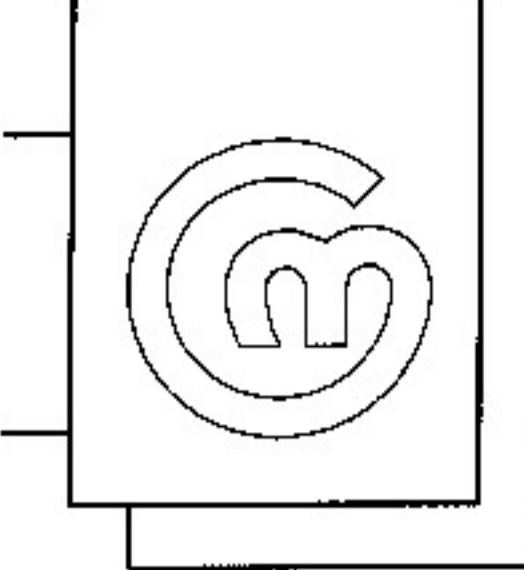


Figure 1 : Principle of the impact tester.



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.

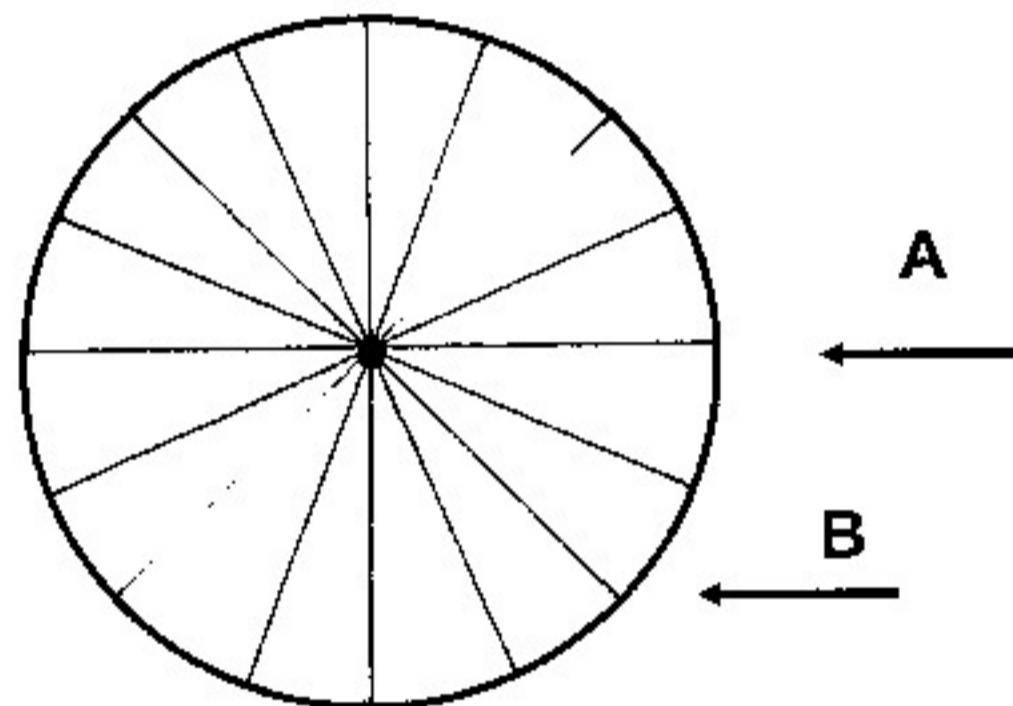
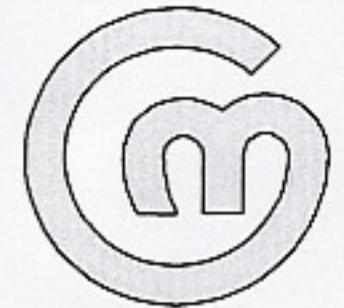


Figure 2 : Positions of the impact point in the two types of tests

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

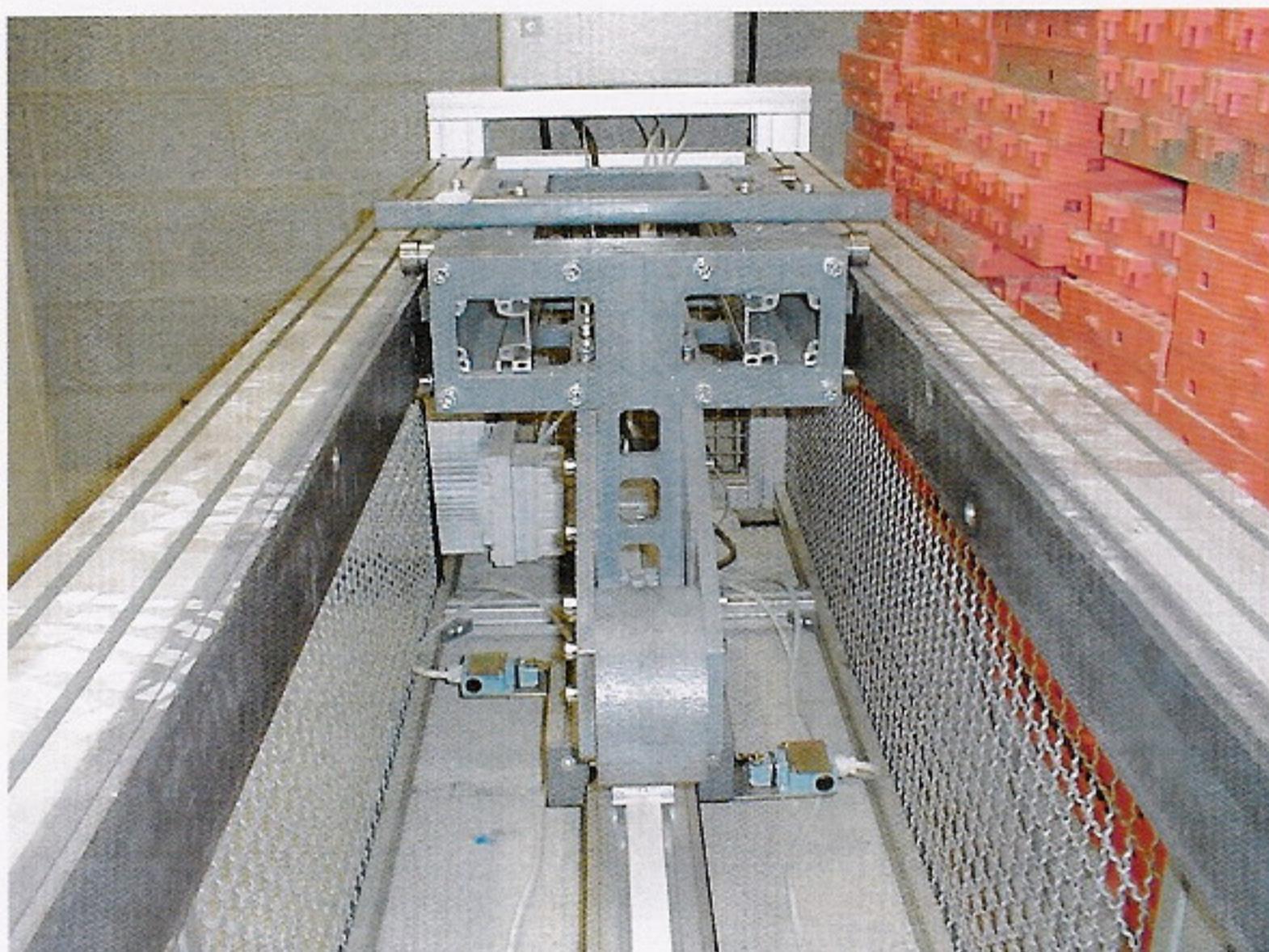
- The movement is horizontal.
- The speed at the moment of the impact is 10km/h.
- The total weight of the trolley is 100kg.
- The material and structure of the trolley is such that no significant deformation of the trolley occurs when it impacts the wheel.
- The contact surface between the wheel and 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.
- Wheels with sticks or where the distance between two consecutive spokes is more than 20 cms, are tested in two different positions, the impact point being situated either on the spoke, or between two spokes.



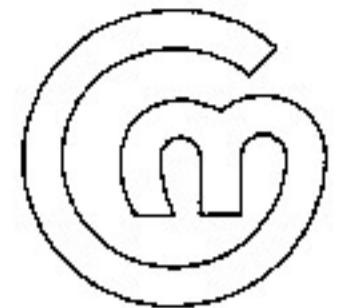
- The wheel must be equipped with a tyre, with a pressure of 7 bars.



Global view of the impact machine



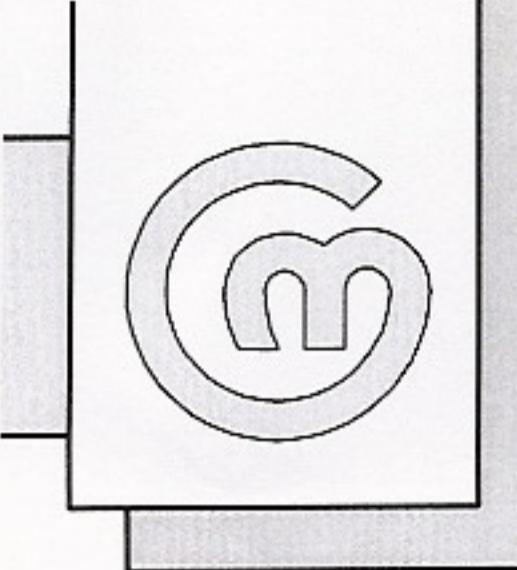
Edge impact : the hammer meets the wheel .



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.
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. Results of the tests

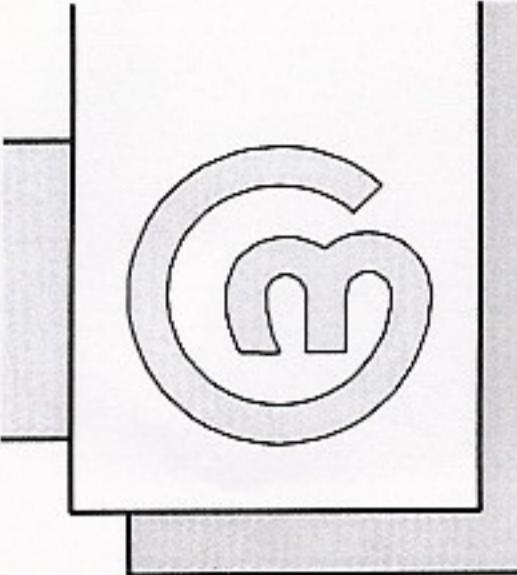
4.1. Front position



Photo – 1 Impact on the spoke



Photo – 2 : Impact between 2 spokes



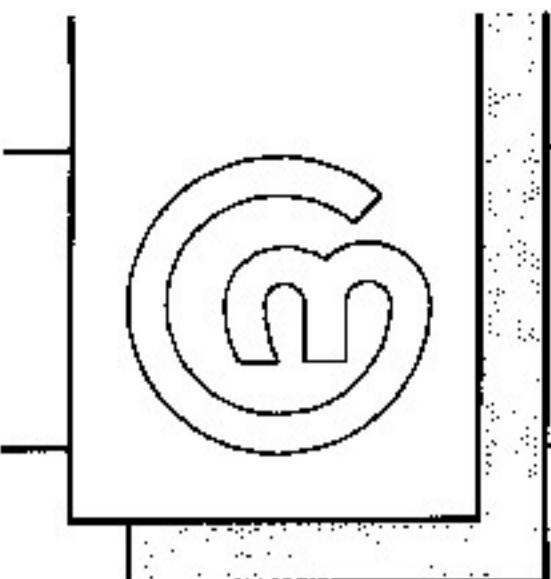
4.2. Edge position



Photo – 3 : Impact on the spoke



Photo – 4 : Impact between 2 spokes



Description of the wheel CarbonSportsTubular

The wheel is made of a composite carbon rim, linked to the hub by 20 flat spokes (1.80*4.40 – 5.20 mm).

Observations

- Front position wheel n°1 - impact in front of a spoke

Three cracks are observed on the rim.

Two spokes are distended.

Three spokes are bent.

The rim stays perfectly bound up with the hub.

- Front position wheel n°2 - impact between the two spokes

Three cracks are observed on the rim.

Two spokes are distended.

Two spokes are bent.

The rim stays perfectly bound up with the hub.

- Edge position wheel n°3 - impact in front of a spoke

Three cracks are observed on the rim.

Four spokes are distended.

Three spokes are bent.

The rim stays perfectly bound up with the hub.

- Edge position wheel n°4 - impact between the two spokes.

Three cracks are observed on the rim.

Three spokes are distended.

Three spokes are bent.

The rim stays perfectly bound up with the hub.

CONCLUSIONS

The rims stay bound up with the hubs. Some cracks, or fractures, may be observed but do not present any danger. All the parts are still bound together in a secure way.

The CarbonSports Tubular 20 spokes front wheels comply with the requirements of the UCI.