

# **Finabel Trial for Run-flat Systems.**

## **FINABEL AGREEMENT NO. 20.A.5. ON COMBAT TYRES - 20TH SEPTEMBER, 1979.**

### **1. Preliminary Remarks.**

#### 1.1 Aim of the Agreement.

The combat tyre must, in the event of being punctured, be capable of allowing combat to be continued uninterrupted. Its use may also lead to savings in a spare wheel..

#### 1.2 Definition.

By the term 'tyre' one is referring to the outer casing only, or to the combination of outer casing, inner tube and/or special fittings for installation on the rim, or fitted inside the outer casing.

The term 'wheel' refers to the rim plus attachment plate assembly; the wheel is being described as being ready for use once the tyre is fitted onto the wheel.

### **2. Military characteristics.**

#### 2.1 General.

The combat tyre must have qualities as similar as possible to those of the tyre with radial casing and with a military tread design.

Following being punctured it must enable the vehicle to move without excessive loss of its qualities.

#### 2.2 Characteristics prior to puncturing.

2.2.1 The combat tyre must possess as far as is possible the same road qualities as those of a tyre with radial casing (speed, transverse and longitudinal grip).

2.2.2 It must possess, more or less, the same qualities of flexibility and aptitude to the terrain as the radial tyre.

2.2.3 It is desirable that under normal conditions of use the degree of wear shown by the combat tyre should not differ appreciably from that of the radial tyre, with the aim of achieving a similar length of service life.

2.2.4 It is essential that the combat tyre should be capable of being adapted to the size of rims associated with radial tyres.

2.2.5 It is desirable that the weight of the wheel fitted with the combat tyre should be similar to that of a wheel fitted with the radial tyre.

2.2.6 It is desirable that the combat tyre be capable, under conditions of normal use, of being repaired and reassembled at Battalion level under the same condition as a radial tyre.

#### 2.3 Performance after being punctured.

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2.3.1 Puncturing implies any damage which the tyre is liable to suffer during combat, and following which the minimal performances given below must be maintained.

2.3.2 These performances are necessary in full only if not more than two tyres have been punctured, one of which to be that of a driven wheel and one front (steerable) wheel. If the vehicle in question has more than four wheels, it is desirable that these performance levels should be maintained following the puncturing of 50 per cent of the total number of wheels.

2.3.3 A vehicle with one or two tyres punctured must be capable either:-

- of running for a total distance of 50km on the road (desirable: 75km), without tyres coming off rims or starting to burn, and without its properties of steering maneuverability, stability or speed being seriously affected under the following conditions:-
  - 3km at maximum speed (escape speed),
  - 10km at uniform speed of 50km/h,
  - the rest of the distance at a uniform speed of 25km/h (1).
- or of operating across country without the tyres coming off the rims or starting to burn over a period of 2 hours at a speed of 20km/h (1). Under these conditions the vehicle must also, as far as possible, retain its full capability to negotiate obstacles (gradients, steps, ditches....).

2.3.4 The achievement of the performances specified in paragraph 2.3.3 must not have any particular consequence on the non-punctures tyres,

### **3. Various.**

#### 3.1 Dimensions.

The dimensions of combat tyres are not laid down, but it is desirable that they should be the same as those of radial casing tyres and with military or NATO tyre tread.

#### 3.2 Standardization.

It is desirable that wheels fitted with combat tyres should be interchangeable, i.e. that the attachment fittings should be standardized.

#### 3.3. Qualification (acceptance?).

The checking of the performance demanded by the agreement so that the combat tyres can qualify will be carried out according to the general and specific conditions set out in the Annex.

(1) One rotation of the tyre casing on the rim may be tolerated provided that it does not change the driving capabilities of the vehicle, and the grip of the tyres.

**ANNEX  
TO AGREEMENT NO. 20.A.5.**

**1. Puncturing of the tyre.**

1.1 Puncturing is to be achieved by means of a 7.62mm round fired from a range of 50 metres; 5 rounds will be fired into the tyre wall and 2 into the tread in accordance with the arrangement illustrated below:-

1.2 Preliminary tests can be carried out with deflation produced by withdrawing the valve core.

NB 1. Trials carried out under these conditions are not valid for leading to qualification of the combat tyre.

2. The performance levels of the un-punctured tyre must have been checked in advance by means of tests which are not covered by this agreement.

**2. Test conditions.**

2.1 The trials must relate to combat tyres fitted on the vehicles for which they are normally intended,

2.2 The punctured tyre will be fitted onto a wheel mounted under the normal conditions of load and maneuverability.

In particular, in the event where the most heavily laded wheel is not steerable, it would be advisable to repeat the test with a punctures tyre fitted onto a steerable wheel.

2.3 With vehicles whose suspension is 'slaved' the test will be carried out using the most adverse configuration on one or two wheels.

2.4 In order to carry out the tests, the following configurations are authorised:-

2.4.1 If the wheel bearing the heaviest load is a steerable wheel, the test will be carried out on that one.

2.4.2 If the wheel bearing the greatest load is not a steerable wheel, two tests will be carried out; one on the wheel under the heaviest load and the other on one steerable wheel.

2.4.3 If the vehicle is fitted with 'a slaved suspension' (non-independent?) which distributes the load, the test will be carried out with two punctured wheels, one of which will be the most heavily loaded, and the other a steerable wheel on the opposite side.

### **3. Performance of the tests.**

The road and cross-country tests will be carried out separately with two different sets of punctures tyres.

#### **3.1 Road test.**

3.1.1 The road test will be carried out over a winding circuit with a figure of eight layout - corresponding to a surfaced or concrete road and incorporating corners with radii of between 25 and 100m.

3.1.2 The vehicle will cover the circuit under the following conditions:-

- 3km at maximum speed,
- 10 km at a uniform speed of 50km/h,
- the remainder of the test mileage (not more than 62km) at a uniform speed of 25km/h.

#### **3.2 Cross-country test.**

3.2.1 The cross-country test will be carried out over a twisting circuit laid out over ground with a normal load-bearing capability and will incorporate a limited number of obstacles such as gradients, steps, ditches and tree-trunks, which will compel the driver to drive exactly as he would have to in open country.

3.2.2 The vehicle will be driven over the cross-country circuit for 2 hours at a speed of about 20km/h.

#### **3.3 Assessment of results.**

A test will be considered as successful if the trial has been carried out in full under the conditions laid down, without either the tyres being shed from the rim or starting to burn.

Following the trial the only unserviceable tyres must be those which have been punctured.

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