

# Bicycle Test Newsletter 2011

2011-04-04

## New EPAC pedelec tests

Pedelecs with electric motor support up to 250 W and 25 km/h are referred to as EPACs (Electrically Power-Assisted Cycles). The standard test for this vehicle type is currently defined by **EN 15194**. The mechanical requirements for load-bearing components in this standard are identical with EN 14764 for trekking and city bikes. For EPACs with **front-wheel motor**, DIN EN 15194 provides non-binding German recommendations.

It is a well-known fact that the EN requirements for trekking and city bikes are inadequate. This is especially true for the higher demands placed on EPACs. Of particular concern is the entire absence of a fatigue test for the frame's head tube area. The increased loads compared to trekking and city bikes on one hand and the required redesigns on the other have caused uncertainty among many manufacturers. This fact prompted us to initiate a development project for an EFBe EPAC standard together with our partners.

Following a survey of EPAC users, we are assuming EPACs to achieve a mileage that lies on average 67 percent above that of trekking and city bikes. Using a standardised stress-number curve ( $k=6$ ), we have transformed this higher mileage into a higher load level according to the miner's rule. The survey has also shown that road speeds are higher by, on average, 5 km/h, which we have taken into account for the affected load types with a shock factor of 1.18. Starting with the tried-and-tested EFBe stipulations for trekking and city bikes, we developed the new **EFBe recommendations** for fatigue testing EPACs. You can find details about these at [www.efbe.de](http://www.efbe.de).

Together with the associated maximum and overload tests, the new tests form the TRI TEST for EPACs. The comprehensive test program places higher demands on the bikes in all respects than the EN standard without resulting in overweight components. Available

since the beginning of this year, it has been in continuous demand.



Image: Test seal for performance level EPAC

The new EPAC test certificate adds a fourth class to the three existing performance classes for trekking and city bikes.

## EN-standard impact tests for frame/fork units



Image: Dropping frame test

With a newly developed test fixture, we can now also offer impact testing of frame–fork units to EN standard. Both tests – “dropping frame” (above) and “dropping mass” (below) can be performed with the same test rig.

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Image: Dropping mass test

Users of these tests should note that the EN standard recommends that bicycle manufacturers perform the tests with a “suitable” fork. Frame manufacturers, on the other hand, can work with a fork that has passed fork impact testing or with a round steel bar in place of the fork. The diameter of the round bar is not specified. The marked differences in rigidity between the various test forks can result in extreme differences in the standard test results.

## DVM workshop on E-bikes at LBF Darmstadt

On 3 and 4 February the third workshop of the DVM (German association for material research and testing) took place. This year’s event was hosted by the renowned LBF Fraunhofer Institute for Structural Durability.

Only about 60 participants followed talks of mixed quality all around safety of electric bicycles. Empirical measurements and mathematical estimates of operating loads on pedelecs were presented, although no concrete suggestions for standard service strength testing were, as yet, forwarded.

The event’s highlight was a highly informative guided tour of the sacred halls of LBF’s Structural Durability laboratory.

## Current frame test statistics

For an objective assessment of EFBe’s test results, it is helpful to know the results of all performed tests. The table below gives an overview of the TRI TEST results, grouped by frame type and performance level. It shows the percentage of passed tests for the total number of tests in each performance category. The figures are taken from 168 TRI TESTs; single tests have not been included.

	<b>MTB</b>	<b>Racer</b>	<b>Trekking /city</b>
<b>TP</b>	66	79	55
<b>HP</b>	67	-	86
<b>SP</b>	-	-	-
<b>Total</b>	66	80	68

Table: Passed TRI TESTs in % of all TRI TESTs (date: 2011-01-01). Data includes only categories for which at least five tests were carried out.

A comparison with last year’s results shows that the transition from pure fatigue testing to the TRI TEST has had no significant impact on the proportion of passed TP tests. Also worth noting is that the demand for standard performance tests, which represent the minimum requirements for frame safety, has almost ceased.

For the evaluation of rigidity tests, all bicycle types were grouped together. The following tables show the percentage distribution of all measured frame rigidity values, with notes

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awarded from 1 to 5 as introduced in the Newsletter of 16 February 2006.

Note	1	2	3	4	5	Σ
Track rigidity (N/mm)	≥ 10	8-10	6.5-8	5-6.5	0-5	
%	8	31	31	24	6	100

Table: Frame track rigidity (date: 2011-01)

Note	1	2	3	4	5	Σ
Out-of-saddle rigidity (N/mm)	≥ 150	120-150	100-120	80-100	0-80	
%	11	34	34	9	12	100

Table: Frame out-of-saddle rigidity (date: 2011-01)

These figures are not representative, but provide a valuable guide for frame designers.

## New test order forms

Until recently, our order forms were categorised by test type, which sometimes meant having to complete several forms for just one test piece. The new forms are categorised by component and indicate clearly which tests are available by default for each component.

A choice of EN and EFBe standard is available. Customers can order the full programme for a standard or select individual tests according to specific needs.

The new order forms are available for download on the EFBe website. The included information sheet aims to help complete the tests as quickly and efficiently as possible.

## Job opportunity: Management Assistant

You are looking for a varied and responsible position at a well-known bicycle technology service provider? Our team offers a pleasant working atmosphere on the restored premises of a former mining company at the northern border of the Ruhr region.



You should have professional experience in business administration and be familiar with the working principles in the engineering sector. In addition to having good cooperation skills and business-level German, you should be familiar with bicycle technology and have a passion for cycling.

We look forward to hearing from you:  
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