Technical Guidance Note TGN 19 on testing of Electrical Power assist Bicycles - EPAC

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1. Introduction

CEN is in the process of drafting prEN15194, a standard for EPAC - electrical (power assist) bicycles. This is not done under a mandate for the EMC Directive. It seems this is only for the purpose of applying this standard for the GPS Directive. However it is evident that those bicycles are under the scope of the EMCD and the question is which standard can be applied for this and if the requirements in the standard are adequate and correct to prove compliance with the essential requirements of the EMCD. prEN15194 has less stringent radiated emission requirements, although because of their NB/BB method a comparison is not really possible.
Tests by EMC Laboratories applying both the prEN15194 and the EN 55022 have proven that a bicycle which is just below the prEN15194 limit does exceed the EN 55022 limits with 10 to 15 dB.

2. Guidelines:

As EPACs can operate in any environment (both residential and heavy industry environment) is seems appropriate to use the test methods and limits provided for in the Generic Standards. However there are some additional points to cover.
1. The charging unit and bike are usually approved at the same time. On this basis it would be unfair to submit the charging unit to the heavy industrial immunity limits as this part of the EUT would only ever be used in a residential environment.
2. The ESD test is not representative of that experienced in real world conditions. The charged frame test from the mobility/wheelchair EMC standard is much more representative of the ESD event that occurs on a pneumatic (insulated) bike or wheelchair i.e. The frame of the bike gets charged when in use and a discharge occurs when the user inadvertently grounds the frame.

Overall this makes for a test plan with some differing requirements:

For Immunity:

- For immunity the functional test set-up of the prEN 15194 can be used.
- ESD using the charged frame method on the bike itself. 4 kV contact and 8 kV air
- ESD to the light industrial generic on the charge unit
- Radiated immunity on the bike itself to the heavy industrial generic. 10V/m any influences not allowed, 30V/m unsafe situations not allowed.
- Radiated immunity on the charge unit to the light industrial generic standard
- Conducted immunity, Transients, Surge and Voltage Dips to the light industrial generic standard on the charge unit

For Emission

- Radiated emissions to the light industrial generic standard on the bike and on the charge unit
- Conducted emissions to the light industrial generic standard on the charge unit
- Mains harmonics to the light industrial generic standard on the charge unit
- Flicker testing to the light industrial generic standard on the charger (if appropriate)