

# DIN EN 15194:2017-12 (E)

## Cycles - Electrically power assisted cycles - EPAC Bicycles

---

<b>Contents</b>		<b>Page</b>
European foreword .....		5
Introduction .....		6
<b>1</b>	<b>Scope .....</b>	<b>7</b>
<b>2</b>	<b>Normative references .....</b>	<b>7</b>
<b>3</b>	<b>Terms and definitions .....</b>	<b>9</b>
<b>4</b>	<b>Safety requirements and/or protective measures .....</b>	<b>16</b>
4.1	General .....	16
4.2	Electrical requirements .....	16
4.2.1	Electric circuit .....	16
4.2.2	Controls and symbols .....	16
4.2.3	Batteries .....	16
4.2.4	Battery charger .....	17
4.2.5	Electric cables and connections .....	17
4.2.6	Wiring .....	18
4.2.7	Power cables and conduits .....	18
4.2.8	External and internal electrical connections .....	18
4.2.9	Moisture resistance .....	18
4.2.10	Mechanical strength test .....	19
4.2.11	Maximum speed for which the electric motor gives assistance .....	19
4.2.12	Start-up assistance mode .....	20
4.2.13	Power management .....	21
4.2.14	Maximum power measurement -- Measurement at the engine shaft .....	22
4.2.15	Electro Magnetic Compatibility .....	23
4.2.16	Failure mode .....	23
4.2.17	Anti-tampering measure .....	23
4.3	Mechanical requirements .....	24
4.3.1	General .....	24
4.3.2	Sharp edges .....	25
4.3.3	Security and strength of safety-related fasteners .....	25
4.3.4	Protrusions .....	26
4.3.5	Brakes .....	26
4.3.6	Steering .....	39
4.3.7	Frames .....	50
4.3.8	Front fork .....	59
4.3.9	Wheels and wheel/tyre assembly .....	67
4.3.10	Rims, tyres and tubes .....	71
4.3.11	Front mudguard .....	73
4.3.12	Pedals and pedal/crank drive system .....	75
4.3.13	Drive-chain and drive belt .....	82
4.3.14	Chain-wheel and belt-drive protective device .....	83
4.3.15	Saddles and seat-posts .....	87
4.3.16	Spoke protector .....	93
4.3.17	Luggage carriers .....	93
4.3.18	Road-test of a fully-assembled EPAC .....	93
4.3.19	Lighting systems and reflectors .....	94
4.3.20	Warning device .....	95

4.3.21	Thermal hazards .....	95
4.3.22	Performance levels (PLrs) for control system of EPACs .....	95
4.4	List of significant hazards .....	95
5	Marking, labelling .....	96
5.1	Requirement .....	96
5.2	Durability test .....	97
5.2.1	Requirement .....	97
5.2.2	Test method .....	97
6	Instruction for use .....	97
Annex A (informative) Example of recommendation for battery charging .....		100
Annex B (informative) Example of relation between speed, torque and current .....		101
Annex C (normative) Electromagnetic compatibility of EPAC and ESA .....		104
C.1	Conditions applying to EPAC and to electrical/electronic sub-assemblies (ESA) .....	104
C.1.1	Marking .....	104
C.1.2	Requirements .....	104
C.2	Method of measuring broad-band electromagnetic radiation from EPA .....	108
C.2.1	Measuring equipment .....	108
C.2.2	Test method .....	109
C.2.3	Measurement .....	109
C.3	Method of measuring narrow band electromagnetic radiation from EPAC .....	109
C.3.1	General .....	109
C.3.2	Antenna type, position and orientation .....	109
C.4	Methods of testing EPAC immunity to electromagnetic radiation .....	110
C.4.1	General .....	110
C.4.2	Expression of results .....	110
C.4.3	Test conditions .....	110
C.4.4	State of the EPAC during the tests .....	110
C.4.5	Type, position and orientation of the field generator .....	111
C.4.6	Requisite test and condition .....	112
C.4.7	Generation of the requisite field strength .....	112
C.4.8	Inspection and monitoring equipment .....	114
C.5	Method of measuring broad-band electromagnetic radiation from separate technical units (ESA) .....	114
C.5.1	General .....	114
C.5.2	State of the ESA during the test .....	114
C.5.3	Antenna type, position and orientation .....	114
C.6	Method of measuring narrow-band electromagnetic radiation from separate technical units (ESAs) .....	114
C.6.1	General .....	114
C.6.2	Test conditions .....	114
C.6.3	State of the ESA during the tests .....	114
C.6.4	Antenna type, position and orientation .....	114
C.7	Methods of testing the ESA immunity to electromagnetic radiation .....	115
C.7.1	General .....	115
C.7.2	Expression of results .....	115
C.7.3	Test conditions .....	115
C.7.4	State of the ESA during the tests .....	115
C.7.5	Requisite test and condition .....	115
C.7.6	Generation of the requisite field strength .....	116
C.7.7	Inspection and monitoring equipment .....	116
C.8	ESD test .....	117
Annex D (informative) Steering geometry .....		118
Annex E (normative) Dummy fork characteristics .....		119

<b>Annex F (informative) Explanation of the method of least squares for obtaining line of best fit and <math>\pm 20\%</math> limit lines for braking performance linearity .....</b>	<b>121</b>
<b>Annex G (normative) Fork mounting fixture .....</b>	<b>124</b>
<b>Annex H (informative) Wheel/tyre assembly - Fatigue test .....</b>	<b>125</b>
<b>H.1 Requirements .....</b>	<b>125</b>
<b>H.2 Test method .....</b>	<b>125</b>
<b>Annex I (normative) Light, warning device, on/off symbols .....</b>	<b>127</b>
<b>Annex J (informative) Walk assist mode symbols .....</b>	<b>128</b>
<b>Annex ZA (informative) Relationship between this European Standard and the essential requirements of EU Directive 2006/42/EC aimed to be covered .....</b>	<b>129</b>
<b>Bibliography .....</b>	<b>134</b>