

# DIN EN 15551:2009-12 (E)

## Railway applications - Railway rolling stock - Buffers

---

<b>Contents</b>		<b>Page</b>
Foreword .....		5
Introduction .....		6
1	Scope .....	7
2	Normative references .....	7
3	Terms and definitions .....	8
4	Classification and designation .....	10
4.1	General .....	10
4.2	Buffers with buffer stroke 105 mm (Categories A, B and C) .....	10
4.3	Buffers with buffer stroke 110 mm .....	10
4.4	Long stroke buffer 150 mm .....	10
4.5	Interaction coupling/buffer .....	11
5	Requirements .....	11
5.1	General .....	11
5.2	Fixing on vehicle and interchangeability .....	11
5.3	Buffer dimensions .....	12
5.4	Mechanical characteristics of buffers .....	13
5.5	Elastic devices .....	15
5.5.1	Types of elastic devices .....	15
5.5.2	Static characteristics .....	15
5.5.3	Dynamic characteristics .....	16
5.5.4	Endurance testing under service load for elastic device .....	16
5.5.5	Endurance testing for life-cycle simulation .....	16
5.6	Marking .....	16
6	Housing .....	18
6.1	Plunger and base .....	18
6.2	Buffer head .....	18
6.2.1	Materials .....	18
6.2.2	Boundary dimensions .....	18
6.2.3	Standard dimensions of buffer head .....	19
7	Crashworthy buffers for tank wagons according to RID .....	20
Annex A (normative) Maximum space envelope of buffer .....		21
A.1	Requirements for space envelope of buffer .....	21
A.1.1	Buffers for freight wagons .....	21
A.1.2	Buffers for coaches .....	24
A.2	Notes on definition of envelopes for overall dimensions of wagon buffers described in Annex A .....	24
A.2.1	General .....	24
A.2.2	Study relating to definition of the envelope .....	25
Annex B (normative) Mechanical characteristics of buffers - Test methods .....		27
B.1	General .....	27

B.2	Force F1 .....	27
B.3	Force F2 .....	27
B.4	Force F3 .....	27
B.5	Force F4 .....	28
B.6	Force F5 .....	28
B.7	Force F6 .....	28
<b>Annex C (normative) Requirements for elastic devices .....</b>		<b>29</b>
C.1	Rubber elastomer or other elastomer elastic systems .....	29
C.1.1	General .....	29
C.1.2	Metal inserts .....	29
C.1.3	Constituents of rubber elastomer and/or other elastomer systems .....	29
C.1.4	Static characteristics of the sets .....	31
C.1.5	Dynamic characteristics of the sets .....	31
C.1.6	Bonding .....	31
C.1.7	Marking .....	31
C.1.8	Inspection and tests .....	31
C.2	Friction spring/Ring spring .....	32
C.2.1	Manufacturer's marks .....	32
C.2.2	Flexibility test .....	33
C.2.3	Endurance test .....	34
C.3	Hydrodynamic or hydrostatic systems .....	34
C.3.1	General .....	34
C.3.2	Steel parts .....	34
C.3.3	Absorbing energy medium .....	34
C.3.4	Static tests of capsules .....	35
C.4	Combined elastic systems .....	35
<b>Annex D (normative) Testing of static characteristics of buffers .....</b>		<b>36</b>
D.1	Test principle .....	36
D.2	Test procedure .....	36
D.3	Measurements .....	36
<b>Annex E (normative) Dynamic testing .....</b>		<b>37</b>
E.1	Dynamic testing of buffer .....	37
E.1.1	General .....	37
E.1.2	Temperature effects .....	38
E.2	Dynamic characteristics of 105 mm stroke buffer .....	39
E.2.1	Test programme .....	39
E.2.2	Category A .....	40
E.2.3	Category B .....	40
E.2.4	Category C .....	41
E.2.5	Comments on the test conditions .....	41
E.3	Dynamic characteristics of 150 mm stroke buffer .....	42
E.4	Dynamic characteristics of 110 mm stroke buffer .....	43
<b>Annex F (normative) Endurance testing under service load for elastic device .....</b>		<b>44</b>
F.1	Aim of the test .....	44
F.2	Test principle .....	44
F.3	Test results to be obtained .....	45
F.4	Test requirements .....	45
F.4.1	Endurance test assembly .....	45
F.4.2	Preliminary static test .....	46
F.4.3	Endurance test .....	46
F.4.4	Final static test .....	46
<b>Annex G (normative) Endurance testing under buffing load for life-cycle simulation .....</b>		<b>47</b>

G.1	Endurance tests for hydrodynamic and hydrostatic buffers for wagons .....	47
G.1.1	Aim of the test .....	47
G.1.2	Test principle .....	47
G.1.3	Expected result .....	47
G.1.4	Test requirements .....	47
G.1.5	Delivery of elastic devices .....	50
G.2	Endurance tests for hydrodynamic and hydrostatic buffers for coaches .....	50
G.2.1	General .....	50
G.2.2	Tests under alternating loads .....	50
G.2.3	Repeated buffing tests .....	51
G.2.4	Conditions to be observed .....	51
<b>Annex H (normative) Plunger and base .....</b>		<b>52</b>
H.1	Plunger and base .....	52
H.2	Manufacture of housing .....	52
H.2.1	Welding .....	52
H.2.2	Initial greasing .....	52
<b>Annex I (informative) Guidelines for buffer head materials .....</b>		<b>53</b>
I.1	Example of test program requirements for verification of buffer head materials .....	53
I.2	List of existing buffer head materials .....	55
<b>Annex J (normative) Calculation of the width of buffer heads .....</b>		<b>56</b>
J.1	General .....	56
J.2	Data used in the calculation .....	56
J.3	Calculation .....	56
<b>Annex K (informative) Regulations relating to the layout of S-curves .....</b>		<b>58</b>
K.1	Data used in the calculation .....	58
K.2	Equations to be applied .....	58
K.3	Working examples .....	59
K.4	Comments on the preparation of the equations in Annex J and Annex K .....	60
K.5	Track .....	60
K.6	Vehicle .....	60
<b>Annex L (normative) Crashworthy buffers for tank wagons according to RID .....</b>		<b>61</b>
L.1	Requirements on crashworthy buffers .....	61
L.1.1	Objectives from RID .....	61
L.1.2	Additional requirements .....	61
L.2	Test procedure for crashworthy buffers .....	61
<b>Annex M (normative) Maximum space envelope of crashworthy buffers .....</b>		<b>63</b>
<b>Annex ZA (informative) Relationship between this European Standard and the Essential Requirements of EU Directive 96/48/EC, as modified by Directive 2004/50/EC .....</b>		<b>66</b>
<b>Annex ZB (informative) Relationship between this European Standard and the Essential Requirements of EU Directive 2001/16/EC of the European Parliament and of the Council of 19 March 2001 on the interoperability of the trans-European conventional rail system, as modified by EU Directive 2004/50/EC of 29 April 2004 .....</b>		<b>67</b>
<b>Bibliography .....</b>		<b>69</b>