

# DIN EN 13802:2014-03 (E)

## Railway applications - Suspension components - Hydraulic dampers

---

<b>Contents</b>		<b>Page</b>
Foreword .....		4
<b>1</b>	<b>Scope .....</b>	<b>6</b>
<b>2</b>	<b>Normative references .....</b>	<b>6</b>
<b>3</b>	<b>Terms, definitions and symbols .....</b>	<b>6</b>
3.1	Terms and definitions .....	7
3.2	Symbols .....	8
<b>4</b>	<b>Method of specifying .....</b>	<b>14</b>
4.1	Overview .....	14
4.1.1	General .....	14
4.1.2	Operational environment .....	14
4.1.3	Technical requirements .....	14
4.2	Operational environment requirements .....	16
4.2.1	Service conditions .....	16
4.2.2	Climatic conditions .....	16
4.2.3	Special environmental conditions .....	17
4.2.4	Vibrational exposure .....	18
4.3	Physical characteristics .....	18
4.3.1	Strength .....	18
4.3.2	Fire resistance .....	18
4.3.3	Surface protection .....	18
4.3.4	Noise .....	18
4.3.5	Whole life environmental impact .....	19
4.3.6	Leakage .....	19
4.3.7	Length and stroke .....	19
4.3.8	Overall dimensions and interface .....	19
4.3.9	Mass .....	19
4.4	Functional requirements .....	20
4.4.1	Orientation .....	20
4.4.2	Nominal force ( $c, v_nF$ , $e, v_nF$ ) and nominal velocity ( $nv$ ) .....	20
4.4.3	Maximum force ( $c_{max}, v_{max}F$ , $e_{max}, v_{max}F$ ) and maximum velocity ( $maxv$ ) .....	20
4.4.4	Force as a function of displacement characteristic .....	20
4.4.5	Force as a function of velocity characteristic .....	24
4.4.6	Dynamic characteristics .....	27
4.4.7	Priming .....	29
<b>5</b>	<b>Test methods .....</b>	<b>29</b>
5.1	General requirements .....	29
5.1.1	Test compliance .....	29
5.1.2	Testing machine .....	29
5.1.3	Test temperature .....	30
5.1.4	Test sample .....	30
5.2	Operational environment requirements .....	30
5.2.1	Service conditions .....	30
5.2.2	Climatic conditions .....	31
5.2.3	Special environmental conditions .....	34
5.2.4	Vibrational exposure .....	34
5.3	Physical characteristics .....	35
5.3.1	Strength .....	35

5.3.2	Fire resistance .....	35
5.3.3	Surface protection .....	35
5.3.4	Noise .....	35
5.3.5	Whole life environmental impact .....	35
5.3.6	Leakage .....	36
5.3.7	Length and stroke .....	36
5.3.8	Overall dimensions and interface .....	36
5.3.9	Mass .....	36
5.4	Functional requirements .....	36
5.4.1	Orientation .....	36
5.4.2	Nominal force ( $c, v_n F$ , $e, v_n F$ ) and nominal velocity ( $n v$ ) .....	37
5.4.3	Maximum force ( $c_{max}, v_{max} F$ , $e_{max}, v_{max} F$ ) and maximum velocity ( $max v$ ) .....	37
5.4.4	Force as a function of displacement characteristic .....	37
5.4.5	Force as a function of velocity characteristic .....	39
5.4.6	Dynamic characteristics .....	39
5.4.7	Priming .....	39
6	Production control .....	40
6.1	General .....	40
6.2	Product verification .....	40
6.3	Results of the tests .....	40
7	Marking .....	40
8	Packaging .....	41
9	Maintainability .....	41
Annex A (informative) Damper specification .....		42
Annex B (informative) Damper dimensions .....		46
B.1	Range of damper overall dimensions .....	46
B.2	Calculating the damper length .....	47
B.3	Preferred end mounting dimensions .....	50
Annex C (informative) Nominal velocities .....		53
Annex D (informative) Examples of force as a function of velocity characteristic .....		54
Annex E (informative) Checks and tests to be performed according to damper category .....		56
Annex F (informative) Dynamic test velocities .....		57
Annex G (informative) Conformity assessment procedures, samples, validity and monitoring .....		58
G.1	Conformity assessment procedure of the product .....	58
G.2	Validity of the product approval .....	59
G.3	Control and monitoring of production quality .....	59
G.4	Traceability .....	59
Bibliography .....		60