

# DIN EN 13146-4:2020-06 (E)

## Railway applications - Track - Test methods for fastening systems - Part 4: Effect of repeated loading

---

<b>Contents</b>		<b>Page</b>
European foreword .....		4
1	Scope .....	5
2	Normative references .....	5
3	Terms, definitions, symbols and abbreviations .....	5
3.1	Terms and definitions .....	5
3.2	Symbols and abbreviations .....	6
4	Principle .....	7
5	Apparatus .....	7
5.1	Rail .....	7
5.2	Actuator .....	7
5.3	Load application head .....	7
5.4	Displacement-measuring instruments .....	7
5.4.1	Calibration procedure .....	7
5.4.2	Calibration requirement .....	7
5.4.3	Fixtures for mounting displacement-measuring instruments .....	8
5.5	Force-measuring instruments .....	8
5.6	Verification of calibration .....	8
6	Test specimens .....	8
6.1	Sleeper or other rail support .....	8
6.2	Fastening .....	8
7	Procedure for one rail .....	8
7.1	General .....	8
7.2	Preparation for test .....	9
7.2.1	In line fastening .....	9
7.2.2	Offset fastening .....	9
7.3	Clamping force .....	9
7.4	Longitudinal rail restraint .....	10
7.5	Vertical stiffness of fastening assembly .....	10
7.5.1	Static stiffness .....	10
7.5.2	Low-frequency dynamic stiffness .....	10
7.6	Cyclic loading .....	10
7.6.1	Preparation for the cyclic load test .....	10
7.6.2	Preliminary load cycles .....	11
7.6.3	Continuation of the repeated load test .....	11
7.6.4	Results required from the repeated load test .....	11
7.7	Repeat tests .....	15
7.8	Final inspection .....	15
8	Alternative test procedure .....	15
8.1	General .....	15
8.2	Apparatus .....	15
8.2.1	General .....	15
8.2.2	Loading frame .....	15
8.3	Procedure .....	16

8.3.1	General .....	16
8.3.2	Preparation for test .....	16
8.3.3	Clamping force .....	16
8.3.4	Longitudinal rail restraint .....	17
8.3.5	Vertical stiffness .....	17
8.3.6	Cyclic loading .....	17
8.3.7	Repeat tests .....	17
8.3.8	Final inspection .....	17
9	Test report .....	18
	Bibliography .....	19