

# DIN EN 13674-1:2017-07 (E)

Railway applications - Track - Rail - Part 1: Vignole railway rails 46 kg/m and above  
(includes Amendment A1:2017)

---

<b>Contents</b>		<b>Page</b>
European foreword .....		5
Introduction .....		7
1	Scope .....	8
2	Normative references .....	8
3	Terms and definitions .....	8
4	Information to be supplied by the purchaser .....	9
5	Steel grades .....	10
6	Profile drawings/properties/mass .....	11
7	Manufacture .....	12
7.1	Product integrity .....	12
7.2	Blooms .....	12
7.3	Rails .....	12
7.4	Identification .....	12
7.4.1	Branding .....	12
7.4.2	Hot stamping .....	13
7.4.3	Cold stamping .....	14
7.4.4	Other identification .....	14
8	Qualifying tests .....	14
8.1	Procedure .....	14
8.2	Fracture toughness (K <sub>Ic</sub> ) .....	15
8.2.1	Test pieces and test methods .....	15
8.2.2	Qualifying criteria .....	15
8.3	Fatigue crack growth rate .....	15
8.3.1	Test method .....	15
8.3.2	Test pieces .....	15
8.3.3	Number of tests and test conditions .....	15
8.3.4	Qualifying criteria .....	15
8.4	Fatigue test .....	16
8.4.1	Test method .....	16
8.4.2	Test pieces .....	16
8.4.3	Number of tests and test conditions .....	16
8.4.4	Qualifying criteria .....	16
8.5	Residual stress in rail foot .....	16
8.5.1	Test method .....	16
8.5.2	Test pieces .....	16
8.5.3	Measurements .....	16
8.5.4	Qualifying criteria .....	16
8.6	Variation of centre line running surface hardness of heat treated rails .....	17
8.7	Tensile strength and elongation .....	17
8.8	Segregation .....	18
8.9	Other qualifying requirements .....	18

9	Acceptance tests .....	18
9.1	Laboratory tests .....	18
9.1.1	General .....	18
9.1.2	Sampling and preparation of samples and test pieces .....	18
9.1.3	Chemical composition .....	18
9.1.4	Microstructure .....	23
9.1.5	Decarburisation .....	24
9.1.6	Oxide cleanness .....	24
9.1.7	Sulfur prints .....	24
9.1.8	Hardness .....	24
9.1.9	Tensile tests .....	25
9.1.10	Retest procedures .....	26
9.2	Dimension tolerances .....	26
9.2.1	Profile .....	26
9.2.2	Straightness, surface flatness and twist .....	27
9.2.3	Cutting and drilling .....	33
9.3	Gauges .....	33
9.4	Inspection for internal quality and surface quality .....	33
9.4.1	Internal quality .....	33
9.4.2	Surface quality .....	36
9.4.3	Checking of automated testing equipment .....	38
Annex A (normative) Rail profiles .....		49
Annex B (normative) Standard test method for the determination of the plane strain fracture toughness (K <sub>Ic</sub> ) of rails .....		76
B.1	Test methods .....	76
B.2	Test pieces .....	76
B.3	Number of tests .....	76
B.4	Test conditions) .....	76
B.5	Analysis of test data .....	77
B.6	Reporting of results .....	77
Annex C (normative) Method for the determination of rail foot surface longitudinal residual stresses .....		82
C.1	Procedure .....	82
C.2	Strain gauges and their location .....	82
Annex D (normative) Limiting sulfur prints .....		85
Annex E (normative) Profile and drilling gauges .....		99
Annex F (normative) "Microscopic examination of rail steels using standard diagrams to assess the content of non-metallic inclusions" .....		113
F.1	General .....	113
F.1.1	Degree of purity .....	113
F.1.2	Standard diagram plate No. 1 .....	113
F.2	Preparation of specimens .....	113
F.3	Structure and use of standard diagram plate No. 1 .....	113
F.3.1	Use of diagram plate No. 1 .....	113
F.3.2	Rating a single inclusion .....	114
F.3.3	Rating of very small inclusions .....	114
F.4	Test procedure .....	114
F.4.1	Magnification .....	114
F.4.2	Selection of inclusions .....	114
F.5	Evaluation .....	115
F.5.1	General .....	115
F.5.2	Method of evaluation .....	115

<b>F.5.3</b>	<b>Calculation procedure for evaluation using method K .....</b>	<b>115</b>
<b>Annex G</b>	<b>(informative) Significant technical changes between this European standard and the previous edition .....</b>	<b>118</b>
<b>Annex ZA</b>	<b>(informative) "Relationship between this European Standard and the Essential Requirements of EU Directive 2008/57/EC" .....</b>	<b>120</b>
<b>Bibliography</b>	<b>.....</b>	<b>122</b>