BS 11:2015

BSI Standards Publication

Specification for dimensional properties and associated tolerances of railway rails

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Contents

Summary of pages

This document comprises a front cover, an inside front cover, pages i to ii, pages 1 to 18, an inside back cover and a back cover.

Foreword

Publishing information

This British Standard is published by BSI Standards Limited, under licence from The British Standards Institution, and came into effect on 31 May 2015. It was prepared by Technical Committee RAE/2, *Railway Applications - Infrastructure*. A list of organizations represented on this committee can be obtained on request to its secretary.

Supersession

This British Standard supersedes BS 11:1985, which is withdrawn.

Information about this document

The revision has been prepared because most of the content concerning rail manufacture, steel grades and some of the rail profiles has been superseded by the new editions of BS EN 13674-1:2011 and BS EN 13674-4:2006. This revision of BS 11 therefore deals only with those aspects not covered by BS EN 13674-1:2011 and BS EN 13674-4:2006 and may therefore be used as a supplement to them.

Presentational conventions

The provisions of this standard are presented in roman (i.e. upright) type. Its requirements are expressed in sentences in which the principal auxiliary verb is "shall".

Commentary, explanation and general informative material is presented in smaller italic type, and does not constitute a normative element.

Where words have alternative spellings, the preferred spelling of the Shorter Oxford English Dictionary is used (e.g. "organization" rather than "organisation").

Requirements in this standard are drafted in accordance with *Rules for the structure and drafting of UK standards*, subclause **J.1.1**, which states, "Requirements should be expressed using wording such as: 'When tested as described in Annex A, the product shall ...'". This means that only those products capable of passing the specified test will be deemed to conform to this standard.

Contractual and legal considerations

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

Compliance with a British Standard cannot confer immunity from legal obligations.

1 Scope

This British Standard specifies requirements for the dimensional properties and associated tolerances of railway rails of 24.8 kg/m (50 lb/yd) and greater linear mass which are not specified in BS EN 13674-1 or BS EN 13674-4.

For chemical and mechanical properties, grade designation, marking and certification requirements see BS EN 13674-1.

2 Normative references

The following document, in whole or in part, is normatively referenced in this document and is indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

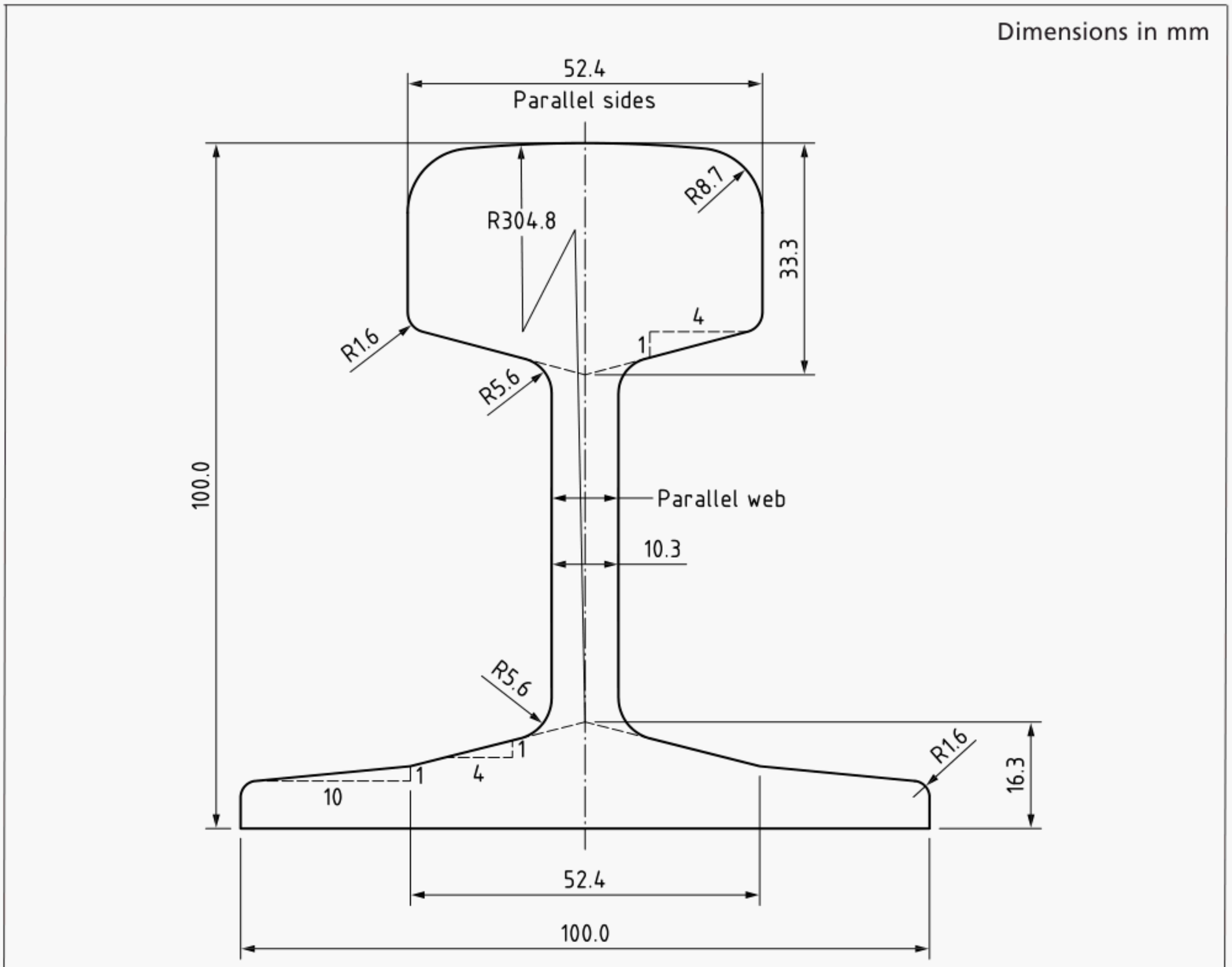
BS EN 13674-1:2011, *Railway applications – Track – Rail – Part 1: Vignole railway rails 46 kg/m and above*

3 Dimensions of rail sections

Rail section dimensional properties and mass per unit length shall conform to the appropriate values given in Figure 1 to Figure 14.

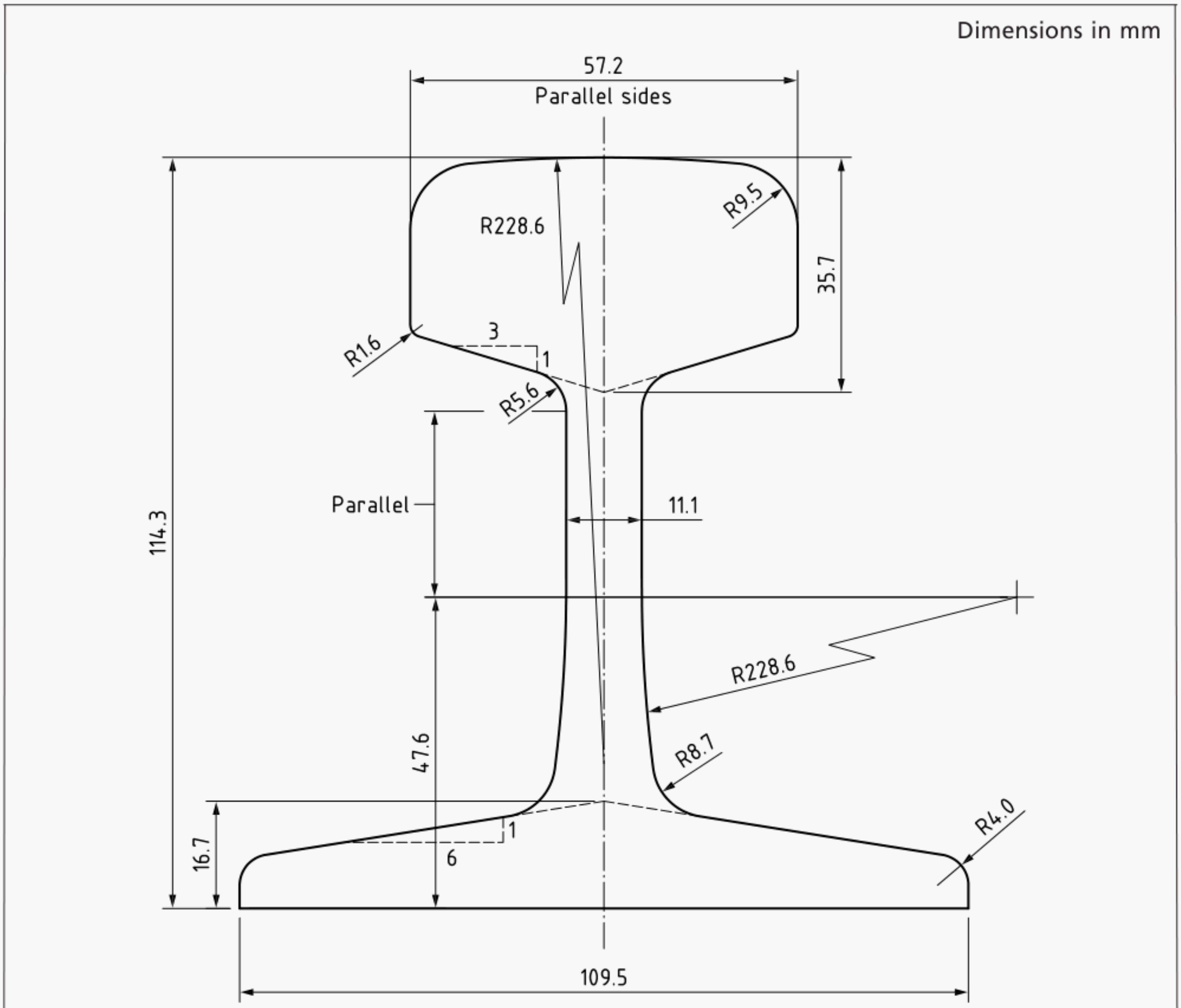
NOTE The rail sections in this British Standard were designed before the change to SI units was planned. The original imperial dimensions used have been converted to SI dimensions with an accuracy necessary for the retention of the previous imperial profiles and properties of the rails.

Figure 1 **BS rail no. 50 "O"**



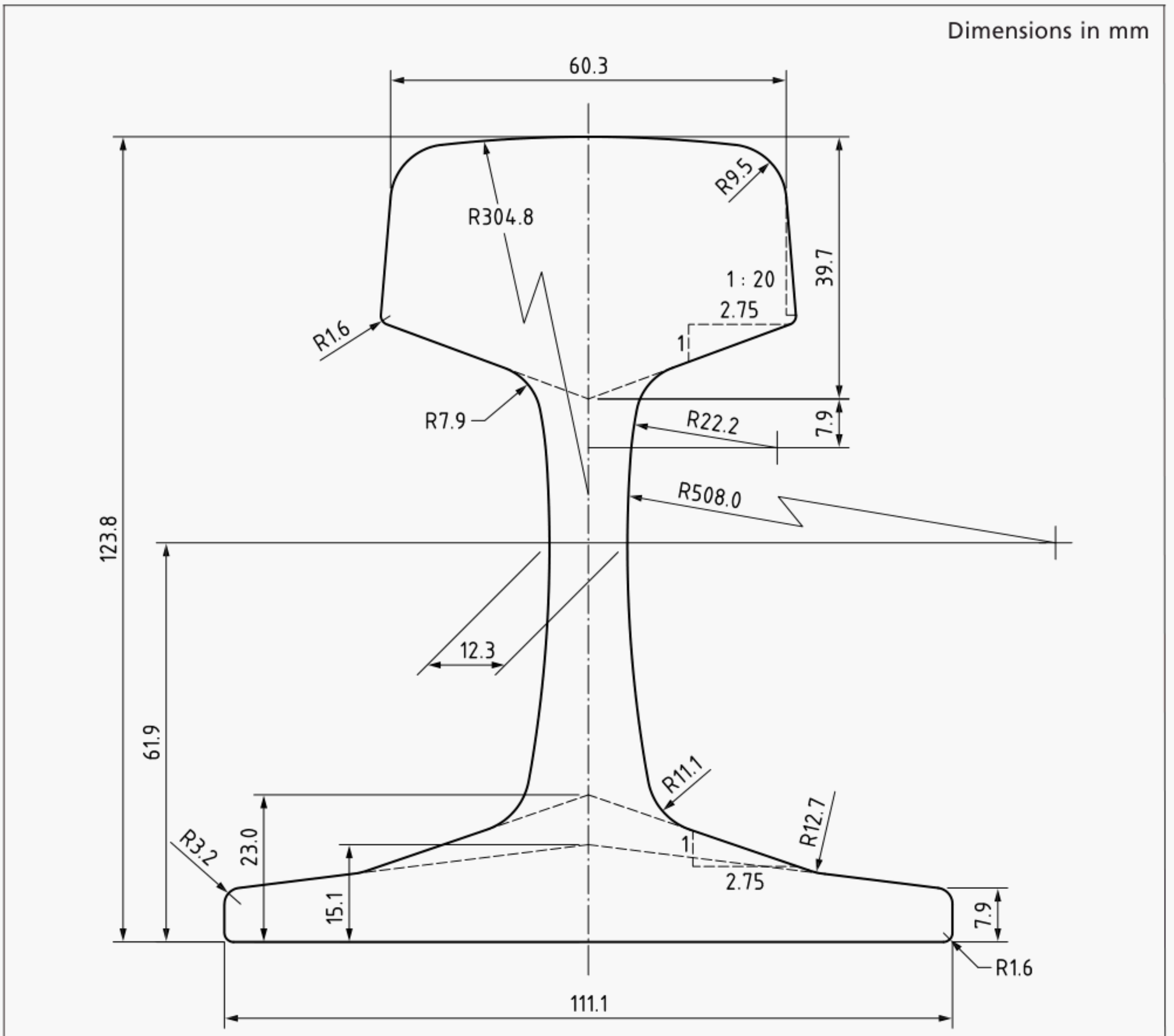
Cross-sectional area:		
Whole section	3 163.5	mm²
Head	1 526.8	mm² (48.26%)
Web	547.9	mm² (17.32%)
Foot	1 088.7	mm² (34.42%)
Calculated mass	24.833	kg/m
Moment of inertia	424.3	cm⁴
Section modulus	84.8	cm³
Distance from top of rail to neutral axis	50.05	mm

Figure 2 **BS rail section no. 60 R**



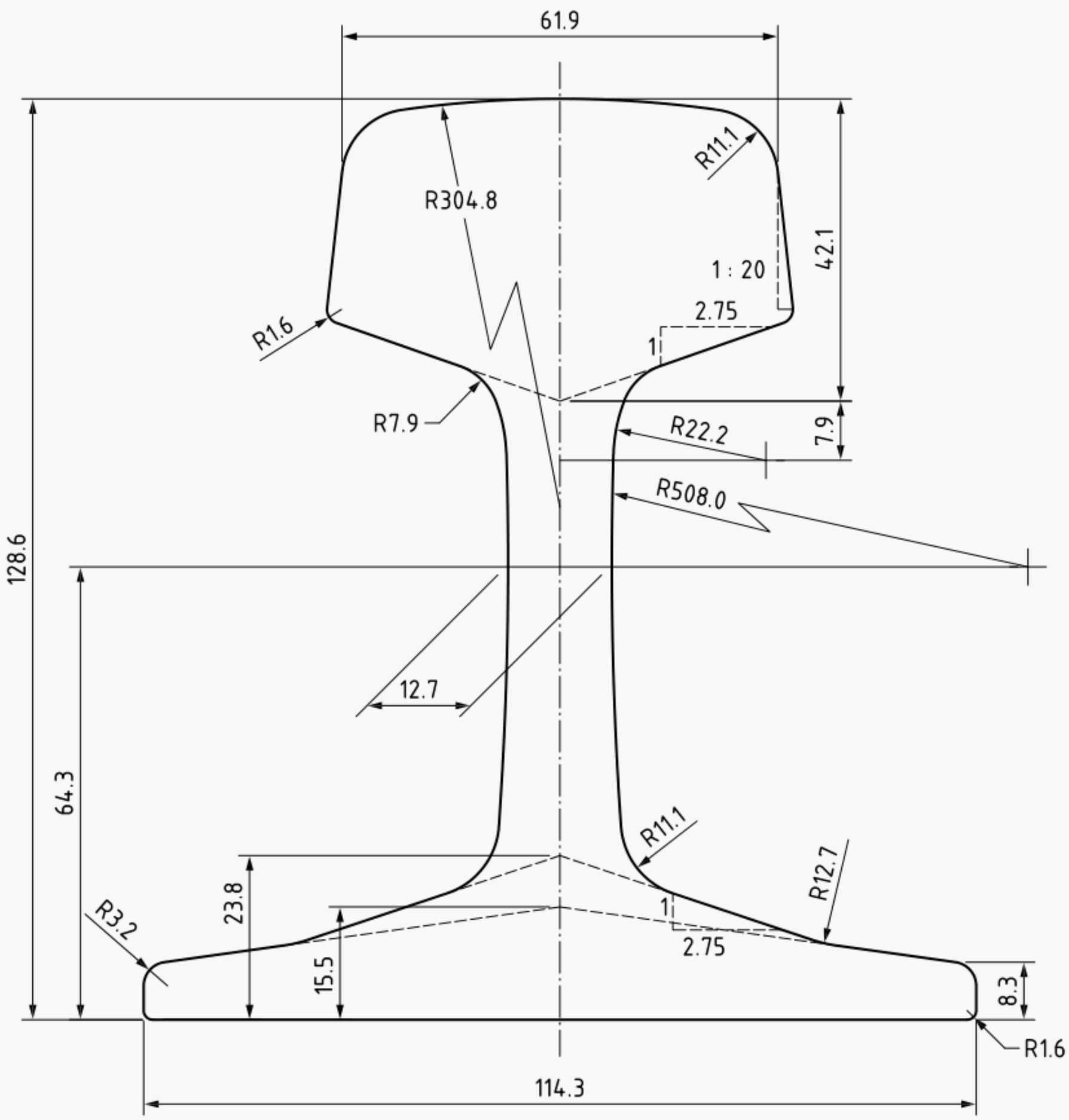
Cross-sectional area:		
Whole section	3 798.9	mm²
Head	1 703.9	mm² (44.85%)
Web	773.7	mm² (20.37%)
Foot	1 321.3	mm² (34.78%)
Calculated mass	29.822	kg/m
Moment of inertia	680.9	cm⁴
Section modulus	116.0	cm³
Distance from top of rail to neutral axis	58.70	mm

Figure 3 **BS rail section no. 70 A**



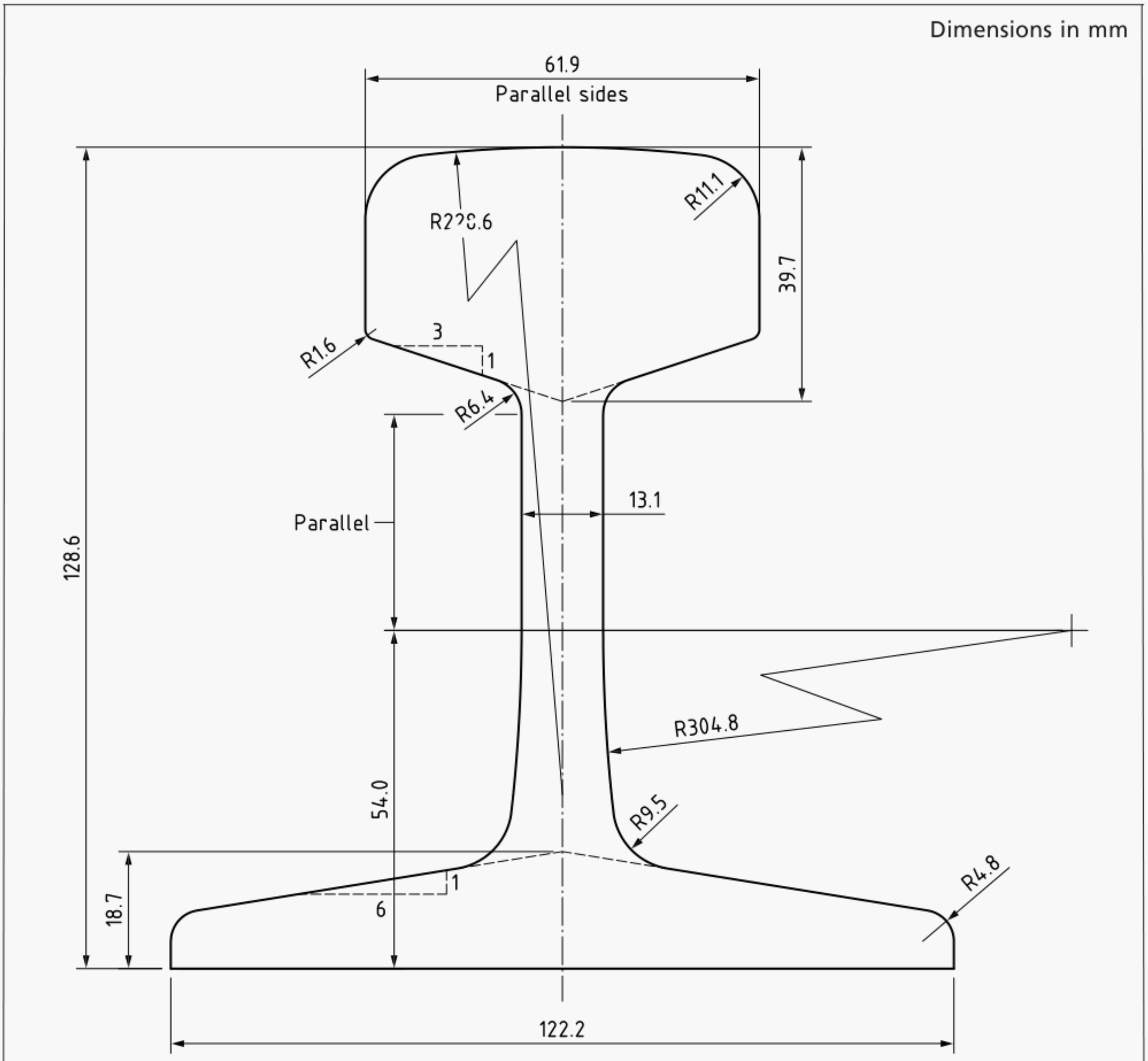
Cross-sectional area:		
Whole section	4 434.0	mm²
Head	2 018.3	mm² (45.52%)
Web	827.8	mm² (19.68%)
Foot	1 542.9	mm² (34.80%)
Calculated mass	34.807	kg/m
Moment of inertia	910.7	cm⁴
Section modulus	145.7	cm³
Distance from top of rail to neutral axis	62.49	mm

Figure 4 **BS rail section no. 75 A**



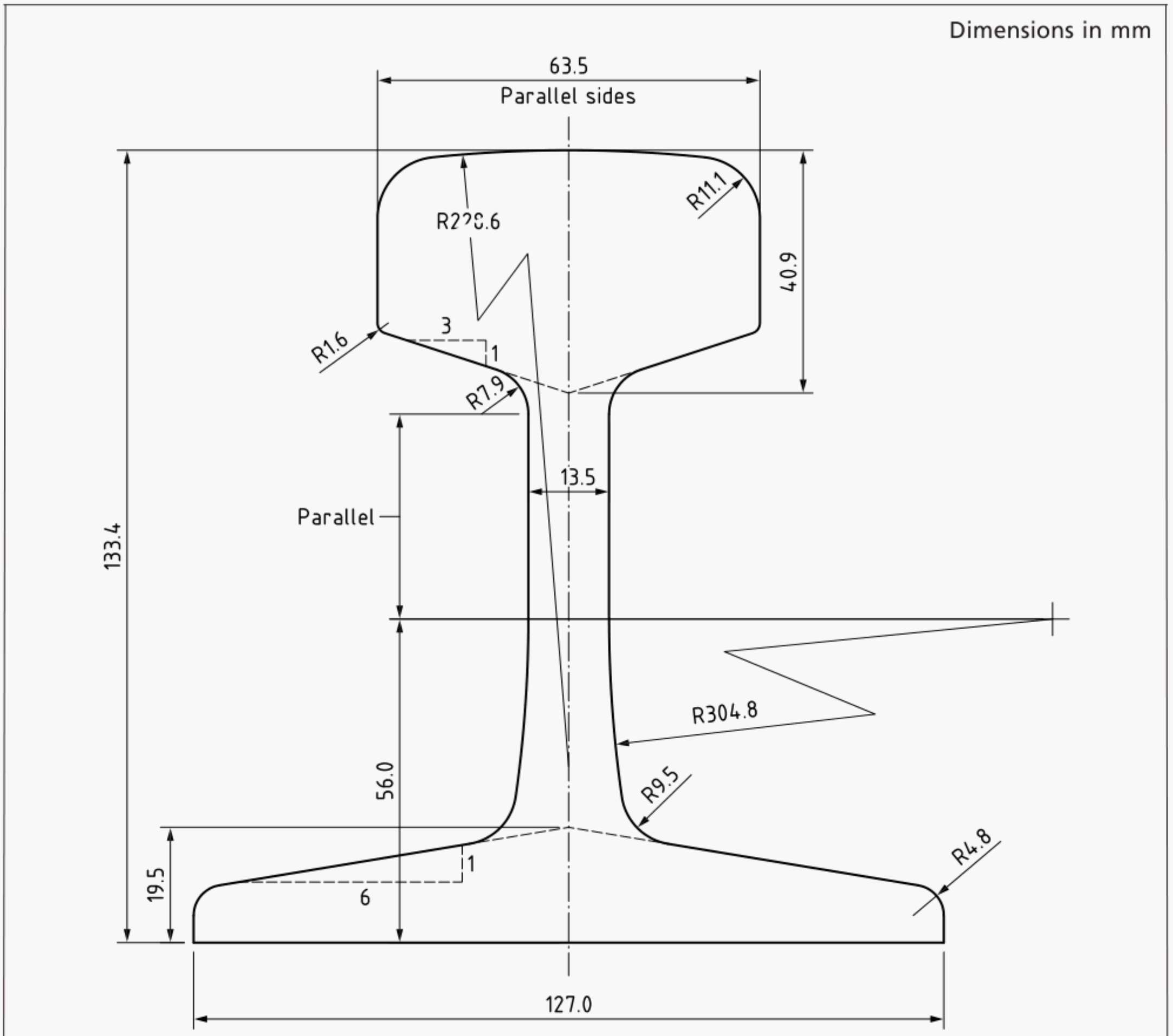
Cross-sectional area:		
Whole section	4 771.3	mm²
Head	2 198.3	mm² (46.07%)
Web	925.2	mm² (19.39%)
Foot	1 647.8	mm² (34.54%)
Calculated mass	37.455	kg/m
Moment of inertia	1 048.8	cm⁴
Section modulus	161.8	cm³
Distance from top of rail to neutral axis	64.81	mm

Figure 5 **BS rail section no. 75 R**



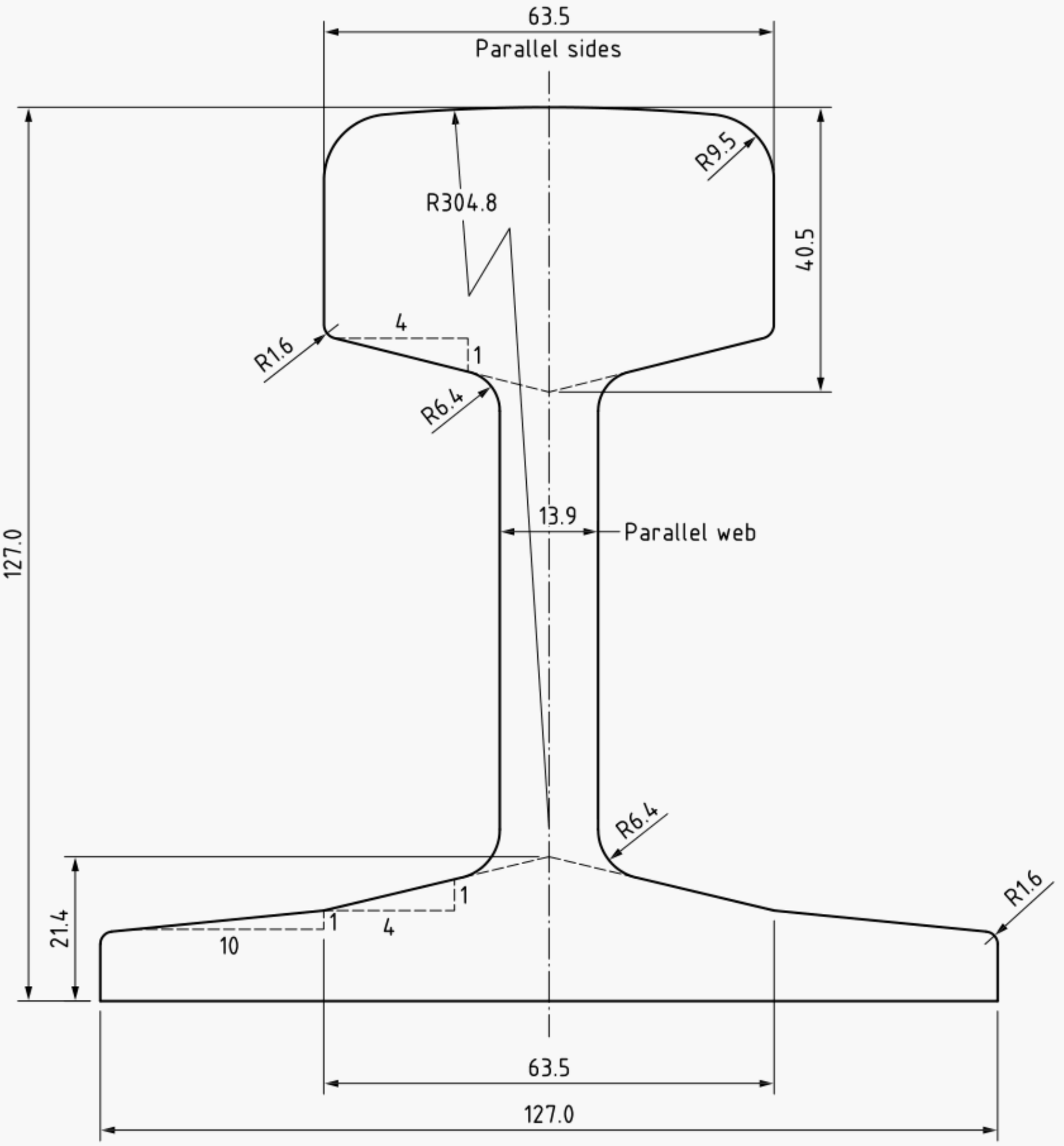
Cross-sectional area:		
Whole section	4 718.7	mm^2
Head	2 052.7	mm^2 (43.50%)
Web	1 023.0	mm^2 (21.68%)
Foot	1 643.0	mm^2 (34.82%)
Calculated mass	37.041	kg/m
Moment of inertia	1 061.3	cm^4
Section modulus	159.1	cm^3
Distance from top of rail to neutral axis	66.71	mm

Figure 6 **BS rail section no. 80 R**



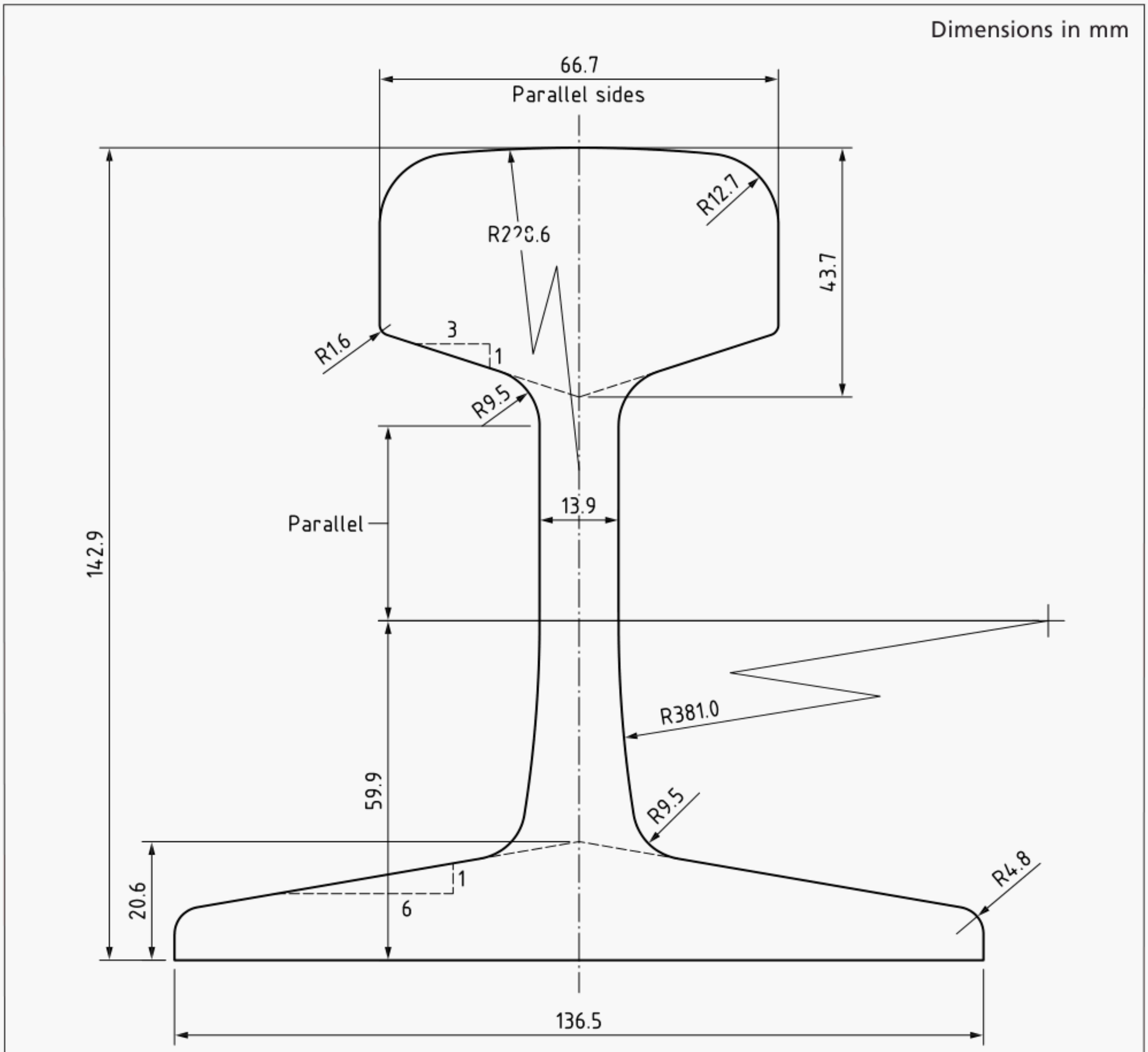
Cross-sectional area:		
Whole section	5 054.0	mm^2
Head	2 171.7	mm^2 (42.97%)
Web	1 099.5	mm^2 (21.76%)
Foot	1 782.8	mm^2 (35.27%)
Calculated mass	39.674	kg/m
Moment of inertia	1 224.5	cm^4
Section modulus	176.0	cm^3
Distance from top of rail to neutral axis	69.58	mm

Figure 7 **BS rail section no. 80 “O”**



Cross-sectional area:		
Whole section	5 061.3	mm^2
Head	2 251.1	mm^2 (44.48%)
Web	947.2	mm^2 (18.71%)
Foot	1 863.0	mm^2 (36.81%)
Calculated mass	39.731	kg/m
Moment of inertia	1 100.5	cm^4
Section modulus	166.9	cm^3
Distance from top of rail to neutral axis	65.94	mm

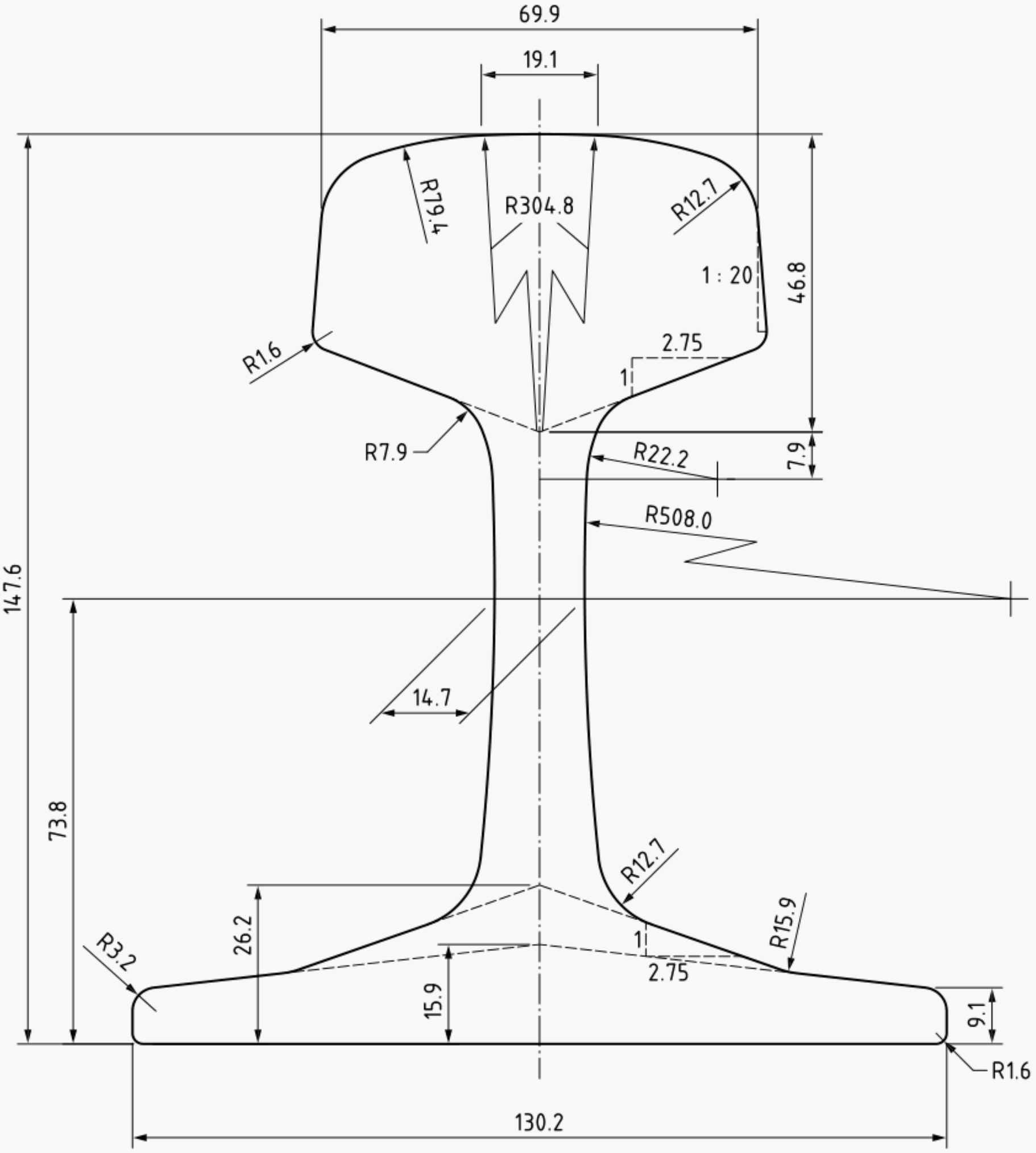
Figure 8 **BS rail section no. 90 R**



Cross-sectional area:

Whole section	5 669.6	mm²
Head	2 432.7	mm² (42.91%)
Web	1 212.6	mm² (21.39%)
Foot	2 024.3	mm² (35.70%)
Calculated mass	44.506	kg/m
Moment of inertia	1 584.3	cm⁴
Section modulus	211.9	cm³
Distance from top of rail to neutral axis	74.78	mm

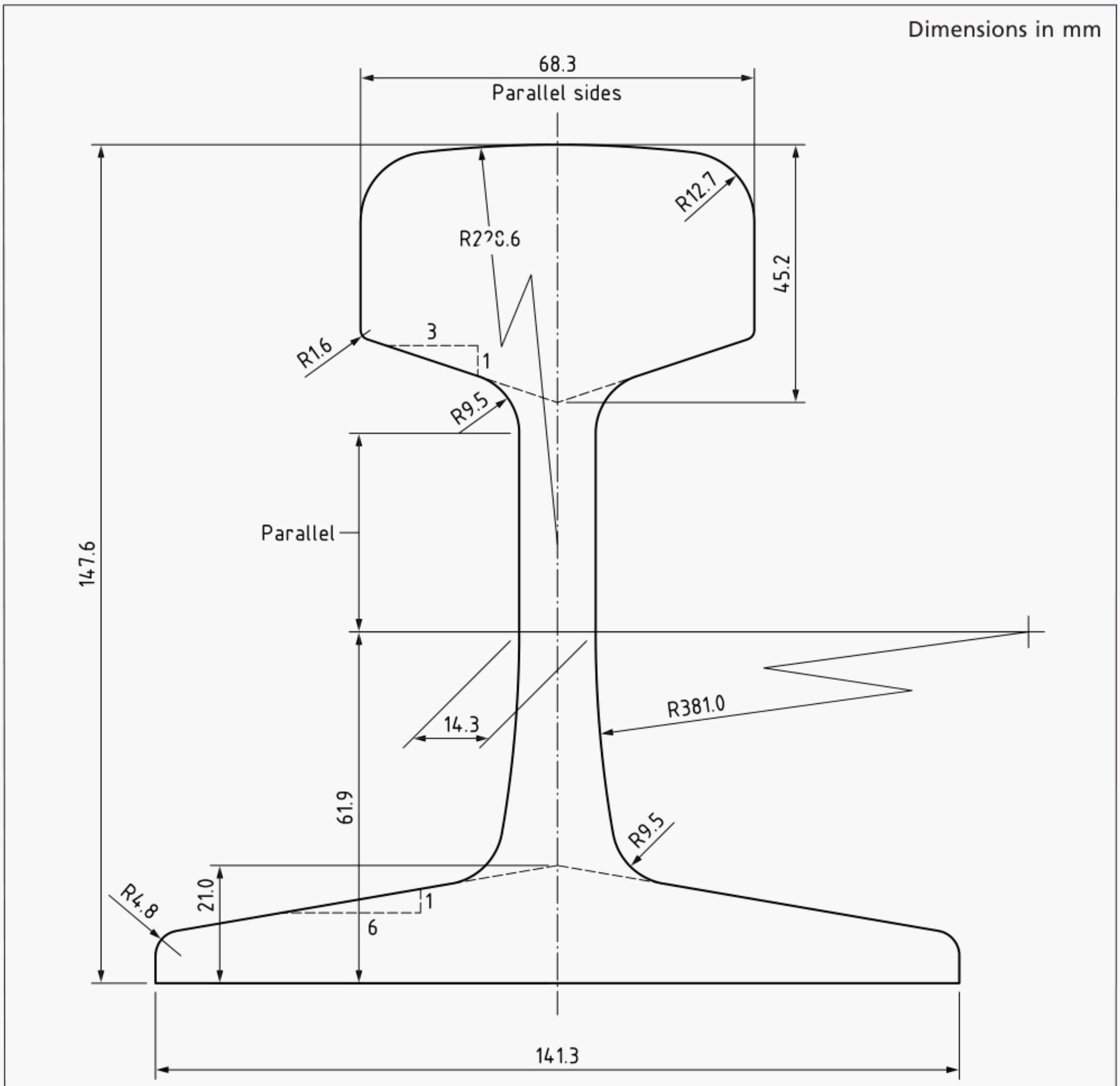
Figure 9 **BS rail section no. 95 A**



Cross-sectional area:

Whole section	6 026.7	mm^2
Head	2 713.0	mm^2 (45.02%)
Web	1 280.9	mm^2 (21.25%)
Foot	2 032.8	mm^2 (33.73%)
Calculated mass	47.310	kg/m
Moment of inertia	1 741.8	cm^4
Section modulus	233.3	cm^3
Distance from top of rail to neutral axis	74.66	mm

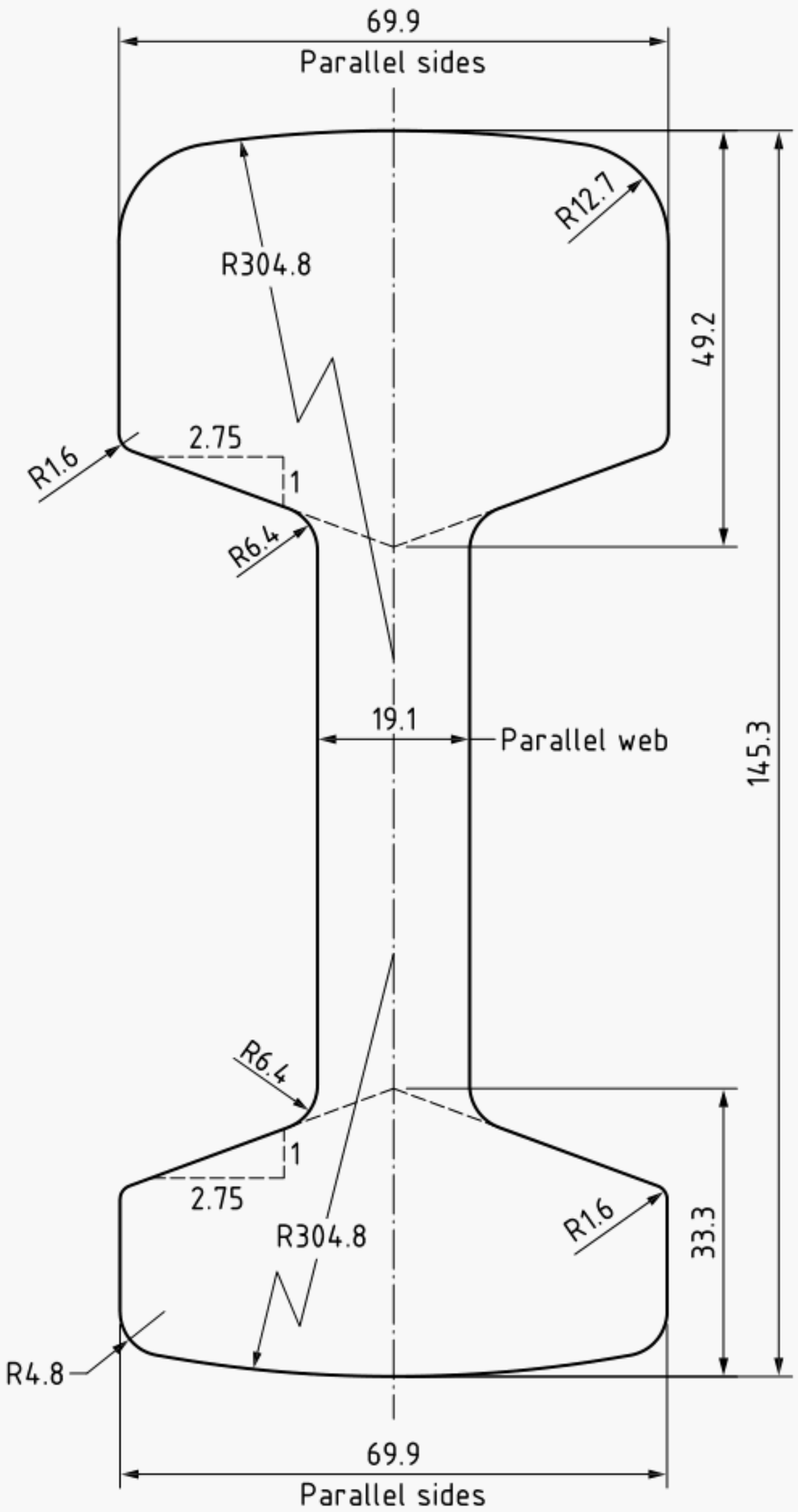
Figure 10 **BS rail section no. 95 R**



Cross-sectional area:		
Whole section	6 005.3	mm²
Head	2 589.0	mm² (43.11%)
Web	1 292.0	mm² (21.53%)
Foot	2 124.3	mm² (35.37%)
Calculated mass	47.142	kg/m
Moment of inertia	1 791.3	cm⁴
Section modulus	232.3	cm³
Distance from top of rail to neutral axis	77.11	mm

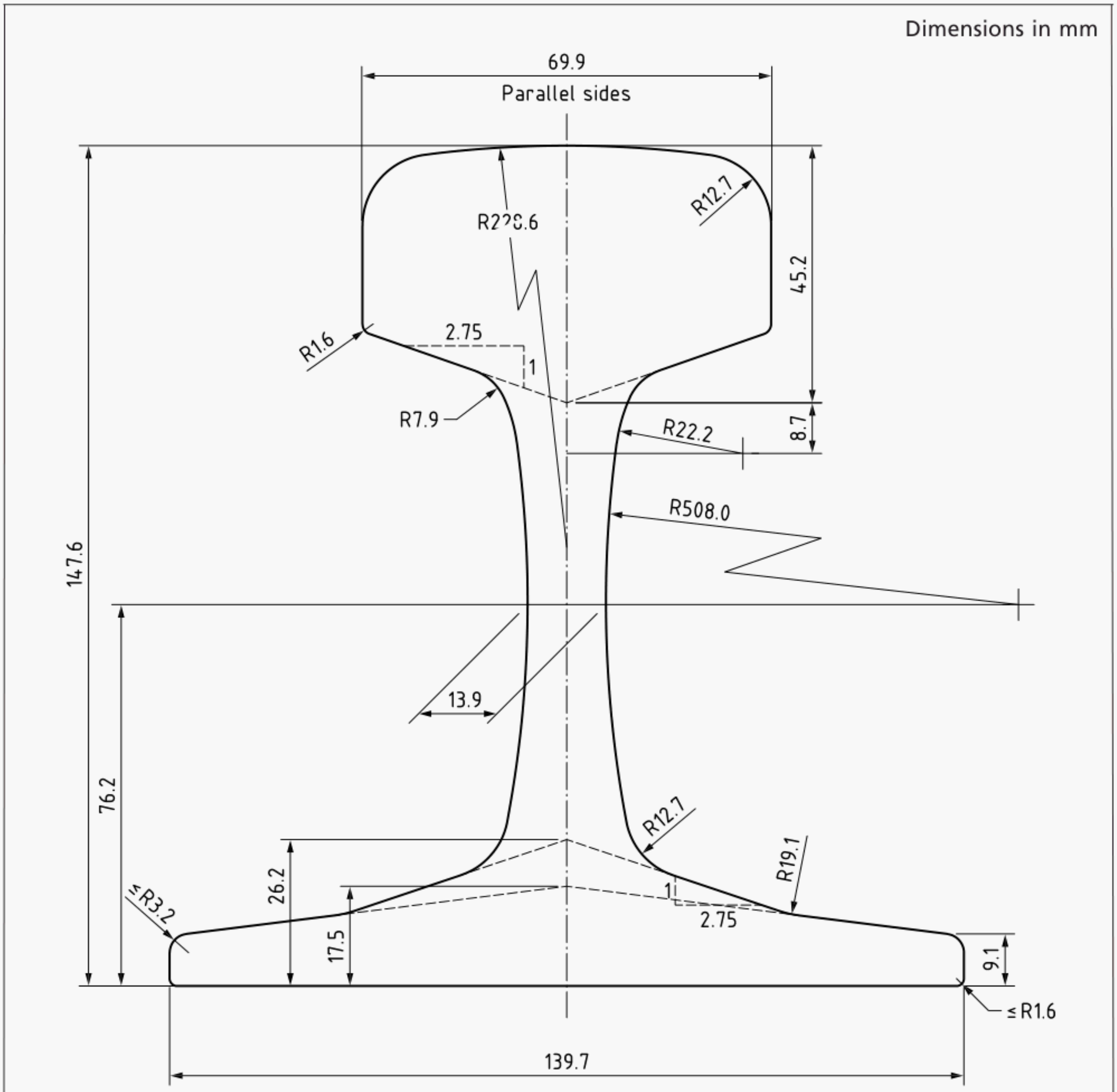
Figure 11 **BS rail section no. 95 RBH**

Dimensions in mm



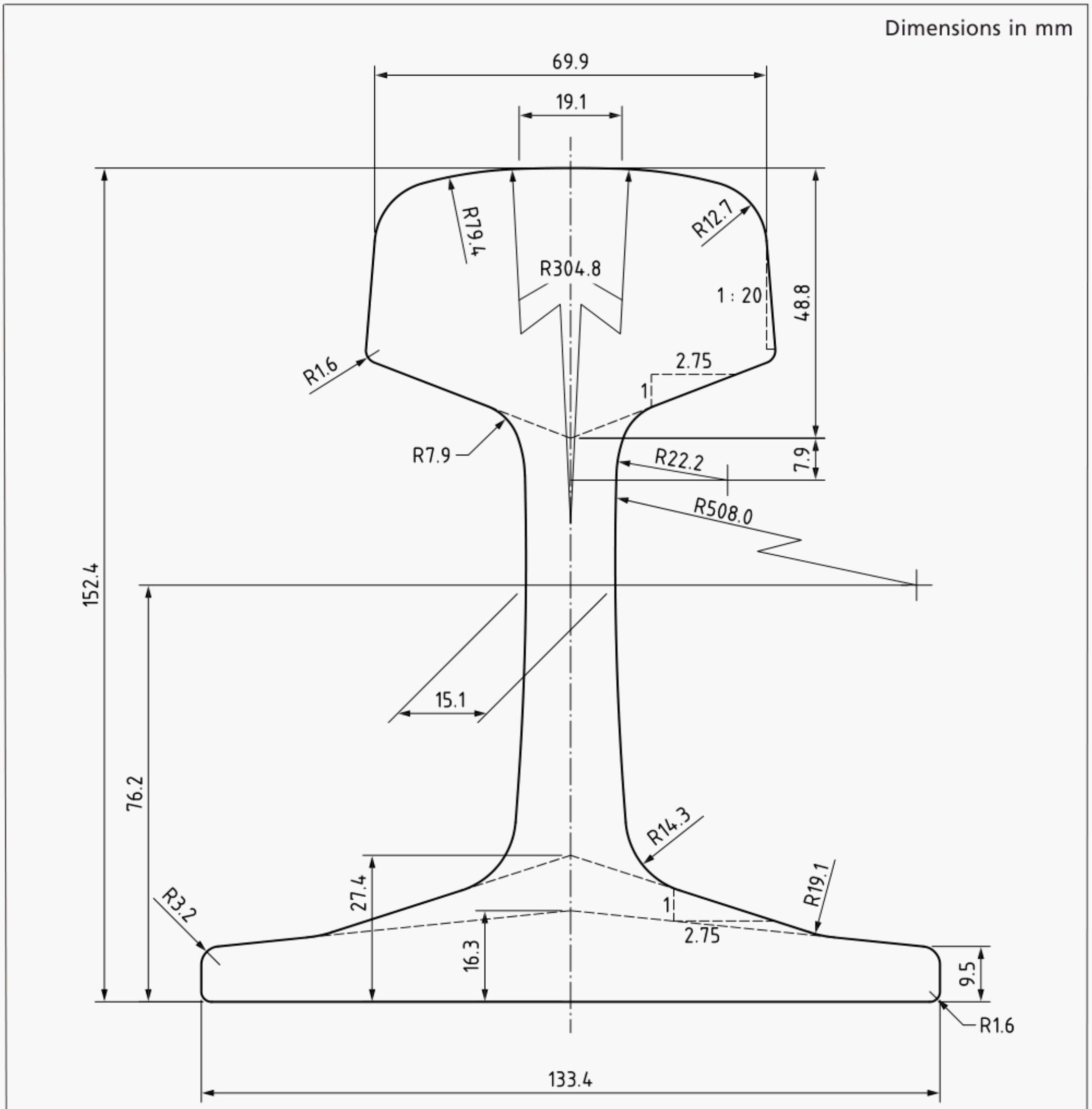
Cross-sectional area:		
Whole section	5 996.1	mm^2
Head	2 890.8	mm^2 (48.21%)
Web	1 275.0	mm^2 (21.26%)
Foot	1 830.4	mm^2 (30.53%)
Calculated mass	47.069	kg/m
Moment of inertia	1 458.0	cm^4
Section modulus	188.5	cm^3
Distance from top of rail to neutral axis	67.89	mm

Figure 12 **BS rail section no. 95 N**



Cross-sectional area:		
Whole section	5 981.0	mm²
Head	2 601.9	mm² (43.51%)
Web	1 253.8	mm² (20.96%)
Foot	2 125.2	mm² (35.53%)
Calculated mass	46.951	kg/m
Moment of inertia	1 774.8	cm⁴
Section modulus	233.2	cm³
Distance from top of rail to neutral axis	76.11	mm

Figure 13 **BS rail section no. 100 A**

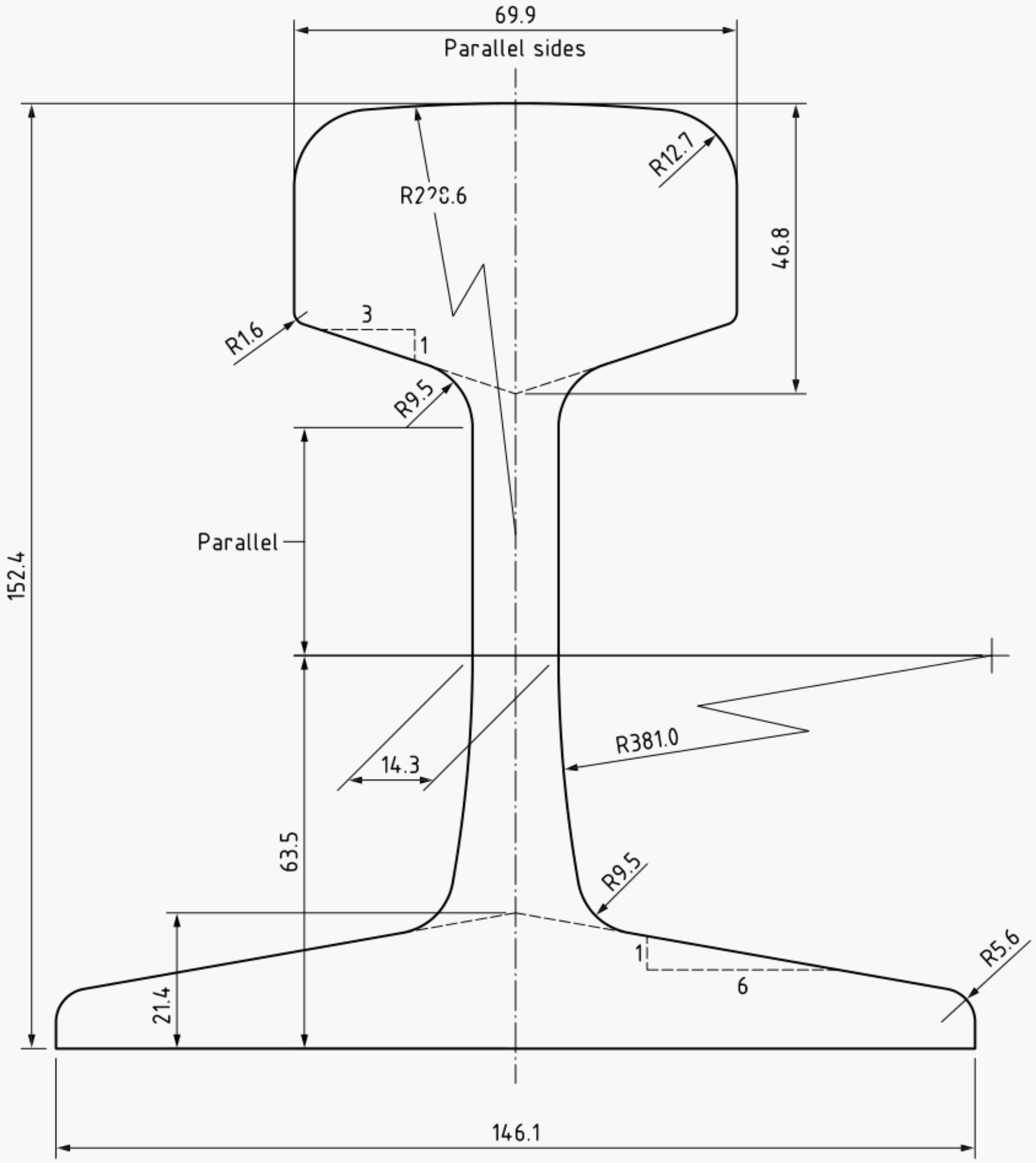


Cross-sectional area:

Whole section	6 392.6	mm²
Head	2 855.8	mm² (44.67%)
Web	1 350.3	mm² (21.12%)
Foot	2 186.5	mm² (34.21%)
Calculated mass	50.182	kg/m
Moment of inertia	1 961.0	cm⁴
Section modulus	252.4	cm³
Distance from top of rail to neutral axis	77.69	mm

Figure 14 **BS rail section no. 100 R**

Dimensions in mm



Cross-sectional area:

Whole section	6 309.8	mm²
Head	2 749.8	mm² (43.58%)
Web	1 337.4	mm² (21.19%)
Foot	2 222.7	mm² (35.23%)
Calculated mass	49.532	kg/m
Moment of inertia	2 013.1	cm⁴
Section modulus	253.7	cm³
Distance from top of rail to neutral axis	79.34	mm

4 Tolerances

4.1 Rail section profile

The dimensional tolerances shall conform to Table 1. Profile conformity gauges shall conform to BS EN 13674-1:2011, Annex E.

Table 1 **Tolerances on rail section profiles**

Characteristic	1 Flat bottom sections	2 Bull head sections
	mm	mm
Overall height of rail measured at the rail end	±0.50	+0.80 –0.40
Width of head	±0.50	±0.40
Width of foot	±1.00	±0.40
Thickness of web	+1.00 –0.50	±0.40
Verticality: maximum deviation at rail head	0.50	0.40
Foot base: flat to maximum concavity	0.50	—
deviation from nominal profile	—	±0.50
Fishing surfaces: maximum stand off of fishing template (see BS EN 13674-1:2011, Figure E.8):		
from web	1.20	1.20
maximum clearance from fishing surface	0.15	0.13
Asymmetry of rail section	0.50	0.40
Asymmetry of rail section as checked by means of combined verticality and asymmetry gauge: flat bottom rails only	1.25	(see Note)

NOTE The gauge shown in BS EN 13674-1:2011 is not applicable to bull head rails. This British Standard does not specify a symmetry gauge for 95 RBH.

4.2 Fishbolt hole sizes and positions

The sizes and positions of fishbolt holes shall conform to Figure 15 and Table 2 with tolerances as given in Table 3. In case of dispute, the fishbolt holes in the rail shall be checked with templates and gauges of the type given in Annex A and BS EN 13674-1:2011, Figure E.12 and Figure E.13.

Figure 15 **Key to position of fishbolt holes**

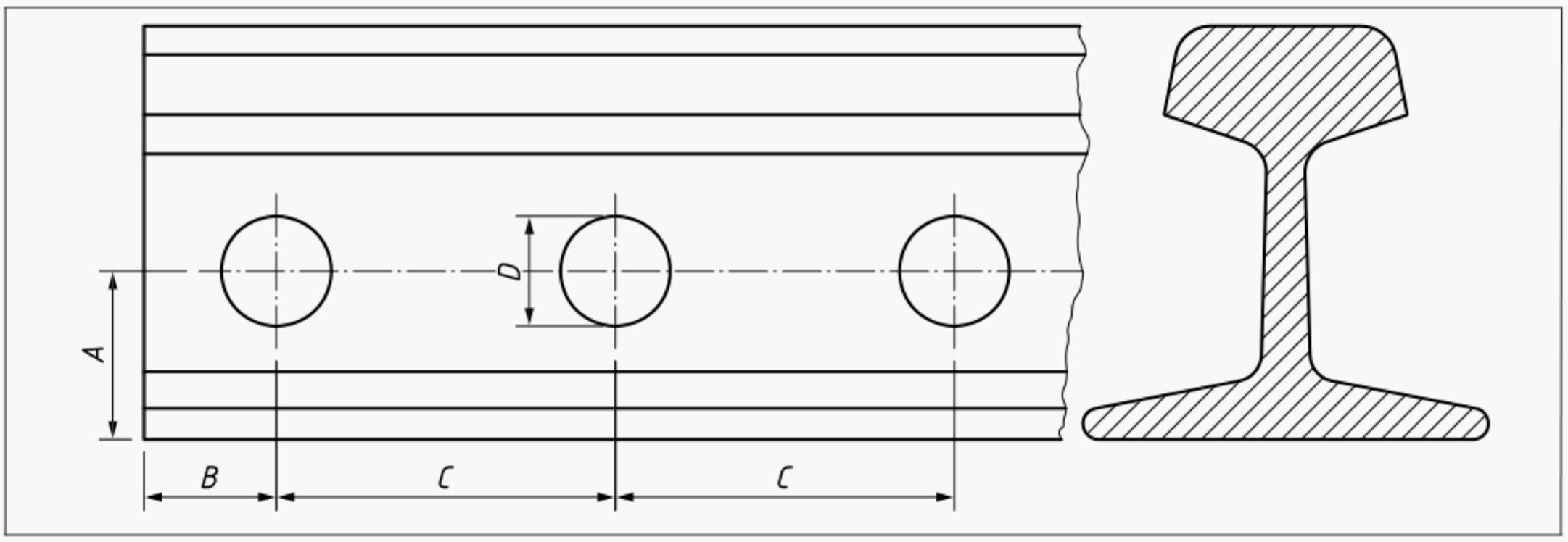


Table 2 **Position of fishbolt holes**

BS rail section number	Dimensions			
	A	B	C	D
	Height of centreline of hole from foot of rail	Distance of centreline of 1st hole from end of rail	Pitch of hole centres	Diameter of holes A)
	mm	mm	mm	mm
50 "O"	41.5	47.6	101.6	23.8
60 R	47.6	47.6	101.6	25.4
70 A	50.8	47.6	101.6	27.0
75 A	52.4	47.6	101.6	28.6
75 R	54.0	47.6	101.6	28.6
80 R	56.0	47.6	101.6	28.6
80 "O"	54.0	60.3	127.0	28.6
90 R	59.9	54.0	114.3	30.2
95 A	58.7	54.0	114.3	31.8
95 R	61.9	54.0	114.3	31.8
95 RBH	64.7	60.3	114.3	28.6
95 N	64.3	54.0	114.3	31.8
100 A	60.3	54.0	114.3	31.8
100 R	63.5	54.0	114.3	31.8

A) Where circumstances call for different size holes, these may be ordered.

Table 3 **Tolerances on fishbolt hole dimensions and positions**

Fishbolt holes	Tolerances	
	Diameter ≤30 mm	Diameter >30 mm
Diameter of fishbolt holes	±0.5 mm	±0.7 mm
Centre position of fishbolt holes vertically and horizontally	±0.5 mm	±0.7 mm

4.3 Straightness

After cold straightening a finished rail shall, when standing on its base or lying on its side, be capable of being pulled into a straight line and of retaining that position.

When checked using a 1 500 mm straight edge, the straightness of the rail shall conform to Table 4, measured as the maximum gap between the rail and the straight edge.

Table 4 **Rail straightness measured over 1.5 m**

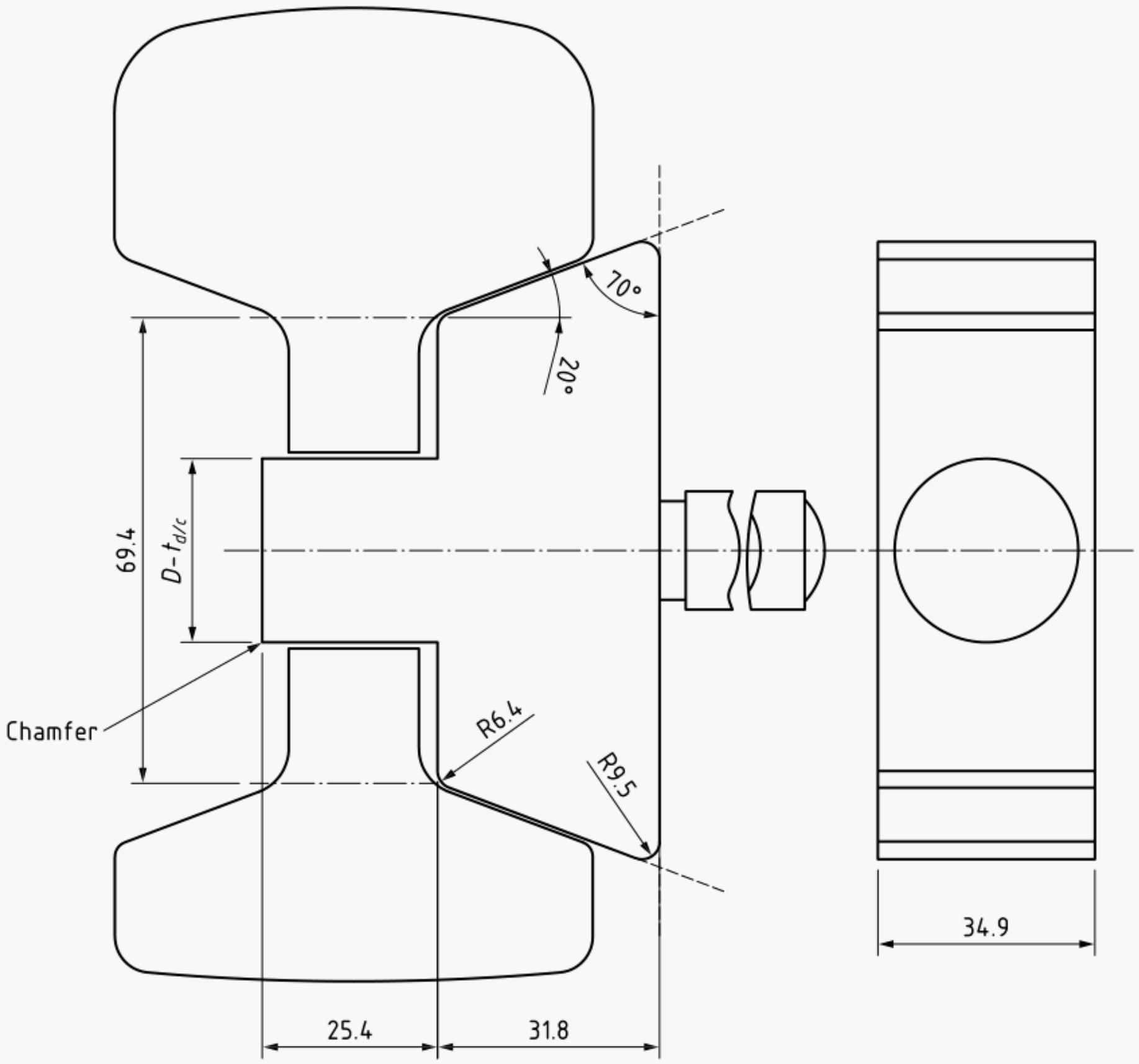
Dimensional property	Rail position	Maximum gap
Horizontal and vertical straightness	Body	0.8 mm
Horizontal straightness	End	0.8 mm
Vertical straightness	End	0.8 mm upturned 0.2 mm downturned

Annex A (normative) Referee gauge for hole height for 95 RBH rails

The vertical drilling gauge for 95 RBH rails is shown in Figure A.1.

Figure A.1 **Vertical drilling gauge for 95 RBH rails**

Dimensions in mm



Key

t_d is the tolerance of diameter of holes

t_c is the tolerance for centring and positioning of holes

$t_{d/c}$ is the combined tolerance for diameter holes and centring of holes vertically

$$t_{d/c} = 2\left(t_c + \frac{t_d}{2}\right)$$

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