

# Annexure 5

PRASA RAIL INFRASTRUCTURE: Perway Technical specification For Rails- Turnout					
File Ref	ENGINEERING_LIB#160-V1-Engineering_Services INFRASTRUCTURE PERWAY TECHNICAL SPECIFICATION FOR RAILS			Last Edit Date	2022-12-19
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Volume & Edition	Vol. 1, 2nd Addison	Executive Manager Engineering Services	Approver	Letsane Rathaba	



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## PRASA RAIL ENGINEERING SERVICES INFRASTRUCTURE

# Annexure 5

Last updated: 16 August 2017

Inter Business / Departmental Interphase Approvals of Procedure:

Name	Role	Responsibility (for this document)	Signature	Date of Approval
1. Letsane Rathaba	Senior Manager Infrastructure	Approved		
3. Vonani Rikhotso	Perway Specialist	Recommended		
4. AM Vermeulen	Chief Engineer Perway	Author		

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## Standard Rail Specification

### 1 General

The standard rail sections will be 48 kg, 57kg, UIC 54 and UIC 60 in accordance with the South Africa Manual for Track Maintenance 2000, European Standard (EN 13674-1) and secondly UIC 860-0 / UIC 861-1, latest editions or equivalent standards.

The South Africa Manual for Track Maintenance 2000, relevant UIC codes, equivalent EN standards, latest versions, must be applied for the inspection, acceptance, supply, delivery, storage, quality assurance and acceptance.

### 2 Technical Description

#### 2.1 Rail Grading

The standard rail must be manufactured in accordance with South Africa Manual for Track Maintenance 2000, EN 13674-1 or equivalent and to the following grade:-

Type	Profile	Steel grade	Tensile Strength	Hardness Brinell	Trackwork Location
48 kg	SAR 48	R350LHT	1175 N/mm <sup>2</sup>	350 - 390	Cat. B and C Lines
57kg	SAR 57	R350LHT	1175 N/mm <sup>2</sup>	350 - 390	Cat. B and C Lines
UIC 60	60 E 1	R350LHT	1175 N/mm <sup>2</sup>	350 - 390	Main Lines
UIC 54	54 E 1	R350LHT	1175 N/mm <sup>2</sup>	350 - 390	Transition zone from UIC 60E1 to SAR 48

The properties and chemical composition of the rail must be in accordance with EN 13674-1, latest edition or equivalent.

#### 2.2 Main Dimensions and Tolerances

The nominal dimensions of the section and ends must be within the following tolerances:

	Dimension				Tolerances
	SAR 48	SAR 57	UIC 60 E1	UIC 54 E1	
Height of Rail	150 mm	165 mm	172 mm	159 mm	± 0.5 mm ± 0.6 mm (UIC60)
Width of Rail Foot	127 mm	140 mm	150 mm	140 mm	± 1.0 mm
Nominal Width of Rail Head	68 mm	70 mm	72 mm	70 mm	± 0.5 mm
Asymmetry of Section					± 1.2 mm
Thickness of Web (at point of minimum thickness)					+ 1.0 mm - 0.5 mm

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Inclination of fishing surface (on the basis of 14 mm parallel to the inclined theoretical fishing surface)						± 0.5 mm ± 0.6 mm (UIC60)
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The rail ends must be cut to 90 degree of the rail longitudinal axis to permit welding without preparatory cuts.

The supply of rails to be accompanied by the provision of 3D models and editable drawings.

## 2.3 Length

The standard rail length will be as specified but generally 18, 36 or 60 m, undrilled, measured at 15°C. Short rails will be permitted ( $E < 5\%$ ) as specified in the respective UIC code. The minimum allowable length is 6 m.

## 2.4 Branding and Stamping

The rails will be marked in accordance with article 7.4 of EN 13674-1 and art. 1.3 of UIC Code 860 or equivalent.

Brandings must be provided on one side of the web and must include the following:

- ◆ The manufacturer's identification
- ◆ The last two digits of the year of manufacture
- ◆ The symbol of the steel grade
- ◆ The symbol of the rail profile

In addition to the branding requirements each rail shall be identified by a numerical and/or alphabetical code system, at least every 10 m hot stamped on the non-branded side of the rail web.

## 3 Manufacture

The steel making process must comply with the procedure of the Manufacturer as accepted by major railway companies world wide.

The Manufacturer is required to substantiate the necessary details for submission. The process must be one of the following: liquid steel melt tapped out of converter (basic oxygen) or electric arc furnace and must comply with art. 7 of EN 13674-1 or equivalent.

The Manufacturer must describe in detail the process under which the rails are to be produced. The description must include:

- ◆ the source of rail steel,
- ◆ the steel making process,
- ◆ chemical composition of final rails,
- ◆ the procedure for straightening rails, and
- ◆ the quality control system for manufacture.

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The manufacturer must provide a certificate of conformance to his specification.

## 4 Corrosion Protection Coating for Rails

Rails destined for the coastal areas will be induced to the highly corrosive coastal environment. Therefore, it is required that corrosion resistant coating is applied to rails that are destined to be delivered at the coastal areas. This process will happen as part of the manufacturing process for rails.

## 5 Protection During Transport and Storage

Storage and transport must be arranged such that the rails are not mechanically damaged and not exposed to aggressive chemical influences.

Rails are not to be stored at port awaiting shipment.

Suitable commonly used protection methods against environmental damage must be proposed for approval.

## 6 Acceptance Tests

The manufacturer must supply the necessary gauges of each rolling to be used for spot checks on site.

Testing must be performed at the manufacturer's plant by independent qualified personnel which must be approved by the Purchaser. All major specification criteria must be tested and inspected to confirm compliance.

The frequency of testing must follow the respective standards of major railways, adjusted for smaller quantities. Test certificates must be delivered with the rails. No delivery may take place before acceptance by the Purchaser.

The testing and acceptance of the quality of the rails must include:

- ◆ chemical composition,
- ◆ tensile tests,
- ◆ hardness tests,
- ◆ ultrasonic testing for internal defects,
- ◆ surface tests, and
- ◆ dimension tests

in accordance with the South Africa Manual for Track Maintenance 2000 and art. 9 of European Standard Rails (EN 13 674-1) or equivalent.

A report of the required tests must be submitted to the PRASARAIL Quality Assurance Inspector prior to delivery. The report of the test results must be traceable to each batch manufactured.

### Remark:

The manufacturer's quality assurance system has to be at least equivalent to the requirements of ISO 9001(latest edition). Qualifying tests must be carried out according to art. 8 of EN 13 674-1. The current certificate must be submitted.

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## 7 Inspection and Dispatch

Representatives of PRASARAIL will be entitled to witness, at any time, the manufacturing process in all details; including all testing procedures (approval of the gauges of each rolling according Annexure “E” of EN 13674-1 or equivalent).

The manufacturer must give the inspector at least 15 days written notice of the date of rolling of the rails for this contract.

The inspector must stamp all rails accepted by him, at least 10% of each rolling out. No rails may be dispatched for use by PRASARAIL unless 10% of each lot carry his acceptance mark.

Final inspection will be performed at the delivery point.

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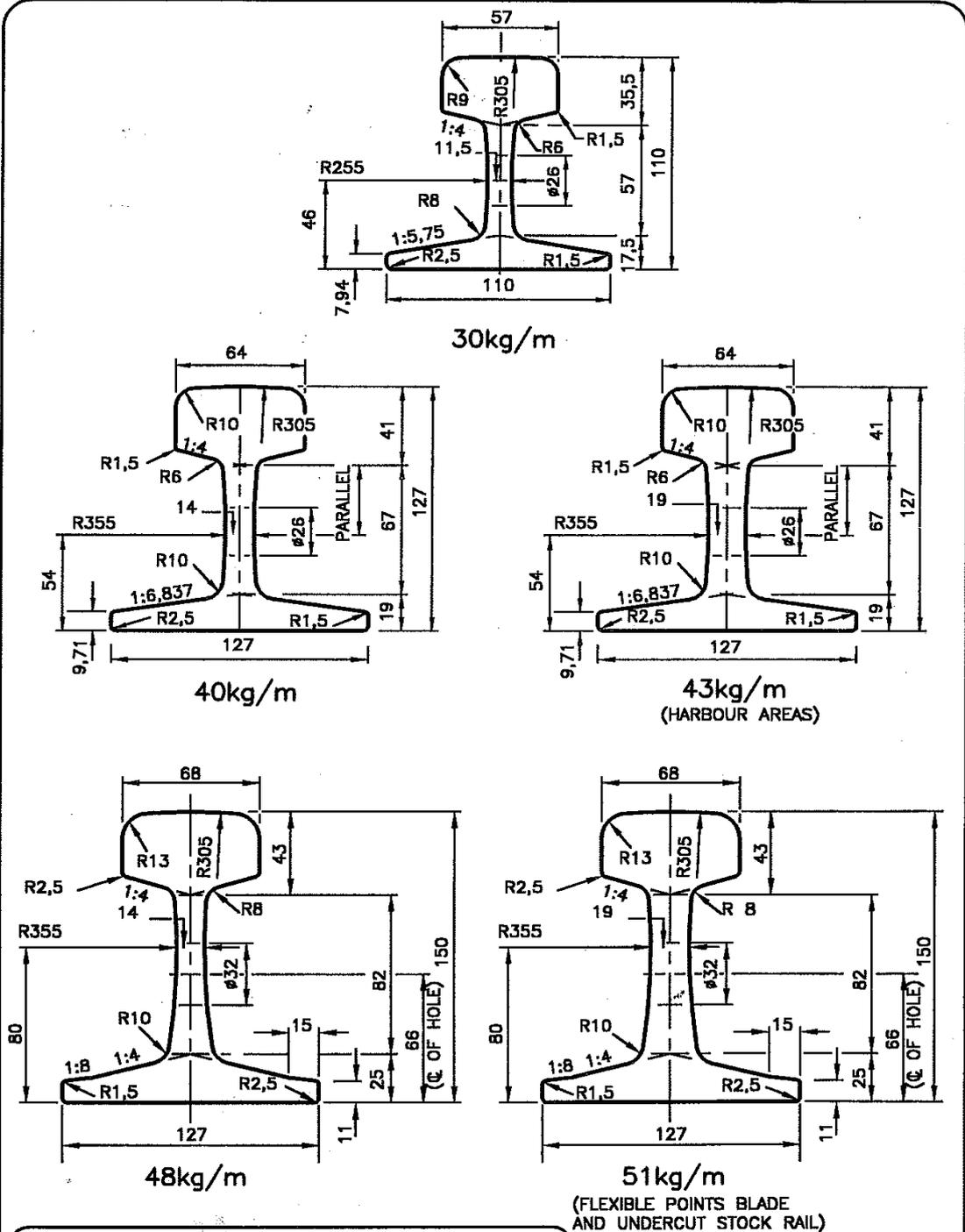


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**8 Extract from the Track Manual**

**ANNEXURE 14 SHEET 1 of 4 AMENDMENT RAIL PROFILES**



**REMARKS:**  
1. FOR PROPERTIES SEE ANNEXURE 14 SHT 4.

BE 97-14 Sht 1 of 4. DATE : JUNE 2000

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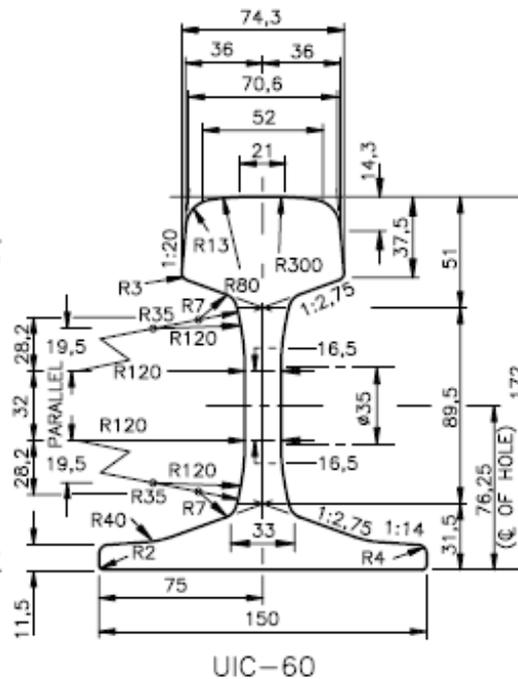
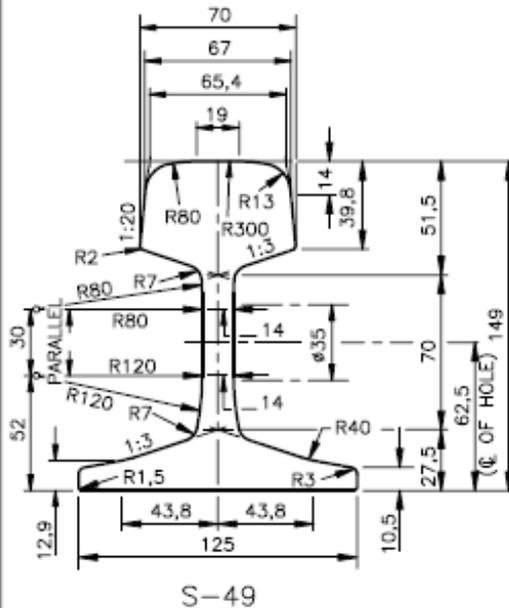
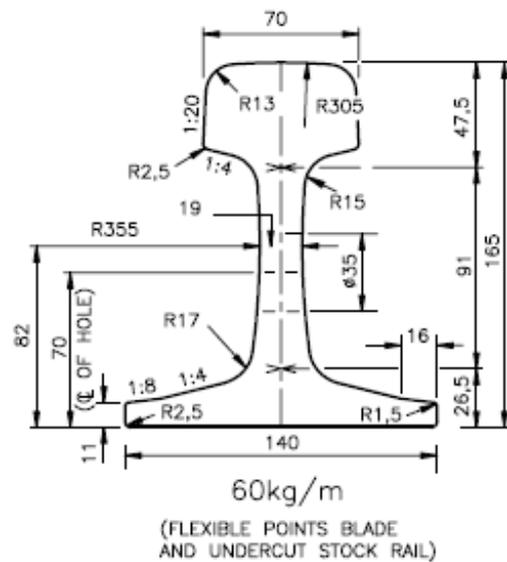
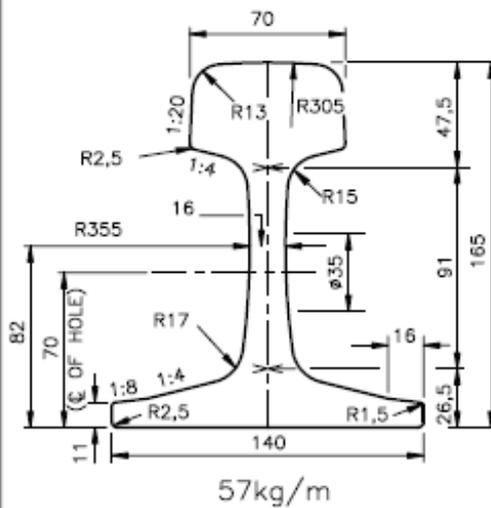


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ANNEXURE 14  
SHEET 2 of 4  
AMENDMENT

**RAIL PROFILES**



REMARKS:  
1. FOR PROPERTIES SEE ANNEXURE 14 SHT 4.

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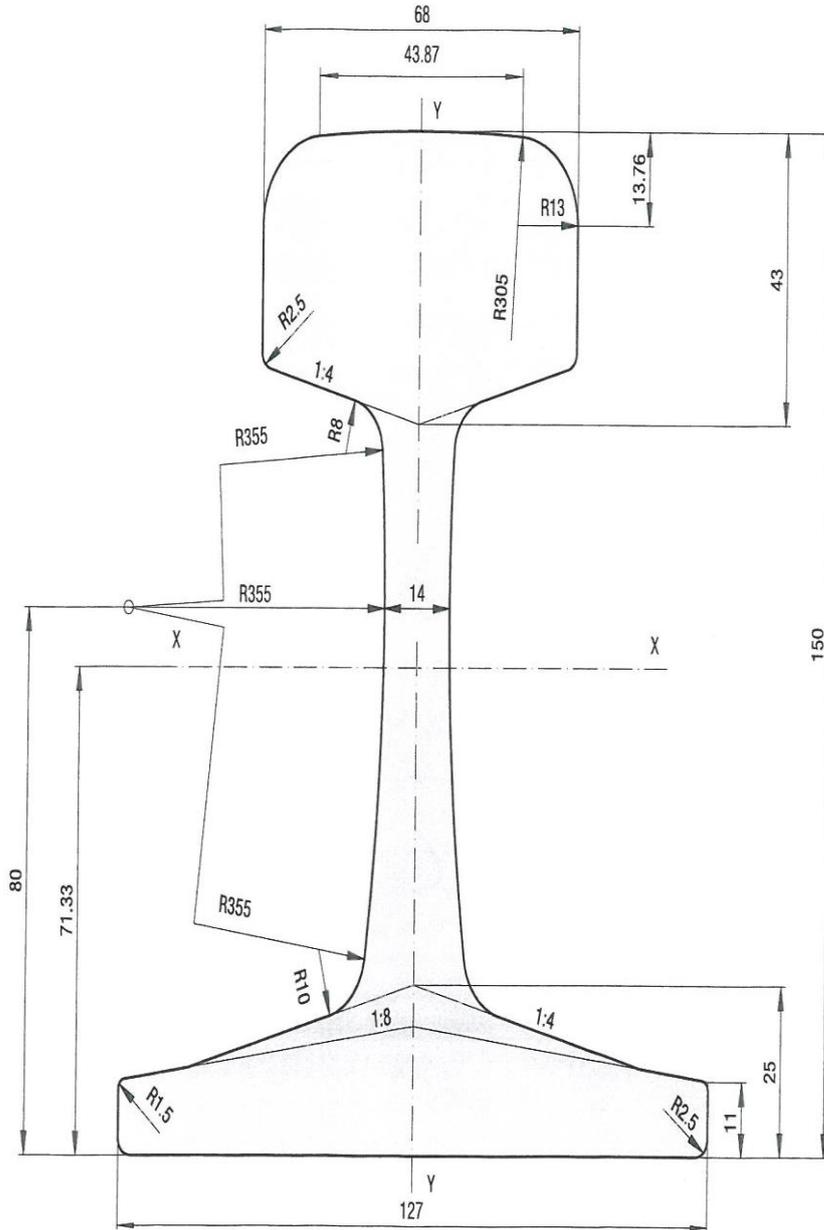
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**9 Other Rail Profiles**

**SAR48**

VIGNOLSCHIENEN, FLAT BOTTOM RAILS



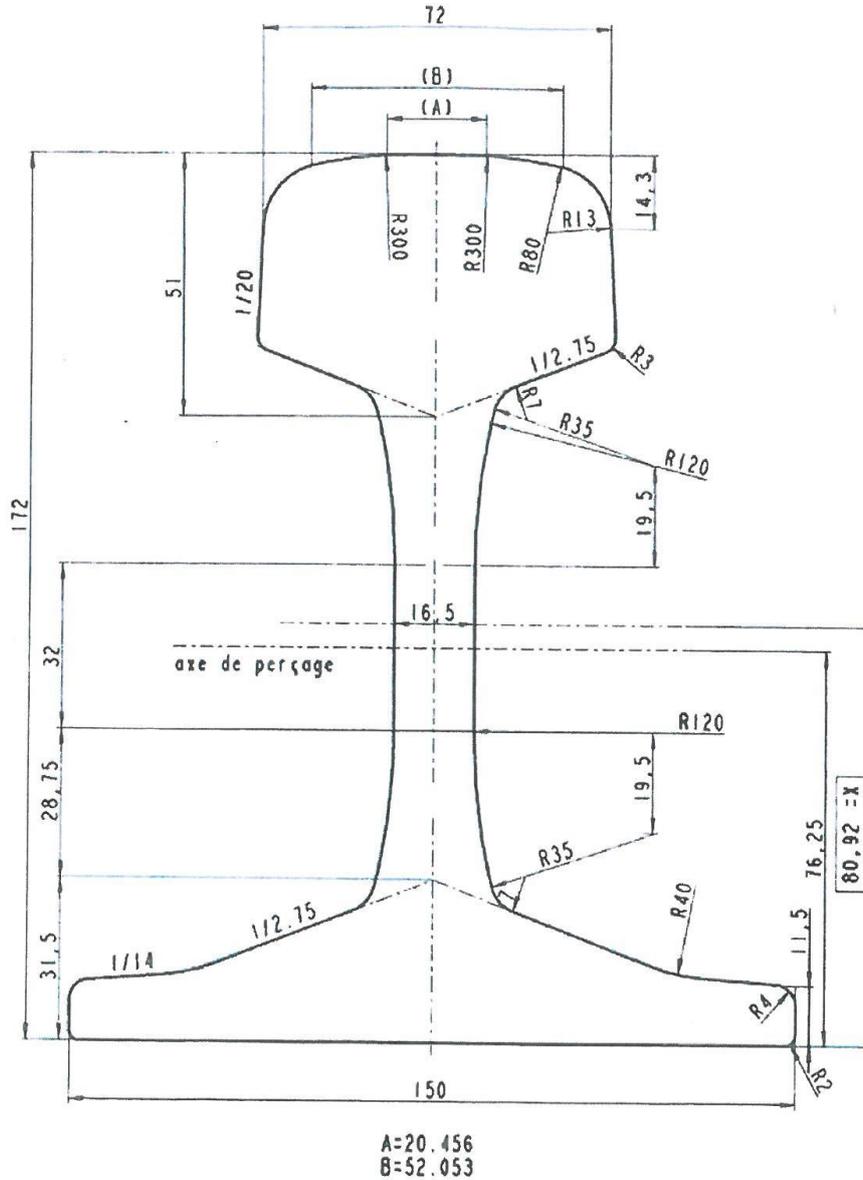
MASSE / MASS		48.07 kg/m	AUSGABE / EDITION	03.2004
FLÄCHE / AREA		61.24 cm <sup>2</sup>	MASSSTAB / SCALE	1:1
TRÄGHEITSMOMENT / MOMENT OF INERTIA	X-X	1854.9 cm <sup>4</sup>		
	Y-Y	322.5 cm <sup>4</sup>		
WIDERSTANDSMOMENT / SECTION MODULUS	X-X Kopf / Head	260.0 cm <sup>3</sup>		
	X-X Fuß / Base	235.8 cm <sup>3</sup>		
	Y-Y Achse / Axis	50.8 cm <sup>3</sup>		

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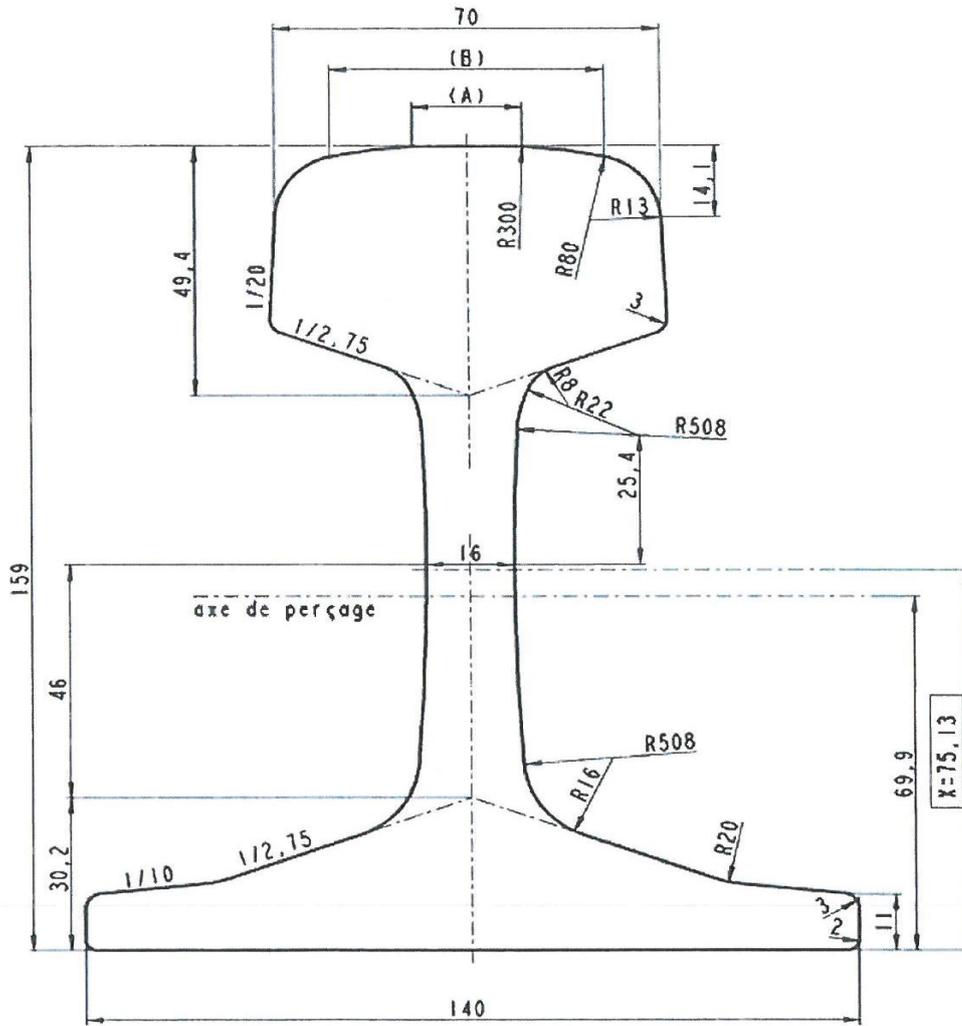
P = 60,21 kg/m	$I_x = 3038 \text{ cm}^4$	$I_x/v = 334 \text{ cm}^3$
S = 76,70 cm <sup>2</sup>	$I_y = 512 \text{ cm}^4$	$I_y/u = 68 \text{ cm}^3$
EN: 60 E1	UC 60	6 420 201 5

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A=20,024  
B=49,727

P = 54,77 kg/m	I <sub>x</sub> = 2338 cm <sup>4</sup>	I <sub>x</sub> /v = 279 cm <sup>3</sup>
S = 69,77 cm <sup>2</sup>	I <sub>y</sub> = 419 cm <sup>4</sup>	I <sub>y</sub> /u = 60 cm <sup>3</sup>
<b>EN:54 EI</b>	<b>UC 54</b>	<b>6 420 201 4</b>