



**TRANSNET**  
freight rail

## INFRASTRUCTURE MAINTENANCE

### SPECIFICATION

# Specification For A Hydraulic Driven Rail Crossing Grinding Machine

**PREVIEW COPY ONLY**

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Date: 03 December 2008

Circulation Restricted To:

Transnet Freight Rail - Infrastructure

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## 1. General Requirements

- 1.1 This specification outlines the requirements of a heavy-duty, hydraulically operated rail crossing grinding machine.

## 2. Operating Conditions

- 2.1 Machines will be operated in all weather conditions at altitudes varying from sea level to 1850 m above sea level, relative humidity 10% to 90% and atmospheric conditions which vary from heavily saline to dry and dusty.
- 2.2 Ambient air temperatures ranging from  $-5^{\circ}\text{C}$  to  $45^{\circ}\text{C}$ .

## 3. Qualifications

- 3.1 The design of the machine is to be that of the manufacturer, but must be of robust construction in order to meet the sustained heavy-duty demands of railway infrastructure maintenance.
- 3.2 A “no-tool” adjustment machine is preferred.
- 3.3 Machines will be acceptable in standard factory production finish and colour. Details to be furnished.
- 3.4 Only products proven in service will be considered. A list of users, both South African and international, is to be submitted.

## 4. Performance

- 4.1 A service life of not less than 7 years is expected from each machine. The actual design life of the machines is to be stated.
- 4.2 The machines are to be easily and economically maintained with standard workshop tools and equipment.
- 4.3 The machine must be compatible with hydraulic oil of viscosity grades 46 and 68 – details as per SANS 1218:2005 (Hydraulic Oil – Anti-wear Type).

## 5. General Requirements

- 5.1 This specification outlines the requirements of a heavy-duty hydraulically operated rail crossing grinding machine.
- 5.2 The machine will be used to grind excess metal on the running top and side of rails and turnout crossings with varying manganese, chrome and carbon content.

## 6. Detailed Requirements

### 6.1 Preferred Mass

- 6.1.1 The mass of the grinder must not exceed 110 kg.

### 6.2 Hydraulic System Requirements

- 6.2.1 The machine must comply to HTMA standards for hydraulic tool operation.
- 6.2.2 The machine must operate on the "Open Centre Circuit" hydraulic system.
- 6.2.3 The hydraulic supply will meet the requirements of HTMA Type RR System and the rail drill must operate effectively on this standard.
- 6.2.4 The grinder must be equipped with 12mm ( $\frac{1}{2}$ " ) hydraulic whip hoses that comply to DIN EN 853 - 2SN (Rubber Hoses and Hose Assemblies - Wire Braid Reinforced Hydraulic Type).
- 6.2.5 The whip hoses must be 400mm long.
- 6.2.6 The whip hoses must be fitted with 12mm ( $\frac{1}{2}$ " ) fixed male and female quick release flat-face fittings that comply to HTMA standards. The quick release fittings must be fitted with dust caps.
- 6.2.7 Hose connections must be placed in a position that would assist in the balance of the machine and make it easy for the operator to handle and move the machine.
- 6.2.8 Coupling points are to indicate whether they are supply or return points.

### 6.3 Grinder Mobility

- 6.3.1 The machine must be fitted with a 4 wheeled under carriage suitable for 1065mm gauge track.
- 6.3.2 The wheels must be of sufficient size to enable the grinder to move efficiently over the various rail profiles as per Annexure A.
- 6.3.3 The wheels must be suitably insulated so as to prevent conduction across rails.
- 6.3.4 The under carriage must have traversing rails with rollers to allow grinding to be done on a rail or at the point of the crossing frog.
- 6.3.5 The mobility and flexibility of the machine must be such that it is possible to grind all surfaces of a turnout.

## 6.4 Noise Emission

6.4.1 The grinder must comply to BS EN ISO 4871:1997 (Declaration and verification of noise emission values of machinery and equipment).

## 6.5 Operating Speed

6.5.1 The maximum no-load speed must not exceed 3400 rpm.

## 6.6 Grinding Movements

6.6.1 The grinder must enable the operator to grind the rail to a tolerance of 0.2mm over 1m.

6.6.2 The grinder must be able to be inclined 30° either side of the vertical.

6.6.3 The grinder must have sufficient horizontal travel inside and outside the track in order to have safe and unobstructed movement of the grinding head.

6.6.4 The grinding head must have a minimum vertical travel of 100 mm above running surface to 75 mm below the running surface.

## 6.7 Positioning of Controls

6.7.1 The controls must be easily accessible to the operator from either side of the machine.

6.7.2 The controls must be positioned such that the operator can at all times observe the grinding wheel upon the rail.

## 6.8 Safety

6.8.1 The grinder is to be provided with suitable safety guards, as per South African Abrasives Association, to protect against the risks resulting from wheel breakage.

6.8.2 The grinder must be provided with a dead-man handle and a safety device to prevent accidental switch-on.

6.8.3 The maximum no load speed (rpm) of the grinder must be clearly marked.

6.8.4 Suitable spark protection must be provided.

## 6.9 Component Markings

6.9.1 The grinder is to be clearly marked in respect of hydraulic oil flow required.

6.9.2 Coupling points are also to indicate whether they are supply or return points.

## 6.10 Body

- 6.10.1 The frame and components of the machine must be robust.
- 6.10.2 The machine must be well protected against rust.
- 6.10.3 The grip on the handles must have a non-slip surface.
- 6.10.4 The machines will be accepted in standard factory finish and colour.  
Due cognisance must be given to the life requirement of the machine.
- 6.10.5 A suitable lifting point must be provided so that the grinder can be lifted by mechanical means.

## 6.11 Ergonomics

- 6.11.1 The tool must be ergonomically designed for maximum operator productivity, safety and transportability.

## 7. Quality Control

- 7.1 All machines must be manufactured in an environment that complies to the latest ISO 9000 to ISO 9004 or similar quality control standards. Details must be furnished.
- 7.2 Machines will be subject to a technical evaluation and the final decision will, amongst others, be based on these findings.

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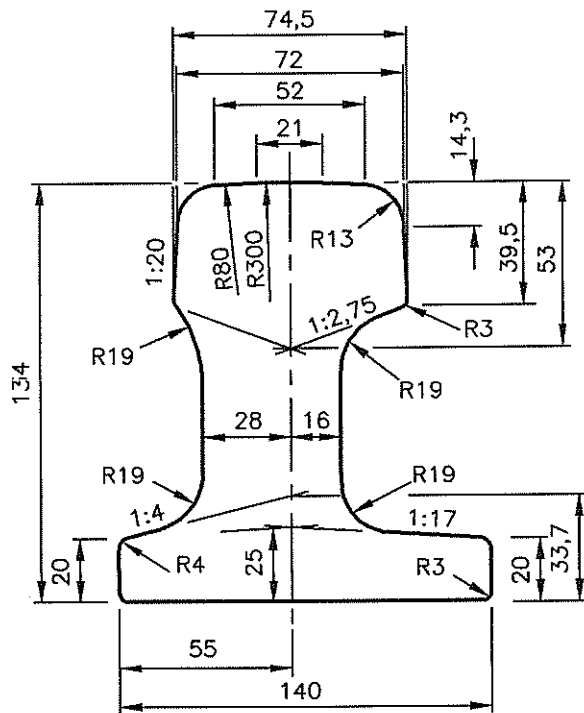
## 8. Legal and Operational

- 8.1 All machines must comply with the requirements of the Machinery and Occupational Safety Act, (Act 85 of 1993 – General Machinery Regulations) and The Machinery Directive 98/37/EC.
- 8.2 The rail drill must be completely assembled and filled with lubricants and ready for service in all respects.
- 8.3 Where grease nipples are fitted these are to be to DIN 71412 in easily accessible positions. Full details of lubrication applicable to machines on offer to be submitted.
- 8.4 An operator's handbook, service manual and spare parts list must be supplied with each machine in order to ensure that the machine is operated in accordance to the manufacturer's instructions.
- 8.5 All machines and equipment must be supplied complete with essential tools such as allen keys, spanners etc. in order to make essential adjustments as well as to fit or remove consumable items.
- 8.6 Suppliers of hydraulic machinery will be required to stock a full range of readily available spare parts required for the maintenance of these machines throughout their life span. Full details of service organisation is to be submitted.
- 8.7 Consumable items must be available locally and must be of standardised format in order to be used on equipment of more than one supplier.
- 8.8 All machines and equipment is to be guaranteed for a minimum period of 12 months against faulty material and workmanship - fair wear and tear excluded. Full details of guarantee is to be submitted.
- 8.9 The information as requested by the various clauses in this specification are to be supplied in the form of technical data, pamphlets and/or drawings. If this is not complied to, offers may be overlooked.
- 8.10 Each machine purchased will be issued with a project number consisting of 20 characters which must be stamped or engraved directly onto the machine or on the manufacturer's data plate or a separate riveted plate on the particular machine.
- 8.11 Sufficient training must be given to all operators of these machines.
- 8.12 Machines not already in service with Transnet Freight Rail must be made available for testing/evaluation during the adjudication of the tender. Technical improvements on existing machines/equipment is to be substantiated by physical examples.

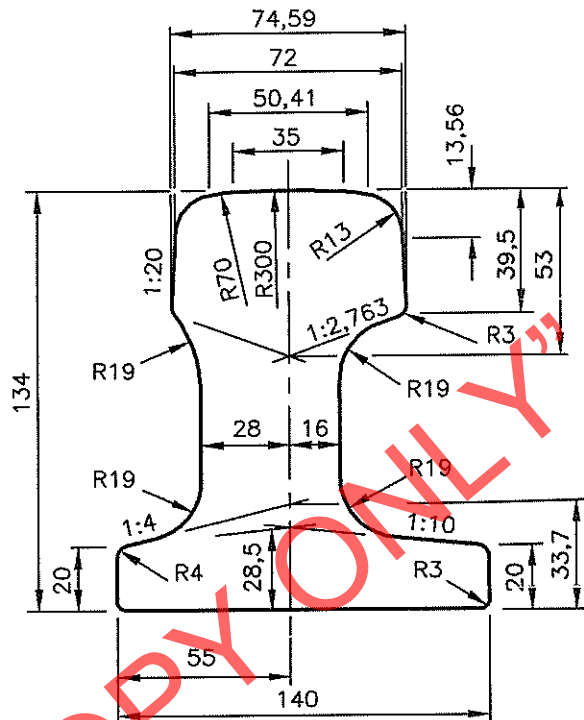
## Annexure A

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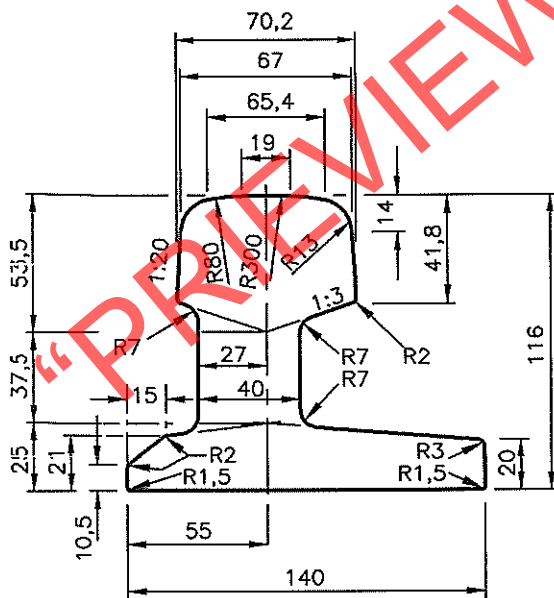




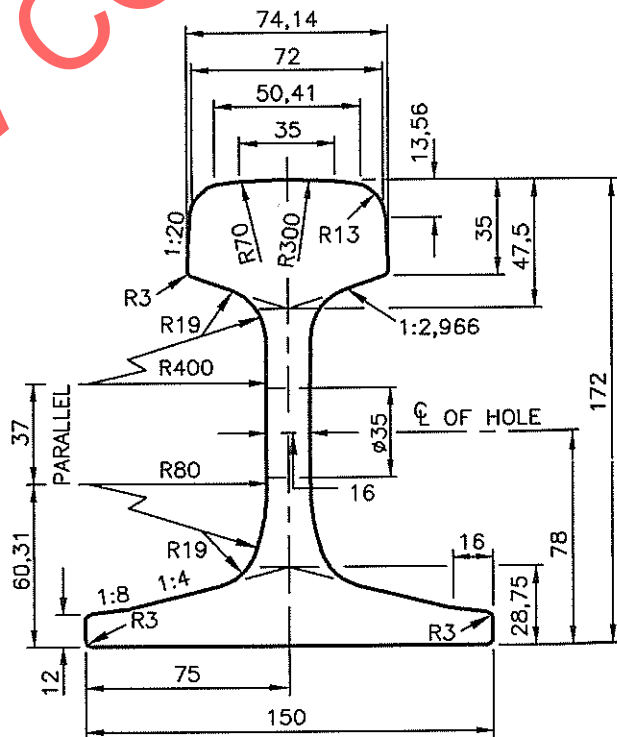
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Z-S60-SAR



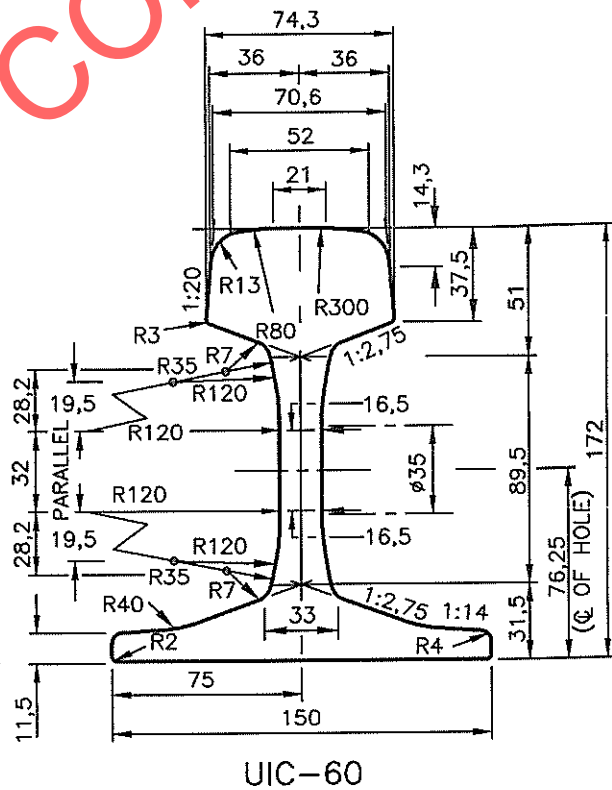
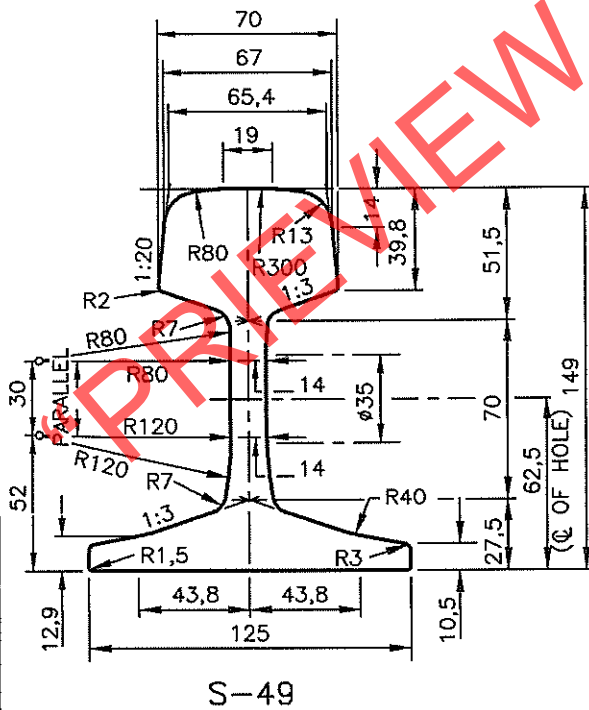
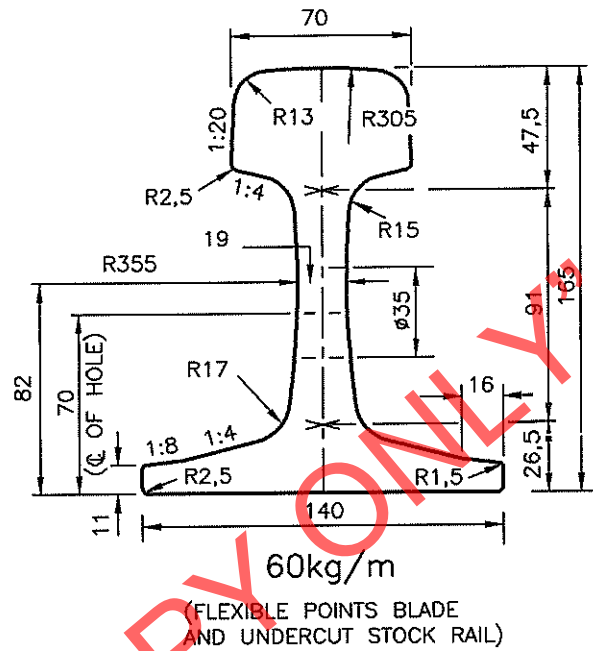
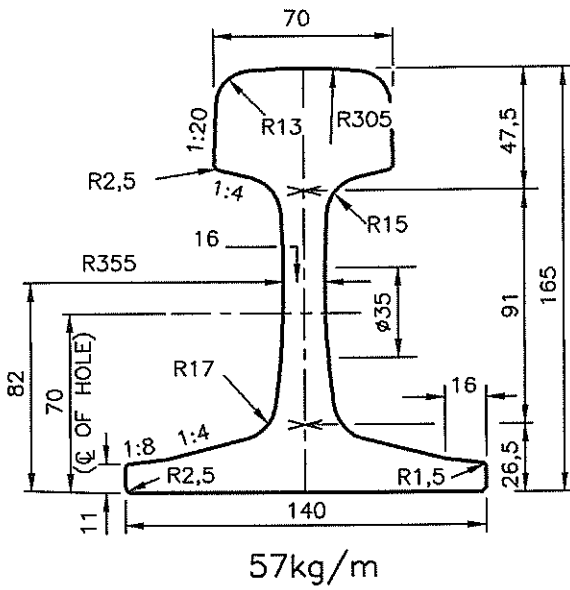
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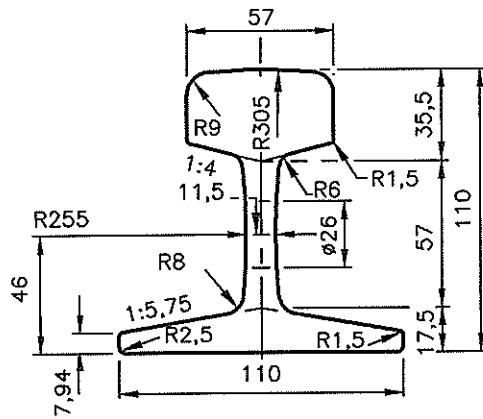
REMARKS:

1. FOR PROPERTIES SEE ANNEXURE 14 SHT 4.

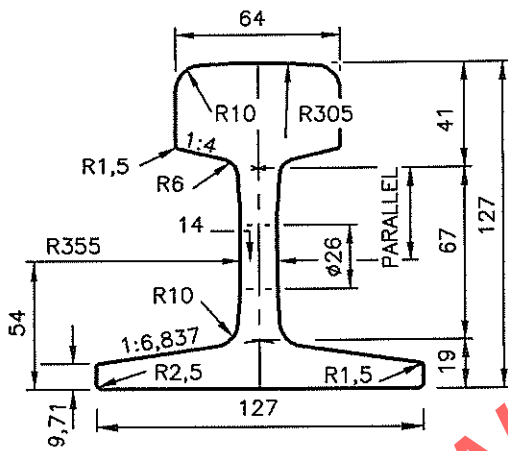


REMARKS:

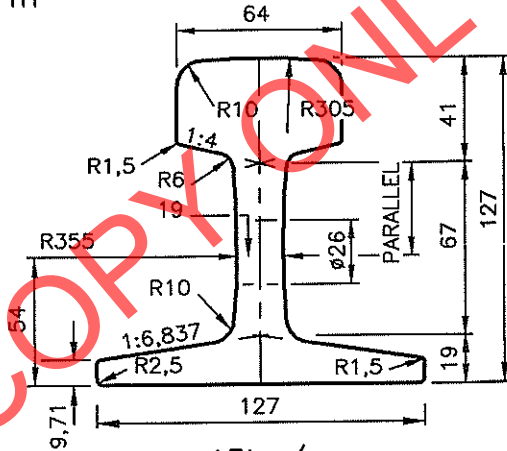
1. FOR PROPERTIES SEE ANNEXURE 14 SHT 4.



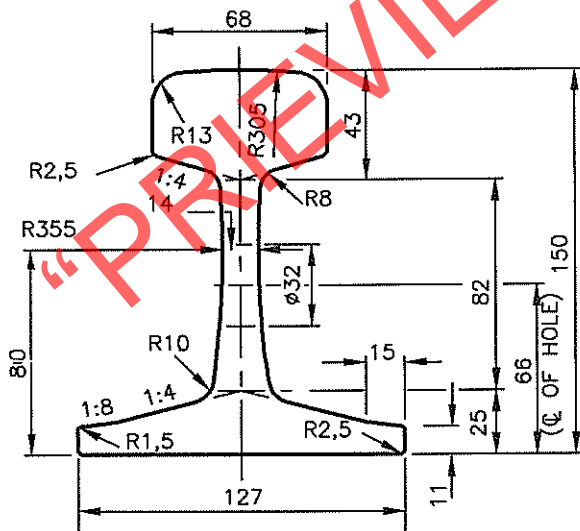
30kg/m



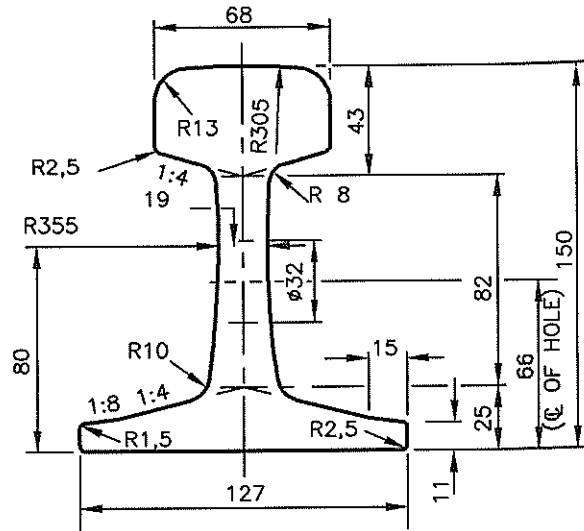
40kg/m



43kg/m  
(HARBOUR AREAS)



48kg/m



51kg/m  
(FLEXIBLE POINTS BLADE  
AND UNDERCUT STOCK RAIL)

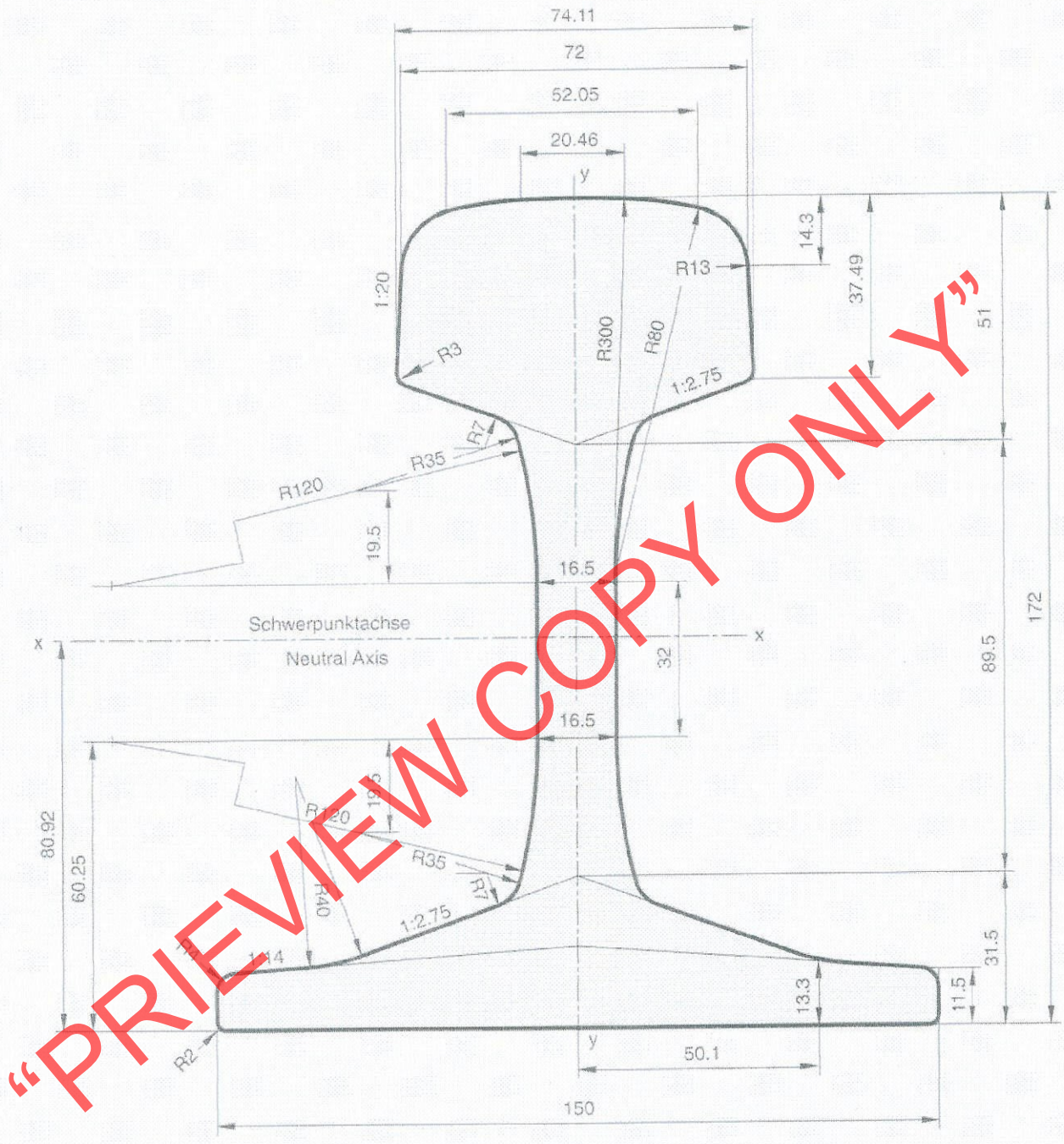
REMARKS:

1. FOR PROPERTIES SEE ANNEXURE 14 SHT 4.



# 60E1

VIGNOLSCHIENE, FLAT BOTTOM RAIL, RAIL VIGNOLE



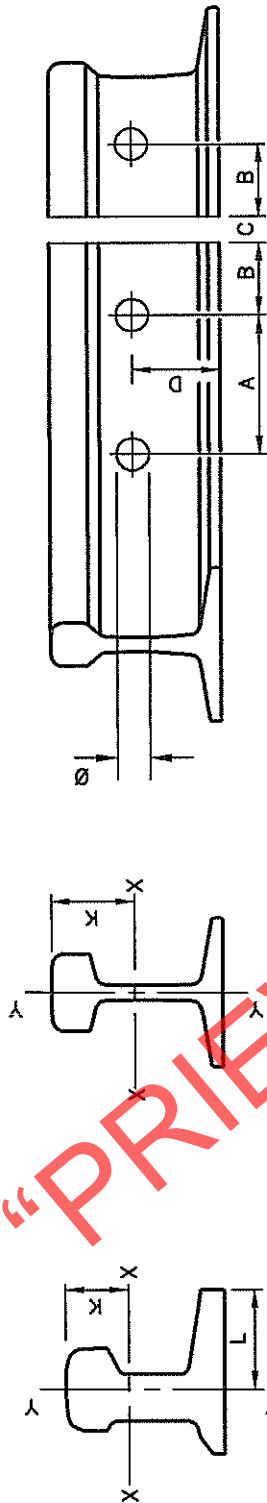
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$A = 76.7 \text{ cm}^2$   
 $G = 60.21 \text{ kg/m}$   
 $I_x = 3038.3 \text{ cm}^4$   
 $W_x = 333.6 \text{ cm}^3$

Scale: 1 : 1.25  
 Edition: 8/97



RAIL PROPERTIES



RAIL	MASS (kg/m)	HOLING						AREAS				PROPERTIES					DRAWING
		A	B	C	D	Ø	NUMBER	HEAD (%)	WEB (%)	FLANGE (%)	SECTION (cm <sup>2</sup> )	I (cm <sup>4</sup> )		Z (cm <sup>3</sup> )	K (mm)	L (mm)	
												X - X	Y - Y				
30kg	30	100	47	6	46	26	4	45,11	18,87	36,02	38,537	626,89	158,18	110,94	56,36	-	E-192M
40kg	40	100	47	6	54	26	4	44,86	19,44	35,70	51,715	1 115,38	281,56	169,20	65,92	-	E-346
43kg	43	100	47	6	54	26	4	42,42	24,03	33,56	55,230	1 129,00	280,30	170,10	66,35	-	E-3215M
48kg	48	100	67	6	66	32	4	41,55	22,65	35,80	60,180	1 822,00	316,04	234,18	78,50	-	E-358M
51kg	51	100	67	6	66	32	4	39,00	27,80	33,20	64,850	1 844,00	320,50	234,60	78,60	-	E-358M
57kg	57	100	67	6	70	35	4	41,55	23,02	35,43	73,240	2 650,80	442,00	336,46	86,21	-	E-3232M
60kg	60	100	67	6	70	35	4	40,14	25,69	34,17	76,125	2 703,27	445,39	343,97	86,41	-	E-3232M
S-60-SAR	60,34	100	67	6	78	35	4	37,53	24,02	38,45	77,020	3 097,82	550,40	395,63	93,70	-	E-3326
Z-S60-SAR	72,83	-	-	-	-	-	-	34,88	30,63	34,47	92,980	1 734,40	746,94	292,98	74,80	82,70	-
UIC-60	60,34	100	67	6	76,25	35	4	40,22	22,55	37,23	76,860	3 055,00	512,90	335,50	91,05	-	700-E-736
Zu- -60	73,00	-	-	-	-	-	-	-	-	-	93,000	1 728,00	743,50	229,90	75,15	82,24	-
S-49	49,43	100	67	6	62,5	35	4	47,45	17,56	34,99	62,970	1 189,00	320,00	240,00	75,70	-	700-E-722
Zu-2-49	62,20	-	-	-	-	-	-	-	-	-	79,260	1 075,00	700,00	162,00	66,30	81,00	-