



INFRASTRUCTURE MAINTENANCE

SPECIFICATION

Specification For A Hydraulic Reversible Rail Saw

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Three handwritten signatures in black ink, each on a dotted line. The first signature is for Ashwin Singh, the second for Colin Blandford, and the third for Colin Blandford.

Date: 22 May 2008

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Transnet Freight Rail - Infrastructure

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Contents

1. General Requirements	3
2. Operating Conditions	3
3. Qualifications.....	3
4. Performance.....	3
5. General Requirements	4
6. Detailed Requirements	4
6.1 Mass	4
6.2 Hydraulic System Requirements	4
6.3 Rail Profiles and Hole Sizes.....	4
6.4 Operator Comfort	4
6.5 Noise Emission	5
6.6 Free Running Speed	5
6.7 Drive.....	5
6.8 Arbor Shaft Diameter	5
6.9 Arbor Flange.....	5
6.10 Reversibility	5
6.11 Rail Clamps.....	5
6.12 Cutting Discs	5
6.13 Body	6
6.14 Safety.....	6
6.15 Ergonomics	6
7. Quality Control	6
8. Legal and Operational	6
Annexure A	8

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1. General Requirements

- 1.1 This specification outlines the requirements of a heavy duty hydraulically operated reversible rail saw, suitable for 400mm (16") diameter cutting discs.
- 1.2 The rail saw must be fitted with a clamp for attaching the machine to the various rail profiles employed within Transnet Freight Rail.

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° C to 45° C.

3. Qualifications

- 3.1 The design of the rail saw is to be that of the manufacturer, but must be of robust construction in order to meet sustained heavy-duty demands of railway infrastructure maintenance.
- 3.2 A "no-tool" adjustment machine is preferred.
- 3.3 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 machine is to be stated.
- 4.2 The rail saws are to be easily and economically maintained with standard workshop tools and equipment.
- 4.3 The machines 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 reversible rail saw, suitable for 400mm (16") diameter cutting discs.
- 5.2 The rail saw must be fitted with a clamp for attaching the machine to the various rail profiles employed within Transnet Freight Rail.

6. Detailed Requirements

6.1 Mass

- 6.1.1 The mass of the rail saw, including whip hoses, must not exceed 17 kg (excluding rail clamp).

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 input will meet the requirements of HTMA Type RR System and the rail saw must operate effectively on this standard.
- 6.2.4 The machine 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 The machine is to be clearly marked in respect of hydraulic oil flow required.
- 6.2.9 Coupling points are to indicate whether they are supply or return points.

6.3 Rail Profiles and Hole Sizes

- 6.3.1 A complete set of drawings depicting the various rail profiles i.e. 30kg/m, 40kg/m, 48kg/m, 57kg/m, S-60-SAR, UIC-60 and 60E1 is provided in Annexure A.
- 6.3.2 The hole sizes and hole distances for the various rail joints, except 60E1 which will be advised, are also indicated in Annexure A.

6.4 Operator Comfort

- 6.4.1 The rail saw must comply with SANS 8662-1:1998 (Hand-Held Portable Power Tools - Measurement of Vibrations at the Handle Part 1:General) and SANS 8662 - 12:2003 (Hand-Held Portable Power Tools - Measurement of Vibrations at the Handle Part 12: Saws and files with reciprocating action and saws with oscillating or rotating action).

6.5 Noise Emission

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

6.6 Free Running Speed

6.6.1 The free running speed of the rail saw must not exceed 4800 rpm.

6.7 Drive

6.7.1 A direct drive machine is preferred but other options may be offered provided the tool complies to the technical requirements of this specification.

6.8 Arbor Shaft Diameter

6.8.1 The arbor shaft diameter must be 25.4mm (1").

6.9 Arbor Flange

6.9.1 Suitable protection to arbor flanges must be provided in order that these may not be able to touch the rail when the blade wears small.

6.9.2 Flange dimensions must comply to those stipulated by the South African Abrasives Association.

6.10 Reversibility

6.10.1 Machines must be reversible i.e. it must have the ability to cut the rail from both sides without the removing of the clamping bracket from the rail.

6.10.2 The main bearing of the rail saw is to be such that thrust on blade is not carried to the hydraulic motor.

6.11 Rail Clamps

6.11.1 Rail clamps of the rail saw must be provided with an absolutely positive type of clamping device/s in order that no movement will be possible during the operation of these machines.

6.11.2 Whilst cutting the rail from both sides, the rail saw needs to maintain alignment such that the cut is equal, level and square.

6.12 Cutting Discs

6.12.1 The hydraulic rail saw must be suitable for locally manufactured 400mm (16") diameter, 4800 rpm, 4mm thick cutting discs that will comply to the Safety Code For Bonded Abrasives as per South African Abrasives Association

6.13 Body

- 6.13.1 The body of the tool and its components must be robust.
- 6.13.2 The machine must be well protected against rust.
- 6.13.3 The grip on the handles must have a non-slip surface.
- 6.13.4 Machines will be acceptable in standard factory production finish and colour. Details to be furnished. Due cognisance must be given to the life requirement of the machine.

6.14 Safety

- 6.14.1 The rail saw is to be provided with suitable safety guards to protect against the risks resulting from wheel breakage.
- 6.14.2 A safety trigger that prevents accidental switch-on of these machines must be fitted to the rail saw.
- 6.14.2 The maximum rated operating speed (rpm) of the rail saw must be clearly marked.

6.15 Ergonomics

- 6.15.1 The machine must be ergonomically designed for maximum operator productivity and safety.

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.

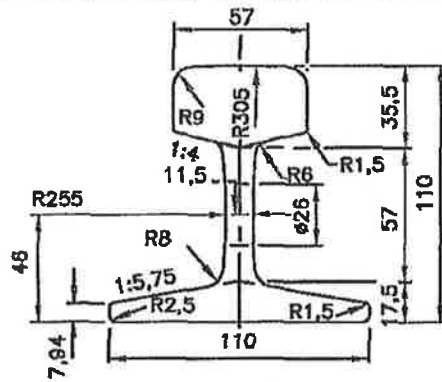
8. Legal and Operational

- 8.1 All machines must comply with the requirements of the Machinery and Occupational Safety Act, (Act 85 of 1993 – General and Driven Machinery Regulations) and The Machinery Directive 98/37/EC.
- 8.2 The machine 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 (Lubricating Nipples – Cone Type) 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.

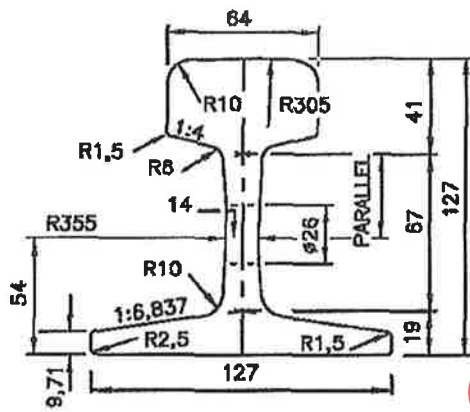
- 8.5 All machines and equipment must be supplied complete with essential tools such as allen keys, spanners etc. in order to make essential adjustments as well as to fit or remove consumable items.
- 8.6 Suppliers of hydraulic machinery will be required to stock a full range of readily available spare 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

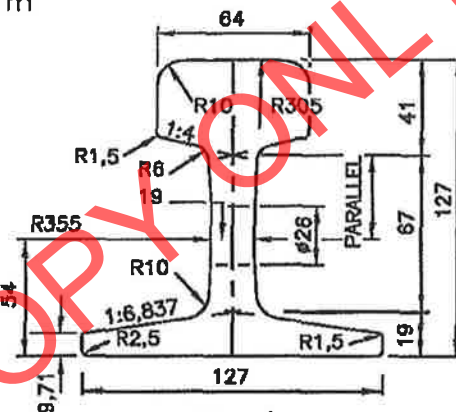
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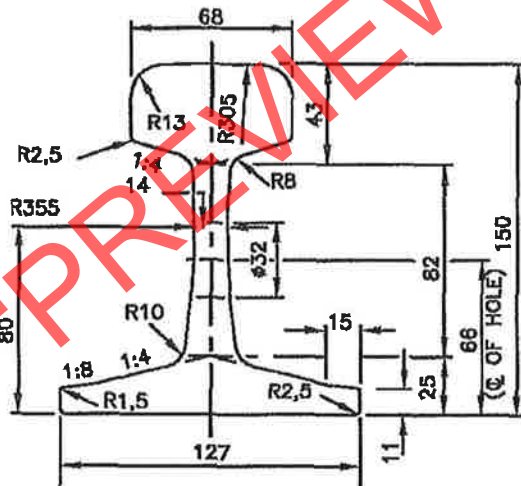
30kg/m



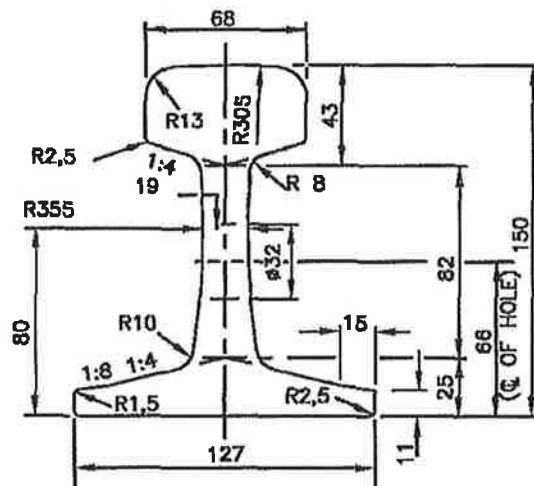
40kg/m



43kg/m
(HARBOUR AREAS)

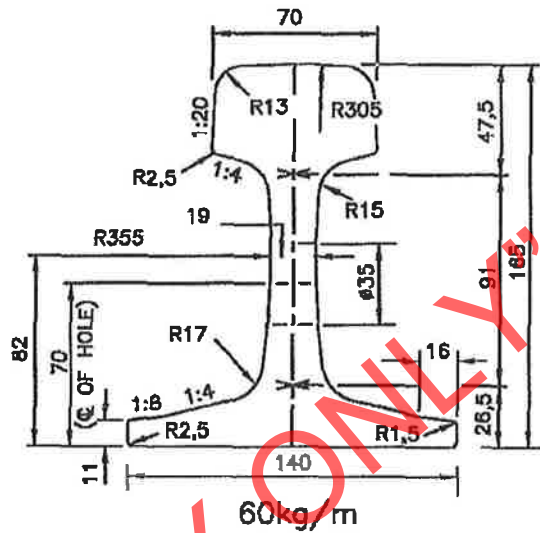
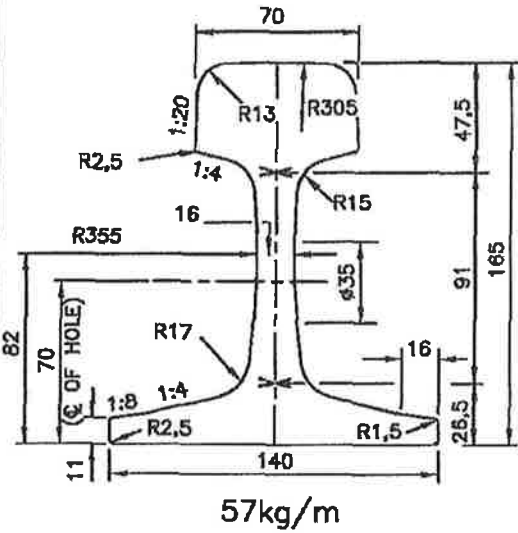


48kg/m

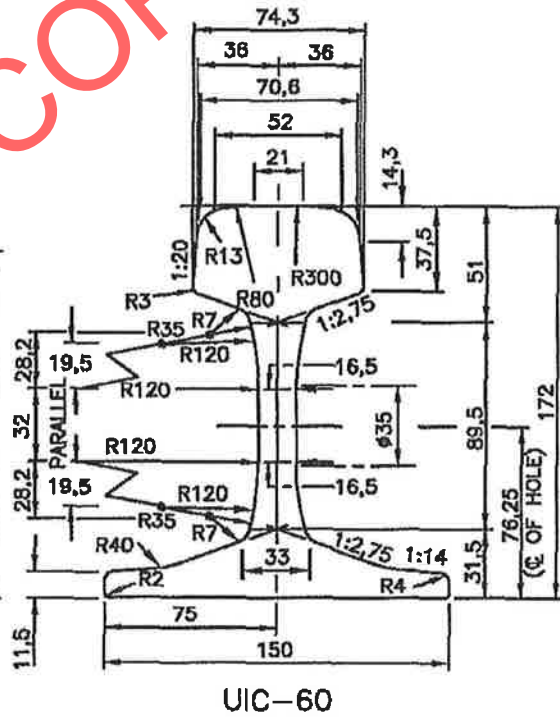
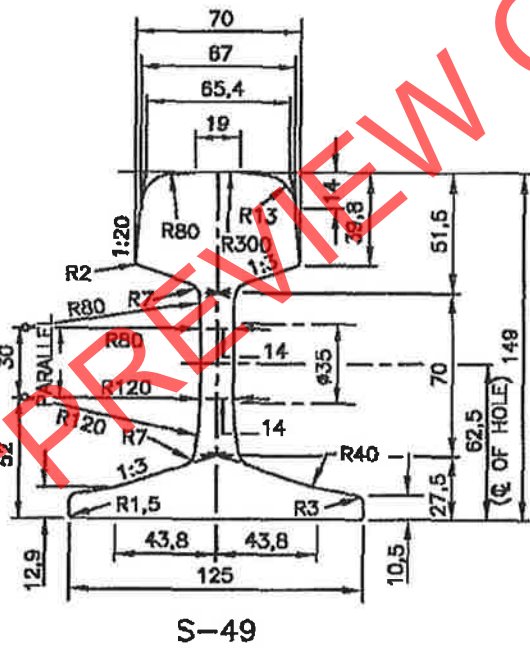


51kg/m
(FLEXIBLE POINTS BLADE
AND UNDERCUT STOCK RAIL)

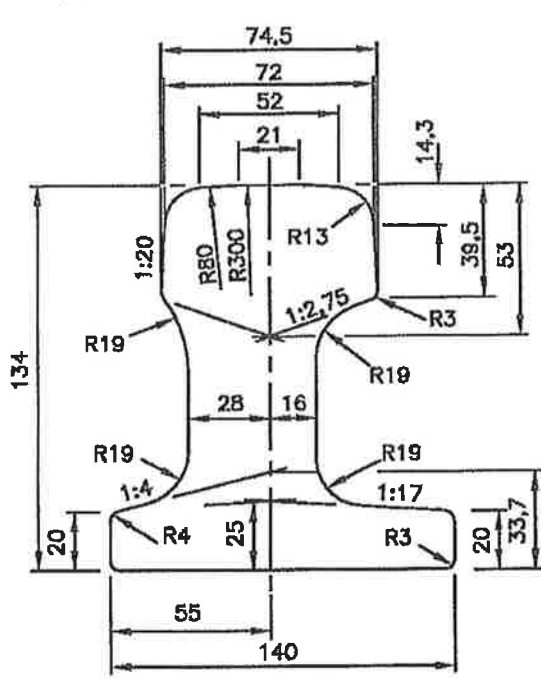
REMARKS :
1. FOR PROPERTIES AND ROLL MARKS SEE
ANNEXURE 14 SHEETS 4 TO 6



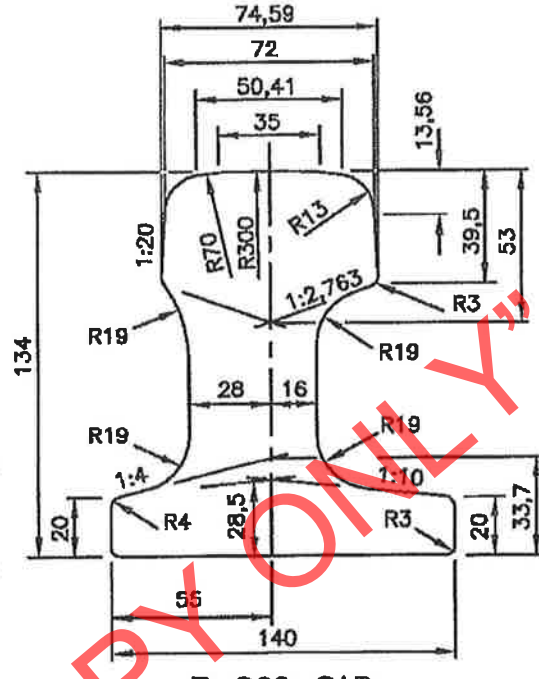
(FLEXIBLE POINTS BLADE
AND UNDERCUT STOCK RAIL)



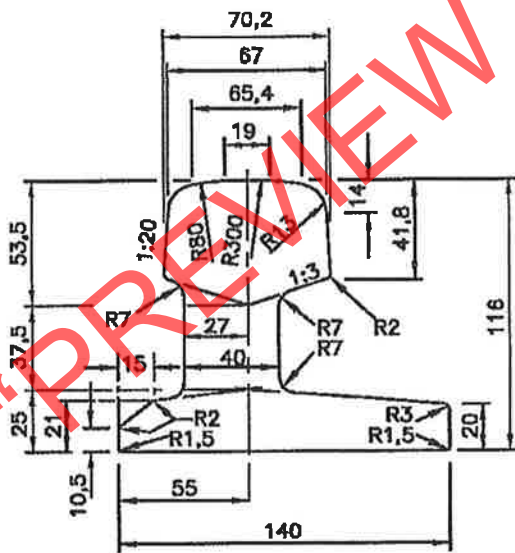
REMARKS :
1. FOR PROPERTIES AND ROLL MARKS SEE
ANNEXURE 14 SHEETS 4 TO 6



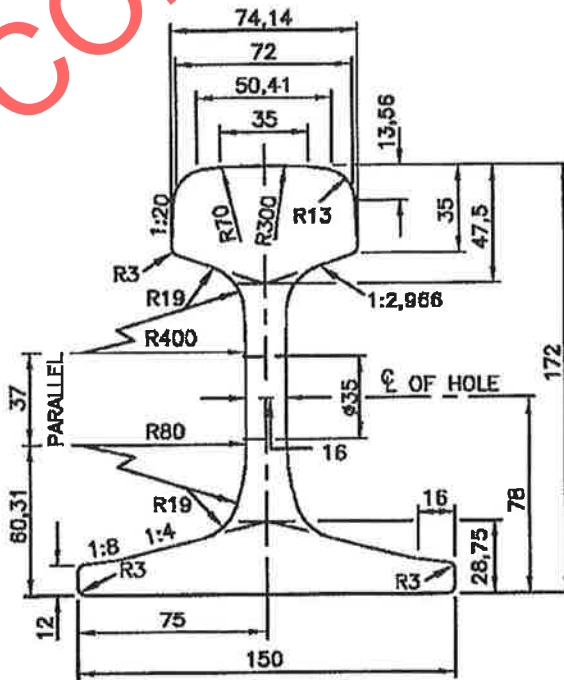
Zu-1-60



Z-S60-SAR



Zu-2-49



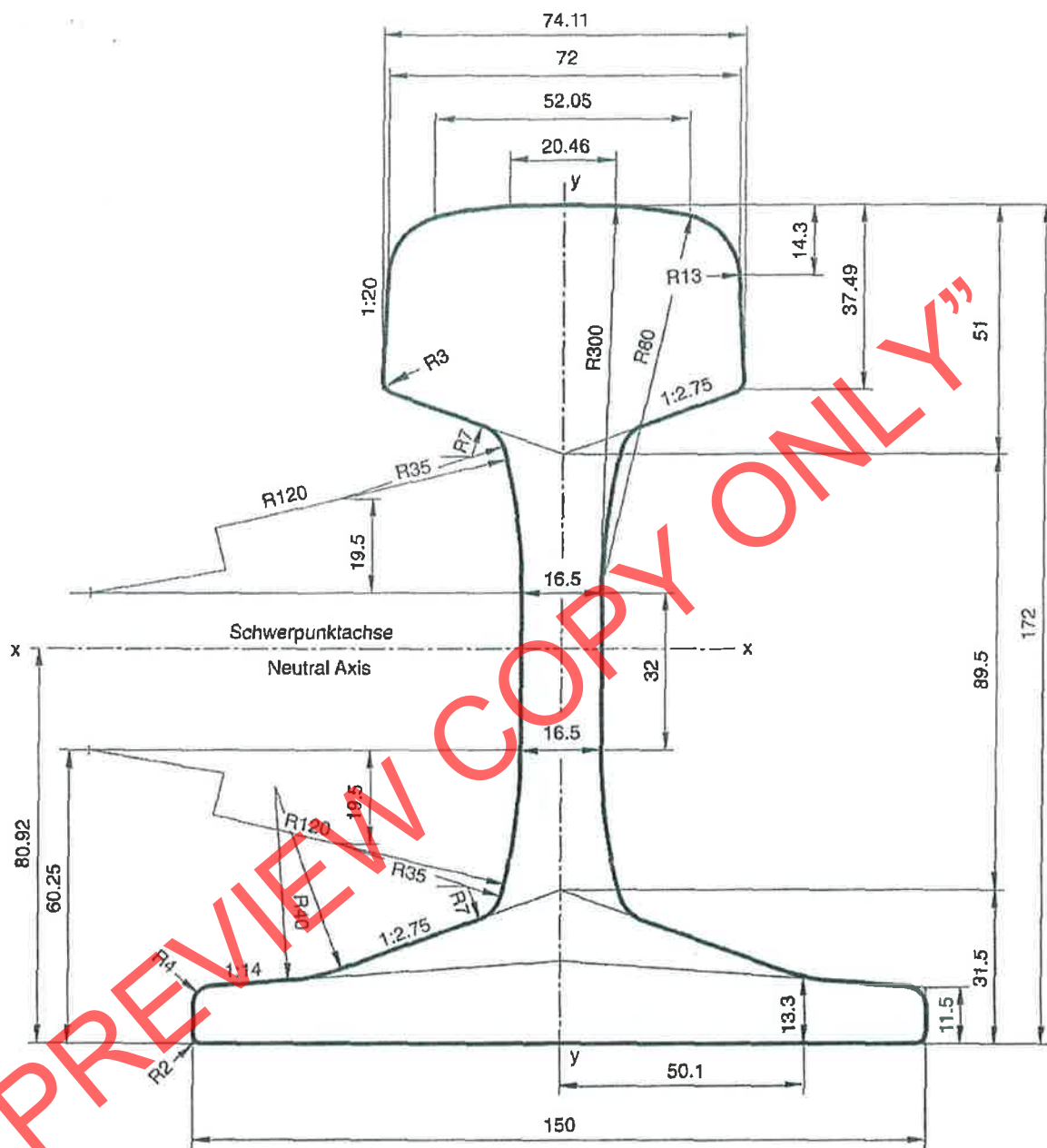
S-60-SAR

REMARKS :
1. FOR PROPERTIES AND ROLL MARKS SEE
ANNEXURE 14 SHEETS 4 TO 6



60E1

VIGNOLSCHIENE, FLAT BOTTOM RAIL, RAIL VIGNOLE

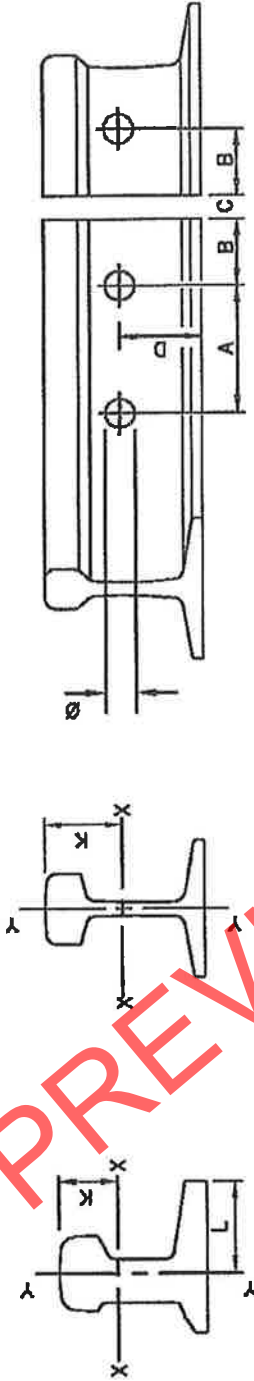


$A = 76.7 \text{ cm}^2$
 $G = 60.21 \text{ kg/m}$
 $I_x = 3038.3 \text{ cm}^4$
 $W_x = 333.6 \text{ cm}^3$

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 ²)	I (cm ⁴)	Z (cm ³)	K (mm)	L (mm)			
		X - X	Y - Y															
30kg	30	100	47	6	46	26	4	45,11	18,87	36,02	38,537	628,89	158,18	110,94	56,36	-	E-192M	
40kg	40	100	47	6	54	26	4	44,86	19,44	35,70	51,715	115,36	281,56	169,20	65,92	-	E-348	
43kg	43	100	47	6	54	28	4	42,42	24,03	33,55	55,230	129,00	280,30	170,10	68,35	-	E-3215M	
48kg	48	100	67	6	66	32	4	41,55	22,85	35,80	60,180	1822,00	318,04	234,18	78,50	-	E-358M	
51kg	51	100	67	6	66	32	4	39,00	27,80	33,20	64,850	844,00	320,50	234,80	78,60	-	E-358M	
57kg	57	100	67	6	70	35	4	41,55	23,02	35,43	73,240	2650,80	442,00	338,48	88,21	-	E-3232M	
60kg	60	100	67	6	70	35	4	40,14	25,69	34,17	76,125	2703,27	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	3097,82	550,40	385,63	93,70	-	E-3326	
Z-560-SAR	72,83	-	-	-	-	-	-	34,88	30,63	34,47	92,980	1734,90	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	76,880	3055,00	512,90	335,50	91,05	-	700-E-736	
Zu-1-60	73,00	-	-	-	-	-	-	-	-	-	93,000	1728,00	743,50	229,80	75,15	82,24	-	
S-49	49,43	100	67	6	62,5	35	4	47,45	17,56	34,99	62,970	1899,00	320,00	240,00	75,70	-	700-E-722	
Zu-2-49	62,20	-	-	-	-	-	-	-	-	-	79,280	1075,00	700,00	162,00	66,30	81,00	-	



INFRASTRUCTURE MAINTENANCE

SPECIFICATION

Specification For A Hydraulic 25.4mm (1") Impact Wrench

Author: Chief Engineering Technician
Small Plant & Equipment

Ashwin Singh

Handwritten signature of Ashwin Singh in black ink, positioned above a dotted line.

Approved: Senior Engineer
Engineering

Colin Blandford

Handwritten signature of Colin Blandford in black ink, positioned above a dotted line.

Authorised: Senior Engineer
Engineering

Colin Blandford

Handwritten signature of Colin Blandford in black ink, positioned above a dotted line.

Date: 06 May 2008

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Contents

1. Scope	3
2. Operating Conditions.....	3
3. Qualifications.....	3
4. Performance.....	3
5. General Requirements	4
6. Detailed Requirements.....	4
6.1 Mass.....	4
6.2 Hydraulic System Requirements.....	4
6.3 Operator Comfort.....	4
6.4 Noise Emission	4
6.5 Speed	5
6.6 Torque Range	5
6.7 Impact Mechanism.....	5
6.8 Body	5
6.9 Ergonomics.....	5
7. Quality Control	5
8. Legal and Operational.....	6

“PREVIEW COPY ONLY”

1. Scope

- 1.1 This specification outlines the requirements of a heavy duty hydraulic 25.4mm (1") impact wrench that will be used for the maintenance of railway infrastructure.

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° C to 45° 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 sustained heavy-duty demands of railway infrastructure maintenance.
- 3.2 A “no-tool” adjustment machine is preferred.
- 3.3 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 machine is to be stated.
- 4.2 The impact wrenches are to be easily and economically maintained with standard workshop tools and equipment.
- 4.3 The impact wrenches 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 The machine must be a heavy-duty reversible impact wrench having a 25.4mm (1") square drive.
- 5.2 Heavy duty impact sockets and extensions will be used on the machine.
- 5.3 The impact wrench will be used in both vertical and horizontal positions.

6. Detailed Requirements

6.1 Mass

- 6.1.1 The mass of the impact wrench (including whip hoses) is to be in the range of 12 – 15kg.

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 input will meet the requirements of HTMA Type 1 System and the impact wrench must operate effectively on this standard.
- 6.2.4 The machine 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 Operator Comfort

- 6.3.1 The impact wrench must comply with SANS 8662-1:1998 (Hand-Held Portable Power Tools - Measurement of Vibrations at the Handle Part 1:General) and SANS 8662 – 7:2003 (Hand-Held Portable Power Tools - Measurement of Vibrations at the Handle Part 7: Wrenches, screwdrivers and nut runners with impact, impulse or ratchet action).

6.4 Noise Emission

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

6.5 Speed

6.5.1 The speed of the impact wrench under no load must not exceed 1000 rpm.

6.6 Torque Range

6.6.1 The impact wrench must have an adjustable torque range from 0 Nm to maximum.

6.6.2 The torque range must be from 0 to not less than 2500 Nm.

6.6.3 The maximum torque output must not exceed 3500 Nm.

6.7 Impact Mechanism

6.7.1 The impact mechanism is to be maintenance free.

6.8 Body

6.8.1 The body of the tool and its components must be robust.

6.8.2 The machine must be well protected against rust.

6.8.3 The grip on the handles must have a non-slip surface.

6.8.4 Machines will be acceptable in standard factory production finish and colour. Details to be furnished. Due cognisance must be given to the life requirement of the machine.

6.9 Ergonomics

6.9.1 The tool must be ergonomically designed for maximum operator productivity and safety.

6.9.2 The impact wrench must have an anti-vibration handle.

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.

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 machine 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 (Lubricating Nipples – Cone Type) 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.
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- 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.
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INFRASTRUCTURE MAINTENANCE

SPECIFICATION

Specification For A Hydraulic Track Jack

Author: Chief Engineering Technician
Documentation Management

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Equipment Technology

Ashwin Singh

Colin Blandford

Colin Blandford

(Signature)

(Signature)

(Signature)

Date: 19 February 2008

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Contents

1. Scope.....	3
2. Operating Conditions	3
3. Qualifications.....	3
4. Performance.....	3
5. General Requirements.....	4
6. Detailed Requirements.....	4
6.1 Lifting Capacity	4
6.2 Mass	4
6.3 Stroke	4
6.4 Height.....	4
6.5 Handle Effort	4
6.6 Body.....	4
6.7 Body and Base.....	4
6.8 Lifting Shoes.....	5
6.9 Lubrication.....	5
6.10 Safety and Protection.....	5
6.11 Ergonomics	5
7. Quality Control	6
8. Legal and Operational	6

“PREVIEW COPY ONLY”

1. Scope

- 1.1 This specification outlines the requirements of a 9000 kg lifting capacity, heavy-duty hydraulic, hand operated rail maintenance track jack.
- 1.2 The jack will be used for both horizontal and vertical operation.

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° C to 45° 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 sustained heavy-duty demands.
- 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.

5. General Requirements

- 5.1 The jacks will be hand operated in both vertical and horizontal positions.
- 5.2 The jack is to incorporate an internal return spring, comfortable carrying/manoeuvring handle as well as a one piece operating (pumping) handle.
- 5.3 The base plate is to be suitable for use in loose ballast, i.e. no additional base plates to be required.

6. Detailed Requirements

6.1 Lifting Capacity

- 6.1.1 The jack must have a minimum lifting capacity of 9000 kg.

6.2 Mass

- 6.2.1 The net mass of the track jack is not to exceed 26kg.

6.3 Stroke

- 6.3.1 The jack must have a stroke of not less than 200mm.

6.4 Height

- 6.4.1 The overall collapsed height of the jack (including carrying handle) must not exceed 400mm.
- 6.4.2 The toe shoe height must be approximately 50mm measured from the base of the retracted jack.
- 6.4.3 The top end shoe height must be approximately 370mm measured from the base of the retracted jack.

6.5 Handle Effort

- 6.5.1 The handle effort at full load is to be a maximum of 350N.

6.6 Body

- 6.6.1 The body of the jack and its components must be robust.
- 6.6.2 The tool must be rustproof.
- 6.6.3 The grip on the handles must have a non-slip surface.

6.7 Body and Base

- 6.7.1 The body and base of the jack shall be of a suitable grade of SG iron complying with SABS 936/937, an aluminium alloy casting or of welded construction.
- 6.7.2 The dimensions of the base plate must be a minimum of 250mm x 150mm.
- 6.7.3 The base must have the ability to resist deformation in service.

6.8 Lifting Shoes

- 6.8.1 The jack must be equipped with both toe and top end lifting shoes.
- 6.8.2 The dimensions of the toe shoe must be approximately 65mm x 75mm.
- 6.8.3 The dimensions of the top end shoe must be approximately 100mm x 70mm
- 6.8.4 The toe shoe must be securely retained.
- 6.8.5 A V-base lifting head is to be supplied, in addition to the standard lifting head, to enable the jack to operate horizontally between railway lines.

6.9 Lubrication

- 6.9.1 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.

6.10 Safety and Protection

- 6.10.1 Each jack must be equipped with a suitable relief valve in order to prevent damage to seals or other working parts when attempts are made to exceed the lifting capacity.
- 6.10.2 The relief valve must be tamper-proof.
- 6.10.3 The seal and piston of the jack must be protected against damage from the ballast or operator abuse.

6.11 Ergonomics

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

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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.

8. Legal and Operational

- 8.1 All machines must comply with the requirements of the Machinery and Occupational Safety Act, (Act 85 of 1993). It must also comply with ANSI/ASME B30.1-2004 (Safety Code for Jacks) and EN 1494 (Mobile or moveable jacks and associated lifting equipment)
- 8.2 The jack must be completely assembled and filled with lubricants and ready for service in all respects.
- 8.3 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.
- 8.4 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.
- 8.5 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.
- 8.6 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.
- 8.7 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.
- 8.8 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.
- 8.9 Sufficient training must be given to all operators of these machines.
- 8.10 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.