



A Division of Transnet SOC Limited

RAIL NETWORK

SPECIFICATION

BATHTUB TYPE CORNERLESS TRAILERS

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1. **Scope**

This specification is for Corner-less bathtub type trailer.

The trailer shall be supplied complete and fully assembled in all respects, including standard equipment supplied by the manufacturer and shall comply with the South Africa Occupational Health and Safety Act, Act 85 of 1993/as amended or equivalent international standards such as ISO, DIN, etc.

2. **Operational Requirements**

2.1 **Equipment Functionality**

2.1.1 The trailer shall be utilised to transport one 40ft, one or two 20ft ISO containers or one 20ft tank container. In addition, the dimensions should accommodate Transnet SARU containers. These containers can be empty or fully laden up to the maximum load as allowed for in the ISO standard.

2.1.2 The tank container can have a total mass of 38,000kg. The tank container shall be placed halfway between the front and the back of the trailer.

2.1.3 In the case of the 20ft ISO containers, the total mass of each container is 30,480 kg.

2.1.4 The trailer shall be designed such that the tank container will rest on its corner blocks on the trailer. The tank container twist locks will be removed before being placed on the trailer.

2.1.5 The trailer will be subjected to shock impact loads of fully loaded containers being loaded by container handling equipment. This shall be factored in the design calculation.

2.1.6 The two 20ft containers will be handled with a separating 'Twin lift' spreader, which allow for the centre twist lock blocks to be maximum 60mm lower than the outer twist lock block or maximum 130mm higher than the outer twist lock blocks. The trailer must be designed to eliminate deflection and bending of the trailer beyond 50% of the above values during the life of the trailer.

2.1.7 The trailer must be designed for short hauls, average 2km per trip at maximum 40km/h with the full load. It will be subject to frequent intermitted stops and will have to negotiate tight corners in and out of the container stacks.

2.1.8 The trailer must be off the Cornerless type, design to allow the fitting and removal of the twist lock connectors on containers loaded on the trailer without having the climb onto the trailer or crawl under the trailer.

2.2 **Constraints**

2.2.1 None

2.3 **Terminal Specific Requirements**

2.3.1 In terms of terminal specification requirements, the Supplier shall refer to the Works Information for the following items, including but not limited to:

- Types of couplings for the brakes (i.e. PBR quick release type coupling or palm type couplings)
- Environmental conditions including altitude, ambient temperature, relative humidity and air pollution concerns.

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- Registration and certificate requirements

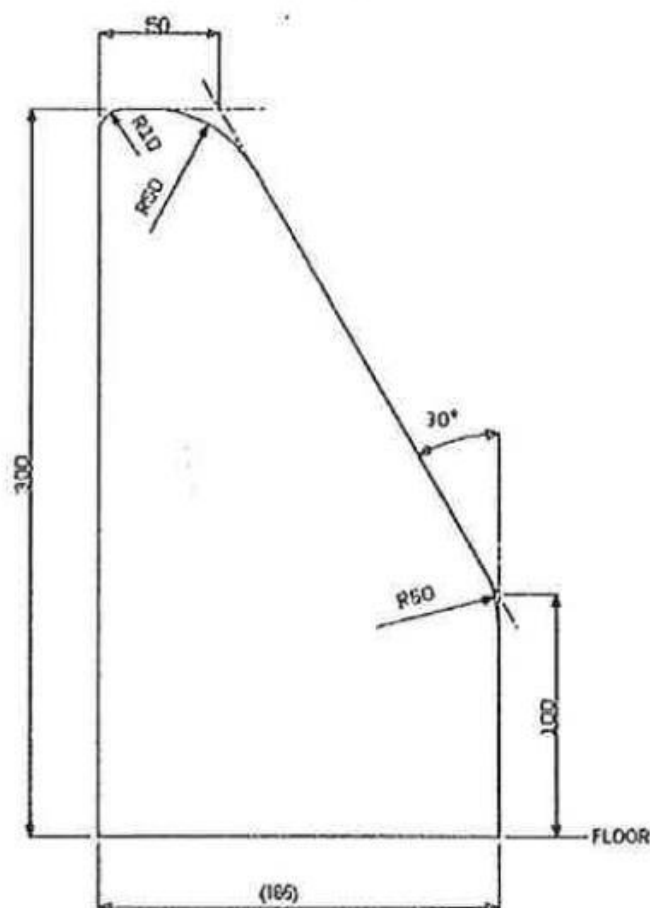
3. Technical Requirements

3.1 Trailer Structure

- 3.1.1 The trailer structure shall be designed and built in accordance with the Specification EEAM-Q-006 Structural Steelwork.
- 3.1.2 The design of the structure shall be such that working stresses are below 25% of the yield stress of the material used.
- 3.1.3 The design of the structure shall be constructed from a carbon steel grade of a recognised specification that is fit for the application.
- 3.1.4 The trailer structure shall be designed and manufactured with trailer mass as low as possible.
- 3.1.5 The trailer structure shall be manufactured with a positive camber, which will remain positive under full load.
- 3.1.6 The trailer structure shall be braced adequately to withstand all stresses at the fifth wheel king-pin.
- 3.1.7 The trailer structure shall be designed such that all load bearing members are of one continuous length. Where joints are necessary, these joints shall be full penetration butt-welded joints.
- 3.1.8 The trailer structure shall be of fully welded construction with all fillet welds continuous (no open sections for corrosion protection) free of slag inclusion and blowholes.
- 3.1.9 All joints on the chassis shall be thoroughly sealed with an approved sealer to prevent rusting between mating surfaces.
- 3.1.10 The trailer shall be designed to minimise the settlement of water and dust on the structure.
- 3.1.11 Drain holes shall be provided in areas where water can accumulate.
- 3.1.12 All fatigue sensitive welds shall be post weld treated by local burr grinding and shot peened afterwards.
- 3.1.13 All joints and cavities must be treated with "Waxoyl"

3.2 Side and end guides

- 3.2.1 The side and end guides facilitate the accurate self-positioning of containers when lowered onto the trailer.
- 3.2.2 The profile of the guide shall be as depicted in the sketch below:



3.2.3 All horizontal and vertical edges shall be smooth with at least 6mm radii.

3.2.4 The length of the side and end guides shall enable the easy removal of twist lock connector from the container after being placed on the trailer.

3.2.5 The distance between the sides and end guides shall allow easy access of container onto the trailer and will prevent the container from shifting around during acceleration, braking and cornering. Details shall be supplied on the drawing.

3.2.6 The top portion of the guides must be tapered with no sharp edges that can cause damage to containers.

3.3 Skid plate

3.3.1 The skid plate shall be at least 16mm thick (finished), 90mm in width and breath and sufficient reinforced.

3.3.1 The skid plate surface shall be smooth and all the edges shall be chamfered.

3.3.3 If necessary the skid plate sub-assembly needs to be machined flat after welding and before fitting to the structure.

3.3.4 The skid plate shall be substantially stiffened to prevent deformation during operation use.

- 3.3.5 The leading edge of the skid plat shall be bent to allow for a skid type operation when coupling the trailer to the hauler.

3.4 King pin

- 3.4.1 The king pin shall be of the bolted type and will contain both SAE 3,5 inch and SAE 2.0 inch pins. The king pin shall be invertible to accommodate the two different pin sizes.
- 3.4.2 The king pin mechanical properties shall be:
Tensile and shear strength: not less than 6 times the "pulling load" on the king-pin
Elongation: 13%
Hardness range: 250HB-300HB
- 3.4.3 The king pin shall be perpendicular (90deg) to the mounting plate with a tolerance of + 1 degree.

3.5 Container stoppers

- 3.5.1 Stoppers to restrain the movement of containers in the different loading configurations must be fitted to the trailer.
- 3.5.2 Stoppers shall be designed that if the trailer is empty. It will be in the open position.
- 3.5.3 Should a 40ft container be loaded, the container must push the relevant stoppers into suitable pockets in the floor of the trailer.
- 3.5.4 A mechanism which will prevent front and rear 20ft containers from sliding forward and backwards shall be fitted in the centre of the trailer.
- 3.5.5 A mechanism that will prevent the tank container from forward or backwards shall be supplied

3.6 Fixed landing legs

- 3.6.1 The fixed landing legs must be capable to support the trailer with a full load and while fully laden container are being loaded.
- 3.6.2 The load desk must be horizontal when the trailer is resting on the landing legs.
- 3.6.3 The landing legs shall be fitted with fixed square 'sand shoe' type bases which will prevent the legs from digging into the pavement when contact is made during travelling.

3.7 Axles and suspension

- 3.7.1 A heavy duty tandem axle, capable of hauling the rated payload at 30 km/h, negotiating sharp turns and capable of withstanding shock impacts by containers when loaded, is required.
- 3.7.2 The trailer shall be able to negotiate speed bumps and full oscillation of the axles is required to allow for working on uneven surface.
- 3.7.3 A multi-leaf walking beam type suspension is required.
- 3.7.4 Bearing shall be rated for a L10 service life of at least five years under the loads and conditions that can be expected.
- 3.7.5 The rear axle design shall enable maximum stability when the trailer is cornering under full load.

3.8 Brake System

- 3.8.1 The brake system shall enable the trailer to comply with SANS 1447- Part 2, SANS 107 and SANS SV1051, as well as the South African Road Traffic Act.
- 3.8.2 The latest technology low maintenance brake system shall be fitted.
- 3.8.3 The axle shall be fitted with S-cam brakes complete with automatic slack adjuster.
- 3.8.4 The breaks shall be capable of stopping and /or holding the fully laden trailer on a 1 in 8 gradient.
- 3.8.5 An independent brake system fed by the hauler is required on all axles. The system shall be an outboard drum type air operated, complete with boosters.
- 3.8.6 A dual circuit compressed air brake system with dual-line hauler brake connections is required.
- 3.8.7 The points are required at all wheels.
- 3.8.8 The emergency line shall be fitted with female coupling.
- 3.8.9 The service line shall be fitted with a male coupling.
- 3.8.10 The air hoses shall run on the inside of the main chassis and be supported at every 1m.
- 3.8.11 In-line filters shall be fitted in both lines. They shall be installed in a position that enables easy maintenance.
- 3.8.12 Steel air reservoirs with sufficient capacity to execute at least ten full brake applications, without the air replenished, shall be supplied.
- 3.8.13 The reservoirs shall be fitted with automatic and manual drain valves.
- 3.8.14 The manual load sensing valve to regulate the trailer brakes shall be fitted.
- 3.8.15 The trailer shall be fitted with a hand brake valve that will allow the stevedore to apply the brakes of the trailer whilst twist locks are being removed. The hand break valve should be located on the front right-hand side of the trailer.

3.9 Tyres and Rims

- 3.9.1 Tyres manufactured in the Republic of South Africa or standard tyres which are readily available in South Africa must be supplied.
- 3.9.2 Tyres and rims must conform to the standards as laid down in S.A.N.S. APR 007 and ARP 008 shall be of an approved brand. Tyres should be able to operate at a speed 40 km/h without any loss of performance.
- 3.9.3 'HUB PILOTED 'or' SPIGOT-MOUNTED' rims shall be supplied.
- 3.9.4 Rims are to be interchangeable.
- 3.9.5 Solid cushion type fitted to suitable rims shall be supplied.
- 3.9.6 The wheels shall not foul or touch the chassis at maximum oscillation.

3.10 Electric System

- 3.10.1 The electrical system on the trailer shall be suitable for operation from a 24 volt DC supply from the hauler.
- 3.10.2 No grounding to the trailer frame shall be permitted.
- 3.10.3 The trailer shall be fitted with a heavy duty SAE-7 pole socket mounted in the centre of the front bulk head.
- 3.10.4 A weather proof 7- core PVC cable shall be supplied between the connecting socket and an easily accessible junction box which shall be located at the rear on the left hand side of the main chassis beam.
- 3.10.5 The junction box shall be fitted with fuse pane/trip switches and test point shall be provided.
- 3.10.6 The trailer shall be fitted with Multi Volt LED lights.
- 3.10.7 The following lights fitted to the left and right hand side of the rear under run bumper are required: Tail light, stoplight, number plate light, direction indicator light and reverse lamps.
- 3.10.8 The reverse lamps shall be coupled to an automatic reverse warning sound mechanism.
- 3.10.9 Shielded light must be fitted in position that will illuminate the corners of the containers when placed on the trailer to assist with the removal of the twist locks during night operations.
- 3.10.10 All lights shall be protected from accidental damages. Lighting shall be fitted in a recess with protective round bars to minimise damage during use.
- 3.10.11 All electric wiring must be colour coded, grommited, sleeved, trunked and securely clamped.
- 3.10.12 Referenced specifications:
- SABS 1376 Parts 1, 2 and 3 (Lights for motor vehicle)
 - SABS 1327:1981 (Electrical connectors for towing and towed vehicles)
 - SABS ISO 12098: 1994 (7-Pole connecting between towing and vehicles and trailers)

3.11 Painting

- 3.11.1 The trailer shall be painted in accordance with Specification EEAM-Q-008 (Corrosion Protection)
- 3.11.2 The manufactures standard painting procedure can be used if it is equivalent to better than that called for above.
- 3.11.3 The total paint dry film thickness shall not be less than 250pm.
- 3.11.4 The colour scheme of the trailer shall be as follows:
- Load deck, chassis and rims painted red to colour specific RAL 3020
- 3.11.5 No other colour shall be expected.
- 3.11.6 Drain holes must be provided in areas where water can accumulate
- 3.11.7 The paint work shall be covered by a ten year corrosion guarantee.

3.12 Signage and Markings

- 3.12.1 A data plate as required by the South African and Traffic act shall be fitted.

- 3.12.2 Durable, ultraviolet resistant and weather resistant warning signs shall be provided in all locations on the trailer that impose danger.
- 3.12.3 Durable, ultraviolet resistant and weather resistant information signs shall be provided to assist the hauler driver/maintenance staff with operation/maintenance of the trailer.
- 3.12.4 A fuse diagram shall be displayed at the fuse box.
- 3.12.5 Retro-reflection tape shall be fitted to both sides and the rear of the trailer.
- 3.12.6 In terms of the emergency air supply line, a label with a red background and black lettering stating 'EMERGENCY LINE' shall be fixed to frame the above coupling. The lettering should at least be 20 mm high.
- 3.12.7 In terms of the service air supply line, a label with a yellow background and white lettering stating 'SERVICE LINE' shall be fixed to the frame above coupling. The lettering should be at least 20mm high.
- 3.12.8 The trailer chassis number, the contract number against which the trailer has been supplied and the date of manufacturing must be stamped into the chassis near the junction box. The lettering must be at least 10mm high.

4. Safety and Environment

4.1 Safety Requirements

- 4.1.1 The trailer shall comply with the South African Occupational Health and Safety Act, Act 85 of 1993/as amended
- 4.1.2 All surfaces where operating or maintenance personnel shall tread must be laid out with non-slip material.
- 4.1.3 Suitable fire extinguishers shall be provided.

4.2 Environmental Requirements

- 4.2.1 None

5. Maintenance

5.1 Lubrication

5.1.1 Manual lubrication

- 5.1.1.1 All grease points must be clearly marked by means of yellow circle of approximately 2.5 cm in diameter.
- 5.1.1.2 Grease points that are not easily reachable must be provided with a steel tube to an accessible position.

5.1.2 Automatic lubrication system

- 5.1.2.1 The trailer shall be fitted with a pneumatic operated single line automatic lubrication system.

5.2 Accessibility

5.2.1 All replacement items including (but not limited to) critical components shall be designed for easy access, removal and replacement.

6. General

6.1 The trailer and all components fitted shall be new.

6.2 All components shall be installed and fitted according to manufacturer's recommendation.

6.3 All the components must be securely mounted to the trailer such that vibrations will not dislodge them.

6.4 No 'HUCK' bolts or rivets shall be used on the trailer structure.

6.5 The threads of all bolts and nuts shall be coated with an anti-seizing agent before installation.

6.6 All hydraulic fittings shall be Denso wrapped.

6.7 All electrical and mechanical components shall have been tested for reliability and extended lifetime in the conditions to be expected.

6.8 The trailer shall be homologated with the necessary certification.

6.9 The trailer must be designed for all parts and components to be easily assembled, adjusted, and removed.

7. Referenced Specifications

Standard specification

The following, not necessarily comprehensive, list of standards specifications are relevant:

ANSI/AWS D1.1	Structural welding Code-Steel
BS-EN 287 Part 1	Approval testing of welders/ fusion welding
BS-EN 288 Part 3	Specification and approval of welding procedures for metallic materials
BS 5135	Metal arc welding of carbon and carbon manganese steels
BS 3923	Methods for ultrasonic examination of welds
BS 2600	Radiographic examination of fusion welded butt joints in steel
BS 5493	Code of practice for protective coating of iron and steel structures against corrosion
DIN 1026	Matric channels
ISO R657	Angels
SANS 135	ISO metric bolts, screws and nuts (hexagon and square) (Coarse threads, free fit series)
SANS 136	ISO metric precision hexagon-head bolts and screws and hexagon nuts (coarse threads medium fit series)
SANS 064	Preparation steel surfaces for coatings
SANS 763	Hot-dip (galvanized) zinc coatings
SANS 1091	National colour standards for paint
SANS 1431	Weldable structural steels
SANS 1376 Parts 1, 2, & 4	Light for motor vehicles
SABS 1327:1981	Electrical connectors for towing and towed vehicles
SABS ISO 12098: 1994	7-Pole connectors between towing vehicles and trailers
SANS 1447 – Part 2	Pneumatic braking systems
SANS 1207 & SANS SV 1051	Braking

Regardless of which specifications are actually worked to when manufacturing Plant and Materials, such Plant and Materials shall be capable of satisfactorily passing all tests laid down in the standard specifications called for.

Employer specifications

The following Employment specifications are relevant:

EEAM-Q-004	Gearing, shafts, bearing, brakes, lubrication, vee-belts, keys and keyways
EEAM-Q-006	Structural steelwork
EEAM-Q-008	Corrosion protection
EEAM-Q-009	Quality Management
TPT_TS_CBT	Bathtub trailers for Ports

END