

TECHNICAL SPECIFICATION

SUBJECT : HEAVY DUTY SWEEPING MACHINES

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1 Background

1.1 Introduction

This specification is for a heavy duty sweeping machines (Road Sweeper). The Heavy Duty Sweeping Machines /trucks shall be utilised to sweep, contain and dispose debris and granular substances that are present within the port terminal environment. The heavy duty sweeping machines shall be capable of operating efficiently in harsh terrain i.e. potholes, uneven surfaces, water drenched roads, etc.

The machine shall be fitted with a steering system capable of making quick, easy turns (minimal turning radius) ensuring that sweeping close to obstacles and curbs is achieved without damaging the tyres and equipment.

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

2 Operational Requirements

2.1 Specific Requirements

2.1.1. In terms of specific requirements requirement, the Supplier shall refer to the Goods Information for the following items, including but not limited to:

- Area that can be swept in an hour 450000m²
- Environmental conditions including altitude, ambient temperature, relative humidity and air pollution concerns
- The machine must have water tank and spraying nozzles for suppressing dust while sweeping.
- The machine must have an ability to manoeuvre easily
- Air con to be installed in the operator's cabin
- The sweeping boom must be able to turn up 45 to degree sweeping angle both left- and right-hand sides.
- The machine must have a water tank and spraying nozzles for suppressing dust during the sweeping activities.
- The machine must have an ability to maneuver easily.
- Air conditioner to be installed in the operator's cabin.
- Sweeper is fitted with main sweeping brush. The sweeping brush (broom) shall be of a bristle type and shall be resistant to water, fuel and oil substances.
- The travelling speed that the Sweeper must be able to obtain is at least 15 km/hr.
- Sweeper must be fitted with a magnet to the front of the machine to collect steel debris.

2.2 Ergonomics

2.2.1 Operator's Cabin

- 2.2.1.1. The driver's cabin shall be ergonomically designed to ensure that visibility, safety and comfort is not compromised. The cabin must be fitted with side and rear mirrors that are suitably positioned for maximum visibility.
- 2.2.1.2. The cabin shall be fitted with a comfortable, full suspension, fully adjustable, sprung type seat, in accordance with EN 13059, complete with arm rests and seat belt, upholstered with a good quality material, and ensuring easy reach of controls and instrumentation.
- 2.2.1.3. The machine shall be fitted with a locally supported air-conditioning system, with spares available locally. Ambient temperatures encountered may range from 0° C to +45° C dry bulb, with relative humidity varying from 15% to 100%. Accessibility to all parts of the air-conditioner, ease of maintenance and simplicity of control and operation are essential.
- 2.2.1.4. When operator's cabin door/s is left open the air-conditioner shall switch off after a predetermined time lapse. (Supplier to indicate the time period.)
- 2.2.1.5. The air-conditioner shall have a heavy duty air filter due to harsh working condition in in a bulk or multi-purpose terminal.

3 Technical Requirements

3.1 Mechanical Brooms

- 3.1.1. The heavy duty sweeping machines shall be fitted with heavy duty, low maintenance brooms.
- 3.1.2. The brooms shall be of a bristle type and shall be resistant to water, fuel and oil substances.

3.2 Chassis

- 3.2.1. The machine shall be constructed with a heavy-duty, low maintenance chassis.

3.3 Diesel Engine and Transmission

- 3.3.1. Engines shall be robust and have sufficient power for the duty required. The engine should be efficient in delivering power for the sweeping without impacting on the vehicle speed.
- 3.3.2. The engine shall be easily accessible for maintenance purposes.
- 3.3.3. An efficient three-stage dry type air cleaner (stage 1 - spinner, stage 2 - centrifugal, stage 3 - dry element) shall be fitted.
- 3.3.4. The exhaust shall be sufficiently silenced in such a manner as not to adversely affect the engine performance to any great extent and shall be reasonably positioned.
- 3.3.5. A full length stainless steel exhaust shall be fitted.
- 3.3.6. The exhaust outlet must be of the 'goose neck' type to prevent the ingress of water under any operational or non-operational conditions.
- 3.3.7. The exhaust pipe must be protected by a stainless steel heat shield if it is exposed and could cause injury to the driver or any other person.
- 3.3.8. The outlet manifold must be protected by a heat shield if exposed when the engine compartment is opened.

- 3.3.9. An efficient pressure fed engine lubrication system is required and shall incorporate an external oil filter of the full flow type, utilising elements of the replaceable cartridge type.
- 3.3.10. The cooling system shall be filled with a coolant mixture which complies with the engine manufacturer's specifications.
- 3.3.11. An engine monitor and cut-out system shall be fitted to protect the engine from overheating, low oil pressure and over revving under no load conditions.
- 3.3.12. The following functions shall be monitored: water temperature, water level and oil pressure.
- 3.3.13. The engine shall be fitted with an Electronic Management System (EMS), which shall also allow for shutting the engine down when the seat is not occupied for a predetermined time lapse. (Supplier to indicate the time period. However, facility must be available to allow Purchaser to adjust time.)
- 3.3.14. The engine shall comply with 'EUROMOT III' with regard to emission standards.

3.4 Brake system

- 3.4.1. The heavy duty sweeping machines shall be fitted with a heavy duty braking system, which is capable of stopping and holding the machine.

3.5 Tyres and rims

- 3.5.1. The machine shall be supplied with heavy duty pneumatic tyres.
- 3.5.2. Tyres manufactured in the Republic of South Africa or standard tyres which are readily available in South Africa must be supplied.
- 3.5.3. Tyres and rims must conform to the standards as laid down in ERT0 or S.A.N.S. ARP 007 and ARP 008 and shall be of an approved brand.
- 3.5.4. The wheels shall not foul or touch the chassis at maximum oscillation.
- 3.5.5. Wheel nut position indicators shall be provided for all wheel nuts.

3.6 Electrical system

- 3.6.1. All electrical lights must be capable of effective visibility and functionality in extreme operating conditions such as rain, fog and mist.
- 3.6.2. A warning horn and reverse buzzer shall be fitted, and shall be in the range of 80 - 85 decibels.
- 3.6.3. The machine shall be fitted with the following minimum lighting system:
 - 2 x headlamps
 - 2 x LED tail lights
 - 2 x LED stop lights
 - 2 x LED front and 2 x LED rear direction indicator lights
 - 2 x LED reverse lights coupled to an automatic reverse warning sound mechanism
 - An amber strobe light shall be fitted in such a manner as to not hinder the operator

3.6.4. All electric wiring must be colour coded, numbered, grommited, sleeved, trunked and securely clamped. Wire numbers to be carried through into the schematic diagrams and detailed drawings.

3.6.5. Referenced specifications for electrical:

- SABS 1376 Parts 1, 2 and 3 (Lights for motor vehicles)
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4 Painting

- 4.1 The machine shall be painted in accordance with Specification EEAM-Q-008 (Corrosion Protection).
- 4.2 4.2 The manufacturer's standard painting procedure can be used if it is equivalent or better than that called for above, and has been approved by the Supply Manager.
- 4.3 The total paint dry film thickness shall not be less than 250µm.
- 4.4 The colour scheme of the sweeper shall be as follows:
- 4.5 Red to colour specification RAL 3020
- 4.6 No other colours shall be accepted.
- 4.7 Drain holes must be provided in areas where water can accumulate.
- 4.8 The paintwork shall be covered by a ten-year corrosion guarantee.

5 Signage and markings

- 5.1 A data plate as required by the South African Road and Traffic Act shall be fitted.
- 5.2 Durable, ultraviolet resistant and weather resistant warning signs shall be provided at all locations that impose a danger.
- 5.3 Durable, ultraviolet resistant and weather resistant information signs shall be provided to assist the driver/maintenance staff with operation/maintenance.
- 5.4 A fuse diagram shall be displayed at the fuse box.
- 5.5 The Transnet Logo (white on the red background) is to be provided on each side of the machine. (Position and size to be agreed.)

6 Safety and Environment

6.1 Safety Requirements

- The machine shall comply with the South African Occupational Health and Safety Act, Act 85 of 1993/as amended.
- All surfaces where operating or maintenance personnel shall tread must be laid out with non-slip material.
- Suitable fire extinguishers shall be provided.
- Fast reacting electric e-stops for vacuum operation
- Manual safety lock to secure door in open position when cleaning or maintenance is required.

- Mechanical locking door clamps to prevent accidental door opening when travelling
- Lock-out gearbox switch mechanism to prevent accidental gearbox switch-over when driving
- Walkways with harness attachment point for where working-at-heights are required.
- Automatic PTO lockout when driving
- Automatic tank isolation valve when driving
- Detailed decals to indicate component locations
- Warning decals where necessary

6.2 Environmental Requirements

6.2.1 The heavy duty sweeping machines shall be fitted with a dust control system.

7 Maintenance

7.1 Lubrication

7.1.1 Manual lubrication

7.1.1.1 All grease points must be clearly marked by means of a yellow circle of approximately 2,5cm in diameter.

7.1.1.2 Grease points that are not easily reachable must be provided with a steel extension tube to an accessible position.

7.2 Accessibility

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

8 General

8.1 The machine and all components fitted shall be new.

8.2 All components shall be installed and fitted according to the manufacturer's recommendations.

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

8.4 The machine will only travel within the boundary of the port; however it shall comply with the requirements of The South African Road Traffic Act, where applicable.

8.5 The Heavy Duty Sweeping Machine /truck must be designed for all parts and components to be easily assembled, adjusted and removed.

8.6 A magnet shall be fitted to the front of the machine to collect steel debris prior to sweeper passing over the steel.

8.7 The machine must be supplied with detailed maintenance, operating, training and spares manuals (in English), including technical data for each spare, as well as general arrangement drawings and a bill of materials. Maintenance manuals to have sufficient information to allow terminal to capture maintenance schedules in terms of inspections, servicing and replacement

of parts. Three hardcopies and two electronic copies of the operating, maintenance, training and spare parts manuals shall be provided, as well as a training manual for each trainee.

9 Referenced Specifications

9.1 Standard specifications

The following, not necessarily comprehensive, list of standard 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 Metric channels

ISO R657 Angles

SANS 135 ISO metric bolts, screws and nuts (hexagon and square) (coarse thread, free fit series)

SANS 136 ISO metric precision hexagon-head bolts and screws, and hexagon nuts (coarse thread medium fit series)

SANS 064 Preparation of steel surfaces for coating

SANS 763 Hot-dip (galvanized) zinc coatings

SANS 1091 National colour standards for paint

SANS 1431 Weldable structural steels

SANS 1376 Parts 1, 2 & 3 Lights for motor vehicles

SABS 1327: 1981 Electrical connectors for towing and towed vehicles

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.

9.2 Employer specifications

The following Employer specifications are relevant:

EEAM-Q-004 Gearing, shafts, bearings, brakes, lubrication, vee-belts, keys and keyways

EEAM-Q-006 Structural steelwork

EEAM-Q-008 Corrosion protection

EEAM-Q-009 Quality Management