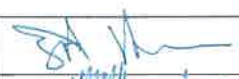
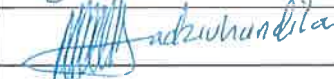





## TE-IMS-PEMM P&E KDS-SPC-353 Specification

Description: (Specification for design, installation, testing and commissioning of new Effluent Plant for Rotating Machine (RM) Business Koedoespoort)				
Compiled By:	F.A. Herselman		Date:	05/08/2022
Recommended By:	A. Madzivhandila		Date:	2022-08-05
Risk:	C. Manana		Date:	2020-08-05
Approved by:	K. Phalime		Date:	2022-08-11
Business Acknowledge:	M. Makgoba		Date:	2022-08-12
Local Business:	Rotating Machines			
Location:	Bay 7 North Koedoespoort			



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## **1. Scope of Work**

This specification requirement covers all the requirements that will be needed to inform the supplier/vendor/manufacture to carry out what is expected from him/her:

This specification states the minimum requirements relating to the work and in no way absolves the contractor from responsibility for sound engineering practice. Any omissions or sub-standard requirements of this specification must be brought to the attention of Transnet Engineering KOEDOESPOORT at tender stage and optional prices for addressing such omissions must be provided.

The contractor shall supply all the labour, tools, material, equipment, consumables, facilities, testing and supervision required for the supply of the specified equipment at site during erection, pre-commissioning and commissioning activities.

## **2. Site Inspection**

Tenderers must visit the site to familiarize themselves with all the aspects involved relating to the project that must be done. This must be arranged via the Contract Manager. The site inspection certificate will be counter-signed by the Contract Manager on day of the site visit. The tender documents must only be submitted if the site inspection certificate has been signed.

## **3. Information Required**

Tenders shall be in duplicate and will not be considered if full particulars of all relevant equipment and works requested are not submitted at the tender stage, to ensure an objective assessment of the offer can be made. Tenderers shall confirm that the items that they are offering comply at a standard not less than the minimum required requirement asked for in the specifications. Tenderers must comply with these specifications, but alternative offers may, in addition, also be submitted. Such alternative offers must be fully motivated and substantiated.

#### 4. Technical Requirements:

All equipment and installation whether detailed in this specification or not shall comply with the requirements of the Occupational Health and Safety Act 85 of 1993 as amended. Sudden power losses will not have an adverse effect on equipment and shall not unduly delay return to operation after power is restored.

#### 5. Codes of Practice, Regulations & Standards:

The tenderer shall specify which statutory or industry rules will be applied for the equipment to be working successfully and safely and shall indicate the designed life span.

#### 6. Operational Parameters:

##### 6.1 Environment:

The equipment will be required to operating in the climatic conditions of Pretoria:

#### 7. Testing:

The tenderer shall indicate the performance/s standard which the equipment will be subjected to.

#### 8. Specific Requirements:

ITEM NO.	REQUIREMENTS	DETAILS OF OFFER Comply (Yes) / Do not comply (No)
	<b>Specification for design, installation, testing and commissioning of new Effluent Plant for Rotating Machine (RM) Business Koedoespoort.</b>	
1.	<b>Scope of work:</b>	
1.1	Design of new Effluent Plant.	
1.2	Installation of newly designed Effluent Plant.	
1.3	Enclosure of newly erected Effluent Plant.	



ITEM NO.	REQUIREMENTS	<b>DETAILS OF OFFER</b> Comply (Yes) / Do not comply (No)
1.4	Supply of power for newly designed Effluent Plant.	
1.5	Supply of compressed air to Effluent Plant.	
1.6	Painting:	
1.7	Documentation.	
1.8	Testing and commissioning of newly installed Effluent Plant.	
2.	<b>Background Information:</b>	
2.1	Different components are cleaned by high pressure washers in this area. These different components are soaked and treated with chemicals before cleaning. See attached Generic specification used for purchasing chemicals. <b>(PD_COMP_NAT_SPEC_986).</b>	
2.2	It shall be required that the bidders take the existing operations, with existing oil separator that are installed in consideration when they design the newly above ground Effluent Plant.	
2.3	Bidders also must take the space that are available in consideration when designing the new Effluent Plant.	
3	<b>Design of new Effluent Plant:</b>	
3.1	It shall be required that bidders shall design a fully functional Effluent Plant for this area. Minimum of 10 000 litres of water used in a month's period. $\pm$ 500 Litres of water used per 8 hr shift.	
3.2	The existing wash area pit must be dry area. No contaminated water or any liquid shall be standing in this area. Contaminated water to be pump to treatment plant.	



ITEM NO.	REQUIREMENTS	DETAILS OF OFFER Comply (Yes) / Do not comply (No)																																						
3.3	<p>The effluent plant shall remove all oils, grease and treat any chemical from the contaminated (effluent) water to an acceptable standard as mentioned in section 35(1), notice of the City of Tshwane Metropolitan Municipality sanitation by-law, and Water Act 36 of 1998 before it shall be discharged into the sewer line.</p> <p><b>The effluent plant shall fully comply with the following minimum requirements:</b></p> <table><tr><th>Effluent Parameters</th><th>Discharge limit</th></tr><tr><td>Manganese (Mn)</td><td>20mg/l</td></tr><tr><td>Chromium (Cr)</td><td>20mg/l</td></tr><tr><td>Copper (Cu)</td><td>5mg/l</td></tr><tr><td>Nickel (Ni)</td><td>20mg/l</td></tr><tr><td>Zinc (Zn)</td><td>20mg/l</td></tr><tr><td>Iron (Fe)</td><td>20mg/l</td></tr><tr><td>Cobalt (Co)</td><td>20mg/l</td></tr><tr><td>Cadmium (Cd)</td><td>5mg/l</td></tr><tr><td>Temperature</td><td>45°C</td></tr><tr><td>Ammonia (NH3)</td><td>200mg/l</td></tr><tr><td>Chlorine(Cl)</td><td>500mg/l</td></tr><tr><td>Chemical Oxygen Demand (COD)</td><td>5000mg/l</td></tr><tr><td>Electrical Conductivity (cond)</td><td>5000mg/l</td></tr><tr><td>Oil &amp; Grease (OG)</td><td>50mg/l</td></tr><tr><td>pH</td><td>6-10</td></tr><tr><td>Phosphate (PO4)</td><td>50mg/l</td></tr><tr><td>Sulphate (SO4)</td><td>1800mg/l</td></tr><tr><td>Total Suspended Solids (TSS)</td><td>1000mg/l</td></tr></table>	Effluent Parameters	Discharge limit	Manganese (Mn)	20mg/l	Chromium (Cr)	20mg/l	Copper (Cu)	5mg/l	Nickel (Ni)	20mg/l	Zinc (Zn)	20mg/l	Iron (Fe)	20mg/l	Cobalt (Co)	20mg/l	Cadmium (Cd)	5mg/l	Temperature	45°C	Ammonia (NH3)	200mg/l	Chlorine(Cl)	500mg/l	Chemical Oxygen Demand (COD)	5000mg/l	Electrical Conductivity (cond)	5000mg/l	Oil & Grease (OG)	50mg/l	pH	6-10	Phosphate (PO4)	50mg/l	Sulphate (SO4)	1800mg/l	Total Suspended Solids (TSS)	1000mg/l	
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3.4	The design of the new effluent plant shall indicate fully the different cleaning process and equipment used to achieve the above-mentioned end results.																																							
3.5	All pipes shall be painted according to the colour code chart and fitted with flow direction arrows.																																							



ITEM NO.	REQUIREMENTS	<b>DETAILS OF OFFER</b> Comply (Yes) / Do not comply (No)
3.6	All foundations shall be fully designed by ECSA registered civil engineer and full details regarding excavations size and depth, compaction required and concrete strength of foundations for installed equipment. Foundation shall fully comply with SANS 10400-H and earth works shall comply with SANS 2001-BE1.	
3.7	All pits (treatment areas) shall be properly sealed to ensure no contamination seepage shall occur.	
3.8	All structure above ground shall be designed by ECSA registered civil structural engineer.	
3.9	All structures erected above ground level shall be design with proper access and full design calculations shall be included regarding the structural forces when plant is in operation. (Walkways, ladders etc.)	
3.10	All material used for the manufacturing/building of the newly designed effluent plant shall be resistant to the contaminated water.	
3.11	Grey water outlet shall be fitted with a new water meter to determine the quantities of water disposed to the sewer line.	
4.	<b>Fencing:</b>	
4.1	Suppliers shall be responsible to enclose the newly erected effluent plant with clear-view fence to a height of 1800mm.	
4.2	Entrance gates to enclosed area shall be fitted for maintenance personnel, environmental persons for sample testing and persons that shall be responsible to remove the contaminated extracted oils and chemicals (Sludge from treatment plant).	



ITEM NO.	REQUIREMENTS	<b>DETAILS OF OFFER</b> Comply (Yes) / Do not comply (No)
4.3	Supply and install “no unauthorised access signage” at entrance gate.	
4.4	Gates shall be fitted with locking device and lock with three sets of keys. Keys to be handed over to local business.	
5.	<b>Electrical installation:</b>	
5.1	Transnet shall identify the point of supply for the electrification of the new effluent plant.	
5.2	Suppliers shall be responsible for the electrical installation for the effluent plant.	
5.3	Electrical Installation shall fully comply with latest SANS 10142 as amended.	
5.4	Suppliers shall be responsible for all circuit breakers, overload protection, distribution boards and electrical cabling for the installation.	
5.5	All electrical cabling shall be Steel wired armoured cable fitted with glands, shrouds and gland rings on both ends.	
5.6	All single-phase cables shall be 3 core cables.	
5.7	All three phase cables shall be 4 core cables with a separate isolated earth conductor.	
5.8	All cables shall be installed on cable ladders suitable for the cable weight and number of cables.	
5.9	All electrical cables and wiring shall be labelled with O-ring cable numbers.	
5.10	All electrical equipment in any distribution board or control cabinet shall be labelled.	





ITEM NO.	REQUIREMENTS	<b>DETAILS OF OFFER</b> Comply (Yes) / Do not comply (No)
5.11	Lockable isolator shall be installed before any electrical motor. Isolator shall be selected according to motor size.	
5.12	Full electrical drawings indicating cable sizes, lengths shall be submitted. Calculations with regards to SANS 10142 shall be used to determine cable selection and sizing and shall be submitted.	
5.13	Electrical COC shall be submitted for electrical installation.	
6.	<b>Compressed Air:</b>	
6.1	There is compressed air available in the area ranging from 600kPA -720kPA.	
6.2	Installers shall be responsible for tapping into the existing airline after stop valve if they required any air point for the newly erected effluent plant.	
6.3	Airline shall be painted according to colour charts.	
6.4	All necessary air shut off valves shall be supplied.	
7.	<b>Documentation:</b>	
7.1	<b>The following documentation is required at tender stage from bidders:</b>	
7.1.1	Detailed project plan with all activities and time frames.	
7.1.2	Electrical contractor's registration with Department of Labour as Installation electrician.	
7.1.3	Electrical contractor's accredited person's installation electrician registration. (Wiremen's licence).	
7.1.4	Chemical engineer qualification and registration with ECSA.	
7.1.5	Civil engineer qualification and registration with ECSA.	



ITEM NO.	REQUIREMENTS	<b>DETAILS OF OFFER</b> Comply (Yes) / Do not comply (No)
7.2	<b>The following documentation shall be submitted by winning bidder before any installation starts:</b>	
7.2.1	Detailed design drawings regarding the new effluent plant. This shall include all equipment used and plant layout, water flow support structures, process flow diagram, process and instrumentation diagram, block process diagram etc.	
7.2.2	Detailed design drawings of the foundation requirements for pits and effluent plant.	
7.2.3	The total amperage drawn by the newly effluent plant.	
7.2.4	The electrical design and calculations to determine the supply cable size.	
7.2.5	All the above documents shall be handed over to the Transnet Engineering Koedoespoort for counter signature before commencing with the installation. This shall in no way absolve the contractor from professional responsibility.	
7.3	<b>The following shall be supplied on the day of commissioning:</b>	
7.3.1	<b>4 sets off hard copies each with a disc containing documentation in PDF Format.</b>	
7.3.1.1	Operating Manual.	
7.3.1.2	Maintenance Manual.	
7.3.1.3	Electrical Schematics.	
7.3.1.4	Mechanical Drawings.	
7.3.1.5	Parts List.	
7.3.1.6	Hard Copy of PLC Program.	
7.3.1.7	Hard copy of Parameters of all systems including PLC, CNC and Drives.	



ITEM NO.	REQUIREMENTS	<b>DETAILS OF OFFER</b> Comply (Yes) / Do not comply (No)
7.3.1.8	Setup guides for Software on Computer.	
7.3.1.9	Passwords for all software.	
7.3.1.10	Backup of PLC Program.	
7.3.1.11	Backup Image for Computer.	
7.3.1.12	Install files for software on Computer.	
7.3.2	All documents required in 7.2.1 to 7.2.5.	
7.3.3	All counter signed design drawings and calculations as requested in 7.2.1 to 7.2.5.	
7.3.4	Certificate of Compliance (COC) for electrical installation.	
7.3.5	Calibration certificates for all instruments used for the issue of Electrical COC and used during final commissioning.	
7.4.6	Grey water test results to confirm water quality that will be disposed of in sewer line is compliant.	
8.	<b>Training.</b>	
8.1	The supplier shall conduct a hand-over and familiarization training when delivering the equipment and shall indicate the period required.	
8.2	The supplier shall offer formal training to Operators and maintenance artisans according to the training manuals of the equipment supplied. (2 x Operators and 4 x Maintenance personnel.)	
9.	<b>Maintenance</b>	
9.1	The supplier shall indicate the maintenance requirements and frequency of the equipment.	



ITEM NO.	REQUIREMENTS	<b>DETAILS OF OFFER</b> Comply (Yes) / Do not comply (No)
9.2	Maintenance/servicing of the equipment during guarantee period shall be included in the price.	
10.	<b>Guarantee:</b>	
10.1	The supplier shall guarantee for a period 12 months after successful commissioning of the newly installed Effluent Plant that all components, plant equipment and material are new and fit for the specific purpose which they are purchased, and free from any defects in design, workmanship and material, and are in strict accordance with the contract, unless otherwise agree in writing.	
10.2	The supplier shall agree to replace at his/her cost any defective items discovered within the guaranteed period.	
10.3	The supplier shall clearly stipulate the nature of the guarantee and how long it will take their maintenance staff to be on site. Transnet Engineering requires a response time of no more than 24 hours. (Technicians to be on site).	
10.4	Should the supplier fail, when called upon, to make good or remedy a defect (under guarantee or declared inherent) within a reasonable time, Transnet Engineering may affect the repair and thereafter recover from the supplier all cost and expenses associated with the supplier.	
11.	<b>General:</b>	
11.1	All material used shall be SANS approved, A-grade first class.	
11.2	All work delivered shall be of a high standard.	
11.3	All rubble shall be removed on a daily base.	
12.	<b>General Safety:</b>	
12.1	The correct PPE must always be worn. (Safety shoes, hardhat, Harnesses ropes, etc.)	



ITEM NO.	REQUIREMENTS	<b>DETAILS OF OFFER</b> Comply (Yes) / Do not comply (No)
12.2	People working on heights shall be certified. Certification shall be required.	
12.3	All scaffolding and lifting tackle shall be certified and SANS approved.	
12.4	The service provider is required to produce a Safety, Health and Environmental (SHE) File before any contractor shall be allowed to perform any work on Transnet Premises. These files shall be approved by the safety office of Transnet Engineering.	
13.	<b>Price Schedule:</b>	
13.1	Bidders to give a full price breakdown for the individual areas identifying all equipment that shall be supplied and work that they will perform.	
14.	<b>Handover and Commissioning:</b>	
14.1	The tenderer shall indicate the performance/s standard which the equipment will be subjected to.	
14.2	Commissioning and testing of the newly installed Effluent Plant shall be done by the service provider and a commissioning certificate shall be issued and be accepted by Transnet Engineering.	
14.3	The service provider shall be fully responsible for any damage caused to all supplied equipment and to Transnet Engineering's assets during the installation, testing and commissioning. The service provider shall conduct a risk assessment as to identify anything that might hinder the installation of effluent plant. Bidders are regarded as subject matter expert and assume full responsibility of the whole design and installation.	



ITEM NO.	REQUIREMENTS	<b>DETAILS OF OFFER</b> Comply (Yes) / Do not comply (No)
14.4	As this project is “Turn-Key” the successful tenderer is responsible for the design, installation, testing and commissioning of the effluent plant. The complete project team, local business, risk Department and PEMM responsible persons will participate in final commissioning.	

## Additional Information from end user:

Wastewater characterization.

The effluent generated from the RM KDS wash bay area is a chemically emulsified stream that is made up of the following constituents as a result of the washing of components process:

- ✓ Water
- ✓ Heavy and light oils and grease from the lubricants used
- ✓ Dirt and soils collected during the component operational life
- ✓ Cleaning chemical used to wash the components
- ✓ Biological organisms from the biological activities that take place in the wash pit.

Parameter	Value	Unit
Temperature	25	°C
pH	7.1	-
The density of effluent stream	990	kg/m <sup>3</sup>
Total suspended solids (TSS)	990	ppm
Chemical oxygen demand (COD)	24 500	ppm
Oil and grease	1600	ppm

### Characterising oil in a stream

Oil is characterised according to droplet size. See below for oil classification according to oil droplet size, oil droplet size can be classified as either soluble, emulsified, dispersed or free oil. Free oil and grease are generally greater than 150 microns. Dispersed oil or mechanically emulsified oil droplets are between 20 and 150 microns in size. Chemically emulsified oils have a droplet size of less than 20 microns and soluble oils, or dissolved oils are less than 5 microns in size.





Monthly Quality Analytical Results																						
Determinator	Temp	NH <sub>3</sub>	Cl	COD	Cond	FC	OG	pH	PO <sub>4</sub>	SO <sub>4</sub>	TSS	Al	Cd	Co	Cr	Cu	Fe	Pb	Mn	Ni	Zn	Overall Compliance
By Laws	40	200	1000	5000	500		50	5.50	20	1800	2000	20	20	20	20	20	20	20	20	10	20	
Sample Date																						
03-May-18	22	8.3	156	14730	300		1500	8.7	45.6	893	375	6.08	0.03	0.09	-	-	27.99	0.94	3.16	0.15	2.39	83%
26-Jun-18	23	52.6	-	23770	289		656	9.3	44.6	-	684	2.12	0.07	0.09	0.19	6.32	38.82	1.32	1.64	0.3	3.09	83%
26-Jul-18	24	47.4	267	15830	206		387	9.4	21.1	966	395	6.13	0.09	4.7	0.16	16.17	27.52	2.01	3.66	0.19	9.93	83%
28-Aug-18	23	167.2	262	9610	301		134	6	6.4	1250	690	2.85	0.04	5.57	0.17	4.54	94.68	1.36	4.56	0.27	8.69	80%
26-Sep-18	25	66.2	141	16850	195		1161	8.6	5.2	914	365	4.55	0.06	2.22	0.19	19.35	31.51	1.49	1.8	0.17	5.98	80%
11-Oct-18	26	121	419	2030	276		1554	6.1	18	2059	70	6.66	0.02	10.8	0.28	6.59	150.22	0.88	2.34	0.29	3.28	85%
29-Nov-18	25	53.1	162	20600	224		820	9.6	6.4	821	982	1.76	0.16	12.33	0.27	16.38	31.97	1.84	2.18	0.33	8.75	82%
04-Dec-18	23	9.2	16	37	28		10	7.8	9.2	12	12	-0.05	-0.02	-0.02	-0.01	-0.03	0.22	-0.04	-0.08	-0.02	-0.07	100%
29-Jan-19	24	192.6	261	11830	259		624	6.1	55.2	244	347	2.06	-0.20	1.31	-0.20	12.05	62.97	0.89	2.09	0.27	5.39	90%
26-Feb-19	25	112.4	195	6250	178		195	5.8	4.8	368	157	2.4	-0.20	0.49	-0.20	-	29.92	0.45	1.68	0.08	1.09	80%
29-Mar-19	23	93.4	80	6970	178		360	6	0.8	356	168	3.72	-0.20	0.34	-0.20	8.9	42.37	0.53	2.13	0.11	2.48	85%
29-Apr-19	23	188.2	144	8240	270		65	5.3	1.3	544	174	2.62	-0.20	0.44	-0.20	6.18	97.65	0.35	4.28	0.13	5.62	80%

1. Discussion of results