TRANSNET ENGINEERING

LOW SULFUR FURNACE FUEL OIL SPECIFICATION

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Revision – 0.7

SUMMARY OF REVISION

First issue – 2 July 2019. Document No. PD_COMP_NAT_SPEC_938

The following revisions have been made in this version:

Change	Description
Section 3	Clause 3.3 Edited to indicate importance of completing Table 2 and Appendix B.
Section 4	Table 2 includes acid content. Table 2 moisture requirement range defined.
Section 6	Clause 6.3 added: Covers application and existing system Requirements.
Section 8	Clause 8.1 expanded to include Table 2, Appendix A and B as returnable documents for technical evaluation.
Section 3	Mandatory requirements added and clarified. COA and Petroleum wholesaler's license required by supplier on application. Category D Professional Driving Permit and vehicle permits also added as a mandatory requirement.

Document Control

Distribution List Distribute to Configuration Offices at the following centers" "Configuration Offices to discuss with the Business Manager, Quality personnel, Lean personnel in the following businesses to distribute the document to all relevant personnel "	All businesses
Document Availability	SAP Docman
Related Policy Documents	
Supporting Procedure	

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1.0 SCOPE

1.1 The scope of this specification is to outline all requirements of the low sulphur heating oil to be used in the Transnet Engineering furnaces as a furnace fuel oil. This includes all technical, quality, safety, and environmental requirements.

1.2 In addition, this specification will also cover the relevant standards to guide the bidder to provide Transnet Engineering with the correct product that meets all requirements as specified.

2.0 RELEVANT STANDARDS

2.1 The following documents contain provisions that, through reference in the text constitute requirements of this specification. All standard and specifications are subject to revision, and parties to agreement based on this specification are encouraged to investigate the application of the latest additions of the documents listed below in Table 1:

Table 1: Relevant standards

Document	Document description
ASTM D396-19	Standard specification for fuel oils.
ASTM D445-18	Standard test method for kinematic viscosity of transparent and opaque liquids.
ASTM D664-18e2	Standard test method for acid number of petroleum products by potentiometric titration.
ASTM D874-13a	Standard test method for sulfated ash from lubricating oils and additives.
ASTM D482-13	Standard test method for ash from petroleum products.
ASTM D 974 – 14e2	Standard test method for acid and base number by colour indicator titration.

ASTM D 2270 – 10	Standard practice for calculating viscosity at 40°C and 100°C.
ASTM D 4951- 14	Standard test method for determination of additive element in lubrication oils by inductively coupled plasma atomic emission spectrometry.
ASTM D2709-16	Standard test method for the determination of the volumes of free water and sediments that is suspended in the bulk of the fuel.
ASTM D86-18	Standard test method for distillation of petroleum products and liquid fuels at atmospheric pressure.
ASTM D4294	Standard test method for sulfur in petroleum products by energy-dispersive X-Ray fluorescence spectroscopy.
ASTM D2622	Standard test method for sulfur in petroleum products by wavelength dispersive X-ray fluorescence spectrometry
ISO 8217	Specifies seven categories of distillate fuels.

3.0 GENERAL TENDERING REQUIREMENTS

3.1 It is in tenderers interest to ensure that they read and fully understand the scope including requirements stipulated in this specification.

3.2 The tenderer must provide the information required in Appendix A of this specification. This must be supported by technical documentation.

3.3 The tenderer must specifically and separately acknowledge and indicate compliance with each and every clause and sub-clause of this specification. The tenderer shall fully complete Table 2 and Appendix B (Compliance form) in this specification. The tenderer must indicate whether they comply with each requirement in Table and in Appendix with a '**yes**' or '**no**'. A comment column has also been added should the tenderer require to raise a point on that particular requirement. *In an instance where the tenderer has indicated **'no'**, the tenderer must provide evidence and reasons (This must be supported by documentation e.g*

laboratory tests, a conducted study, a formal letter) to Transnet Engineering why they deviating from a particular requirement in Table 2 and Appendix B. ***Failure to fully complete Table 2 and Appendix B will result in an automatic disqualification during the technical evaluation. This includes failure to provide supporting evidence where the tenderer has indicated 'no'.***

3.4 It is a mandatory requirement that the tenderer supplies a COA for the product required from a SANAS approved laboratory on their application, as evidence that the required fuel quality is achievable by the supplier. Failure to comply will lead to disqualification.

3.5 The supplier should ensure that they have a valid Petroleum Retail License OR a valid Petroleum Wholesaler's License, as required by the Department of Mineral Resources and Energy and NERSA, and evidence should be provided by the supplier in the application. Failure to comply will result in disqualification.

3.6 The supplier should ensure that they are permitted to transport the fuel and should show proof of a valid *Category D Professional Driving Permit*. Furthermore, they shall also provide proof of a valid *Annual Licence and Roadworthy Certificate*, a valid *Hazardous Substance Transport Permit,* and a valid *Operator Card – D*. These documents are needed to ensure the vehicle used for transportation is compliant for transport of petroleum. Failure to comply will result in disqualification.

3.7 Deviations from this specification shall not be accepted without written consent from Transnet Engineering, Product Development.

3.8 Any innovations which deviate from this specification but will, however, benefit Transnet Engineering will be considered provided that the tenderer clearly communicates such deviations beforehand. All deviations will have to be approved by Transnet Engineering, Product Development.

4.0 TECHNICAL REQUIREMENTS

4.1 The proposed furnace fuel oil must be formulated from high quality performance

component base stock oils which is the same or better in performance compared to the current furnace fuel oil.

4.2 The proposed furnace fuel oil shall not contain water, acid, dust particles or other substances considered as contaminants that may negatively affect the properties of the furnace fuel oil, resulting in poor functionality and performance of the furnace.

4.3 The proposed furnace fuel oil shall not contain any polychlorinated biphenyl (PCB's). Technical data sheets clearly listing chemical and physical properties of the furnace fuel oil must be submitted. The technical data sheet shall reveal the specific base stock elements and additives.

4.4 Transnet Engineering is committed to protect the environment through reduction the harmful emissions such as sulfur emissions. Therefore, the proposed furnace fuel oil must be a very low sulphur fuel oil. The sulfur content must be stated in Appendix A, Table A.2 and on the certificate of analysis (COA) clearly.

4.5 The purity of the oil is very important and has a significant role in its performance and environmental factors. Therefore, the ISO cleanliness (as per ISO 4406:2017) information of the proposed furnace fuel oil shall be submitted and stated.

4.6 The proposed furnace fuel oil must provide good clean burning and maximum heat as required. It may contain corrosion inhibitors or combustion enhancing additives provided there are no negative effect on performance and storage.

4.7 Table 2 of this specification states the typical properties that the proposed furnace fuel oil should demonstrate and satisfy. The tenderer must complete Table 2 and provide evidence. *(Refer to clause 3.3)*

4.8 Viscosity and energy content are very important characteristics in the furnace fuel oil and has a significant role in its performance. Therefore, the tenderer must take note of these characteristics when formulating the furnace fuel oil.

4.9 If the proposed furnace fuel oil is formulated of cyclic compounds rather than

aromatics, it will be at an advantage. However, the formulated product must meet the same laboratory tests as in this specification.

4.10 The tenderer shall submit technical data sheets (TDS) of the proposed furnace fuel oil accompanied by test certificates results. The approved quality standards should be followed accordingly.

4.11 The tenderer must take note of the information in Section 2 of this specification, which outlines relevant standards that the bidder must comply with during testing of the furnace fuel oil, to ensure the quality of the product and technical requirements.

4.12 The tenderer must provide product qualification certificates and trace element information as outlined in Appendix A and populate and sign the tables in Appendix A with the required information as specified:

- Product qualification certificate: Base oil blend information in Table A.1
- Product qualification certificate: Blending oil control limit in Table A.2.
- Trace elements content: Table A.3.

Table 2: Furnace fuel oil specifications

PROPERTY	UNITS	REQUIREMENT	COMPLY (YES/NO)	COMMENT
Density @ 20°C	Kg/L	0.780 - 0.800		
Viscosity @ 40°C	mm^2/s	1.8 – 2.5		
Gross energy content	MJ/kg	46.70 – 50.75		
Gross energy content	MJ/L	39.10 – 41.5		
Moisture	% (m/m)	0.001 – 1		
Sulfur	ppm	≤ 100		
Ash content	% (m/m)	Nil		
Flash point(min)	°C	43-49		

Pour point	°C	-10 to -26		
Boiling point	°C	>150		
Atomising temperature	°C	Ambient		
Aromatic content	% v/v	≤25.0		
Colour		Water white/ amber/ clear		
Acid	%(m/m)	0		

5.0 QUALITY, SAFETY AND ENVIRONMENTAL REQUIREMENTS

5.1 Transnet Engineering is ISO 9001: 2015 accredited, therefore the bidder shall have a quality management system in place to ensure that the performed work and delivered product and service are in good quality and meets Transnet Engineering requirements.

5.2 The bidder must submit a certificate of analysis (COA) or test results of the proposed furnace fuel oil, tested by a South African National Accreditation System (SANAS) accredited laboratory or a relevant certified body. And all test parameters and standards shall be adhered to.

5.3 The bidder must submit safety data sheets (SDS) of the proposed furnace fuel oil, indicating clearly all precautionary and safety measures.

5.4 The bidder must submit technical data sheets (TDS) of the proposed furnace fuel oil, stating all physical and chemical properties of the furnace oil. Failure of the product to meet the required physical and chemical properties will be considered as noncompliance and shall constitute to grounds for rejection.

5.5 The proposed furnace fuel oil must not release harmful, toxic fumes which may negatively impact on the environment and human life. The tenderer must advise Transnet Engineering of any special requirements necessary during the introduction of the proposed furnace fuel oil. Any possible impact on the people and the

environment during the furnace fuel oil life cycle must be clearly stated and communicated.

5.6 Transnet Engineering may check the incoming batch supplied to ensure compliance to the specification and for quality control purposes.

5.7 All requirements of Occupational Health and Safety Act (Act 85 of 1993 as amended), and its regulations should be adhered to during manufacturing, transportation and storage of the product. The bidder must submit a detailed procedure stating storage, delivery, handling and safety procedure of the proposed furnace fuel oil.

5.8 Transnet Engineering businesses are obliged by environmental legislation and best environmental requirements (extended producer responsibility principle) to which subscribes to prevent pollution, and also reduce the amount of waste going to landfill site. The successful bidder must be in position to receive/take back the empty waste chemical containers from Transnet Engineering to reuse and recycle.

5.9 No change in the formulation of the approved furnace fuel oil including base stock source, additives, concentration, composition, and physical properties without prior engagement and communication with Transnet Engineering shall be done. Any deviations shall be communicated in writing within a reasonable duration to Transnet Engineering and an agreement contract shall be drawn by all parties. Failure to do such, constitute grounds for Transnet Engineering to reject the product and take legal action.

5.10 Transnet Engineering requires that each batch of furnace fuel oil blended be tested and recorded on a batch control certificate. Each batch delivered must be accompanied by a batch certificate. No batch will be accepted without a batch control certificate.

5.11 Transnet Engineering reserves the right to test compatibility. Therefore, the bidder is expected to keep laboratory certificate of analysis records for a period of five (5) year for traceability and quality purpose.

5.12 The proposed furnace fuel oil must have clear marking and packaged in a safe container as per product properties and make. In addition, the agreed quantities and delivery capacity must be adhered to.

6.0 APPLICATION AND EXISTING SYSTEM

6.1 The furnace fuel oil is primarily used at the furnaces for the generation of heat for Transnet Engineering operations.

6.2 It is important to note that, viscosity influences the degree of pre-heat required for handling, and satisfactory atomisation. High viscosity oil may become difficult to pump, burner may be hard to light and operation may be erratic. Poor atomisation may result in the carbon deposits on the burner tips or on the walls.

6.3 The successful tenderer will be required to physically come to Transnet Engineering facilities where the furnace fuel oil will be used to learn and understand the internal offloading system, during this visit the tenderer must also take measurements of the coupling system (this includes dimensions). This is to ensure that there are no challenges during the delivery and that there is compatibility to Transnet Engineering infrastructure and the awarded tenderer. The detail visit will be arranged by Transnet Engineering team before an official award is made.

7.0 GUARANTEE AND WARRANTEE

7.1 The proposed furnace fuel oil must have at least a minimum shelf life of 12 months from the date of delivery. The date at which the product was manufactured should be visible and stated.

7.2 Batch control certificate shall be provided for every batch delivered to Transnet Engineering. Transnet Engineering shall not accept any batch delivered without a batch certificate.

8.0 DOCUMENTATIONS

8.1 The following documents of the proposed furnace fuel oil must be submitted during tendering stage and will be used during technical evaluation stage. Failure to submit

the requested outline the documentation will disadvantage the tenderer during technical evaluation scoring stage:

- Proof of valid Petroleum Retail License OR Petroleum Wholesaler's Licence
- Safety data sheet.
- Technical data sheet.
- Certificate of analysis.
- Copy of batch certificate
- Shelf life proof.
- A quality management system.
- A detailed storage, transportation, handling system/ procedure.
- A completed Table 2 of this specification
- A completed Appendix A of this specification/ product qualification certificate and trace element
- A completed Appendix B of this specification.

APPENDIX A: PRODUCT QUALIFICATION CERTIFICATE AND TRACE ELEMENTS

Product name: ……Manufactured by: ……..

Table A.1: Furnace fuel oil: Base oil information

PROPERTY	UNITS	MIN	MAX	TYPICAL	TEST METHOD ASTM IP AND STANDARD
Viscosity @ -10°C	cSt				D5293
Viscosity @ 40°C	cSt				D445 IP71 ISO 3104
Flash point	°C				D445 IP71
ISO Cleanliness level					ISO 4406:2017

Signature: ……. Date: …….

Table A.2: Oil blending control limits

PROPERTY	UNITS	MIN	MAX	TYPICAL	TEST METHOD ASTM, IP, ISO
Density @ 20°C	kg/m^3				D1298
Viscosity @ 40°C	cSt				D445, IP71, ISO 3104
Viscosity @ 10°C	cSt				D5293
Pour point	°C				D97, IP15, ISO 3016
Flash point	°C				D93, IP36, ISO 2592
Sulfated ash	%m/m				D874, IP163
Total acid no.	Mg KOH/g				D974, IP139
Ash content	% m/m				D482
Water and sediments content					D2709
Sulfur content	ppm				D4294, D2622
Magnesium content	ppm				

Calcium content	ppm				
ISO cleanliness level					

Signature: …… Date: ……

Table A.3: Trace element and test method used

ELEMENT	UNITS	MIN	MAX	TYPICAL	TEST METHO ASTM IP ISO
Iron	ppm				#
Copper	ppm				#
Lead	ppm				#
Aluminium	ppm				#
Chromium	ppm				#
Silicon	ppm				#
Tin	ppm				#
Silver	ppm				#
Sodium	ppm				#
Zinc	ppm				#
Molybdenum	ppm				#
Chlorine	ppm				#

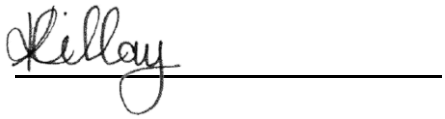
Signature: …… Date: ……

APPENDIX B: COMPLIANCE FORM *(Clause by clause refer to clause 3.3)*

No.	Heading/ Sub-section	Comply		Comment	Signature
		Yes	No		
1.0	**SCOPE**				
1.1					
1.2					
2.0	**RELEVANT STANDARDS**				
2.1					
3.0	**GENERAL TENDER REQUIREMENTS**				
3.1					
3.2					
3.3					
3.4					
3.5					
3.6					
3.7					
3.8					
4.0	**TECHNICAL REQUIREMENTS**				
4.1					
4.2					
4.3					
4.4					
4.5					
4.6					
4.7					
4.8					
4.9					
4.10					
4.11					
4.12					

5.0	**QUALITY,SAFETY, AND ENVIRONMENT REQUIREMENTS**				
5.1					
5.2					
5.3					
5.4					
5.5					
5.6					
5.7					
5.8					
5.9					
5.10					
5.11					
5.12					
6.0	**RELEVANT STANDARDS**				
6.1					
6.2					
6.3					
7.0	**GUARANTEE AND WARRANTEE**				
7.1					
7.2					
8.0	**DOCUMENTATIONS**				
8.1					

DOCUMENT AUTHORITIES

COMPILER	**Keshini Pillay**
DESIGNATION	**Engineer**
SIGNATURE	
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