

Request for Quotation

Doc. No	FIN-SCM-RFQ-xxx
Revision	3
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RFQ Number	NLM-QUO-24/057
Request for Quotation Date	09 October 2024
RFQ Closing Date	06 November 2024
RFQ Closing Time	17:00
Compulsory Site Briefing	Not compulsory but if more information required can be arranged
Contact Person	Catherine Matima
Quotation Validity	90 Days from the closing date
Submission Details	RFQ Response must be sent to: catherine.matima@necsa.co.za
RFQ Description	To design, manufacture and supply plate heat exchangers for the PTFE filter destruction project that conforms to all of the specifications in ENS-FDP-SPE-24005

Dear Service Provider

Kindly provide a quotation for goods and or services as outlined in section 2 of this document.

1. Introduction

The South African Nuclear Energy Corporation Limited (Necsa) is a state-owned public company (SOC), registered in terms of the Companies Act, (Act No. 61 of 1973), registration number 2000/003735/06.

The Necsa Group engages in commercial business mainly through its wholly-owned commercial subsidiaries: NTP Radioisotopes SOC Ltd (NTP), which is responsible for a range of radiation-based products and services for healthcare, life sciences and industry, and Pelchem SOC Ltd (Pelchem), which supplies fluorine and fluorine-based products. Both subsidiaries, together with their subsidiaries, supply local and global markets, earning valuable foreign exchange for South Africa and are among the best in their field in their respective world markets.

Necsa's safety, health, environment and quality policies provides for top management commitment to compliance with regulatory requirements of ISO 14001, OHSAS 18001 and RD 0034 (Quality and Safety Management Requirements for Nuclear Installations), ISO 9001 and ISO 17025.

Necsa promotes the science, technology and engineering expertise of South Africa and improves the public understanding of these through regular communications at various forums and outreach programmes to the community. We are a proudly South African company

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continuously striving, and succeeding in many respects, to be at the edge of science, technology and engineering related to the safe use of nuclear knowledge to improve our world.

For more information on Necsa, please visit: WWW.Necsa.co.za

2. Scope of Work

Item Description	Quantity
To design, manufacture and supply plate heat exchangers for the PTFE filter destruction project as per the specification document	3

3. Attachments

Ref #	DOCUMENT NAME	DESCRIPTION
01	ENS-FDP-SPE-24005	Purchase Specification for the Plate Heat Exchangers in the PTFE Filter Destruction System
02	ENS-FDP-SPE-24006	Specification Sheet for Plate Heat Exchanger H83125 in the PTFE Filter Destruction System
03	ENS-FDP-SPE-24003	Specification Sheet for Plate Heat Exchanger H83163 in the PTFE Filter Destruction System
04	ENS-FDP-SPE-24004	Specification Sheet for Plate Heat Exchanger H83236 in the PTFE Filter Destruction System
05	ENS-FDP-PID-24003	P&ID Diagram: KOH Scrubber System 831
06	ENS-FDP-PID-24004	P&ID Diagram: Cooling Water System 832

3. Pricing

- All price quoted to include all applicable taxes.
- Price must be fixed and firm
- Price should include additional cost elements such as freight, insurance until acceptance, duty where applicable, disbursements etc.
- Quotation must be completed in full, incomplete quote could result in a quote being disqualified.
- Payment will be according to Necsa's General Conditions of Purchase.

4. Evaluation

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4.1. **Phase 1- Functionality Evaluation / Technical Evaluation**

Where functional or technical evaluation criterion is applicable, assessment will be performed in terms of the criterion listed below and the criterion may include Technical, Performance, Quality and Risk.

If the Bidder's response to the Technical templates does not indicate that the Bidder can support an acceptable technical solution, the Bidder's response will be rejected and not evaluated further.

Together the Technical, Performance & Quality and Risk criteria make up the functionality criterion and a Bidder's Proposal will be evaluated for functionality out of a possible 100 points. Only RFQ responses achieving an evaluation score of greater than the set threshold points out of the possible 100 points and which score a number of points for functionality that is greater than or equal to the set threshold points of the number of points achieved by the highest scoring Bid for functionality will be selected to progress to the second stage.

The quotations will be evaluated according to the following selection criteria (based on information requested above):

Item	Requirement	Weight	Points	Criteria
1	Company Experience Relevant company (or JV/Sub-contractor) experience in design and manufacture of Plate Heat Exchangers. Completed projects – list of past projects (client details, project value, duration of the project, etc.) Traceable reference letter from clients that the supplier have completed the projects for 1. Company letter head 2. Contact details of the company 3. Purchase order amount Nature of the service rendered by the supplier.	70	70	More than 10 projects completed and reference letters from companies for which the supplier has designed and manufactured Plate Heat Exchangers.
			60	Seven to Nine projects completed and reference letters from companies for which the supplier has designed and manufactured Plate Heat Exchangers.
			50	Five to Six projects completed and reference letters from companies for which the supplier has designed and manufactured Plate Heat Exchangers.
2	ISO 9001: 2015 (or latest) accredited Must provide evidence (ISO 9001 certificate)	30	30	ISO 9001 accreditation

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Item	Requirement	Weight	Points	Criteria
Total		100		

4.2. **Phase 2 - Evaluation In Terms Of Preferential Procurement Policy Framework Act, 2022**

This bid will be evaluated and adjudicated according to the 80/20 point system, in terms of which a maximum of 80 points will be awarded for price and 20 points will be allocated based on the specific goals (B-BBEE status level).

	POINTS
PRICE	80
SPECIFIC GOALS (B-BBEE status level)	20
Total points for Price and SPECIFIC GOALS	100

Preference goal

B-BBEE status level contributor

B-BBEE Status Level of Contributor	Number of points (80/20 system)
1	20
2	18
3	14
4	12
5	8
6	6
7	4
8	2
Non-compliant contributor	0

5. Required Documentation

- **Tax Clearance Certificate (Tax pin issued by SARS)**
- **Declaration of interest (SBD 4)**
- **BEE Certificate / Applicable Affidavit if classified as EME**
- **Letter of Good Standing (COID ME 2)**

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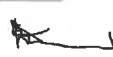
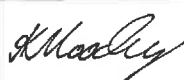
- Any other document or certification that might have been requested on this RFQ

6. Important

- 6.1. Quotation must be submitted on or before the RFQ closing date and time stated above.
- 6.2. Orders above R 30 000 will be evaluated according to the PPPFA 80/20-point system and a functionality scorecard where applicable and the ones above R 1 Million will be subjected to the tender process.
- 6.3. This RFQ is subjected to the Necsa's General Conditions of Purchase, Preferential Procurement Policy Framework Act 2000 and the Preferential Procurement Regulations, 2022, the General Conditions of Contract (GCC) and, if applicable, any other legislation or special conditions of contract
- 6.4. Failure on the part of a bidder to submit proof of B-BBEE Status level of contributor together with the bid, will be interpreted to mean that preference points for specific goals are not claimed.
- 6.5. The purchaser reserves the right to require of a bidder, either before a bid is adjudicated or at any time subsequently, to substantiate any claim in regard to specific goals, in any manner required by the purchaser.
- 6.6. For a Bidder to obtain clarity on any matter arising from or referred to in this document, please refer queries, in writing, to the contact details provided above. Under no circumstances may any other employee within Necsa be approached for any information. Any such action might result in a disqualification of a response submitted in competition to this RFQ.
- 6.7. No goods and/or services should be delivered to Necsa without an official Necsa Purchase order.
- 6.8. Necsa reserves the right to; cancel or reject any quote and not to award the RFQ to the lowest Bidder or award parts of the RFQ to different Bidders, or not to award the RFQ at all.
- 6.9. The supplier shall under no circumstances offer, promise or make any gift, payment, loan, reward, inducement, benefit or other advantage, which may be construed as being made to solicit any favour, to any Necsa employee or its representatives. Such an act shall constitute a material breach of the Agreement and the Necsa shall be entitled to terminate the Agreement forthwith, without prejudice to any of its rights
- 6.10. By responding to this request, it shall be construed that: the bidder, hereby acknowledge to be fully conversant with the details and conditions set out in the Necsa's General Conditions of Purchase, Preferential Procurement Policy Framework Act 2000 and the Preferential Procurement Regulations, 2022, the General Conditions of Contract (GCC), Technical Information and Specifications attached, and hereby agree to supply, render services or perform works in accordance therewith

Title	Purchase Specification for the Plate Heat Exchangers in the PTFE Filter Destruction System
Doc. No.	ENS-FDP-SPE-24005
Revision	1

APPROVAL & DISTRIBUTION

SIGNATURE	NAME	SIGNATURE & DATE
Prepared	M Correia Senior Process Engineer	 Signed by MICHELLE CORREIA, MICHELLE@CORREIA.BIZ 09/09/2024 09:14:41(UTC+04:00) 
Checked	M Mashaya Process Engineer	 Signed by Mondli Mashaya, Mondli.mashaya@necsa.co.za 09/09/2024 15:19:44(UTC+02:00) 
Checked	B Khumalo Senior Process Engineer	 Signed by Bheka Khumalo, bheka.khumalo@necsa.co.za 09/09/2024 15:23:07(UTC+02:00) 
Checked	SM Mngoma Chief Mechanical Engineer	 Signed by Sibongeleni Mngoma, Sibongeleni.mngoma@necsa.co.za 09/09/2024 15:59:39(UTC+02:00) 
Approved	K Moodley Chief Process Engineer	 Signed by Kasuren Moodley, kasuren.moodley@necsa.co.za 09/09/2024 16:20:34(UTC+02:00) 
Distribution	ES Records SM Mngoma K Moodley	Docman M Mashaya N Mokoena

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1 PURPOSE AND SCOPE

1.1 Purpose

The purpose of this document is to provide details for the plate heat exchangers to be supplied as part of the PTFE Filter Destruction project.

1.2 Scope

The scope of the document includes the purchase information for three plate heat exchangers:

- KOH Top Up Tank Heat Exchanger (H83163)
- KOH Heat Exchanger (H83125)
- Primary Cooling Water Heat Exchanger (H83236)

2 REFERENCES AND ABBREVIATIONS

2.1 References

This document refers to the following documents:	
[1]	ENS-FDP-CLC-24014: Mass Balance Calculation for the PTFE Destruction System
[2]	ENS-FDP-SPE-24006: Specification Sheet for Plate Heat Exchanger H83125 in the PTFE Filter Destruction System
[3]	ENS-FDP-SPE-24003: Specification Sheet for Plate Heat Exchanger H83163 in the PTFE Filter Destruction System
[4]	ENS-FDP-SPE-24004: Specification Sheet for Plate Heat Exchanger H83236 in the PTFE Filter Destruction System
[5]	ENS-FDP-PID-24003: P&ID Diagram: KOH Scrubber System 831
[6]	ENS-FDP-PID-24004: P&ID Diagram: Cooling Water System 832
[7]	ISO 9001:2015: Quality Management Systems - Requirements

2.2 Abbreviations

Abbreviation	Description
F	Free Fluorine
K ₂ CO ₃	Potassium carbonate
KF	Potassium fluoride
KHCO ₃	Potassium bicarbonate
KOH	Potassium hydroxide
max	Maximum
min	Minimum
P&ID	Piping & Instrumentation Diagram
PTFE	Polytetrafluoroethylene
QMS	Quality Management System
UO ₃	Uranium trioxide

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3 SYSTEM DESCRIPTION

3.1 KOH Top-Up Tank Heat Exchanger (H83163)

The makeup tank T83155 is used to prepare a 30% aqueous KOH solution by mixing KOH flakes and process water. In order to remove the heat generated during the exothermic mixing process, the KOH mixture is recirculated from the tank through the external plate heat exchanger H83163. This plate heat exchanger is cooled by the primary cooling water system.

A block flow diagram of the system around this heat exchanger is provided in Figure 1. More details are available on the P&ID [5].

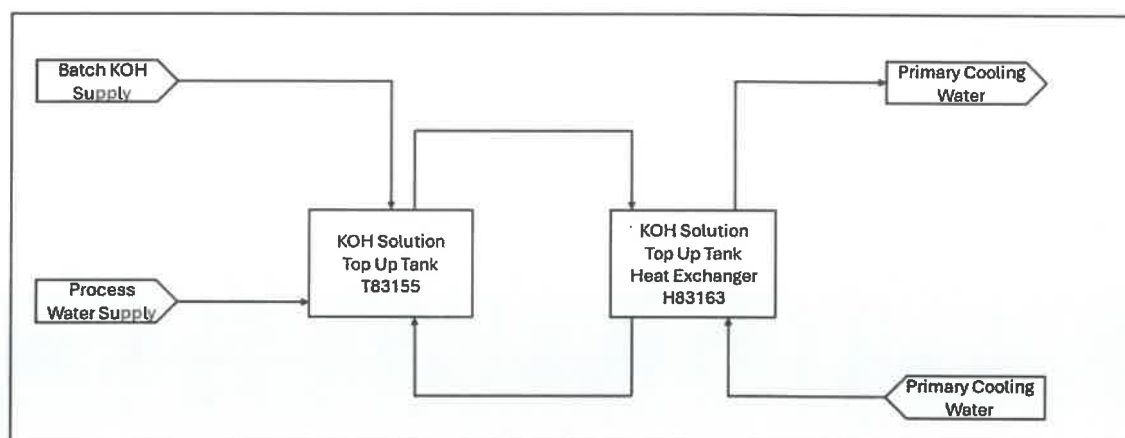


Figure 1: Block Flow Diagram of the KOH Top Up Tank Heat Exchanger system.

3.2 KOH Heat Exchanger (H83125)

The wet KOH Scrubber S83123 is used to remove gaseous impurities from the off-gas stream before release into the building stack. A 30% aqueous KOH mixture is used in the scrubber to react with these gaseous impurities. These reactions are exothermic and generate heat. The scrubbing solution is therefore passed through the plate heat exchanger H83125 to remove the heat generated during the reactions in the scrubber. The scrubber solution is re-used until the solution is deemed spent, therefore the composition of the scrubbing solution will change over time. The composition of the scrubbing liquid over time is shown in Figure 2 [1].

A filter is installed prior to the heat exchanger to reduce the amount of solids passing through the heat exchanger. This plate heat exchanger is cooled by the primary cooling water system.

A block flow diagram of the system around this heat exchanger is provided in Figure 3. More details are available on the P&ID [5].

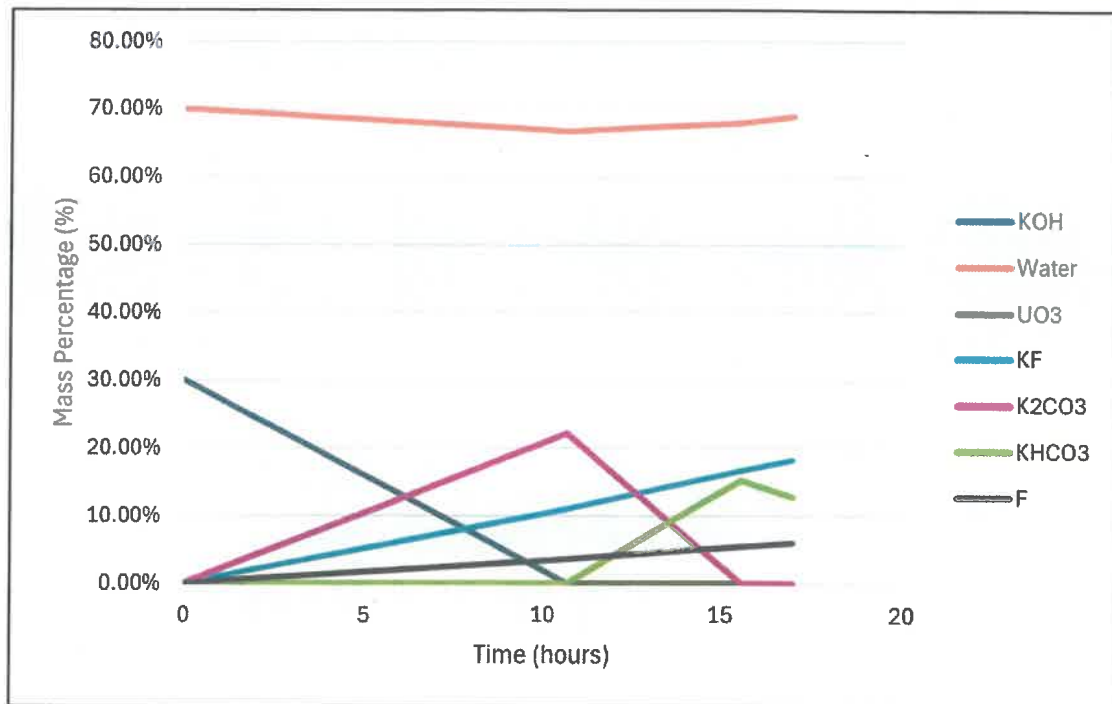


Figure 2: Composition of scrubbing liquid over time [1]

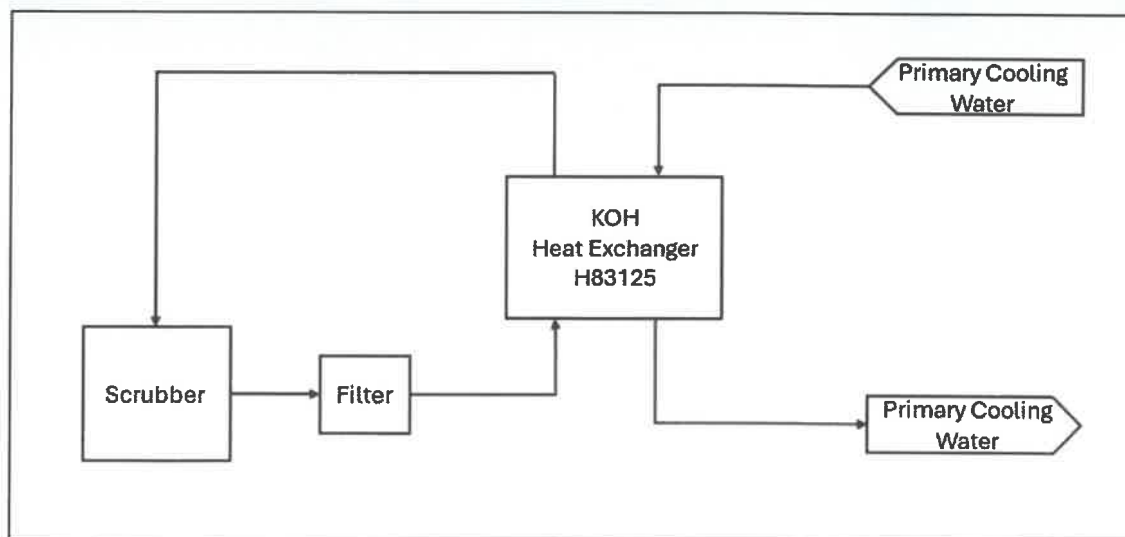


Figure 3: Block Flow Diagram of the KOH Heat Exchanger System

3.3 Primary Cooling Water Heat Exchanger (H83236)

This plate heat exchanger is used in the primary cooling loop to cool down the water coming from the different users prior to recirculating it back to these users. This plate heat exchanger is cooled by the secondary cooling water system.

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A block flow diagram of the system around this heat exchanger is provided in Figure 4. More details are available on the P&ID [6].

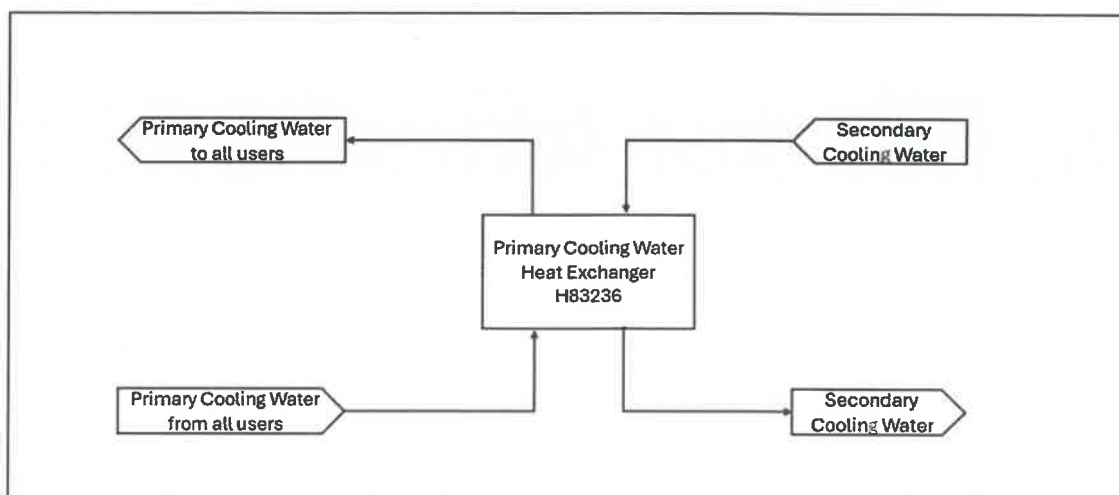


Figure 4: Block Flow Diagram of the Primary Cooling Water System Heat Exchanger System

3.4 System Location

The locations of the different heat exchangers are as follows:

- H83163 is located outside Building V-H2, close to the KOH top up tank T83155, inside bund B83168, on top of a stand.
- H83125 is located inside Building V-H2, laboratory 131H, close to the scrubber S83123, inside bund B83153, on top of a stand.
- H83236 is located outside Building V-H2, close to the cooling tower T83260, inside bund B83264, on top of a stand.

4 SYSTEM TECHNICAL DATA

4.1 Site Conditions

Site specific atmospheric data is provided in Table 1.

Table 1: Atmospheric data

Parameter	Minimum	Maximum
Mean summer temperature	18.9°C	26°C
Mean winter temperature	11.7°C	16.4°C
Design dry bulb temperature	2°C	32°C
Design wet bulb temperature	-1°C	21.6°C
Atmospheric pressure	87.4 kPa	88.3 kPa

4.2 Process Parameters

Process parameters are available in the individual heat exchanger specification sheets attached as Exhibit 1, as shown in Table 2.

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Table 2: Process parameters

Plate Exchanger Tag Number	Data Sheet Reference Number
H83163	ENS-FDP-SPE-24006 [2]
H83125	ENS-FDP-SPE-24003 [3]
H83236	ENS-FDP-SPE-24004 [4]

The heat exchangers will not be operated continuously. It is expected to be in operation for approximately 6 hours a day, 5 days per week.

4.3 Specific Requirements

The following connection points must be provided:

Heat Exchanger	Location	Size	Connection type	Rating	Material
H83163	Hot Side	40 NB	Raised Flange (RF)	150 lb	304L Stainless Steel
	Cold Side	40 NB	Raised Flange (RF)	150 lb	304L Stainless Steel
H83125	Hot Side	25 NB	Raised Flange (RF)	150 lb	304L Stainless Steel
	Cold Side	25 NB	Raised Flange (RF)	150 lb	304L Stainless Steel
H83236	Hot Side	50 NB	Raised Flange (RF)	150 lb	304L Stainless Steel
	Cold Side	50 NB	Raised Flange (RF)	150 lb	304L Stainless Steel

5 SCOPE OF SUPPLY

The following will be required from the supplier:

- Design, manufacture, and supply plate heat exchangers that conforms to all of the specifications of this document.
- The supplier shall provide Necsa with a preliminary design report and mechanical drawings of the designed scrubber for acceptance, prior to manufacturing thereof.
- Develop a quality control plan for the fabrication and assembly of the plate heat exchangers.
- Non-destructive examination of the fabricated heat exchangers shall be performed at the manufacturer's premises before it is delivered to Necsa.
- A pre-dispatch factory acceptance test will be carried out in the presence of Necsa's engineers, as follows:
 - Verification of all quality documents
 - Verification of traceability of materials and components used
 - The manufacturer shall first perform all the above checks/verifications on their own, prior to calling Necsa's engineers for the pre-dispatch factory acceptance test.
- A leak test of the heat exchangers will be performed after installation on site
- In addition to the above, provide the following:
 - General assembly drawings detailing major dimensions and connections
 - Heat exchanger design and manufacturing package, including non-destructive examination certificates
 - Installation manual
 - Operating manual (including troubleshooting guides)

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- Maintenance manual
- List of critical spares
- Supply of critical spares

6 QUALIFICATION OF BIDDER

Based on the quality classification of the various heat exchangers in Exhibit 1 (see attachment), the minimum qualification criteria for the supplier are as follows:

- The supplier shall be ISO 9001:2015 [7] accredited or be able to demonstrate that they have a QMS that complies with ISO 9001:2015 [7].

7 REVISION HISTORY

This document has been revised in accordance with the following schedule:

Rev. No.	Date approved	Nature of Revision	Prepared
1	See title page	First issue.	M Correia

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EXHIBIT 1: SPECIFICATION SHEETS FOR THE PLATE HEAT EXCHANGERS

ENGINEERING SERVICES DEPARTMENT



PLATE HEAT EXCHANGER SPECIFICATION SHEET

Project	PTFE Filter Destruction	Unit Tag Number	H83163
Datasheet Document No.	ENS-FDP-SPE-24006	Revision	1
Description	KOH Heat Exchanger - removes heat generated during the mixing of KOH and water.		
Plant	PTFE Filter Destruction Demonstration Facility		
Equipment Location	At the KOH Solution Top Up Tank T83155 (outside Building V-H2, Laboratory 131H)		
Safety Classification	Non-classified (N) and SC-3(C)		
Quality Classification	Non-classified (N) and QC-3(C)		
Duty	51 kW ^[1]		

FLOW MEDIA

	UNITS	HOT MEDIUM	COLD MEDIUM
Media		Aqueous 30% (w/w) KOH solution	Demineralised water
Inlet temperature	°C	45	30
Outlet temperature	°C	33	40
Design temperature	°C	100	100
Flow rate	kg/s	1,456 ^[1]	1,201 ^[1]
Maximum operating pressure	kPa(g)	600	600
Permissible pressure drop	kPa	70	70
Calculated pressure drop	kPa	Supplier to advise	Supplier to advise
Design pressure	kPa	2000	2000

FLUID PROPERTIES (at average temperature)

Density	kg/m ³	1276,4 ^[5]	994,03 ^[3]
Specific heat	kJ/kg.K	2,88 ^[4]	4,18 ^[1]
Thermal conductivity	W/m.K	0,608 ^[4]	0,622 ^[3]
Viscosity	cP	1,7 ^[5]	0,729 ^[3]
Corrosive		Yes	No
Erosive		Yes	No
Abrasive		No	No
Toxic		No	No
Presence of solids		Possible undissolved KOH	No
Presence of uranic material		No	No

DESIGN DATA

Plate heat exchanger type		Supplier to advise	
Design duty (calculated)	kW	Supplier to advise	
Frame type		Supplier to advise	
Frame size (height, width, thickness)	mm	Supplier to advise	
Number of plates		Supplier to advise	
Maximum number of plates allowed		Supplier to advise	
Total active heat transfer area	m ²	Supplier to advise	
Nominal plate gap	mm	Supplier to advise	
Flow arrangement		Supplier to advise	Supplier to advise
Packed size	mm	Supplier to advise	
Mass of empty unit	kg	Supplier to advise	
Volume of fluid in exchanger	m ³	Supplier to advise	Supplier to advise

ENGINEERING SERVICES DEPARTMENT



PLATE HEAT EXCHANGER SPECIFICATION SHEET

Project	PTFE Filter Destruction	Unit Tag Number	H83163
Datasheet Document No.	ENS-FDP-SPE-24006	Revision	1

MECHANICAL SECTION

Process Connections	Pipe size	40 NB; Sch. 40	Pipe size	40 NB; Sch. 40
	Type	Raised Flange (RF)	Type	Raised Flanged (RF)
	Material	304L Stainless Steel	Material	304L Stainless Steel
Material of Construction	Casing	Carbon Steel	Plates	304L Stainless Steel
Surface Finish	Casing	Supplier to advise	Plates	Supplier to advise
Surface Protection	Casing	Supplier to advise	Plates	Supplier to advise
Corrosion Allowance	Casing	0.00"	Plates	0.00"
Pressure Rating	Casing	150 lb	Plates	150 lb

SITE CONDITIONS

Altitude	m	1300 m
Site Location		Pelindaba East, H-Building
Atmospheric Pressure	kPa(a)	Min: 87,4 kPa; Max: 88,3 kPa
Ambient Temperature (min./max.)	°C	Min: 2°C; Max: 32°C

REFERENCE DRAWINGS AND DOCUMENTS

- [1] ENS-FDP-CLC-24015: Energy Balance Calculation for the PTFE Filter Destruction System
- [2] ENS-FDP-PID-24003: PTFE Filter Destruction System KOH Scrubber P&ID
- [3] www.engineeringtoolbox.com
- [4] L Bideau, E et.al., 2019, Review of Necessary Thermophysical Properties and their Sensitivities with Temperature and Electrolyte Mass Fractions for Alkaline Water Electrolysis Multiphysics Modelling, International Journal of Hydrogen Energy, 44(10) 4553 - 4569
- [5] ENS-FDP-CLC-24016: Scrubber Design Calculation for the PTFE Destruction System

NOTES

Note 1: The heat exchanger shall be fully drainable in situ, with the drainage mechanism normally closed.

	Name	Signature	Date
Compiled by	M Correia (Senior Process Engineer)		
Checked by	SM Mngoma (Chief Mechanical Engineer)		
Checked by	N Mokoena (Process Engineer)		
Checked by	B Khumalo (Senior Process Engineer)		
Checked by	G Manuel (Chief C&I Engineer)		
Checked by	W van den Berg (Chief Electrical Engineer)		
Approved by	K Moodley (Chief Process Engineer)		

ENGINEERING SERVICES DEPARTMENT



PLATE HEAT EXCHANGER SPECIFICATION SHEET

Project	PTFE Filter Destruction	Unit Tag Number	H83125
Datasheet Document No.	ENS-FDP-SPE-24003	Revision	1
Description	KOH Heat Exchanger - removes heat generated due to chemical reaction in the scrubber S83123.		
Plant	PTFE Filter Destruction Demonstration Facility		
Equipment Location	Recycle loop of the scrubber S83123 (inside Building V-H2, Laboratory 131H)		
Safety Classification	SC-3(N) and SC-2(C)		
Quality Classification	QC-3(N) and QC-2(C)		
Duty	37 kW ^[1]		

FLOW MEDIA

	UNITS	HOT MEDIUM	COLD MEDIUM
Media		Scrubbing solution (aqueous 30% (w/w) KOH) ^{Note 1}	Demineralised water
Inlet temperature	°C	44,18	30
Outlet temperature	°C	35	40
Design temperature	°C	100	100
Flow rate	kg/s	1,455 ^[1]	0,866 ^[1]
Maximum operating pressure	kPa(g)	600	600
Permissible pressure drop	kPa	70	70
Calculated pressure drop	kPa	Supplier to advise	Supplier to advise
Design pressure	kPa	2000	2000

FLUID PROPERTIES (at average temperature)

Density	kg/m ³	1274.8 - 1344 ^[5]	994,03 ^[3]
Specific heat	kJ/kg.K	2,88 ^[4]	4,18 ^[1]
Thermal conductivity	W/m.K	0,608 ^[4]	0,622 ^[3]
Viscosity	cP	1,7 ^[5]	0,729 ^[3]
Corrosive		Yes	No
Erosive		Yes	No
Abrasive		No	No
Toxic		Yes	No
Presence of solids		No	No
Presence of uranic material		Yes, small amounts of UO ₃	No
Presence of solids		Possible undissolved UO ₃ , KF and/or KOH	No

DESIGN DATA

Plate heat exchanger type		Supplier to advise
Design duty (calculated)	kW	Supplier to advise
Frame type		Supplier to advise
Frame size (height, width, thickness)	mm	Supplier to advise
Number of plates		Supplier to advise
Maximum number of plates allowed		Supplier to advise
Total active heat transfer area	m ²	Supplier to advise
Nominal plate gap	mm	Supplier to advise
Flow arrangement		Supplier to advise
Packed size	mm	Supplier to advise
Mass of empty unit	kg	Supplier to advise
Volume of fluid in exchanger	m ³	Supplier to advise

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PLATE HEAT EXCHANGER SPECIFICATION SHEET

Project	PTFE Filter Destruction	Unit Tag Number	H83125
Datasheet Document No.	ENS-FDP-SPE-24003	Revision	1

MECHANICAL SECTION

Process Connections	Pipe size	25 NB, Sch. 40	Pipe size	25 NB, Sch. 40
	Type	Raised Flanged (RF)	Type	Raised Flanged (RF)
	Material	304L Stainless Steel	Material	304L Stainless Steel
Material of Construction	Casing	Carbon Steel	Plates	304L Stainless Steel
Surface Finish	Casing	Supplier to advise	Plates	Supplier to advise
Surface Protection	Casing	Supplier to advise	Plates	Supplier to advise
Corrosion Allowance	Casing	0.00"	Plates	0.00"
Pressure Rating	Casing	150 lb	Plates	150 lb

SITE CONDITIONS

Altitude	m	1300 m
Site Location		Pelindaba East, H-Building
Atmospheric Pressure	kPa(a)	Min: 87,4 kPa; Max: 88,3 kPa
Ambient Temperature (min./max.)	°C	Min: 2°C; Max: 32°C

REFERENCE DRAWINGS AND DOCUMENTS

- [1] ENS-FDP-CLC-24015: Energy Balance Calculation for the PTFE Filter Destruction System
- [2] ENS-FDP-PID-24003: PTFE Filter Destruction System KOH Scrubber P&ID
- [3] www.engineeringtoolbox.com
- [4] L Bideau, E et.al., 2019, Review of Necessary Thermophysical Properties and their Sensitivities with Temperature and Electrolyte Mass Fractions for Alkaline Water Electrolysis Multiphysics Modelling, International Journal of Hydrogen Energy, 44(10) 4553 - 4569
- [5] ENS-FDP-CLC-24016: Scrubber Design Calculation for the PTFE Destruction System

NOTES

Note 1: The sump tank of scrubber S83123 will be charged with a batch of aqueous 30% KOH solution at the start and this solution will then recirculated through the heat exchanger H83125 during the scrubbing process. The scrubber solution composition will change over time due to the chemical reactions taking place in the scrubber. The scrubbing process is divided into three phases. During the first phase, KOH will start decreasing, while KF and K_2CO_3 will start forming. At the end of this phase, the composition of the scrubbing solution will be 66.81% water, 11.012% KF, 22.165% K_2CO_3 and approximately 13 ppm UO_3 . At the end of the next phase, the composition of the scrubbing solution will be 68.04% water, 16.62% KF, 15.27% $KHCO_3$ and approximately 19 ppm UO_3 . At the end of the final phase, the solution composition will be 68.95% water, 18.30% KF, 12.729% $KHCO_3$ and approximately 21 ppm UO_3 . At this point the solution will be replaced with a fresh batch of aqueous 30% KOH solution.

Note 2: The heat exchanger shall be fully drainable in situ, with the drainage mechanism normally closed.

	Name	Signature	Date
Compiled by	M Correia (Senior Process Engineer)		
Checked by	N Mokoena (Process Engineer)		
Checked by	B Khumalo (Senior Process Engineer)		
Checked by	SM Mngoma (Chief Mechanical Engineer)		
Checked by	G Manuel (Chief C&I Engineer)		
Checked by	W van den Berg (Chief Electrical Engineer)		
Approved by	K Moodley (Chief Process Engineer)		

ENGINEERING SERVICES DEPARTMENT



PLATE HEAT EXCHANGER SPECIFICATION SHEET

Project	PTFE Filter Destruction		Unit Tag Number	H83236
Datasheet Document No.	ENS-FDP-SPE-24004		Revision	1
Description	Cooling Loop Heat Exchanger - cools down cooling water in the primary cooling loop being returned from the process equipment.			
Plant	PTFE Filter Destruction Demonstration Facility			
Equipment Location	At the cooling tower T83260 (outside Building V-H2, Laboratory 131H)			
Safety Classification	Non-classified (N) and SC-3(C)			
Quality Classification	Non-classified (N) and QC-3(C)			
Required Duty	188 kW ^[1]			
FLOW MEDIA				
	UNITS	HOT MEDIUM	COLD MEDIUM	
Media		Demineralised water	Process water	
Inlet temperature	°C	40	25	
Outlet temperature	°C	30	35	
Design temperature	°C	100	100	
Flow rate	kg/s	4,48 ^[1]	4,48 ^[1]	
Maximum operating pressure	kPa(g)	600	600	
Permissible pressure drop	kPa	70	70	
Calculated pressure drop	kPa	Supplier to advise	Supplier to advise	
Design pressure	kPa	2000	2000	
FLUID PROPERTIES (at average temperature)				
Density	kg/m ³	994,03 ^[3]	995,65 ^[3]	
Specific heat	kJ/kg.K	4,18 ^[1]	4,18 ^[1]	
Thermal conductivity	W/m.K	0,622 ^[3]	0,615 ^[3]	
Viscosity	cP	0,729 ^[3]	0,801 ^[3]	
Corrosive		No	No	
Erosive		No	No	
Abrasive		No	No	
Toxic		No	No	
Presence of solids		No	No	
Presence of uranic material		No	No	
DESIGN DATA				
Plate heat exchanger type		Supplier to advise		
Design duty (calculated)	kW	Supplier to advise		
Frame type		Supplier to advise		
Frame size (height, width, thickness)	mm	Supplier to advise		
Number of plates		Supplier to advise		
Maximum number of plates allowed		Supplier to advise		
Total active heat transfer area	m ²	Supplier to advise		
Nominal plate gap	mm	Supplier to advise		
Flow arrangement		Supplier to advise	Supplier to advise	
Packed size	mm	Supplier to advise		
Mass of empty unit	kg	Supplier to advise		
Volume of fluid in exchanger	m ³	Supplier to advise	Supplier to advise	

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PLATE HEAT EXCHANGER SPECIFICATION SHEET

Project	PTFE Filter Destruction	Unit Tag Number	H83236
Datasheet Document No.	ENS-FDP-SPE-24004	Revision	1

MECHANICAL SECTION

Process Connections	Pipe size	50 NB, Sch. 40	Pipe size	50 NB, Sch. 40
	Type	Raised Flange (RF)	Type	Raised Flanged (RF)
	Material	304L Stainless Steel	Material	304L Stainless Steel
Material of Construction	Casing	Carbon Steel	Plates	304L Stainless Steel
Surface Finish	Casing	Supplier to advise	Plates	Supplier to advise
Surface Protection	Casing	Supplier to advise	Plates	Supplier to advise
Corrosion Allowance	Casing	0.00"	Plates	0.00"
Pressure Rating	Casing	150 lb	Plates	150 lb

SITE CONDITIONS

Altitude	m	1300 m
Site Location		Pelindaba East, H-Building
Atmospheric Pressure	kPa(a)	Min: 87,4 kPa; Max: 88,3 kPa
Ambient Temperature (min./max.)	°C	Min: 2°C; Max: 32°C

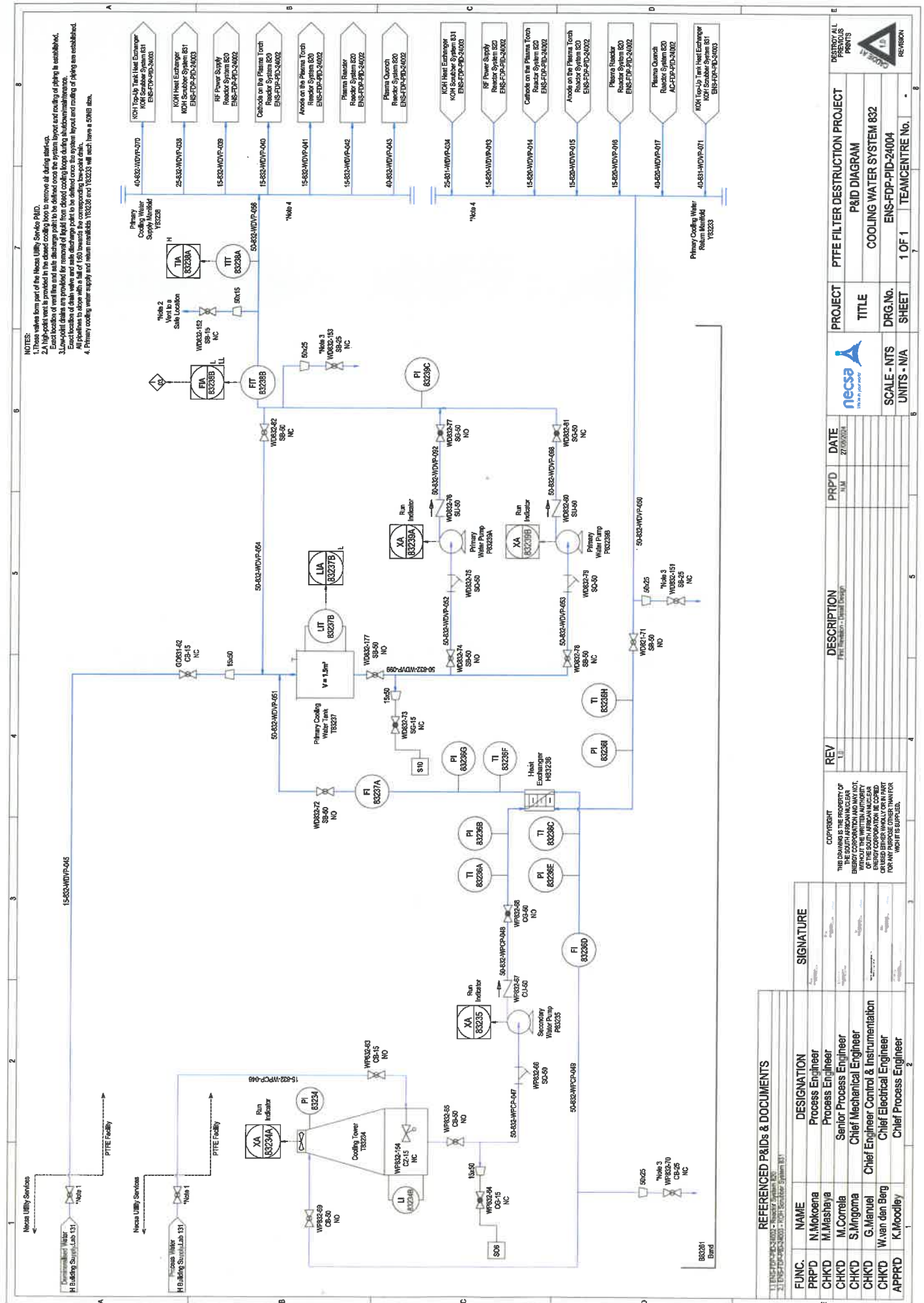
REFERENCE DRAWINGS AND DOCUMENTS

[1] ENS-FDP-CLC-24015: Energy Balance Calculation for the PTFE Filter Destruction System
[2] ENS-FDP-PID-24004: PTFE Filter Destruction Project Cooling Water System P&ID
[3] www.engineeringtoolbox.com

NOTES

Note 1: The heat exchanger shall be fully drainable in situ, with the drainage mechanism normally closed.

	Name	Signature	Date
Compiled by	M Correia (Senior Process Engineer)		
Checked by	SM Mngoma (Chief Mechanical Engineer)		
Checked by	N Mokoena (Process Engineer)		
Checked by	B Khumalo (Senior Process Engineer)		
Checked by	G Manuel (Chief C&I Engineer)		
Checked by	W van den Berg (Chief Electrical Engineer)		
Approved by	K Moodley (Chief Process Engineer)		



REFERENCED P&IDs & DOCUMENTS

FUNC.	NAME	DESIGNATION
PRP'D	N.Mokoena	Process Engineer
CHK'D	M.Mashiywa	Process Engineer
CHK'D	M.Correlle	Senior Process Eng
CHK'D	S.Mngoma	Chief Mechanical Eng
CHK'D	G.Manuel	Chief Engineer Control & Instr
CHK'D	W.van den Berg	Chief Electrical Eng
APPR'D	K.Moodley	Chief Process Eng ²

PROJECT	PTFE FILTER DESTRUCTION PROJECT		
TITLE	P&ID DIAGRAM		
	COOLING WATER SYSTEM 832		
DRG.No.	ENS-FDP-PID-24004		
SHEET	1 OF 1	TEAMCENTRE No.	8

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	UNITS - N/A

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This image shows a single sheet of white paper with horizontal blue or grey ruling lines. The lines are evenly spaced and run across the width of the page. There are also dashed midlines between some of the solid lines, which is typical of primary-ruled notebook paper. The paper appears slightly aged or off-white.

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Process Engineer
Senior Process Engineer
Chief Mechanical Engineer
Engineer Control & Instrumentation
Chief Electrical Engineer
Chief Process Engineer

Shaya	St
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Goma	Chief Eng
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APPR'D	K. Mo

