RFQ Number	**MATT-NLM-QUO-24/057**
Request for Quotation Date	**27 November 2024**
RFQ Closing Date	**06 December 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

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

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/Reference list** Supplier to provide a reference list of past projects indicating client details, including client contacts and the nature of the service (scope of work) rendered by the supplier.	50	50	More than 20 heat exchangers supplied.
			40	Eleven to Nineteen heat exchangers supplied.
			30	Five to Ten heat exchangers supplied.
2	**ISO Certification** ISO 9001: 2015 (or latest) accredited or accredited alternative QMS Must provide evidence of the accreditation of the equipment manufacturer (ISO 9001 certificate)	30	30	ISO 9001 accreditation or alternative

Item	Requirement	Weight	Points	Criteria
3	**After sales service** Supplier must provide letter referencing after sales service and maintenance	20	20	Supplier having a service and repair workshop Supplier holds critical spares as stock items
			15	Supplier having a service and repair workshop
			10	Supplier outsources service and repair
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-BBE 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)**
- **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**

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

APPROVAL & DISTRIBUTION

	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) SIGNIFLOW
Checked	M Mashaya Process Engineer	Signed by Mondli Mashaya, Mondli.mashaya@necsa.co.za 09/09/2024 15:19:44(UTC+02:00) SIGNIFLOW
Checked	B Khumalo Senior Process Engineer	Signed by Bheka Khumalo, bheka.khumalo@necsa.co.za 09/09/2024 15:23:07(UTC+02:00) SIGNIFLOW
Checked	SM Mngoma Chief Mechanical Engineer	Signed by Sibongeleni Mngoma, Sibongeleni.mngoma@necsa.co.za 09/09/2024 15:59:39(UTC+02:00) SIGNIFLOW
Approved	K Moodley Chief Process Engineer	Signed by Kasuren Moodley, kasuren.moodley@necsa.co.za 09/09/2024 16:20:34(UTC+02:00) SIGNIFLOW
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_2CO_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

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].

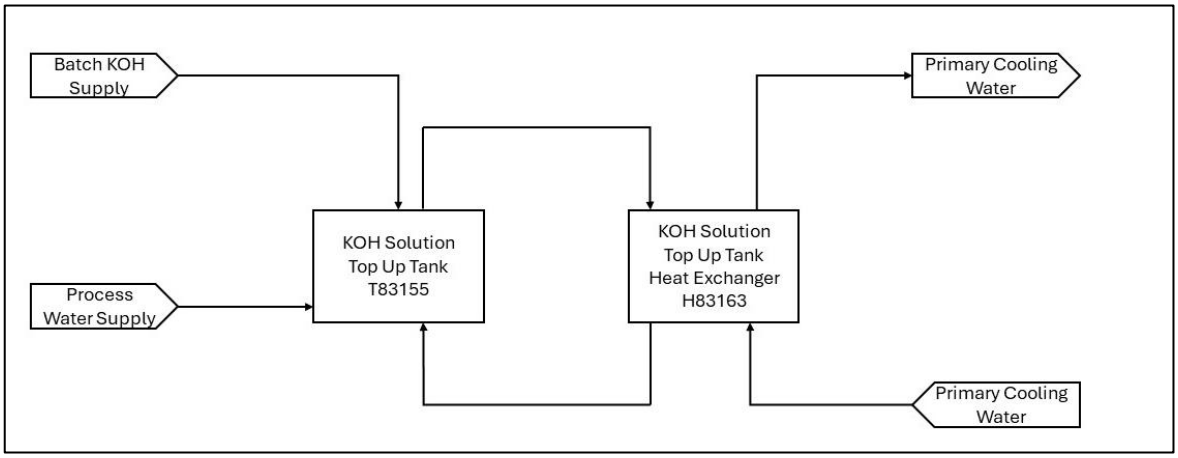

Figure 1: Block Flow Diagram of the KOH Top Up Tank Heat Exchanger system.

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].

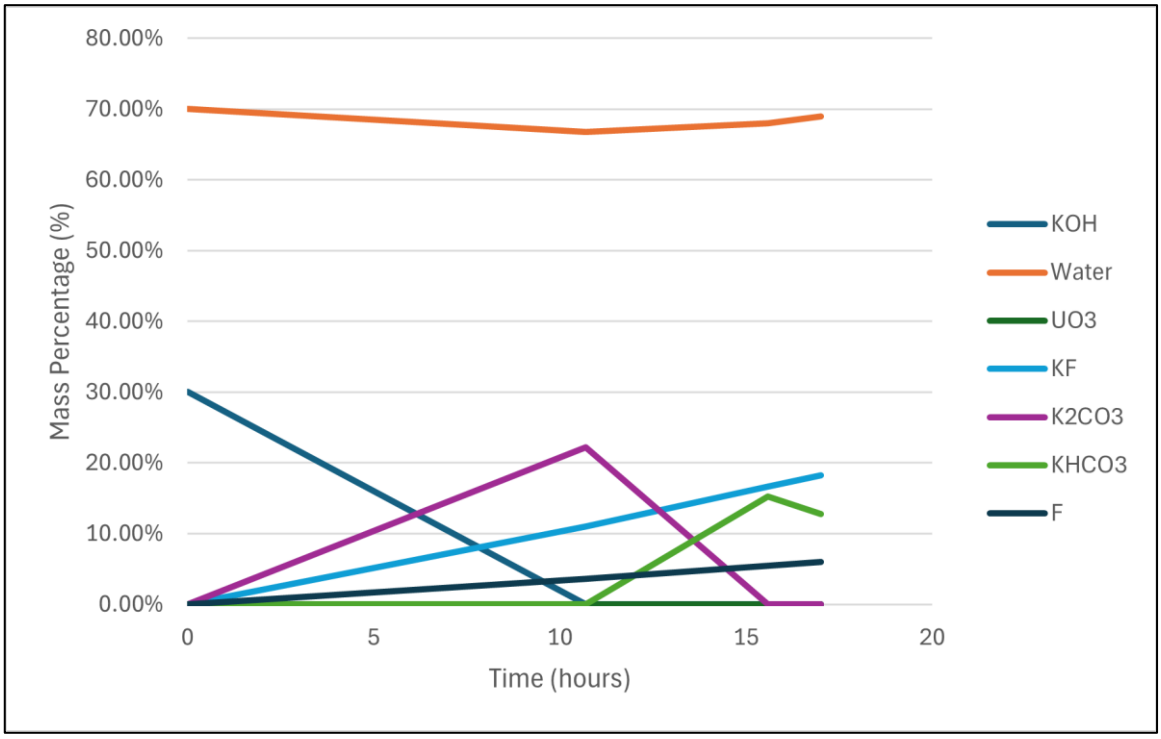

Figure 2: Composition of scrubbing liquid over time [1]

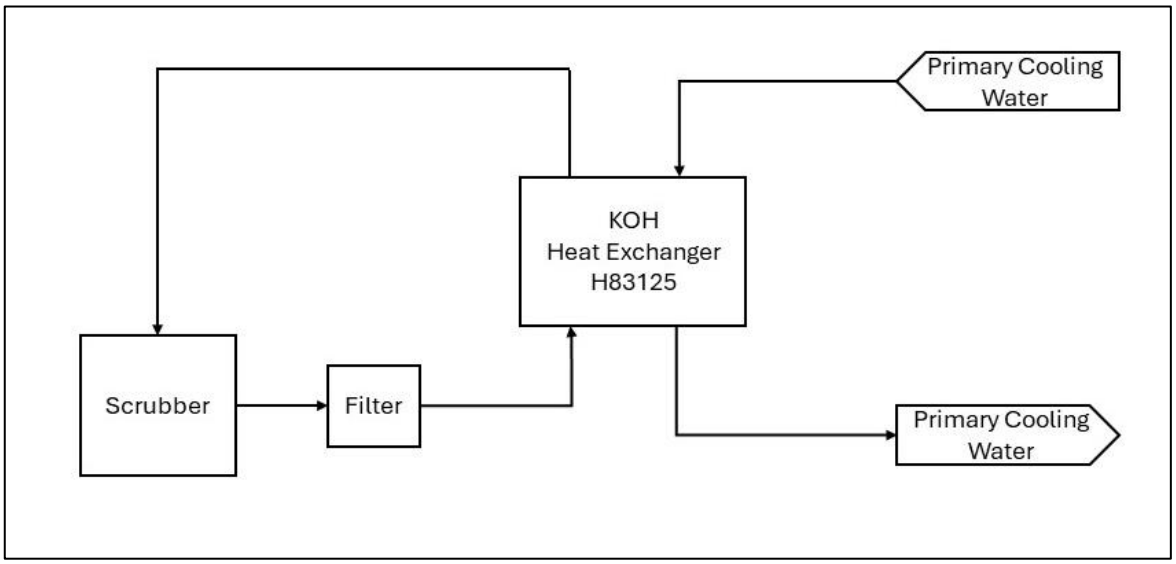

Figure 3: Block Flow Diagram of the KOH Heat Exchanger System

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.

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].

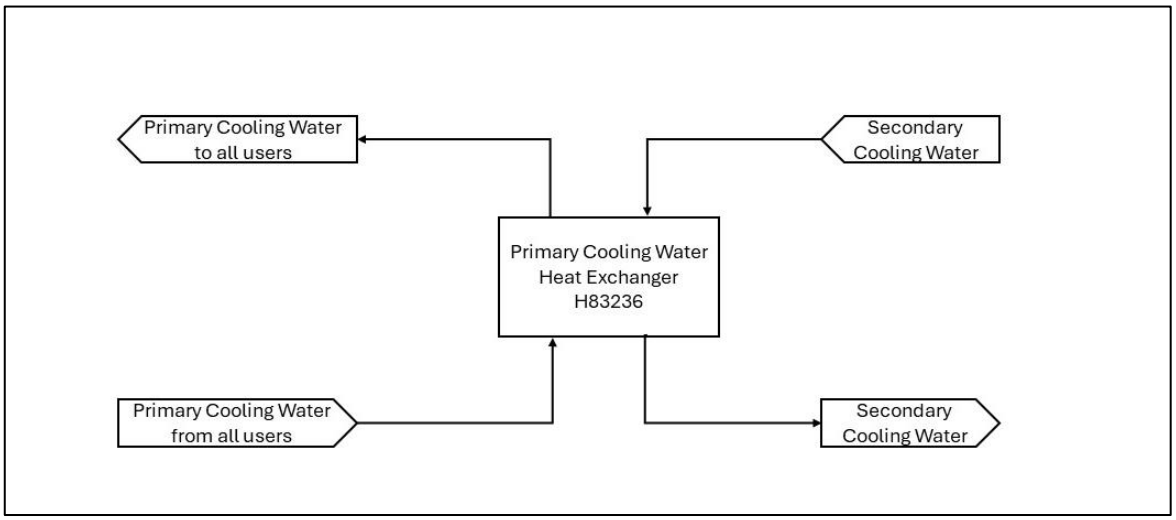

Figure 4: Block Flow Diagram of the Primary Cooling Water System Heat Exchanger System

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.

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)

- 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

EXHIBIT 1: SPECIFICATION SHEETS FOR THE PLATE HEAT EXCHANGERS

ENGINEERING SERVICES DEPARTMENT

PLATE HEAT EXCHANGER SPECIFICATION SHEET

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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 arrangment		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

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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% KHCO3 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

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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 arrangment		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

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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)		

ENGINEERING SERVICES DEPARTMENT

PLATE HEAT EXCHANGER SPECIFICATION SHEET

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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 arrangment		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

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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)		
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