

	Request for Quotation	Doc. No	NLM-QUO-25/105
		Revision	1
		Page	1 of 4

RFQ Number	NLM-QUO-25/097
Request for Quotation Date	28 July 2025
RFQ Closing Date	29 August 2025
RFQ Closing Time	12:00
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 supply Heat Exchanger as per the attached Specification Sheets

Dear Service Provider

Kindly provide a quotation for goods and or services as outlined in section 3 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. Background

	Request for Quotation	Doc. No	NLM-QUO-25/105
		Revision	1
		Page	1 of 4

Necsa plans to establish a plasma gasification demonstration facility in a laboratory on-site to volumetrically reduce uranium-contaminated waste oil. A plate heat exchanger is utilized as a heater, H1005, for heating up the oil using hot water in the oil feed system, before the oil is processed in a downstream reactor. Details of the heat exchanger are given in the attached Purchase Specification [01] and Specification Sheet [02]. The position of the heat exchanger within the oil feed system is also shown in the attached Piping and Instrumentation Diagram (P&ID) [03].

3. Scope of Work

Item Description	Quantity
To supply and deliver to the NECSA site the Heat Exchanger, H1005, as per the attached Purchase Specification [01] and Specification Sheet [02]. NOTES: 1. The heat exchanger, H1005, operates for a maximum period of 8 h/day. 2. All other equipment and components identified in Section 2 and/or shown in the P&ID [03] are outside the scope of work considered here.	1

4. Attachments

Ref #	DOCUMENT NAME	DESCRIPTION
01	ENS-OWPVR-SPE-25002, Rev. 1	Purchase Specification for the Plate Heat Exchanger in the Uranium-Contaminated Waste Oil Plasma Gasification Facility
02	ENS-OWPVR-SPE-25001, Rev. 1	Specification Sheet for Oil Heater H1005
03	ENS-OWPVR-PID-24002, Rev. 6	Uranium Contaminated Waste Oil Plasma Gasification P&ID – Waste Oil Feed System

5. Pricing

	Request for Quotation		Doc. No	NLM-QUO-25/105
			Revision	1
			Page	1 of 4

- All price quoted to include all applicable taxes.
- Price must be fixed and firm.
- Price should include additional cost elements such as freight, delivery to site, 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.

6. Evaluation

6.1. 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.

	Request for Quotation	Doc. No	NLM-QUO-25/105
		Revision	1
		Page	1 of 4

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

Item	Requirement	Weight	Points	Criteria
1	ISO 9001: 2015 (or latest) accredited Supplier must provide evidence (ISO 9001 certificate)	25	25	ISO 9001 accreditation of supplier of the required products. OR ISO 9001 accreditation of OEM and OEM letter listing local supplier as authorised supplier and service agent
2	Supplier must provide letter referencing after sales service and maintenance	25	25	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
3	Supplier lead-time Supplier must specify lead-time	25	25	Product available within 4 weeks of issue of Purchase Order
			15	Product available within 6 weeks of issue of Purchase Order
			10	Product available within 8 weeks of issue of Purchase Order
4	Suitability of Product Supplier must provide details of the make and model, as well as datasheets.	25	25	Supplier adequately demonstrates how the recommended product meets the user's requirements or specifications
Total		100		

Note: Bidders that score <80 out of 100 in respect of Technical/Functional evaluation criteria will be regarded as submitting a non-responsive bid and will not be evaluated further.

	Request for Quotation	Doc. No	NLM-QUO-25/105
		Revision	1
		Page	1 of 4

6.2. 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

7. 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) only if Applicable due to the nature of work required
- Any other document or certification that might have been requested on this RFQ

	Request for Quotation	Doc. No	NLM-QUO-25/105
		Revision	1
		Page	1 of 4

8. Important

- 8.1. Quotation must be submitted on or before the RFQ closing date and time stated above.
- 8.2. 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.
- 8.3. 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.
- 8.4. 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.
- 8.5. 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.
- 8.6. 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.
- 8.7. No goods and/or services should be delivered to Necsa without an official Necsa Purchase order.
- 8.8. 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.
- 8.9. 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
- 8.10. 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

	Request for Quotation	Doc. No	NLM-QUO-25/105
		Revision	1
		Page	1 of 4

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 Uranium-Contaminated Waste Oil Plasma Gasification Facility
Doc. No.	ENS-OWPVR-SPE-25002
Revision	1

APPROVAL & DISTRIBUTION

	NAME	SIGNATURE & DATE
Prepared	M Correia Senior Process Engineer	 Signed by Michelle Correia, correiam2504@gmail.com 26/02/2025 07:35:20(UTC-05:00) SIGNIFLOW®
Checked	BM Khumalo Senior Process Engineer	 Signed by Bheka Khumalo, bheka.khumalo@necsa.co.za 26/02/2025 14:38:19(UTC+02:00) SIGNIFLOW®
Checked	W Ludwick Senior Process Engineer	 Signed by Werner Ludwick, werner.ludwick@necsa.co.za 27/02/2025 07:20:19(UTC+02:00) SIGNIFLOW®
Checked	SR Mngoma Chief Mechanical Engineer	 Signed by Sibongeleni Mngoma, Sibongeleni.mngoma@necsa.co.za 27/02/2025 08:26:54(UTC+02:00) SIGNIFLOW®
Approved	K Moodley Chief Process Engineer	 Signed by Kasuren Moodley, kasuren.moodley@necsa.co.za 27/02/2025 11:38:12(UTC+02:00) SIGNIFLOW®
Distribution	1. ES Records 2. DocMan 3. K Moodley 4. BM Khumalo 5. LWB Dlamini 6. SR Mngoma 7. M Correia 8. W Ludwick 9. N Manilal 10. MK Nkadimeng 11. N Mokoena 12. M Mashaya	

	Purchase Specification for the Plate Heat Exchangers in the Uranium-Contaminated Waste Oil Plasma Gasification Facility		Doc. No	ENS-OWPVR-SPE-25002
			Rev. No.	1
			Page	2 of 6

	PAGE
TABLE OF CONTENTS	
1 PURPOSE AND SCOPE	3
1.1 Purpose	3
1.2 Scope	3
2 REFERENCES AND ABBREVIATIONS	3
2.1 References	3
2.2 Abbreviations.....	3
3 SYSTEM DESCRIPTION	4
3.1 Oil Heater H1005.....	4
3.2 System Location	4
4 SYSTEM TECHNICAL DATA.....	4
4.1 Site Conditions	4
4.2 Process Parameters	5
4.3 Specific Requirements.....	5
5 SCOPE OF SUPPLY.....	5
6 QUALIFICATION OF BIDDER	6
7 REVISION HISTORY	6

LIST OF TABLES

Table 1: Atmospheric data	5
Table 2: Heat Exchanger Connection Points.....	5

LIST OF FIGURES

Figure 1: Block Flow Diagram for the Oil Heater System	4
--	---

	Purchase Specification for the Plate Heat Exchangers in the Uranium-Contaminated Waste Oil Plasma Gasification Facility		Doc. No	ENS-OWPVR-SPE-25002
			Rev. No.	1
			Page	3 of 6

1 PURPOSE AND SCOPE

1.1 Purpose

The purpose of this document is to provide details for the brazed plate heat exchanger to be supplied as part of the Uranium Contaminated Waste Oil Plasma Gasification (WOPG) demonstration facility.

1.2 Scope

The scope of the document includes the purchase information for the following heat exchanger:

- Oil Heater (H1005) [1]

The purchase information for the following two heat exchangers is available in [2].

- KOH Heat Exchanger (H1504)
- Cooling Water Heat Exchanger (H1603)

2 REFERENCES AND ABBREVIATIONS

2.1 References

This document refers to the following documents:	
[1]	ENS-OWPVR-PID-24002: P&ID for the Waste Oil Feed System
[2]	ENS-NWPVR-SPE-24021: Purchase Specification for the Plate Heat Exchangers in the Nuclear Waste Plasma Gasification system
[3]	ENS-OWPVR-SPE-25001: Specification Sheet for Oil Heater H1005
[4]	ISO 9001:2015: Quality Management Systems - Requirements

2.2 Abbreviations

Abbreviation	Description
FAT	Factory Acceptance Test
lb	Pound
NB	Nominal Bore
P&ID	Piping and Instrumentation Diagram
RF	Raised Face
Sch	Schedule
WOPG	Waste Oil Plasma Gasification

	Purchase Specification for the Plate Heat Exchangers in the Uranium-Contaminated Waste Oil Plasma Gasification Facility	Doc. No	ENS-OWPVR-SPE-25002
		Rev. No.	1
		Page	4 of 6

3 SYSTEM DESCRIPTION

3.1 Oil Heater H1005

The Oil Heater H1005 is used to increase the temperature of the waste oil feed from room temperature to 60 – 70°C. This reduces the viscosity of the oil for easier flow through the spray nozzle inside the downstream plasma reactor to prevent possible blockage of the spray nozzle and ensure that the oil enters the plasma reactor R1205 as an atomised spray.

The heating medium is hot demineralised water. A block flow diagram of the system around this heat exchanger is provided in Figure 1. More details are available on the P&ID [1].

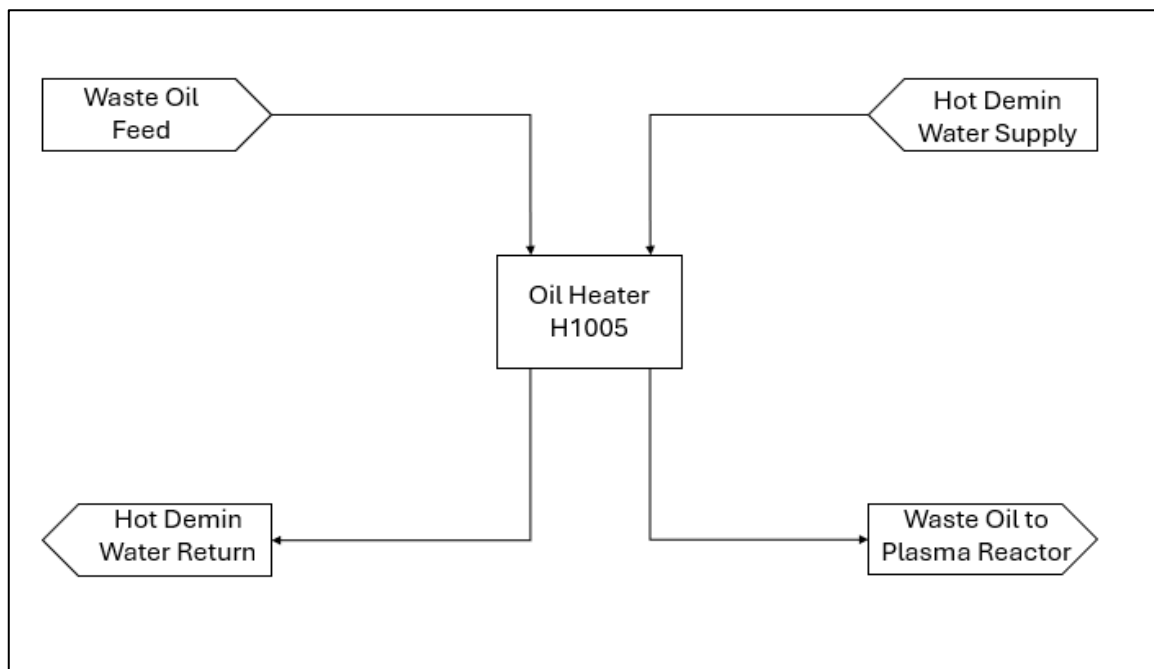


Figure 1: Block Flow Diagram for the Oil Heater System

3.2 System Location

The Oil Heater H1005 is located in the process area, inside Laboratory 150, Building V-H2. The heat exchanger is mounted on top of a stand within a bunded area.

4 SYSTEM TECHNICAL DATA

4.1 Site Conditions

Site-specific atmospheric data is provided in Table 1.

	Purchase Specification for the Plate Heat Exchangers in the Uranium-Contaminated Waste Oil Plasma Gasification Facility		Doc. No	ENS-OWPVR-SPE-25002
			Rev. No.	1
			Page	5 of 6

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 specification sheet [3].

The heat exchanger 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

Connection points must be provided on the heat exchanger as described in Table 2.

Table 2: Heat Exchanger Connection Points

Heat Exchanger	Location (Inlet / Outlet)	Size	Connection type	Flange Rating	Material
H1005	Hot side	15NB, Sch 40	Raised face (RF)	150 lb	304L Stainless Steel
	Cold side	3/8" tubing	Tubing compression fitting	150 lb	304L Stainless Steel

5 SCOPE OF SUPPLY

- The following will be required from the supplier:
- Design, manufacture, and supply a brazed plate heat exchanger that conforms to all of the specifications of this document.
- Develop a quality control plan for the fabrication and assembly of the heat exchanger.
- Non-destructive examination (pressure test) of the fabricated heat exchanger 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 in accordance with ISO 9001:2015 [4] requirements.
 - Verification of material certificates for materials and components used to assemble the heat exchanger.
 - 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 exchanger will be performed by Necsa after installation on site.

	Purchase Specification for the Plate Heat Exchangers in the Uranium-Contaminated Waste Oil Plasma Gasification Facility	Doc. No	ENS-OWPVR-SPE-25002
		Rev. No.	1
		Page	6 of 6

- 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 spare gaskets for connecting piping
 - Necsa requires proof that the thermal performance of the heat exchanger has been demonstrated during the FAT.

6 QUALIFICATION OF BIDDER

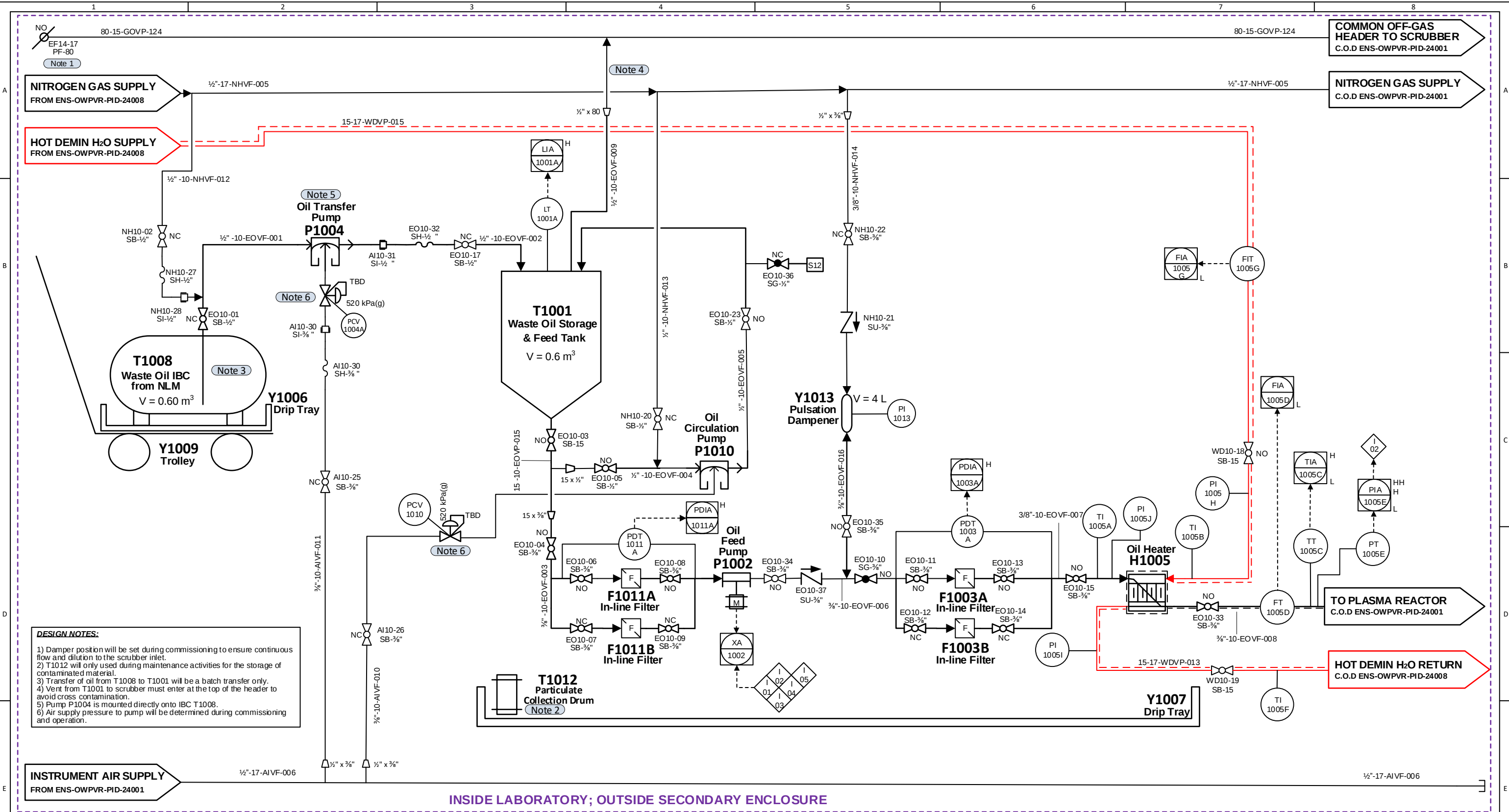
Based on the quality classification of the heat exchanger, the minimum qualification criteria for the supplier are as follows:

The supplier shall be ISO 9001:2015 [4] accredited.

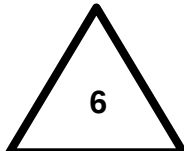
7 REVISION HISTORY

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

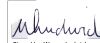
Rev. No.	Date approved	Nature of Revision	Prepared
1	See title page	First issue.	M Correia



FUNCTION	NAME	DESIGNATION	SIGNATURE	REVISION HISTORY				
F	PREPARED	Mr W Ludwick	Senior Process Engineer	 Signed by: Wayne Ludwick, Senior Process Engineer on 14/04/2025 08:54 (S15TC-402-001)	REV	DESCRIPTION	PREPARED	DATE
	REVIEWED	Mr N Manilal	Process Engineer	 Signed by: Nihal Manilal, nihal.manilal@ens.co.za FUNCTION ID: 14/04/2025 11:29 (S15TC-402-002)	2	Second Issue	W Ludwick	2024/10/24
					3	Update after Control Review	P Dube	2024/11/29
					4	Update after HAZOP 3 and aligned interlocks as per Interlock Schedule ENS-OWPVR-LST-24005-R1	P Dube	2025/01/29
					5	Update to correct document number in referenced documents	P Dube	2025/02/20
					6	Updated after HAZOP Close-out Report, and completion of equipment specifications and valve and line lists	W Ludwick	2025/04/10
REVIEWED	Mr BM Khumalo	Senior Process Engineer	 Signed by: Bheki Khumalo, Senior Process Engineer on 14/04/2025 08:54 (S15TC-402-001)	LIST OF REFERENCED P&IDs & DOCUMENTS				
REVIEWED	Mr SR Mngoma	Chief Engineer Mechanical	 Signed by: Sibusiso Mngoma, Chief Engineer Mechanical on 14/04/2025 09:06 (S15TC-402-002)					
REVIEWED	Dr G Manuel	Chief Engineer Control & Instrumentation	 Signed by: Gert Manuel, gert.manuel@ens.co.za 14/04/2025 10:25 (S15TC-402-003)					
REVIEWED	Mr WJ van den Berg	Chief Engineer Electrical	 Signed by: Willem van den Berg, Chief Engineer Electrical on 14/04/2025 09:18 (S15TC-402-001)					
APPROVED	Dr K Moodley	Chief Process Engineer	 Signed by: Keesus Moodley, keesus.moodley@ens.co.za 14/04/2025 09:28 (S15TC-402-002)					

 <i>We're in your world</i> South African Nuclear Energy Corporation SOC Limited	PROJECT	URANIUM CONTAMINATED WASTE OIL PLASMA GASIFICATION		DESTROY ALL PREVIOUS PRINTS 
	TITLE	P&ID – WASTE OIL FEED SYSTEM		
	DRG. NO.	ENS-OWPVR-PID-24002		
COPYRIGHT This drawing is the property of Necsa and may not, without written permission, be copied, communicated to a third party, or be used either wholly or in part for any purpose other than for which it is supplied.	DRAWN BY	W LUDWICK	SHEET 1 OF 1	REVISION
Classification: CONFIDENTIAL	DATE	2025/04/10		

ENGINEERING SERVICES DEPARTMENT			 necsa We're in your world South African Nuclear Energy Corporation SOC Limited
SPECIFICATION SHEET FOR OIL HEATER H1005			
Project	WOPG	Unit Tag No.	H1005
Datasheet Document No.	ENS-OWPVR-SPE-25001	Revision	1
Description	Brazed plate heat exchanger in the Waste Oil Plasma Gasification (WOPG) Demonstration Facility to increase the temperature of the waste oil feed to 60 - 70°C. This reduces the viscosity of the oil for easier flow through the spray nozzle inside the downstream plasma reactor to prevent possible blockage of the spray nozzle.		
Plant location	NECSA, Pelindaba, North-West Province.		
Equipment location	Process area inside Laboratory-150, Building V-H2.		
Safety Classification	SC-3 (N) and SC-2 (C) [a]		
Quality Classification	QC-3 (N) and QC-2 (C) [b]		
Duty	0.35 kW [e]		
FLOW MEDIA			
Fluid	UNITS	COLD MEDIUM	HOT MEDIUM
		Uranium-contaminated waste oil with the following estimated composition (wt/wt) : 3.22% toluene; 7.95% hexadecane; 16.61% heptadecane; 18.52% octadecane; 53.34% nonadecane; 0.11% elemental uranium; traces of elemental sulphur; 0.04% hydrogen fluoride; 0.21% hydrogen chloride [1]	Demineralised water
Inlet temperature [1]	°C	25	80
Outlet temperature [1]	°C	65	70
Design temperature	°C	100	100
Flow rate [1]	kg/h	10	20.22
Maximum operating pressure	kPa(g)	1000	600
Permissible pressure drop	kPa	20	20
Calculated pressure drop	kPa	Supplier to advise	Supplier to advise
Design pressure	kPa	1500	1500
FLUID PROPERTIES			
Density	kg/m ³	630 - 823 [1]	974.81 [2]
Specific heat	kJ/kg.K	2.07 [c]	4.2 [2]
Thermal conductivity	W/m.K	0.14 [d]	0.66 [2]
Viscosity	cP	1.73 - 3.29 [1]	0.377 [2]
Corrosive		Yes	No
Erosive		Yes	No
Abrasive		No	No
Toxic		Yes	No
Presence of solids		Possible uranium compounds, dust and rust	No
Presense of uranic material		Yes, small amounts of uranium compounds	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	
Total active heat transfer area	m ²	Supplier to advise	
Nominal plate gap	mm	Supplier to advise	

ENGINEERING SERVICES DEPARTMENT				 necsa We're in your world South African Nuclear Energy Corporation SOC Limited	
SPECIFICATION SHEET FOR OIL HEATER H1005					
Project		WOPG		Unit Tag No.	
Datasheet Document No.		ENS-OWPVR-SPE-25001		Revision	
				H1005	
				1	
DESIGN DATA					
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			
MECHANICAL INFORMATION					
Process connections	Pipe size	¾ Tubing	Pipe size	15NB SCH40 pipe	
	Type	Tubing compression fitting	Type	Flanged (Raised Face); 150 lb	
	Material	Stainless Steel	Material	Stainless Steel	
Material of construction	Casing	N/A	Plates	Stainless Steel	
Surface finish	Casing	N/A	Plates	Supplier to advise	
Surface protection	Casing	N/A	Plates	Supplier to advise	
Corrosion allowance	Casing	N/A	Plates	Supplier to advise	
Pressure rating	Casing	N/A	Plates	150 lb	
SITE CONDITIONS					
Altitude	m	1300			
Atmospheric pressure	kPa(a)	Min: 87.4 kPa; Max: 88.3 kPa			
Ambient temperature (min/max)	°C	Min: 2°C; Max: 32°C			
REFERENCES					
[1] ENS-OWPVR-CLC-24002: Mass & Energy Balance Calculations for the Basic Engineering Design of the Uranium Contaminated Waste Oil Plasma Gasification Project					
[2] www.engineeringtoolbox.com					
NOTES AND ABBREVIATIONS					
[a] SC - Safety Class					
[b] QC - Quality Class					
[c] Average estimated from information available in [1]					
[d] Estimated from the thermal conductivities of the individual organic compounds present in the oil feed					
[e] A calculated heat duty of 0,23 kW is given for the oil heater in [1]. A safety margin of 50% was incorporated to obtain the final heat load specified here.					
		Name		Signature & Date	
Compiled by		M Correia (Process Engineer)		 Signed by: Muzile Correia, muzile.correia@necsa.co.za 27/02/2023 07:46:17 (UTC+02:00)	
Checked		N Manilal (Process Engineer)		 Signed by: Nithil Manilal, nithil.manilal@necsa.co.za 01/03/2023 13:56:25 (UTC+02:00)	
Checked		S Masango (Mechanical Engineer)		 Signed by: Sipho Masango, sipho.masango@necsa.co.za 03/03/2023 08:35:42 (UTC+02:00)	
Checked		W Ludwick (Senior Process Engineer)		 Signed by: Werner Ludwick, werner.ludwick@necsa.co.za 03/03/2023 09:45:50 (UTC+02:00)	
Checked		G Manuel (Chief C&I Engineer)		 Signed by: Grant Manuel, grant.manuel@necsa.co.za 04/03/2023 14:32:50 (UTC+02:00)	
Checked		S Mngoma (Chief Mechanical Engineer)		 Signed by: Sibongile Mngoma, sibongile.mngoma@necsa.co.za 04/03/2023 14:16:02 (UTC+02:00)	
Checked		W van den Berg (Chief Electrical Engineer)		 Signed by: Willem Van Den Berg, willem.vandenberg@necsa.co.za 04/03/2023 14:48:03 (UTC+02:00)	
Approved		K Moodley (Chief Process Engineer)		 Signed by: Kapeen Moodley, kapeen.moodley@necsa.co.za 05/03/2023 08:47:33 (UTC+02:00)	
Distribution	1. ES Records 2. Docman 3. Dr K Moodley 4. Mr D Ngwenya				
This document is the property of Necsa and shall not be used, reproduced, transmitted or disclosed without prior written permission RESTRICTED					