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1. INTRODUCTION

Duvha Power Station is a 3000 MW, 6 Unit Coal Fired Power Station situated near Emalahleni, Mpumalanga, South Africa. The Power Station was commissioned in the early 1980s. Various coating and painting is required during outage opportunities as corrosion protection or general upkeep of the plant.

2. SUPPORTING CLAUSES

2.1 SCOPE

The works is for the specialized painting/coating of various oil tanks, coolers and water boxes on the turbine plant as detailed in section 3. **Prices quoted will be per m² of area coated.**

This contract shall be for an extended period and the services mentioned in this works information shall be called upon when required during different Unit outages. Refer to the contract for the duration of the contract.

The *Contractor* provides all equipment and associated engineering services to fulfil and execute the requirements of the Works Information / Scope of Work (SOW). The *Contractor* quotes on price per square meter coverage. Payment shall then be based on actual squares covered.

The Works include supplying of the necessary equipment specified in the price list to complete the required work.

All redundant equipment and used material to be removed from the plant by the *Contractor*.

2.1.1 Purpose

The purpose of this document is to provide the *Contractor* with all the details required to perform the work as defined in the scope and to meet the expectations of the *Employer*.

2.1.2 Applicability

This document applies to the Turbine Plant at Duvha Power Station.

2.2 NORMATIVE/INFORMATIVE REFERENCES

Parties using this document shall apply the most recent edition of the documents listed in the following paragraphs.

2.2.1 Normative References

- [1] ISO 9001 Quality Management Systems
- [2] 240-48929482 Tender Technical Evaluation Procedure
- [3] 240-101712128 Standard for the internal corrosion protection of water systems, Chemical Tanks and Vessels and Associated Piping with Linings
- [4] 240-106365693 Standard for the External Corrosion Protection of plant equipment and associated plant
- [5] 34-1168 Colour Coding, Symbolic Safety Signs and Demarcation

2.2.2 Informative References

- [6] 03A-ENG0001 Outage Scope Management Guideline

2.3 ABBREVIATIONS

Abbreviation	Description
AKZ	Alpha-numeric Plant Codification system
BFPT	Boiler Feed Pump Turbine
EA	Each
EFP	Electric Feed Pump
FRF	Fire Resistant Fluid
H2	Hydrogen
l	Litres
m	Meters
MOT	Main Oil Tank
RFWT	Reserve Feed Water Tank
SOW	Scope of Work

2.4 ROLES AND RESPONSIBILITIES

The roles and responsibilities are as defined in 03A-ENG0001 Outage Scope Management Guideline.

3. WORKS INFORMATION

- All internal corrosion protection shall comply with 240-101712128 [3].
- All external corrosion protection shall comply with 240-106365693 [4].

Table 1 below is a summary of the areas that require coating / painting with detailed information on the larger items supplied in section 3.1 and 3.2.

Table 1: SOW Summary

Item No.	Description	Size / Area	Internally / Externally	Qty	Rate per m²	Price
A	Turbine Tanks to be painted					
1	Lube Oil Tanks					
1.1	Main Oil Tank (MOT)	108 m²	External ¹	1		
1.2	Recovery Dirty Oil Tank	12 m²	External ¹	1		
1.3	Boiler Feed Pump Turbine (BFPT) Oil Tank	29 m²	External ¹	1		
1.4	EFP "A" Lube Oil Tank	28 m²	External ¹	1		
1.5	EFP "B" Lube Oil Tank	28 m²	External ¹	1		
2	Water Tanks					
2.1	Reserve Feed Water Tank (RFWT)	140 m²	External ²	1		
B	Turbine and Boiler feed pump coolers					
1	Seal Oil Coolers					
1.1	Waterboxes	5 m²	Internal ³ & External ¹	2		
1.2	End Shield / Water Return Chambers	4 m²		4		
1.3	Shell	5 m²	External ¹	2		
2	Turbine Lube Oil Coolers					
2.1	Waterboxes	8 m²	Internal ³ & External ¹	2		
2.2	End Shield/ Water Return Chambers	4 m²		4		
2.3	Shell	14 m²	External ¹	2		
3	FRF					
3.1	Waterboxes	3.5 m²	Internal ³	2		
3.2	End Shield/ Water Return Chambers	2 m²	Internal ³	4		
4	Stator Water					
4.1	Waterboxes	6 m²	Internal ³	2		
4.2	End Shield/ Water Return Chambers	4 m²	Internal ³	4		
5	BFPT Lube Oil Coolers					
5.1	Waterboxes	3.5 m²	Internal ³ & External ¹	2		
5.2	End Shield/ Water Return Chambers	4 m²		4		
5.3	Shell	11 m²	External ¹	2		
6	H2 Coolers					
6.1	Waterboxes	8 m²	Internal ³ & External ¹	8		
6.2	End Shield/ Water Return Chambers	8 m²		4		
7	Exciter Coolers					
7.1	Waterboxes	8 m²	Internal ³ & External ¹	8		
7.2	End Shield/ Water Return Chambers	8 m²		4		
8	EFP A & B Oil Coolers					
8.1	EFP Lube Oil Waterboxes	4 m²	Internal ³ &	2		

Item No.	Description	Size / Area	Internally / Externally	Qty	Rate per m²	Price
8.2	EFP Lube Oil End Shield/Water	2 m²	External¹	2		
8.3	EFP Lube Oil cooler shell	5 m²	External¹	2		
8.4	EFP Working Oil Waterboxes	4 m²	Internal³ & External¹	2		
8.5	EFP Working Oil End Shield/Water	2 m²		2		
8.6	EFP Working Oil cooler shell	5 m²	External¹	2		
8.7	EFP Motor Coolers	20 m²	External¹	2		
C	Turbine Main Condenser and BFPT Condenser					
1	Main Condenser					
1.1	Inlet Waterboxes	20 m²	Internal³ & External¹	2		
1.2	Outlet Waterboxes	20 m²		2		
1.3	Intermediate Waterboxes	20 m²		2		
2	Main Condenser Ducts					
2.1	Inlet Ducts	20 m²	External¹	2		
2.2	Outlet Ducts	20 m²	External¹	2		
3	BFPT Condenser					
3.1	Inlet Waterboxes	10 m²	Internal³ & External¹	1		
3.2	Outlet Waterboxes	10 m²		1		
3.3	Crossover Waterbox	10 m²		1		
4	BFPT Condenser Ducts					
4.1	Inlet Ducts	4 m²	External¹	1		
4.2	Outlet Ducts	4 m²	External¹	1		
D	Feed Pump Floor, plinths & Handrails					
1	Painting of floors, handrails etc.	324 m²	External¹⁴	1		
E	Others					
1	All Transportation(including tools, equipment etc) and Accommodation	EA		1		
2	Safety (all safety requirements to cover for risk related to this contract)	EA		1		
3	Site establishment and site de-establishment	EA		1		
	Total of the Prices (Excluding VAT):					
F	Additional coating required that is not specified in the scope					
1	Additional coating CPIA101C per m²					
2	Additional coating CPS03 per m²					
3	Additional coating as per Appendix A per m²					

¹ CPIA101C as per Table 1 in 240-106365693 [4]

² CPS03 as per Annexure F in 240-106365693 [4]

³ As per Appendix A

⁴ CPS12 as per Annexure F in 240-106365693 [4]

3.1 EXTERNAL PAINTING AND COATING

The *Contractor* must paint all components listed under section 3.1 externally. Refer to 240-106365693 [4] and 34-1168 Colour Coding, Symbolic Safety Signs and Demarcation [5].

3.1.1 Main Oil Tank (MOT)

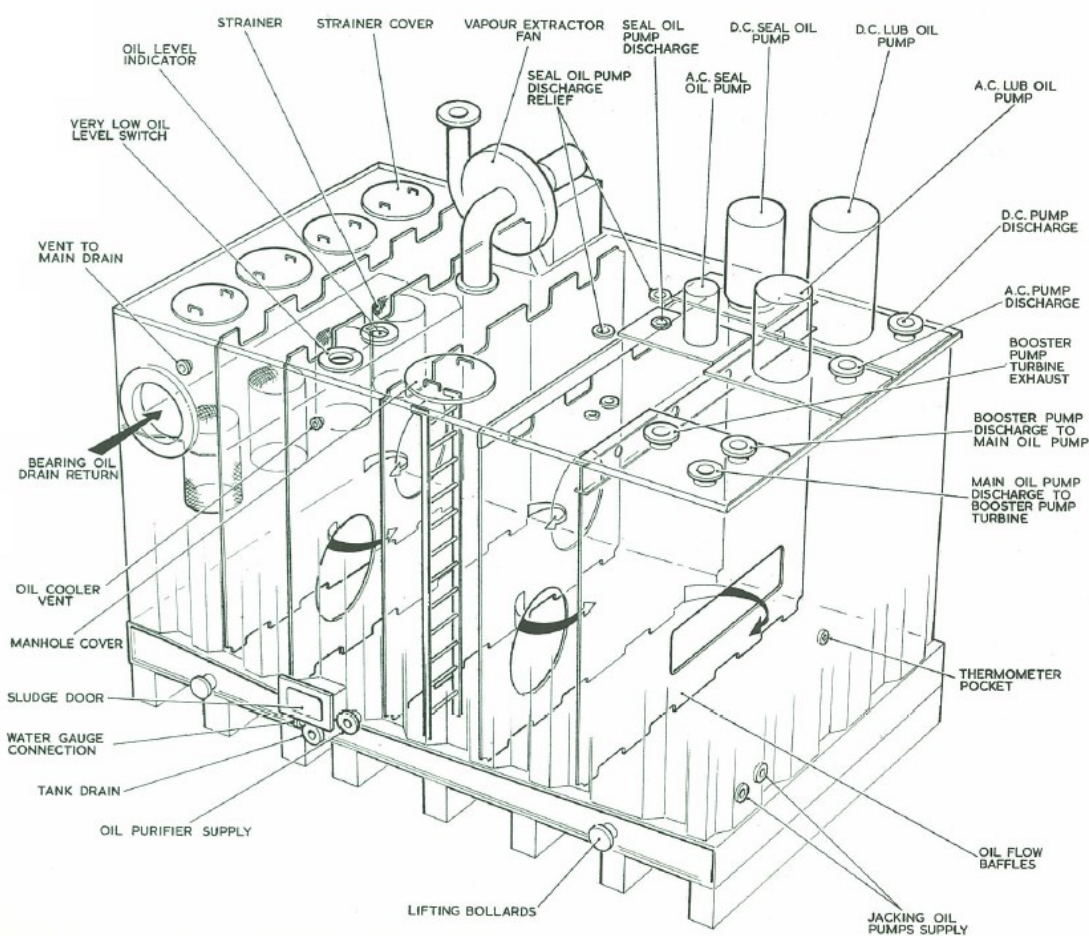


Figure 1: Main oil tank (MOT) drawing

Table 2: MOT details

1.0 LOCATION OF COMPONENT	
1.1 Name of power station	Duvha Power Station
1.2 Component Identification i.e. Plant Code	Main Oil Tank (SC11G901)
2.0 COMPONENT DETAILS	
2.1 Capacity of Component	97m ³
2.2 Dimensions	6270mm x 4335mm x 3580mm
2.3 No of access man-holes	1
2.4 Size of access man-holes	Diameter of 800mm
2.5 Location of access man-holes	Top of the oil tank
2.6 Diameter and length of pipework	See Figure 1
2.7 Material of construction (mild steel etc.)	Mild Steel
2.8 Please provide A4 drawing of component with this questionnaire	See Figure 1
3.0 ACCESS COMPONENT	
3.1 Is access available to locate compressors and equipment next to the component?	No
3.2 If adjacent access is not available how long will air and spray hoses need to be?	15m
4.0 TYPE OF WORK	
4.1 New works – clean original steel	Old painted equipment
4.2 Maintenance work – previously lined	Previously painted
4.3 Concrete i.e. Water retaining structures	
4.3.1 Are surfaces new, dry, cured, post service?	Outside surface is dry, might be oily due to leaks.
4.3.2 Is there spalling, cracking, exposed rebar?	Spalling paint
4.3.2 What is allowable duration for lining activity?	20 days
4.4 Type and age of previous lining	Paint, 10 years
4.5 Condition of the previous lining	Paint peeling off
4.6 Total surface area to be lined (m ²)	Outside: 110m ²

5.0 SURFACE PREPARATION	
5.1 Can abrasive blast cleaning be carried out inside the component/vessel/tank with consideration of access/confined space, ventilation etc.	No
6.0 PROPERTIES OF LIQUID CONTAINED IN OR IN CONTACT WITH THE COMPONENT	
6.3 Petroleum products – petrol, diesel etc.	
6.3.1 Type of petroleum product	Inside: Turbine lubricating oil. (CASTROL PERFECTO THZ 32)
6.5 Temperature & Pressure of liquid	
6.5.1 Normal operating temperature	50°C
6.5.2 Maximum or peak temperatures	70°C
6.5.3 Minimum temperatures	15°C
6.5.4 Pressure of Liquid	Atmospheric
6.5.5 Maximum pressure of liquid	Atmospheric
6.5.6 Flow rate of liquid	Oil is static
6.5.7 Will vacuum conditions occur?	No
6.6 If applicable, abrasion characteristics of the liquid	
6.6.1 Provide information of content, particle size, and physical characteristics of abrasive suspended matter likely to be present	N/A
7.0 OPERATION OF COMPONENT	
7.1 Is the component operated on a continuous or batch process basis	Continuous
7.3 Will the applied lining be subjected to any thermal shock, if so describe the operation.	No
8.0 GENERAL	
8.1 Provide any further information considered relevant to ensure the selection of the most appropriate organic lining/rubber lining material i.e. photographs of previous components/coating condition	Paint is open to atmosphere on the outside of the tank.

8.2 In the case of refurbishment work what is the shut-down period during which this lining work must be carried out (number of days)	
8.3 Provide information and details of whether corrosion protection by lining will interface with areas such as flanges, crevices and transition areas to other protective lining systems which would necessitate specific consideration. Schematics, photographs or appropriate drawings will be required to provide specific recommendations.	<p>Tank is connected with multiple flanges. Tank has welds on the outside of the tank.</p> <p>Text and arrows on tank must be painted back onto them.</p> <p>All the C&I equipment must be cleaned and protected during blast cleaning (External) and painting.</p>

3.1.2 Recovery Dirty Oil Tank

Table 3: Recovery dirty oil tank details

1.0 LOCATION OF COMPONENT	
1.1 Name of power station	Duvha Power Station
1.2 Component Identification i.e. Plant Code	Recovery Dirty Oil Tank (UW01G001)
2.0 COMPONENT DETAILS	
2.1 Capacity of Component	3 m ³
2.2 Dimensions	Diameter of 1.4m , Height of 2m
2.3 No of access man-holes	1
2.4 Size of access man-holes	Diameter on 0.6m
2.5 Location of access man-holes	Side of the tank
2.6 Diameter and length of pipework	Not applicable
2.7 Material of construction (mild steel etc.)	Mild Steel
2.8 Please provide A4 drawing of component with this questionnaire	Not available
3.0 ACCESS COMPONENT	
3.1 Is access available to locate compressors and equipment next to the component?	Yes
3.2 If adjacent access is not available how long will air and spray hoses need to be?	

4.0 TYPE OF WORK	
4.1 New works – clean original steel	Old painted equipment
4.2 Maintenance work – previously lined	Previously painted
4.3 Concrete i.e. Water retaining structures	
4.3.1 Are surfaces new, dry, cured, post service?	Outside surface is dry, might be oily due to leaks.
4.3.2 Is there spalling, cracking, exposed rebar?	Spalling paint
4.3.2 What is allowable duration for lining activity?	10 days
4.4 Type and age of previous lining	Paint, 30 years
4.5 Condition of the previous lining	Paint peeling off
4.6 Total surface area to be lined (m ²)	Outside: 10.5m ²
5.0 SURFACE PREPARATION	
5.1 Can abrasive blast cleaning be carried out inside the component/vessel/tank with consideration of access/confined space, ventilation etc.	No
6.0 PROPERTIES OF LIQUID CONTAINED IN OR IN CONTACT WITH THE COMPONENT	
6.3 Petroleum products – petrol, diesel etc.	
6.3.1 Type of petroleum product	Inside: Turbine lubricating oil. (CASTROL PERFECTO THZ 32) Outside: Sun and wind
6.5 Temperature & Pressure of liquid	
6.5.1 Normal operating temperature	Ambient
6.5.2 Maximum or peak temperatures	60°C
6.5.3 Minimum temperatures	0°C
6.5.4 Pressure of Liquid	Atmospheric
6.5.5 Maximum pressure of liquid	Atmospheric
6.5.6 Flow rate of liquid	Oil is static
6.5.7 Will vacuum conditions occur?	No
7.0 OPERATION OF COMPONENT	
7.1 Is the component operated on a continuous or batch process basis	Continuous

7.3 Will the applied lining be subjected to any thermal shock, if so describe the operation.	No
8.0 GENERAL	
8.1 Provide any further information considered relevant to ensure the selection of the most appropriate organic lining/rubber lining material i.e. photographs of previous components/coating condition	Paint is open to atmosphere on the outside of the tank.
8.2 In the case of refurbishment work what is the shut-down period during which this lining work must be carried out (number of days)	
8.3 Provide information and details of whether corrosion protection by lining will interface with areas such as flanges, crevices and transition areas to other protective lining systems which would necessitate specific consideration. Schematics, photographs or appropriate drawings will be required to provide specific recommendations.	Tank is connected with multiple flanges. Tank has welds on the inside and outside of the tank. Text and arrows on tank must be painted back onto them. All the C&I equipment must be cleaned and protected during blast cleaning and painting.

3.1.3 Boiler Feed Pump Turbine (BFPT) Oil Tank

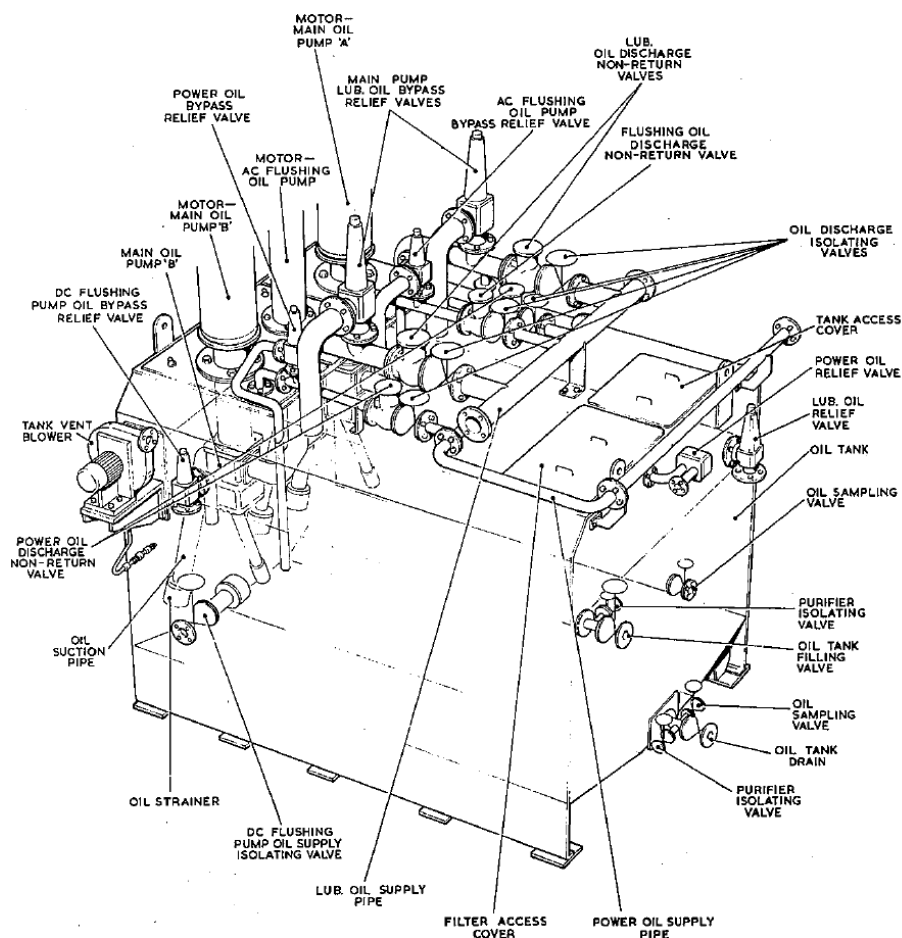


Figure 2: BFPT oil tank drawing

Table 4: BFPT oil tank details

1.0 LOCATION OF COMPONENT	
1.1 Name of power station	Duvha Power Station
1.2 Component Identification i.e. Plant Code	BFPT Oil Tank (SC71G951)
2.0 COMPONENT DETAILS	
2.1 Capacity of Component	13.8 m ³
2.2 Dimensions	2m x 3m x 2.3m
2.3 No of access man-holes	2
2.4 Size of access man-holes	1m x 800mm
2.5 Location of access man-holes	Top of the oil tank
2.6 Diameter and length of pipework	See Figure 2

2.7 Material of construction (mild steel etc.)	Mild Steel
2.8 Please provide A4 drawing of component with this questionnaire	See Figure 2
3.0 ACCESS COMPONENT	
3.1 Is access available to locate compressors and equipment next to the component?	Yes
3.2 If adjacent access is not available how long will air and spray hoses need to be?	
4.0 TYPE OF WORK	
4.1 New works – clean original steel	Old painted equipment
4.2 Maintenance work – previously lined	Previously painted
4.3 Concrete i.e. Water retaining structures	
4.3.1 Are surfaces new, dry, cured, post service?	Outside surface is dry, might be oily due to leaks.
4.3.2 Is there spalling, cracking, exposed rebar?	Spalling paint
4.3.2 What is allowable duration for lining activity?	10 days
4.4 Type and age of previous lining	Paint, 10 years
4.5 Condition of the previous lining	Paint peeling off
4.6 Total surface area to be lined (m ²)	Outside: 28m ²
5.0 SURFACE PREPARATION	
5.1 Can abrasive blast cleaning be carried out inside the component/vessel/tank with consideration of access/confined space, ventilation etc.	No
6.0 PROPERTIES OF LIQUID CONTAINED IN OR IN CONTACT WITH THE COMPONENT	
6.3 Petroleum products – petrol, diesel etc.	
6.3.1 Type of petroleum product	Inside: Turbine lubricating oil. (CASTROL PERFECTO THZ 32)
6.5 Temperature & Pressure of liquid	
6.5.1 Normal operating temperature	50°C
6.5.2 Maximum or peak temperatures	70°C
6.5.3 Minimum temperatures	15°C

6.5.4 Pressure of Liquid	Atmospheric
6.5.5 Maximum pressure of liquid	Atmospheric
6.5.6 Flow rate of liquid	Oil is static
6.5.7 Will vacuum conditions occur?	No
6.6 If applicable, abrasion characteristics of the liquid	
6.6.1 Provide information of content, particle size, and physical characteristics of abrasive suspended matter likely to be present	N/A
7.0 OPERATION OF COMPONENT	
7.1 Is the component operated on a continuous or batch process basis	Continuous
7.3 Will the applied lining be subjected to any thermal shock, if so describe the operation.	No
8.0 GENERAL	
8.1 Provide any further information considered relevant to ensure the selection of the most appropriate organic lining/rubber lining material i.e. photographs of previous components/coating condition	Paint is open to atmosphere on the outside of the tank.
8.2 In the case of refurbishment work what is the shut-down period during which this lining work must be carried out (number of days)	
8.3 Provide information and details of whether corrosion protection by lining will interface with areas such as flanges, crevices and transition areas to other protective lining systems which would necessitate specific consideration. Schematics, photographs or appropriate drawings will be required to provide specific recommendations.	Tank is connected with multiple flanges. Tank has welds on the inside and outside of the tank. Text and arrows on tank must be painted back onto them. All the C&I equipment must be cleaned and protected during blast cleaning and painting.

3.1.4 EFP A and B Lube Oil Tanks

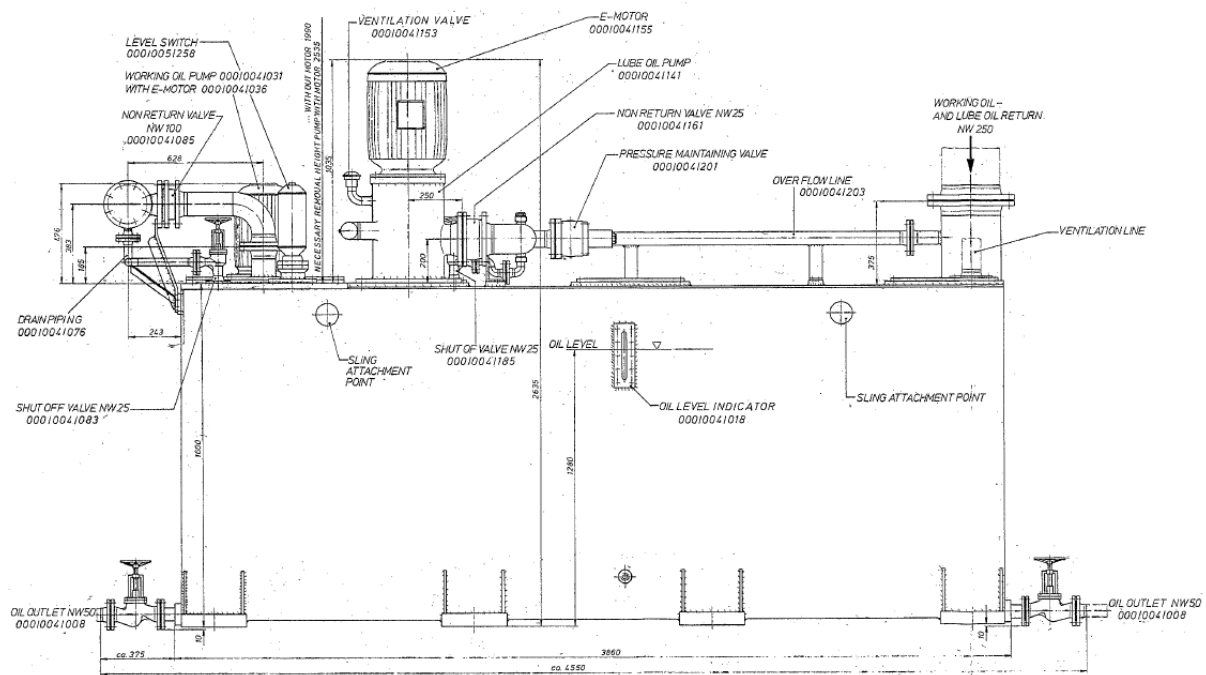


Figure 3: EFP A & B lube oil tanks drawing

Table 5: EFP A & B lube oil tank details

1.0 LOCATION OF COMPONENT	
1.1 Name of power station	Duvha Power Station
1.2 Component Identification i.e. Plant Code	EFP A and B Oil Tanks (SC76G971 & SC78G981)
2.0 COMPONENT DETAILS	
2.1 Capacity of Component	13.4m ³
2.2 Dimensions	1.6m x 3.8m x 2.2m
2.3 No of access man-holes	1
2.4 Size of access man-holes	1.1m x 850mm
2.5 Location of access man-holes	Top of the oil tank
2.6 Diameter and length of pipework	See Figure 3
2.7 Material of construction (mild steel etc.)	Mild Steel
2.8 Please provide A4 drawing of component with this questionnaire	See Figure 3
3.0 ACCESS COMPONENT	

3.1 Is access available to locate compressors and equipment next to the component?	Yes
3.2 If adjacent access is not available how long will air and spray hoses need to be?	
4.0 TYPE OF WORK	
4.1 New works – clean original steel	Old painted equipment
4.2 Maintenance work – previously lined	Previously painted
4.3 Concrete i.e. Water retaining structures	
4.3.1 Are surfaces new, dry, cured, post service?	Outside surface is dry, might be oily due to leaks.
4.3.2 Is there spalling, cracking, exposed rebar?	Spalling paint
4.3.2 What is allowable duration for lining activity?	10 days
4.4 Type and age of previous lining	Paint, 10 years
4.5 Condition of the previous lining	Paint peeling off
4.6 Total surface area to be lined (m ²)	Outside: 28m ²
5.0 SURFACE PREPARATION	
5.1 Can abrasive blast cleaning be carried out inside the component/vessel/tank with consideration of access/confined space, ventilation etc.	No
6.0 PROPERTIES OF LIQUID CONTAINED IN OR IN CONTACT WITH THE COMPONENT	
6.3 Petroleum products – petrol, diesel etc.	
6.3.1 Type of petroleum product	Inside: Hydraulic lubricating oil. (CASTROL Energol HLP 32)
6.4 Water – type of water	
6.5 Temperature & Pressure of liquid	
6.5.1 Normal operating temperature	50°C
6.5.2 Maximum or peak temperatures	80°C
6.5.3 Minimum temperatures	15°C
6.5.4 Pressure of Liquid	Atmospheric
6.5.5 Maximum pressure of liquid	Atmospheric
6.5.6 Flow rate of liquid	Oil is static

6.5.7 Will vacuum conditions occur?	No
7.0 OPERATION OF COMPONENT	
7.1 Is the component operated on a continuous or batch process basis	Continuous
7.2 Will the applied lining be subjected to any thermal shock, if so describe the operation.	No
8.0 GENERAL	
8.1 Provide any further information considered relevant to ensure the selection of the most appropriate organic lining/rubber lining material i.e. photographs of previous components/coating condition	Paint is open to atmosphere on the outside of the tank.
8.2 In the case of refurbishment work what is the shut-down period during which this lining work must be carried out (number of days)	
8.3 Provide information and details of whether corrosion protection by lining will interface with areas such as flanges, crevices and transition areas to other protective lining systems which would necessitate specific consideration. Schematics, photographs or appropriate drawings will be required to provide specific recommendations.	Tank is connected with multiple flanges. Tank has welds on the inside and outside of the tank. Text and arrows on tank must be painted back onto them. All the C&I equipment must be cleaned and protected during blast cleaning and painting.

3.1.5 EFP A & B Lube & Working oil coolers

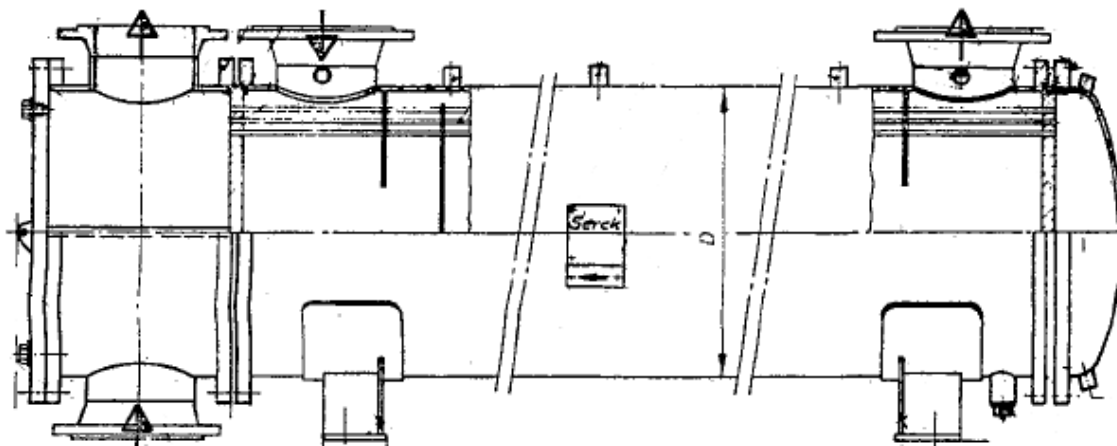


Figure 4: EFP A & B Lube and Working oil cooler

Table 6: EFP Lube oil cooler details

1.0 LOCATION OF COMPONENT	
1.1 Name of power station	Duvha Power Station
1.2 Component Identification i.e. Plant Code	EFP Lube Oil Coolers (SC76G973 & SC78G982)
2.0 COMPONENT DETAILS	
2.1 Capacity of Component	N/A
2.2 Dimensions	3m x ø465mm
2.3 No of access man-holes	N/A
2.4 Size of access man-holes	N/A
2.5 Location of access man-holes	N/A
2.6 Diameter and length of pipework	ø150 x 3m
2.7 Material of construction (mild steel etc.)	Mild Steel
2.8 Please provide A4 drawing of component with this questionnaire	Figure 4
3.0 ACCESS COMPONENT	
3.1 Is access available to locate compressors and equipment next to the component?	No
3.2 If adjacent access is not available how long will air and spray hoses need to be?	8m
4.0 TYPE OF WORK	

4.1 New works – clean original steel	Old painted equipment
4.2 Maintenance work – previously lined	Previously painted
4.3 Concrete i.e. Water retaining structures	
4.3.1 Are surfaces new, dry, cured, post service?	Surfaces are dry, might be oily due to leaks
4.3.2 Is there spalling, cracking, exposed rebar?	Spalling paint
4.3.2 What is allowable duration for lining activity?	7 days
4.4 Type and age of previous lining	Paint, 30 years
4.5 Condition of the previous lining	Paint faded and peeling off
4.6 Total surface area to be lined (m ²)	4.4m ²
5.0 SURFACE PREPARATION	
5.1 Can abrasive blast cleaning be carried out inside the component/vessel/tank with consideration of access/confined space, ventilation etc.	Yes, only cooler's externals must be painted. Equipment around the equipment must be protected during abrasive cleaning.
6.0 PROPERTIES OF LIQUID CONTAINED IN OR IN CONTACT WITH THE COMPONENT	
6.5 Temperature & Pressure of liquid	
6.5.1 Normal operating temperature	60°C
6.5.2 Maximum or peak temperatures	75°C
6.5.3 Minimum temperatures	15°C
6.5.4 Pressure of Liquid	Atmospheric
6.5.5 Maximum pressure of liquid	Atmospheric
6.5.6 Flow rate of liquid	N/A
6.5.7 Will vacuum conditions occur?	No
6.6 If applicable, abrasion characteristics of the liquid	
6.6.1 Provide information of content, particle size, and physical characteristics of abrasive suspended matter likely to be present	N/A
7.0 OPERATION OF COMPONENT	
7.1 Is the component operated on a continuous or batch process basis	Continuous
7.2 Ion exchange vessels	N/A

7.3 Will the applied lining be subjected to any thermal shock, if so describe the operation.	Yes, 25°C to 60°C in 3 minutes. 60°C to 30°C in 1 minutes.
8.0 GENERAL	
8.1 Provide any further information considered relevant to ensure the selection of the most appropriate organic lining/rubber lining material i.e. photographs of previous components/coating condition	Paint is open to atmosphere.
8.2 In the case of refurbishment work what is the shut-down period during which this lining work must be carried out (number of days)	
8.3 Provide information and details of whether corrosion protection by lining will interface with areas such as flanges, crevices and transition areas to other protective lining systems which would necessitate specific consideration. Schematics, photographs or appropriate drawings will be required to provide specific recommendations.	Coolers are connected with multiple flanges. Coolers have welds on it. Text on coolers must be painted back onto them.

Table 7: EFP Working oil cooler details

1.0 LOCATION OF COMPONENT	
1.1 Name of power station	Duvha Power Station
1.2 Component Identification i.e. Plant Code	EFP Working Oil Coolers (SC77G974 & SC79G984)
2.0 COMPONENT DETAILS	
2.1 Capacity of Component	N/A
2.2 Dimensions	3m x ø500mm
2.3 No of access man-holes	N/A
2.4 Size of access man-holes	N/A
2.5 Location of access man-holes	N/A
2.6 Diameter and length of pipework	ø150 x 3m
2.7 Material of construction (mild steel etc.)	Mild Steel
2.8 Please provide A4 drawing of component with this questionnaire	Figure 4

3.0 ACCESS COMPONENT	
3.1 Is access available to locate compressors and equipment next to the component?	No
3.2 If adjacent access is not available how long will air and spray hoses need to be?	8m
4.0 TYPE OF WORK	
4.1 New works – clean original steel	Old painted equipment
4.2 Maintenance work – previously lined	Previously painted
4.3 Concrete i.e. Water retaining structures	
4.3.1 Are surfaces new, dry, cured, post service?	Surfaces are dry, might be oily due to leaks
4.3.2 Is there spalling, cracking, exposed rebar?	Spalling paint
4.3.2 What is allowable duration for lining activity?	7 days
4.4 Type and age of previous lining	Paint, 30 years
4.5 Condition of the previous lining	Paint faded and peeling off
4.6 Total surface area to be lined (m ²)	4.8m ²
5.0 SURFACE PREPARATION	
5.1 Can abrasive blast cleaning be carried out inside the component/vessel/tank with consideration of access/confined space, ventilation etc.	Yes, only cooler's externals must be painted. Equipment around the equipment must be protected during abrasive cleaning.
6.0 PROPERTIES OF LIQUID CONTAINED IN OR IN CONTACT WITH THE COMPONENT	
6.5 Temperature & Pressure of liquid	
6.5.1 Normal operating temperature	90°C
6.5.2 Maximum or peak temperatures	130°C
6.5.3 Minimum temperatures	15°C
6.5.4 Pressure of Liquid	Atmospheric
6.5.5 Maximum pressure of liquid	Atmospheric
6.5.6 Flow rate of liquid	N/A
6.5.7 Will vacuum conditions occur?	No
7.0 OPERATION OF COMPONENT	
7.1 Is the component operated on a continuous or batch process basis	Continuous

7.3 Will the applied lining be subjected to any thermal shock, if so describe the operation.	Yes, 30°C to 90°C in 4 minutes. 90°C to 30°C in 1 minute.
8.0 GENERAL	
8.1 Provide any further information considered relevant to ensure the selection of the most appropriate organic lining/rubber lining material i.e. photographs of previous components/coating condition	Paint is open to atmosphere.
8.2 In the case of refurbishment work what is the shut-down period during which this lining work must be carried out (number of days)	
8.3 Provide information and details of whether corrosion protection by lining will interface with areas such as flanges, crevices and transition areas to other protective lining systems which would necessitate specific consideration. Schematics, photographs or appropriate drawings will be required to provide specific recommendations.	Coolers are connected with multiple flanges. Coolers have welds on it. Text on coolers must be painted back onto them.

3.1.6 BFPT Lube oil coolers

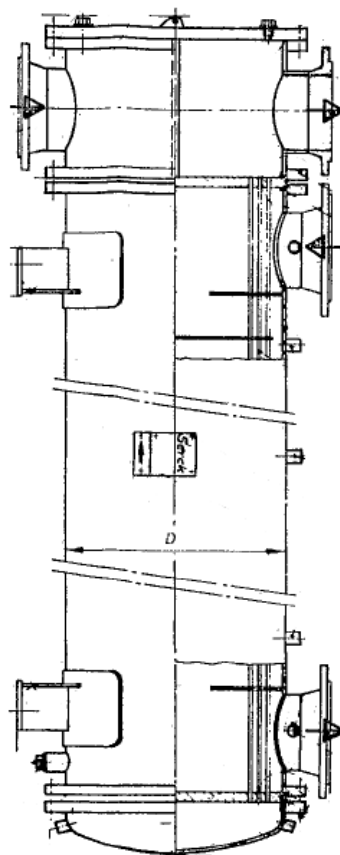


Figure 5: BFPT Lube oil cooler drawing

Table 8: BFPT Lube oil cooler details

1.0 LOCATION OF COMPONENT	
1.1 Name of power station	Duvha Power Station
1.2 Component Identification i.e. Plant Code	BFPT Lube Oil Coolers (SC71G952 & SC71G953)
2.0 COMPONENT DETAILS	
2.1 Capacity of Component	N/A
2.2 Dimensions	2.8m x ø450mm
2.3 No of access man-holes	N/A
2.4 Size of access man-holes	N/A
2.5 Location of access man-holes	N/A
2.6 Diameter and length of pipework	ø150 x 3m
2.7 Material of construction (mild steel etc.)	Mild Steel

2.8 Please provide A4 drawing of component with this questionnaire	Figure 5
3.0 ACCESS COMPONENT	
3.1 Is access available to locate compressors and equipment next to the component?	No
3.2 If adjacent access is not available how long will air and spray hoses need to be?	10m
4.0 TYPE OF WORK	
4.1 New works – clean original steel	Old painted equipment
4.2 Maintenance work – previously lined	Previously painted
4.3 Concrete i.e. Water retaining structures	
4.3.1 Are surfaces new, dry, cured, post service?	Surfaces are dry, might be oily due to leaks
4.3.2 Is there spalling, cracking, exposed rebar?	Spalling paint
4.3.2 What is allowable duration for lining activity?	7 days
4.4 Type and age of previous lining	Paint, 30 years
4.5 Condition of the previous lining	Paint faded and peeling off
4.6 Total surface area to be lined (m ²)	4m ²
5.0 SURFACE PREPARATION	
5.1 Can abrasive blast cleaning be carried out inside the component/vessel/tank with consideration of access/confined space, ventilation etc.	Yes, only cooler's externals must be painted. Equipment around the equipment must be protected during abrasive cleaning.
6.0 PROPERTIES OF LIQUID CONTAINED IN OR IN CONTACT WITH THE COMPONENT	
6.5 Temperature & Pressure of liquid	
6.5.1 Normal operating temperature	60°C
6.5.2 Maximum or peak temperatures	80°C
6.5.3 Minimum temperatures	15°C
6.5.4 Pressure of Liquid	Atmospheric
6.5.5 Maximum pressure of liquid	Atmospheric
6.5.6 Flow rate of liquid	N/A
6.5.7 Will vacuum conditions occur?	No
6.6 If applicable, abrasion characteristics of the liquid	

6.6.1 Provide information of content, particle size, and physical characteristics of abrasive suspended matter likely to be present	N/A
7.0 OPERATION OF COMPONENT	
7.1 Is the component operated on a continuous or batch process basis	Continuous
7.2 Will the applied lining be subjected to any thermal shock, if so describe the operation.	No
8.0 GENERAL	
8.1 Provide any further information considered relevant to ensure the selection of the most appropriate organic lining/rubber lining material i.e. photographs of previous components/coating condition	Paint is open to atmosphere.
8.2 In the case of refurbishment work what is the shut-down period during which this lining work must be carried out (number of days)	
8.3 Provide information and details of whether corrosion protection by lining will interface with areas such as flanges, crevices and transition areas to other protective lining systems which would necessitate specific consideration. Schematics, photographs or appropriate drawings will be required to provide specific recommendations.	Coolers are connected with multiple flanges. Coolers have welds on it. Text on coolers must be painted back onto them.

3.1.7 Reserve Feed Water Tank (RFTW)

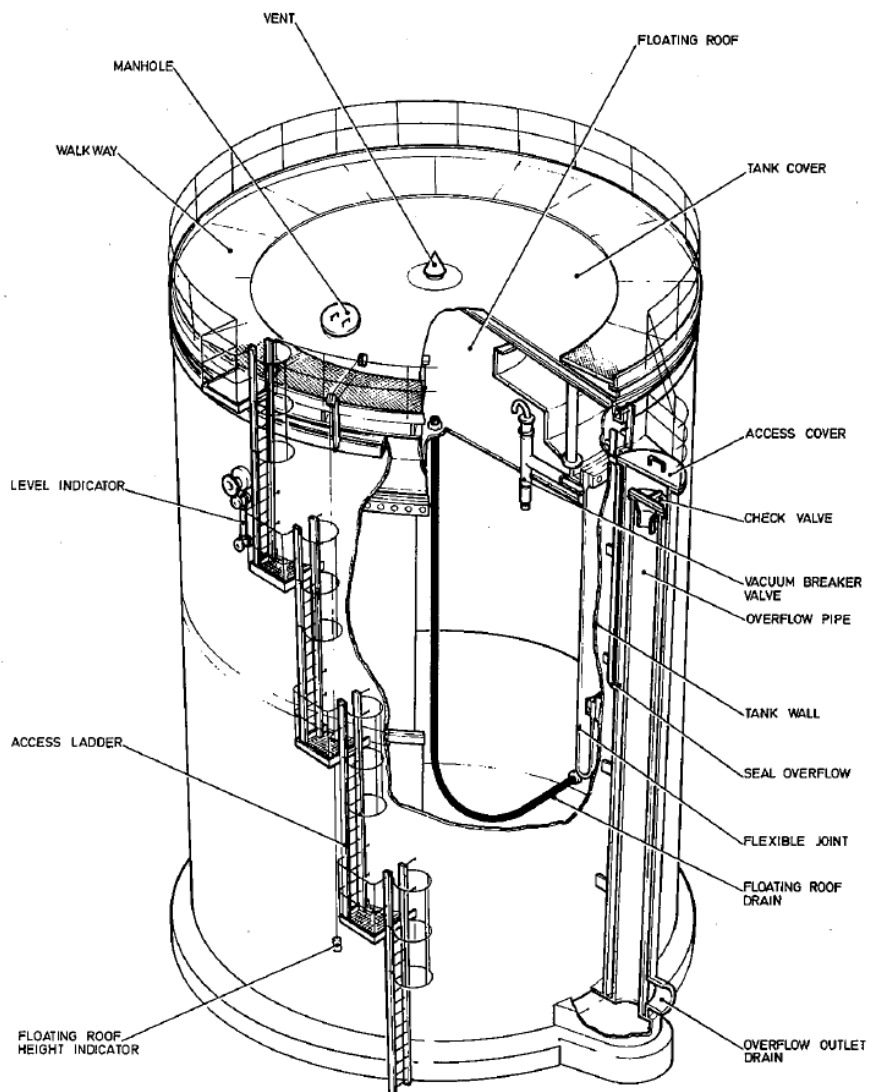


Figure 6: RFT drawing

Table 9: Reserve feed water tank

1.0 LOCATION OF COMPONENT	
1.1 Name of power station	Duvha Power Station
1.2 Component Identification i.e. Plant Code	RFTW (RM51)
2.0 COMPONENT DETAILS	
2.1 Capacity of Component	600m ³
2.2 Dimensions	Internal diameter of 9.05m. Height of 11.5m

2.3 No of access man-holes	One
2.4 Size of access man-holes	Diameter of 1.2m
2.5 Location of access man-holes	Top of the tank
2.6 Diameter and length of pipework	maximum of 200mm
2.7 Material of construction (mild steel etc.)	Carbon steel
2.8 Please provide A4 drawing of component with this questionnaire	
3.0 ACCESS COMPONENT	
3.1 Is access available to locate compressors and equipment next to the component?	Yes
4.0 TYPE OF WORK	
4.1 New works – clean original steel	Old painted equipment
4.2 Maintenance work – previously lined	Previously painted
4.3 Concrete i.e. Water retaining structures	N/A
4.3.1 Are surfaces new, dry, cured, post service?	Scope is for the outside of the tank which is dry.
4.3.2 Is there spalling, cracking, exposed rebar?	No
4.3.2 What is allowable duration for lining activity?	7 days
4.4 Type and age of previous lining	N/A
4.5 Condition of the previous lining	N/A
4.6 Total surface area to be lined (m ²)	415m ²
5.0 SURFACE PREPARATION	
5.1 Can abrasive blast cleaning be carried out inside the component/vessel/tank with consideration of access/confined space, ventilation etc.	Yes, only tank's externals must be painted. Equipment around the tank must be protected during abrasive cleaning.
6.0 PROPERTIES OF LIQUID CONTAINED IN OR IN CONTACT WITH THE COMPONENT	
6.1 Temperature & Pressure of liquid	
6.1.1 Normal operating temperature	Ambient conditions
6.1.2 Maximum or peak temperatures	60°C
6.1.3 Minimum temperatures	Ambient conditions
6.1.4 Pressure of Liquid	Atmospheric

6.1.5 Maximum pressure of liquid	Atmospheric
6.1.6 Flow rate of liquid	Wind speeds
6.1.7 Will vacuum conditions occur?	No
7.0 OPERATION OF COMPONENT	
7.1 Is the component operated on a continuous or batch process basis	Continuous
7.3 Will the applied lining be subjected to any thermal shock, if so describe the operation.	No
8.0 GENERAL	
8.1 Provide any further information considered relevant to ensure the selection of the most appropriate organic lining/rubber lining material i.e. photographs of previous components/coating condition	Paint will be exposed to sun and the wind
8.2 In the case of refurbishment work what is the shut-down period during which this lining work must be carried out (number of days)	
8.3 Provide information and details of whether corrosion protection by lining will interface with areas such as flanges, crevices and transition areas to other protective lining systems which would necessitate specific consideration. Schematics, photographs or appropriate drawings will be required to provide specific recommendations.	<p>Tank is connected with multiple flanges. Tank has welds on it. Text on the tank must be painted back onto them. Only the carbon steel section of the tank will be painted. Not the stainless section.</p> <p>All the C&I equipment must be cleaned and protected during blast cleaning and painting.</p>

3.2 INTERNAL & EXTERNAL COATING

The Contractor needs to coat all components listed under section 3.2 internally as well as externally. Refer to Appendix A for the internal coating standard and 240-106365693 [4] for external coating standard.

The external areas of the main condenser and BFPT condenser itself will be coated as required. The waterboxes on these components will be coated internally and externally as specified.

3.2.1 Main Condenser waterboxes

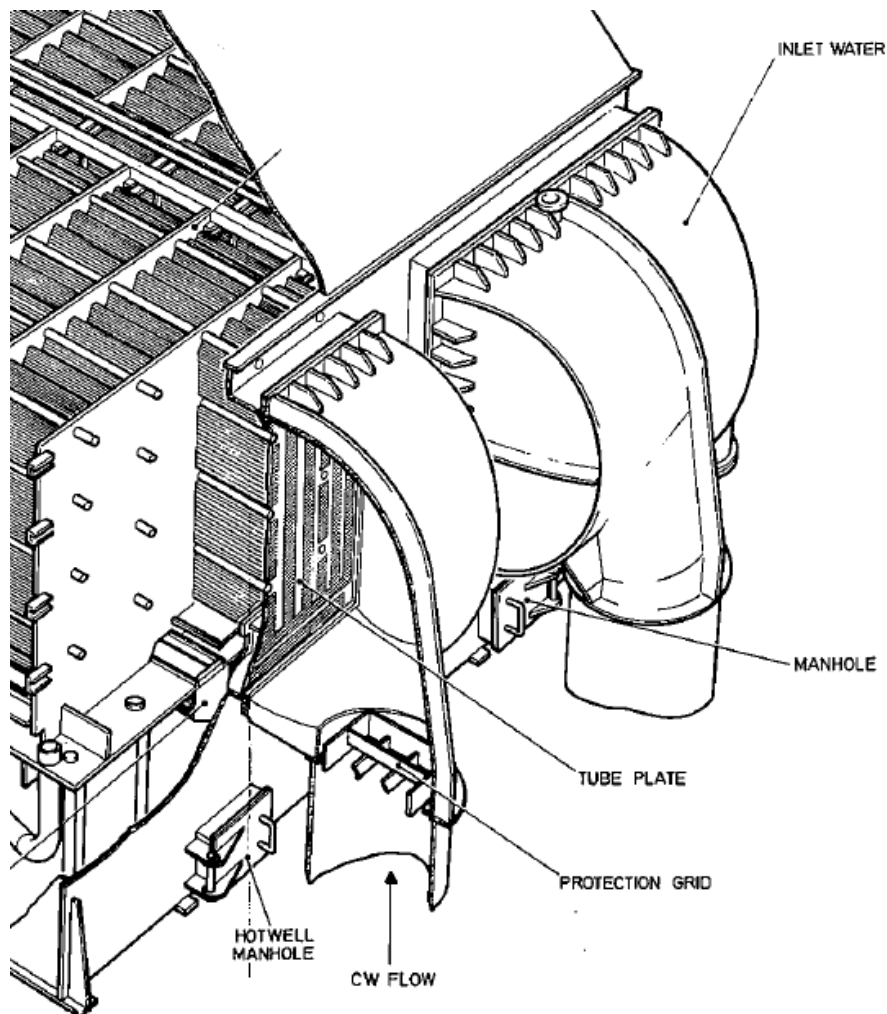


Figure 7: Main condenser waterbox drawing

Table 10: Main condenser waterbox detail

1.0 LOCATION OF COMPONENT	
1.1 Name of power station	Duvha Power Station
1.2 Component Identification i.e. Plant Code	Main Condenser waterboxes
2.0 COMPONENT DETAILS	
2.1 Capacity of Component	Varies
2.2 Dimensions	Varies
2.3 No of access man-holes	One
2.4 Size of access man-holes	Diameter of 1.2m
2.5 Location of access man-holes	Underneath the water box
2.6 Diameter and length of pipework	maximum of 1600mm diameter
2.7 Material of construction (mild steel etc.)	Cast steel
2.8 Please provide A4 drawing of component with this questionnaire	Figure 7
3.0 ACCESS COMPONENT	
3.1 Is access available to locate compressors and equipment next to the component?	Yes
3.2 If adjacent access is not available how long will air and spray hoses need to be?	N/A
4.0 TYPE OF WORK	
4.1 New works – clean original steel	Coated or rubber lined equipment
4.2 Maintenance work – previously lined	Previously coated or rubber lined
4.3 Concrete i.e. Water retaining structures	N/A
4.3.1 Are surfaces new, dry, cured, post service?	Inside surfaces are wet. Outside surface is dry.
4.3.2 Is there spalling, cracking, exposed rebar?	Spalling lining
4.3.2 What is allowable duration for lining activity?	20 days
4.4 Type and age of previous lining	Paint or rubber lined, 5 years
4.5 Condition of the previous lining	Lining peeling off
4.6 Total surface area to be lined (m2)	Inside: 33m ² Outside: 30m ²

5.0 SURFACE PREPARATION	
5.1 Can abrasive blast cleaning be carried out inside the component/vessel/tank with consideration of access/confined space, ventilation etc.	Yes, Surface Preparation - Abrasive blast clean to Grade Sa 3
6.0 PROPERTIES OF LIQUID CONTAINED IN OR IN CONTACT WITH THE COMPONENT	
6.4 Water – type of water	Raw water used for cooling
6.4.4 Water treatment process waters (provide specific composition/concentration) i.e. % hydrochloric acid, sulphuric acid, caustic soda, ammonia, etc.)	pH 8.1 to 8.6, Turbidity (FTUs) max <100, Conductivity ($\mu\text{S.cm}^{-1}$) max <4000, Total aerobic bacteria (CFUs/ml) max <10 ⁵ , Total anaerobic bacteria (CFUs/ml) max <10 ⁴ , Chlorides (mg.kg^{-1}) max < 400 mg.kg^{-1} as Cl, Sulphate (mg.kg^{-1}) max <1000 mg.kg^{-1}
6.5 Temperature & Pressure of liquid	
6.5.1 Normal operating temperature	40°C
6.5.2 Maximum or peak temperatures	60°C
6.5.3 Minimum temperatures	Ambient conditions
6.5.4 Pressure of Liquid	210kPa
6.5.5 Maximum pressure of liquid	250kPa
6.5.6 Flow rate of liquid	6.25 m ³ /s
6.5.7 Will vacuum conditions occur?	No
7.0 OPERATION OF COMPONENT	
7.1 Is the component operated on a continuous or batch process basis	Continuous
7.2 Will the applied lining be subjected to any thermal shock, if so describe the operation.	No
8.0 GENERAL	
8.1 Provide any further information considered relevant to ensure the selection of the most appropriate organic lining/rubber lining material i.e. photographs of previous components/coating condition	The inside of the water box is a confined space. Paint is open to atmosphere on the outside of the waterbox. Exposed to dust. Not in contact with the sun.

8.2 In the case of refurbishment work what is the shut-down period during which this lining work must be carried out (number of days)	The shorter outages are 21 days. Where the allowable working time is 15 days
8.3 Provide information and details of whether corrosion protection by lining will interface with areas such as flanges, crevices and transition areas to other protective lining systems which would necessitate specific consideration. Schematics, photographs or appropriate drawings will be required to provide specific recommendations.	Waterbox is connected with a large flange to the condenser tubesheet and a rubber gasket is used. On the inside the rubber gasket protrudes slightly into the waterbox which forms a crevice. Special care need to be taken to ensure proper surface preparation in this area.

3.2.2 BFPT Condenser waterboxes

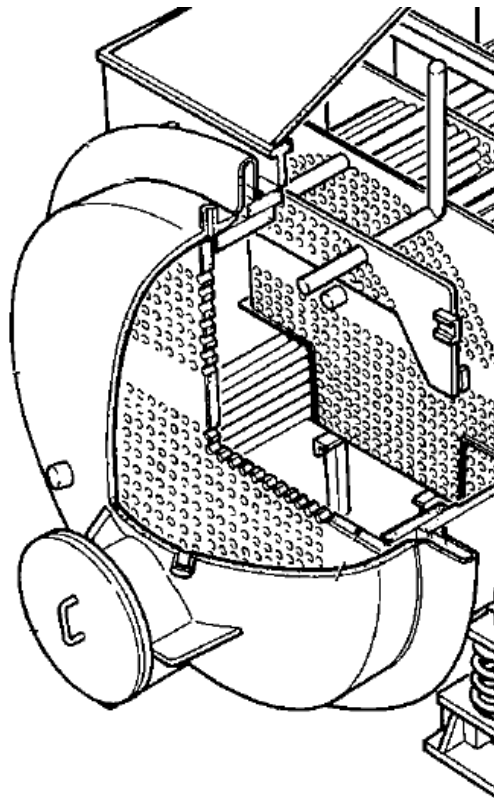


Figure 8: BFPT Condenser waterbox drawing

Table 11: BFPT Condenser waterbox details

1.0 LOCATION OF COMPONENT	
1.1 Name of power station	Duvha Power Station
1.2 Component Identification i.e. Plant Code	BFPT Condenser waterboxes (RW11G901)
2.0 COMPONENT DETAILS	
2.1 Capacity of Component	
2.2 Dimensions	Diameter of 2300mm
2.3 No of access man-holes	One per water box section
2.4 Size of access man-holes	Diameter of 600mm
2.5 Location of access man-holes	Side the water box
2.6 Diameter and length of pipework	maximum of 700mm diameter
2.7 Material of construction (mild steel etc.)	Carbon steel
2.8 Please provide A4 drawing of component with this questionnaire	Figure 8
3.0 ACCESS COMPONENT	
3.1 Is access available to locate compressors and equipment next to the component?	Yes
3.2 If adjacent access is not available how long will air and spray hoses need to be?	N/A
4.0 TYPE OF WORK	
4.1 New works – clean original steel	Coated equipment
4.2 Maintenance work – previously lined	Previously coated
4.3 Concrete i.e. Water retaining structures	N/A
4.3.1 Are surfaces new, dry, cured, post service?	Inside surfaces are wet. Outside surface is dry.
4.3.2 Is there spalling, cracking, exposed rebar?	Spalling lining
4.3.2 What is allowable duration for lining activity?	20 days
4.4 Type and age of previous lining	Paint or rubber lined, 5 years
4.5 Condition of the previous lining	Lining peeling off
4.6 Total surface area to be lined (m2)	Inside: 15m ² Outside: 10m ²

5.0 SURFACE PREPARATION	
5.1 Can abrasive blast cleaning be carried out inside the component/vessel/tank with consideration of access/confined space, ventilation etc.	Yes, Surface Preparation - Abrasive blast clean to Grade Sa 3
6.0 PROPERTIES OF LIQUID CONTAINED IN OR IN CONTACT WITH THE COMPONENT	
6.4 Water – type of water	Raw water used for cooling
6.4.4 Water treatment process waters (provide specific composition/concentration) i.e. % hydrochloric acid, sulphuric acid, caustic soda, ammonia, etc.)	pH 8.1 to 8.6, Turbidity (FTUs) max <100, Conductivity ($\mu\text{S.cm}^{-1}$) max <4000, Total aerobic bacteria (CFUs/ml) max <10 ⁵ , Total anaerobic bacteria (CFUs/ml) max <10 ⁴ , Chlorides (mg.kg^{-1}) max < 400 mg.kg^{-1} as Cl, Sulphate (mg.kg^{-1}) max <1000 mg.kg^{-1}
6.5 Temperature & Pressure of liquid	
6.5.1 Normal operating temperature	60°C
6.5.2 Maximum or peak temperatures	100°C
6.5.3 Minimum temperatures	Ambient conditions
6.5.4 Pressure of Liquid	210kPa
6.5.5 Maximum pressure of liquid	250kPa
6.5.6 Flow rate of liquid	0.826 m ³ /s
6.5.7 Will vacuum conditions occur?	No
7.0 OPERATION OF COMPONENT	
7.1 Is the component operated on a continuous or batch process basis	Continuous
7.2 Will the applied lining be subjected to any thermal shock, if so describe the operation.	No
8.0 GENERAL	
8.1 Provide any further information considered relevant to ensure the selection of the most appropriate organic lining/rubber lining material i.e. photographs of previous components/coating condition	The inside of the water box is a confined space. Paint is open to atmosphere on the outside of the water box. Exposed to dust. Not in contact with the sun.

8.2 In the case of refurbishment work what is the shut-down period during which this lining work must be carried out (number of days)	
8.3 Provide information and details of whether corrosion protection by lining will interface with areas such as flanges, crevices and transition areas to other protective lining systems which would necessitate specific consideration. Schematics, photographs or appropriate drawings will be required to provide specific recommendations.	Waterbox is connected with flanges. Waterbox have welds on it. Text and arrows on pipes and water boxes must be painted back onto them.

3.2.3 Cooler waterboxes

Table 12: Cooler waterbox details

1.0 LOCATION OF COMPONENT	
1.1 Name of power station	Duvha Power Station
1.2 Component Identification i.e. Plant Code	Cooler waterboxes
2.0 COMPONENT DETAILS	
2.1 Capacity of Component	
2.2 Dimensions	Multiple
2.3 No of access man-holes	N/A
2.4 Size of access man-holes	N/A
2.5 Location of access man-holes	N/A
2.6 Diameter and length of pipework	maximum of 200mm diameter
2.7 Material of construction (mild steel etc.)	Cast steel
2.8 Please provide A4 drawing of component with this questionnaire	Figures 4 and 5
3.0 ACCESS COMPONENT	
3.1 Is access available to locate compressors and equipment next to the component?	Yes
3.2 If adjacent access is not available how long will air and spray hoses need to be?	N/A

4.0 TYPE OF WORK	
4.1 New works – clean original steel	Old painted
4.2 Maintenance work – previously lined	Previously painted
4.3 Concrete i.e. Water retaining structures	N/A
4.3.1 Are surfaces new, dry, cured, post service?	Inside surfaces are wet. Outside surface is dry.
4.3.2 Is there spalling, cracking, exposed rebar?	Spalling lining
4.3.2 What is allowable duration for lining activity?	10 days
4.4 Type and age of previous lining	Paint, 5 years
4.5 Condition of the previous lining	Lining peeling off
4.6 Total surface area to be lined (m ²)	Seal Oil Coolers (Inside and outside) • 2x Waterboxes - 5 m ² • 4x End Shield/ Water Return Chambers - 4 m ²
	Turbine Lube Oil Coolers (Inside and outside) • 2x Waterboxes - 8 m ² • 4x End Shield/ Water Return Chambers - 4 m ²
	FRF (Inside and outside) • 2x Waterboxes - 3.5 m ² • 4x End Shield/ Water Return Chambers - 2 m ²
	Stator Water (Inside and outside) • 2x Waterboxes - 6 m ² • 4x End Shield/ Water Return Chambers - 4 m ²
	BFPT Lube Oil Coolers (Inside and outside) • 2x Waterboxes - 3.5 m ² • 4x End Shield/ Water Return Chambers - 4 m ²
	H2 Coolers (Inside and outside) • 4x Waterboxes - 8 m ² • 8x End Shield/ Water Return Chambers - 8 m ²
	Exciter Coolers (Inside and outside) • 2x Waterboxes - 8 m ² • 8x End Shield/ Water Return Chambers - 8 m ²
	EFP A & B Oil Coolers (Inside and outside) • 2x Lube Oil Waterboxes - 4 m ² • 2x Lube Oil End Shield/ Water Return Chambers - 2 m ² • 2x Working Oil Waterboxes - 4 m ² • 2x Working Oil End Shield/ Water Return Chambers - 2 m ²

5.0 SURFACE PREPARATION	
5.1 Can abrasive blast cleaning be carried out inside the component/vessel/tank with consideration of access/confined space, ventilation etc.	Yes, Surface Preparation - Abrasive blast clean to Grade Sa 3
6.0 PROPERTIES OF LIQUID CONTAINED IN OR IN CONTACT WITH THE COMPONENT	
6.4 Water – type of water	Raw water used for cooling
6.4.4 Water treatment process waters (provide specific composition/concentration) i.e. % hydrochloric acid, sulphuric acid, caustic soda, ammonia, etc.)	pH 8.1 to 8.6, Turbidity (FTUs) max <100, Conductivity ($\mu\text{S.cm}^{-1}$) max <4000, Total aerobic bacteria (CFUs/ml) max <10 ⁵ , Total anaerobic bacteria (CFUs/ml) max <10 ⁴ , Chlorides (mg.kg ⁻¹) max < 400 mg.kg ⁻¹ as Cl, Sulphate (mg.kg ⁻¹) max <1000 mg.kg ⁻¹
6.5 Temperature & Pressure of liquid	
6.5.1 Normal operating temperature	60°C
6.5.2 Maximum or peak temperatures	100°C
6.5.3 Minimum temperatures	Ambient conditions
6.5.4 Pressure of Liquid	350kPa
6.5.5 Maximum pressure of liquid	2MPa
6.5.6 Flow rate of liquid	Not more than 2m/s
6.5.7 Will vacuum conditions occur?	No
7.0 OPERATION OF COMPONENT	
7.1 Is the component operated on a continuous or batch process basis	Continuous
7.2 Will the applied lining be subjected to any thermal shock, if so describe the operation.	No
8.0 GENERAL	
8.1 Provide any further information considered relevant to ensure the selection of the most appropriate organic lining/rubber lining material i.e. photographs of previous components/coating condition	Waterboxes for coolers can be removed from site. Paint is open to atmosphere on the outside of the waterbox. Exposed to dust. Not in contact with the sun.
8.2 In the case of refurbishment work what is the shut-down period during which this lining work must be carried out (number of days)	

8.3 Provide information and details of whether corrosion protection by lining will interface with areas such as flanges, crevices and transition areas to other protective lining systems which would necessitate specific consideration. Schematics, photographs or appropriate drawings will be required to provide specific recommendations.	Waterbox is connected with flanges. Waterbox have welds on it. Text and arrows on pipes and water boxes must be painted back onto them.
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4. AUTHORISATION

This document has been seen and accepted by:

Name	Designation

5. DEVELOPMENT TEAM

The following people were involved in the development of this document:

- Not applicable

APPENDIX A: SPECIFICATION FOR THE INTERNAL CORROSION PROTECTION

Table to be considered as Annexure D of 240-101712128: "Specification for the Internal Corrosion Protection of Water Systems, Chemical Tanks and Vessels and Associated Piping with Linings"	
Vessels	Condenser / Cooler Waterboxes
Internal Immersed (Material/Substrate)	Steel/cast iron – previously rubber lined/coated
Internal Immersed (Environment)	<ul style="list-style-type: none"> Operating Temperature: 25°C – 65°C Flow rates of up to 2 metres per second pH: 8 to 8.6 Medium: Raw or Cooling Water (CW) Conductivity (K) < 4000 µS Chloride < 400 mg.kg⁻¹ as Cl Sodium < 500 mg.kg⁻¹ as Na Sulphate < 1000 mg.kg⁻¹ Calcium Carbonate Precipitate Potential (CCPP) 80 to 160mg.kg⁻¹ as CaCO₃
Internal Immersed (Surface Preparation and coating)	Abrasive blast clean to Grade Sa 3 (ISO 8501-1). The surface profile as specified by the coating manufacturer.
Generic System	Solvent Free Epoxy
First Coat	Apply by brush, one coat Two Component Solvent Free Amine Cured Epoxy coating from 350 - 450 micron .
Stripe Coat	After allowing sufficient time (as recommended by coating manufacturer) for the first coat to cure, all accessible edges, weld seams, bolt holes and other crucial areas shall be given an additional stripe coat by brush.
Final Coat	After allowing sufficient time for the first coat and stripe coating to cure, the manufacturer's recommendations shall be adhered to in this regard, apply by brush, one coat Two Component Solvent Free Amine Cured

	<p>Epoxy coating from 350 - 450 micron.</p> <p>Total System Minimum Dry Film Thickness (DFT) = 700 microns.</p>
<p>With respect to aspects not mentioned in the above coating specification table (e.g. mixing ratios, pot life, straining, thinning, induction times, over-coating and curing times), the manufacturer's recommendations shall be strictly adhered to.</p>	
<p>This specification sheet is applicable to the application of protective coating to the entire tubesheet surface with specific emphasis of ensuring continuous coating of the interface surfaces between the tubesheet and onto the protruding section of tubing.</p>	
<p>Specific Project Requirements:</p> <p>2. In the case of any existing rubber lining then the lining shall be completely stripped and removed in preparation for coating/lining.</p> <p>3. A detailed visual inspection shall be carried out by the Eskom engineer and the contractor to identify and mark-up all areas that need to be repaired/reinstated OR completely coated/recoated. Based on the inspection (section 4.13 of 240-101712128 can assist in providing guidance) Eskom will instruct the applicator whether to perform patch repairs of the coating or complete recoating. Specific requirements for patch repairing a coating system are defined further in this specification sheet and in section 4.8.6 of 240-101712128.</p> <p>4. The applicator shall take cognisance of the fact that after initial surface preparation as above, Eskom may require access for a further inspection and assessment to determine the need for possible mechanical repairs i.e. welding which will be done by Eskom. Unfortunately, this inspection can only be carried out once the surfaces have been blast cleaned in preparation for coating. The depth and morphology of corrosion damage, extent of component wall thickness loss and pitting needs to be considered. For steel, the following guide (obviously dependent on installed wall thickness) can be applied to all areas of extensive deep pitting:</p> <ul style="list-style-type: none">• All pits less than 2mm in depth and all edges and weld seams shall be stripe coated after application of the primer/first coat.• All pits in excess of 2mm and up to 5 mm in depth shall be filled using a compatible two component solvent free epoxy filler. The filler to be used shall be supplied by the same supplier as the rest of the coating system and confirmed to be compatible to the specified coating system.• All severely grooved/corroded welds shall be filled by welding (welding repairs will be done by	

Eskom). Perforations and defects, pitting etc. which are close to approaching the wall thickness shall be repaired by welding in steel plate. The plate shall be welded onto the internal/immersed surface.

5. At all times care shall be taken to ensure adequate protection of any surfaces and parts of components or systems not requiring blast cleaning and coating (as an example valve seats/trim, pump inlets, condenser/heat exchanger tubes) and every effort shall be taken to prevent grit, water and other dirt entering drain systems, tank/vessel inlet/outlet piping or settling on isolating valves seats, shafts etc.

Equipment name plates and identification plates shall be protected from coatings. No coatings shall be applied over any surfaces where these will adversely affect the performance of the item or component.

6. All materials, i.e. paint, solvents and cleaning agents for a specific paint system shall be supplied by the same manufacturer. The solvents used shall be those recommended and manufactured by the paint manufacturer. Where the recommended 'solvent' and 'clean-up thinners' for a material differs, the 'clean-up' solvent must not be added to the paint for dilution purposes.
7. The method of surface preparation for the waterbox internal surfaces shall be by conventional hand held equipment.
8. Corrosion Protection shall only proceed once all mechanical activities have been completed and released in terms of the manufacturing/fabrication Quality Control Plan (QCP).
9. In cases of recoating waterboxes where the existing lining/coating significantly deteriorated and the substrate badly corroded then the substrate shall be tested for chloride contamination, according to ISO 8502-6.

Casting substrates which may be pitted and/or rough and porous are inherently susceptible to soluble salt contamination. Testing shall be performed prior to final surface preparation.

10. Testing shall be performed by the Bresle soluble salt test method. If not within acceptable limits (as per the manufacturer requirement but not exceeding 100mg/m²), the surfaces shall be washed/decontaminated by High Pressure (HP) water washing using fresh/clean water (with a conductivity reading of maximum 100 µS/cm) at a minimum pressure of 300 bar. A salt decontamination chemical additive with demonstrated capability of removing salts may be used in conjunction with HP cleaning.
11. Testing shall be repeated on representative test patches which shall be blast cleaned to Grade

Sa 3 (ISO 8501-1).

If acceptable then proceed with blasting and application steps – if not then repeat HP washing until the salt contamination has been removed to within acceptable limits.

12. Surface preparation by abrasive blasting shall be performed by means of conventional hand held blasting equipment capable of removing mill scale, old coating, rust and suitably preparing the substrate to the required cleanliness of Grade Sa 3.
13. Removal of dust and debris shall be performed by vacuuming. The process shall be repeated until the required level of dust and debris removal is achieved.
14. The level of cleanliness required shall be less than “dust quality rating” 2 when tested in accordance with ISO 8502-3.
15. If coating is to be performed downstream of a draft either naturally or by fans then the upstream area shall be completely grit and dust free to prevent any possible carry-over of the dust/grit contamination onto the downstream wet/curing coating.

General Requirements:

1. The applicator shall be wholly responsible for the surface preparation and coating application. The coated surfaces shall meet the DFT as required by this specification sheet and aspects thereof in referenced documents.
2. Rounded edges are required in order to be able to apply the protective coating uniformly and to attain adequate coating DFTs on sharp edges, refer to ISO 12944-3 should more detail be required. All sharp edges from the original fabrication shall be rounded or chamfered and burrs around holes and along other cut edges shall be removed. All edges to be rounded off with a grinder to a radius of 3mm or more.
3. Weld beads with a surface irregularity exceeding 3mm or with sharp crests having a radius less than 3mm shall be ground.
4. Power and hand tool cleaning is only applicable to very localised touch ups or patch repairs. Specific requirements for patch repairing a coating system are defined in section 4.8.6 of 240-101712128. Hand-tool cleaning for isolated/localised areas may be utilised provided the required standard of finish is achieved. For all immersion applications final mechanical cleaning shall be by bristle blaster in order to create a required surface profile.
5. Cleaning by means of hand or power-tools, i.e. wire brushes, chipping hammers, scrapers, grinders, sanders, needle descalers, bristle blasters etc. may only be used where accepted by the

Eskom engineer and where the position and condition of the substrate metal is such that efficient cleaning and surface profile can be achieved and where the protective coating system is designed for application to brushed or ground surfaces i.e. specifically formulated surface tolerant coatings.

6. All welds shall be free of slag, slag inclusions and pinholes. Adjacent areas shall be free of weld spatter, which shall be removed by grinding or scraping.
7. Oil and grease deposits shall be removed prior to cleaning. Special attention shall be paid to drillings, bolt holes, etc.
8. Burnishing of the surface shall not be permitted.
9. In all cases, after wire brushing or grinding, all traces of loose material shall be removed from the surface by compressed air or vacuum cleaning. Cleaned surfaces shall not be contaminated with oil, grease, rust or other deposits before coating application.
10. Different grades and types of blasting media exist. It is important that the correct abrasive be used in combination with a specific coating system to achieve the specified surface profile. The required blast profile height should be carefully considered. The applicator shall select an appropriate abrasive type and mesh size to attain the specified surface profile.
11. Only inert mineral grit or steel grit abrasives shall be used. Steel grit is preferred in sensitive plant areas such as Water Treatment Plants in order to ensure no contamination of plant processes due to excessive dust. Sand or silica based abrasives shall not be used. Abrasive material for blast cleaning shall be used in line with local environmental regulations.
12. The abrasive shall be used in accordance to the manufacturer's specifications and shall be clean, sound, hard particles free from foreign substances such as dirt, oil, grease, toxic substances, organic matter and water soluble salts.
13. It is important that good quality abrasives are used in order to minimize the amount of waste grit and dust generated and contamination of the surfaces.
14. The use of re-cycled blasting media for the final blast is strictly prohibited.
15. All abrasive media shall be stored in an area that is completely dry, covered and protected from weather.
16. The profile height of the blasted surfaces should be within the range of the specified coating system. Refer to the manufacturers Product Data Sheets. Unless otherwise specified by the coating manufacturer, a profile height of 25 microns to 90 microns is recommended for most

coatings systems.

17. It is important that the blast profile does not exceed the specified DFT of the primer or first coat. Blast cleaning of severely corroded surfaces may result in high profiles i.e. > than 100 microns. In these cases, the primer or first coat shall be applied by brush/roller to ensure complete wet-out of the pitted/jagged surface. In addition a different primer or first coat may be required. However, agreement should be reached between the applicator and coating manufacturer as to the most suitable profile range, with due consideration of the application method, for a specific coating system.
18. The applicator shall consider and detail these potential scenarios or eventualities in the required Method Statement which shall be reviewed by Eskom for acceptance/rejection prior to any work. Ultimately, the applicator shall be responsible for any risk that could arise or be attributed to this choice.
19. The requirement for surface preparation of all metallic surfaces for immersion is strictly Grade Sa 3 (ISO 8501-1), in which case the surfaces shall be blast cleaned to white metal where all traces of rust, mill scale and other foreign matter are removed.
20. All compressed air for blasting activities shall be free from entrained moisture and oil. All traps shall be in a functional condition. The compressed air shall be tested at regular intervals using clean white clothes to assess cleanliness and dryness. This requirement shall be included in the QCP.
21. After surface preparation, all dust, grit blasting media or any other deleterious matter shall be removed from the surfaces by vacuuming. The process shall be repeated until the required level of dust and debris removal is achieved. It is imperative that all surface dirt and contaminants are completely removed before coating or the adhesion of the coating shall be impaired.
22. 22. Cleaned surfaces shall not be contaminated with oil, grease, rust or other deposits before coating. Unnecessary traffic prior to painting shall be avoided.
23. 23. Immediately before coating, blast cleaned steel shall not exhibit more than "dust quantity rating" 2 when tested in accordance with ISO 8502-3 [13].
24. The applicator shall ensure that during surface preparation and coating activities the relative humidity (RH) in open, undercover shop environments is less than 80% RH and for waterboxes in-situ (confined spaces) is less than 60% RH. Ambient temperatures shall be between 5°C and 30°C or as per the manufacturer recommendations, whichever is the more stringent. The maximum/minimum substrate temperature at the time of coating application shall be strictly in

accordance with the product data sheet. During stable weather conditions environmental parameters shall be measured and recorded at least 4 times per shift. During periods of inclement or cold weather conditions the environmental parameters shall be measured and recorded hourly. In the event that the latest two readings of any of the parameters indicate a deteriorating trend which would likely exceed parameter/s limit then no final surface preparation or coating application shall be permitted. All measurements shall be recorded at the steel surface. Dew point requirements shall be as per the Product Datasheet or 240-101712128.

25. For all inspections of all surface preparation and coating activities the surfaces shall be clean allowing unhindered visual access to the surface. The applicator shall provide sufficient and adequate lighting (Cool White) to enable inspections. Cell phone lighting is not acceptable.
26. In order to avoid recontamination and flash rusting of the surfaces, the primer or first coat shall be applied within 8 hours after final surface preparation of the steel surfaces. Under no circumstances shall the blast be permitted to stand overnight.
27. Many modern organic coatings can be applied without the use of a primer. However, should a primer coat be required for holding of the blast, or otherwise, the applicator shall indicate/describe the reasoning for the need of such a primer i.e. as a holding primer or as a means of enhancing adhesion of the system? Details shall be provided in the Method Statement for the type of primer, generic resin, solvent borne or free, maximum DFT and compatibility with subsequent coats. The detailed Method Statement shall be submitted and reviewed by Eskom for acceptance/rejection prior to any work. Ultimately, the applicator shall be responsible for any risk that could arise or be attributed to this choice.
28. The coating applicator shall be equipped with a “wet comb” and frequently monitor the wet film thickness to prevent/reduce a wide spread of DFT's.
29. After allowing sufficient time for the first coat to cure, all edges, weld seams, bolts and nuts, and other crucial areas shall be given an additional stripe coat, by brush application, with the same material as the following coat. Should the use of a primer be omitted, stripe coating shall be carried out between applications of the first coat and the subsequent coat.
30. Multiple coats shall be applied as per the table at the top of this specification sheet. Single coat systems are not permissible.
31. Where more than one coat is applied, the colour of each coat shall be different from the previous coat. In the case where aesthetic requirements are secondary, repairs after final testing shall be carried out using a different colour. In other cases two finishing coats of the same colour may be

applied to achieve complete colour uniformity.

32. Where more than one coat is being applied in an open exposed yard environment, surface preparation and washing shall be carried out between coats. Where the coating has completely cured or allowed to age before finishing, before application of a subsequent coat the surface shall be prepared by light sanding, scrubbing with potable water using a bristle brush and drying before over-coating.
33. Application of subsequent coats shall be in accordance with the specified system. The required over-coating intervals as mentioned in the latest Product Data Sheet shall be observed and adhered to.
34. The total DFT of the applied coating system shall comply with the recommended minimum and maximum DFT limits as recommended in the latest Product System Data Sheet and this specification.
35. The range of DFTs of each coat shall be as follows; 90% of random readings shall be equal to or greater than the minimum specified DFT. No individual reading shall be less than 80% of the specified DFT. In the case of solvent borne coatings no individual reading shall be greater than 150% of the manufacturer's maximum specified DFT. All deficient film DFTs shall be rectified prior to release of components.
36. The coating shall be evenly applied to form a smooth, continuous, unbroken layer free from misses, sags, runs, tears and other defects that could affect the integrity of the coating.
37. Unless otherwise instructed by the Eskom engineer for flange surfaces at least one coat of the coating system shall be brought around onto a third of the surface area of the flange face. In the case of flange face (gramophone surface finish) with compressed fibre gaskets, blasting and coating is not permitted.
38. The applicator shall perform pinhole detection using appropriate "spark" testing equipment at a voltage setting as per the coating manufacturer's requirements. Wet sponge testing shall not be acceptable.
39. It is imperative that wherever possible pinhole detection and general patch repairs are to be performed before final cure of the coating system.
40. With the exception of access limitations or as instructed by the Eskom engineer all areas of coating damage shall be patch repaired in a different or contrasting colour and by brush application. The extent of the damage shall be carefully inspected to assess which coats in the system have been damaged and which surface preparation methods are most suitable and

appropriate. The Eskom engineer shall accept/reject the applicator's recommended method of surface preparation i.e. mechanical power and hand tool cleaning. When more widespread repairs are required and when the damage extends to the steel substrate abrasive blast cleaning to Grade Sa 3 (ISO 8501-1) is required.

41. All coats in the system shall be re-instated. Areas to be primed shall be cleaned of dust, dirt, grease, salts or other deleterious matter and all edges of existing paint shall be feathered back to a hard edge. The patch primer used shall be in accordance with the requirements of the relevant coating system. The over-coating onto an existing coating by subsequent intermediate and finishing coats (where applicable) shall be stepped at 25 mm intervals to produce a feathered edge. Specifics of such instances shall be assessed on a case by case basis.
42. Provision shall also be made for the repair of handling damage to the coating after installation/assembly/erection/scaffolding removal. Spot repairs shall reinstate each of the previous coats and shall commence directly after the localised surface preparation.
43. All immersed surfaces shall be pinhole tested (only after completion of all handling, moving equipment and scaffolding removal) to ensure the coating is pinhole free and if required additional repairs shall be performed and once cured then the repair areas shall be retested. The process to be repeated until a pinhole free coating is achieved.
44. After completion of the coating activities sufficient curing time of the coating system shall be given prior to immersion as per the requirements of the Product Data Sheet. Accelerated curing is not permitted. All coated surfaces shall be adequately ventilated until full cure has been achieved. At the end of the curing period and before immersion the full cure of the applied coating shall be verified by the applicator and/or coating manufacturer.

Safety Requirements and Considerations:

1. During the applications of all coatings/lining, care shall be taken to ensure adequate ventilation and lighting, to allow for good visibility and proper curing of the coatings and to avoid/minimise health and safety risks.
2. A confined spaces (CSs) may be defined as an enclosed, restricted, or limited space in which, because of its construction, location or contents, or any work activity carried on therein, a hazardous substance may accumulate and/or an oxygen-deficient atmosphere may occur, and/or in which a dangerous liquid or dangerous concentration of gas, vapour, dust or fumes may be present. It includes any chamber, tunnel, pipe, pit, sewer, container, valve, pump, sump, chute, bunker, silo, gearbox, tank, receiver, drum or any similar construction, equipment, machinery or

object.

3. Flammable Atmospheres: Gases, vapours and dusts can become trapped in CSs and create flammable or explosive atmospheres, and include combustibles e.g. Hydrogen, Acetylene, Paint and thinning/cleaning solvents, etc.
4. Walking / Working Surfaces and Visibility: Poor lighting may add to hazards caused by an irregular, sloped, or constricted working surface.
5. Special care needs to be taken when working with all organic coatings. Prior to the use of any coating material, the Material Safety Data Sheets shall be obtained from the relevant coating manufacturer. The applicator shall be familiar with the contents of these safety data sheets and ensure that the necessary safety precautions are taken in order to comply with local and national safety and health requirements such as the OHS Act.
6. Any solid waste materials or liquids stripped or generated during the coating operations shall be discarded in accordance with the requirements of the appropriate national and/or local authorities or the requirements of Eskom.
7. The applicator shall ensure compliance with all statutory regulations, municipal by-laws, etc. concerning pollution and the health and safety of personnel and/or members of the public who may be affected by the work. The applicator shall provide the personnel with the appropriate required PPE.
8. The applicator shall provide for all necessary safety precautions and risk assessments.
9. The applicator shall advise Eskom of all hazardous materials to be brought on site.
10. All painting materials on site shall be stored in designated areas in storage facilities that meet the storage requirements of the paint manufacturer and the safety requirements of the specific site. The contractor shall be responsible for the provision of appropriate storage/shipping containers as required. These containers shall include the appropriate refrigeration/conditioning systems for temperature control. This requirement shall be dependent on where the container will be located (indoors/outdoors), typical ambient temperature for the particular season of the year and the maximum storage temperature limits as per the manufacturers recommendations.
11. The applicator's Safety File for the area to be worked it shall address all the hazardous activities of abrasive blast cleaning and coating. The applicator shall verify that the personnel carrying out these activities are suitably qualified.
12. The applicator shall ensure that the abrasive materials used conform to all National Health and

Safety Standards.

Specifically with respect to CSs and based on the descriptions and definitions of safety risks as per the above points it is imperative that the contractor's/applicator's Method Statement shall describe in detail, the measures and mitigation steps for the risks and hazards as identified in this specification sheet. It is compulsory that these safety risks/mitigation measures and any others as identified by the contractor/applicator be included in the Method Statement. Prior to the commencement of any work the Method Statement shall be submitted for review, acceptance/rejection by the respective Duvha Power Station Risk and Safety office/department.

Pre-job Method Statement and Quality Documentation review and acceptance:

1. The coating manufacturer/applicator shall supply individual product data sheets for all products, comprising the system which shall contain the following as a minimum:
 - A description of the generic type of paint.
 - Confirmation that the coating is suitable for the intended method of application.
 - Recommended and non-recommended uses.
 - Maximum recommended service temperature which shall be a minimum of 30% greater than the maximum temperatures as is indicated in the table at the top of this specification sheet. The coating rating shall consider the above temperatures as continuous service i.e. not intermittently.
 - Chemical resistance limits.
 - Surface preparation.
 - Application conditions and details including but not limited to: application temperatures, dilutions, pot-life, application techniques and DFT for the particular application method, over-coating intervals, and curing times required before immersion.
2. Prior to the application of any of the corrosion protection systems, the Product Data Sheet/s shall be signed by the manufacturer and applicator. This is to ensure that the manufacturer is aware of this specification, the conditions under which it will be applied and to allow for technical back-up where required.
3. The signed Product Data Sheet/s shall be deemed to be a binding reference document (as part of the QCP). It shall be specific to this project and any further/other subsequent revisions of the Product Data Sheet/s shall be submitted to Eskom for reacceptance clearly stating the variations/deviations. No further use/application of the related product, for this project, is permitted until acceptance is granted by Eskom.
4. A detailed Method Statement explaining all required steps as specified in this specification sheet

shall be provided at the time of tender. The steps to be considered includes:

- The methods, steps, sequence and equipment required for ventilation and dust mitigation.
- Grease decontamination and washing.
- Soluble salt decontamination.
- The parameter setup for blasting and coating techniques i.e. sweep blasting and coating by brush, shall also be included in the Method Statement.
- Methods for dust and debris removal, maintaining and ensuring cleanliness between coats shall be described.
- The Method Statement shall detail the precise sequence and breakdown of work areas/activities in order to apply the system with due consideration of dust contamination onto adjacent surfaces still requiring additional coats.
- The Method Statement shall also consider the most efficient methods and sequencing to avoid unnecessary delays between coats that may have an impact i.e. time required for removal of spent abrasive grit and dust/debris, delay due to material handling, time required to handle, rig and move the component etc.
- All inspection interventions during and after completion of final coats shall be considered and included.
- Specifically for confined spaces i.e. condenser water boxes, the Method Statement shall describe all measures and details for establishing and maintaining:
 - ✓ The environmental conditions as required by this specification.
 - ✓ The required ventilation for the prevention and/or management of fumes and dust build-up.

The number of extraction fans; mounting diameters, sizes and mounting methods of fans to manholes; power rating of fans; positioning of fans and direction of intended air flow shall be described and detailed.

5. Given that the single most limiting aspect of working in CSs is access, the Method Statement shall describe and indicate how and where access will be established for (1) personnel, (2) general equipment – buckets, shovels, etc. (3) lighting equipment, (4) blast equipment, (5) grit removal and cleaning etc. in relation to and considering the manhole/access points already used for ventilation purposes.
6. The detailed Method Statement shall be submitted to Eskom for review and acceptance/rejection prior to the commencement of any work. Eskom reserves the right to request further revision, clarification or additions in accordance with or as required by this specification sheet.

7. The applicator shall submit a detailed, project specific QCP. The QCP shall be based on the detailed Method Statement and shall contain all intervention points and relevant acceptance criteria as per the information as described in the Product Data Sheet/s and this specification sheet. Eskom reserves the right to request further revision, clarification or additions in accordance with or as required by this specification sheet.
8. Under no circumstances shall any work be performed until the QCP and Method Statement have been accepted by the Eskom engineer.
9. The coating manufacturer shall provide technical surveys during the execution of the project. The applicator shall commit to this requirement in the Method Statement.

Reference Documents:

Since the compilation of the Eskom Standards 240-101712128: Standard for the internal corrosion protection of water systems, Chemical Tanks and Vessels and Associated Piping with Coatings there have been changes in terms of the referenced documents i.e. some documents have been withdrawn, replaced or superseded. The following list of references shall apply in addition to the requirements of 240-101712128. The latest revision of the referenced standards shall apply.

Where conflict exists between any of these documents the more stringent requirement shall apply.

1. 240-101712128: Standard for the internal corrosion protection of water systems, Chemical Tanks and Vessels and Associated Piping with Coatings.
2. ISO 9001: Quality Management Systems - "is defined as the international standard that specifies requirements for a quality management system (QMS). Organizations use the standard to demonstrate the ability to consistently provide products and services that meet customer and regulatory requirements."
3. ASTM D4414: Standard practice for measurement of wet film DFT by notch gauges.
4. ASTM F21: Standard Test Method for Hydrophobic Surface Films by the Atomizer Test.
5. ISO 2409: Paints and varnishes – Cross cut test.
6. ISO 4628 – 1: Paints and varnishes – Evaluation of degradation of coatings – Designation of quantity and size of defects, and of intensity of uniform changes in appearance – Part 1: General introduction and designation system.
7. ISO 4628 – 3: Paints and varnishes – Evaluation of degradation of coatings – Designation of quantity and size of defects, and of intensity of uniform changes in appearance – Part 3:

Assessment of degree of rusting.

8. ISO 8501-1: Preparation of steel substrates before application of paints and related products – Visual assessment of surface cleanliness – Part 1: Rust grades and preparation grades of uncoated steel substrates and of steel substrates after overall removal of previous coatings.
9. ISO 8502-3: Preparation of steel substrates before application of paint and related products – Test for the assessment of surface cleanliness – Part 3: Assessment of dust on steel surfaces prepared for painting (pressure sensitive tape method).
10. ISO 8502-6: Preparation of steel substrates before application of paint and related products – Test for the assessment of surface cleanliness – Part 6: Extraction of soluble contaminants for analysis – The Bresle method.
11. ISO 8503-4: Preparation of steel substrates before application of paint and related products – Surface roughness characteristics of blast-cleaned steel substrates.
12. Part 4: Method for the calibration of ISO surface profile comparators and for the determination of surface profile – Stylus instrument procedure. (May be used as an alternative to SANS 5772).
13. ISO 12944-3: Paint and varnishes – Corrosion protection of steel structures by protective paint systems. Part 3: Design considerations.
14. SANS 5770: Preparation of steel substrates before the application of paints and related products – Test for the assessment of cleanliness of blast-cleaned steel surface – Freedom from certain soluble salts.
15. SANS 5772: Preparation of steel substrates before the application of paints and related products – Surface roughness characteristics of blast-cleaned steel surfaces – Profile of blast-cleaned surfaces determined by a micrometer profile gauge (Can be used as alternative to ISO 8503-4).
16. SIS 055900: Swedish Code of Practice - Pictorial surface preparation standard for painted steel surfaces. (Can be used as alternative to ISO 8501 – 1).