

SHAMS POWER COMPANY
ENGINEERING DIVISION
INSPECTION & CORROSION SECTION

SHAMS 1

LOCATION : R1LCC40AC001

KKS : R1LCC40AC001

GRADE & CLASSIFICATION : 2

CERTIFICATE OF INSPECTION

The equipment detailed below was examined in accordance with the SHAMS code of practice for plant inspection,

ITEM : HP- Heater -2

LOCATION : SHAMS Plant

TYPE OF INSPECTION : Major

DATE OF INSPECTION : March, 2020

PLACE OF INSPECTION : IN-SITU

DATE OF LAST INSPECTION : Jan, 2016

REPORT :

1.0. Summary

The above HP- Heater -1 was taken off line, isolated, opened, vented & cleaned for major external & internal inspections.

2.0. Subject

This is a horizontal, cylindrical, carbon steel tank with one inlet and outlet of condensate water.

Item	Shell Side	Tube side
Design pressure	8 bar	159 bar
Design temperature	209 C	209 C
Operation pressure	6.61 bar	132.82 bar
Operation temperature	193/149 C	140/158 C
Hydrostatic test pressure	11.5 bar	228 bar
Fluid	Steam/condensate	Water
Material	Carbon Steel	304 L
Tube Number		1216
Tube diameter		5/8 inch
Tube thickness		2.11 mm
Tube length		9500 mm

The above equipment is/ is not considered suitable for further service under the present operating conditions

NEXT MAJOR INSPECTION DUE : March 2024

INSPECTED: Osman Ismail

ENDORSEMENT: 48 MONTHS

REVIEWED: Ali Al Masabai

3.0 History

This HP heater -2 was commissioned in 2013. Periodical inspection records since Oct.'2014 are available.

4.0. Scope of Inspection

- 4.1 Visual Inspection
- 4.2 Eddy Current
- 4.3 Ultrasonic Thickness survey
- 4.4 Dye- penetrant
- 5.4 Borescope inspection

5.0. Conditions Found

5.1. External (Shell side)

- 5.1.1 All painting and insulation found intact without any evidence of painting peel off or blistering and no evidence of any damage for insulation or insulation cover aluminum sheet.
- 5.1.2 All ladders, stairways and handrails found in satisfactory condition.
- 5.1.3 All concrete support found in satisfactory condition without evidence of cracking or spalling.
- 5.1.4 All external piping insulation found in satisfactory condition.
- 5.1.5 All earthling lugs found in satisfactory condition.

5.2. Internal (Tube side)

- 5.2.1 All tubes as could be seen internal surfaces found satisfactory without evidence of severe corrosion.
- 5.2.2 All tube to tube sheet welds found satisfactory.
- 5.2.3 All surfaces and welds of channel and pass partition found satisfactory.
- 5.2.4 All internal surface as could be seen of connected piping to channel found satisfactory.

6.0 NDT

6.1 Ultrasonic thickness survey

Ultrasonic thickness measurement was carried out on accessible locations of channel found satisfactory with average thickness 66.00 mm. See attached thickness measurement report.

6.2 Dye - Penetrant test

Dye - Penetrant test was carried out on tube to tube sheet welds found satisfactory. See attached thickness measurement report.

6.3 Eddy Current test

Eddy current test was carried out on 18 tubes as sample, results was not clear due to high amplitude noises caused by well know inter-granular corrosion created during tube fabrication (see attached integrity review report dated December 2017 for more details).

6.4 Borescope Inspection

6.1 Due to presence of inter-granular corrosion damage mechanism in the tubes, a part of chromium content in stainless steel was depleted in some locations, these locations behave like carbon steel. As eddy current technique not suitable for testing carbon steel material, a tube condition cannot be accurately defined using eddy current technique. Also, IRIS suitable probe for this diameter of tubes not available in the market. So, a five tubes were selected for borescope internal visual inspection to visually define internal condition of tubes, all found no visual defects, one of them was eddy current tested. Meanwhile, borescope inspection from shell side result was satisfactory (see attached videos and photos).

6.2 Details of selected tubes for internal borescope inspection:

S.N	Tube location		Test Result
	Row	Tube	
01	12	4	No defect
02	12	26	No defect
03	12	28	No defect
04	3	1	No defect

7.0. Recommendations

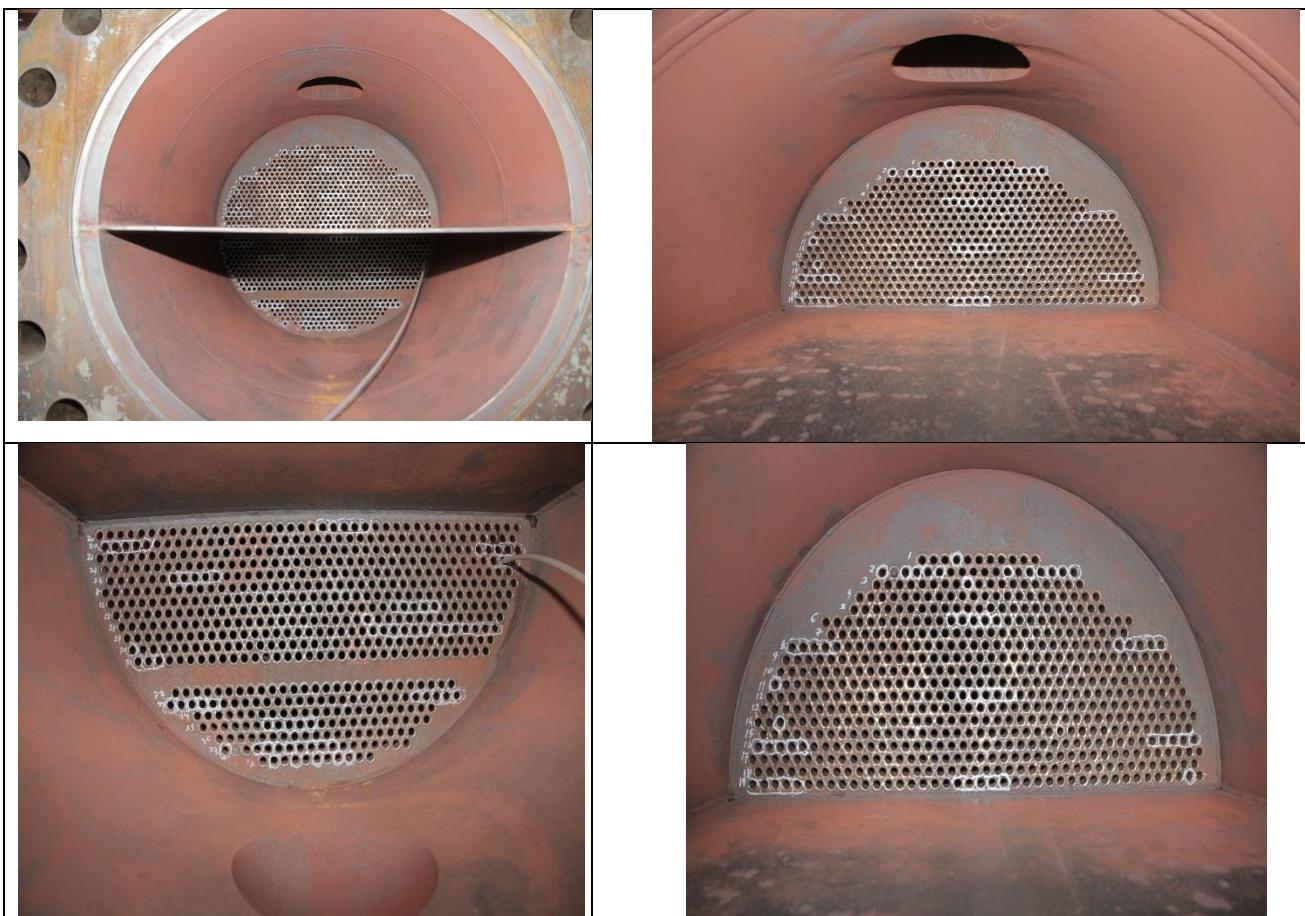
HP heater -2 should be open for inspection after four years as per SHAMS code of practice.

8.0 Inspection Grade and Interval

In accordance with the latest revision of SHAMS Code of Practice, this HP- Heater -2 endorsed for 48 months under class 2, for next Major Inspection.

FREQUENCY : 48 MONTHS.
ENDORSEMENT : 48 MONTHS,
GRADE : 2
Next Major Insp. due : March, 2024

Photos



Tubes, welds and internal surfaces of (channel & pass partition)

Form No.: IN-QSF-36 Rev. 05E Dtd.: 20-10-2018

ULTRASONIC THICKNESS GAUGING REPORT

Client: SHAMS POWER COMPANY

Date:	14.03.2020	Report No.:	AD / 476
Project:	SHAMS OUTAGE MARCH 2020	Job No.:	N/A
Location:	MADINAT ZAYED	Drawing No.:	N/A
Item ID:	HP HEATER-2	Material:	CS
Ref/ Procedure No:	INSPEC/UTG/001 Rev.10	Ref. Standard:	ASME SEC V
UTG Equipment Model/ Manufacturer:	USM 35 X DAC / GE	Serial No.:	7292a
Calibration Block No. :	STEP WEDGE, IIW V2 BLOCK	EQPT Calibration Certificate & Due Date:	INS/UT/CAL-043/19/AUH
Probe Type/ Size/Frequency:	WK TR 0° PROBE/ 10mm DIA / 5 MHz	Couplant Brand Name & Type:	POLYCELL + WATER
Connecting Cable Type & Length:	LEMO TO MICRODOT & 2 MTR	Special Attachment/ Equipment/ Block:	STEP WEDGE BLOCK (SL NO : AZB270)
Test Temperature:	AMBIENT	Surface Condition:	AS CLEANED
Inspection Date:	14.03.2020	Page:	1 of 2

Description:

ULTRASONIC THICKNESS GAUGING WAS CARRIED OUT ON THE FOLLOWING HP HEATER-2 (KKS R1LCC40AC001)

LOCATION	ORIENTATION	MEASURED THICKNESS (mm)
1	12 O'CLOCK	62.18
1	3 O'CLOCK	61.45
1	6 O'CLOCK	61.90
1	9 O'CLOCK	61.97

REPORT FORMAT APPLICABLE ONLY FOR AUH & FUJ FACILITY

LEVEL II TECHNICIAN		CLIENT REPRESENTATIVE		AI / TPI
Name :	SIVANESAN	Name :		
Sign :		Sign :		
Date :	Level II No. 660 Date 14.03.2020	Date :		
Dubai Branch	A.P.O. Box 14100, Dubai, U.A.E	Tel : 04 3241955	Fax: 04 3241957	Email: inspec.dxbcoor@intertek.com
Sharjah Branch	P.O. Box 61227, Sharjah, U.A.E	Tel : 06 5361300	Fax: 06 5361173	Email: inspec.shjcoor@intertek.com
Abu Dhabi Branch	P.O. Box 41227, Abu Dhabi, U.A.E	Tel : 02 6225820	Fax: 02 6225830	Email: inspec.adhcoor@intertek.com
Fujairah Branch	P.O. Box 7517, Fujairah, U.A.E	Tel : 09 2238754	Fax: 09 2238754	Email: inspec.fujcoor@intertek.com
Oman Branch	P.O. Box 143, P.C. 111, Sultanate of Oman	Tel : 00968 2443 2391	Fax: 00968 2448 5855	Email: inspec.muscat@intertek.com
Registered Office	:93-37 Athol Street, Douglas, IM1, 1LB, Isle of Man. Company Number 010728V.			

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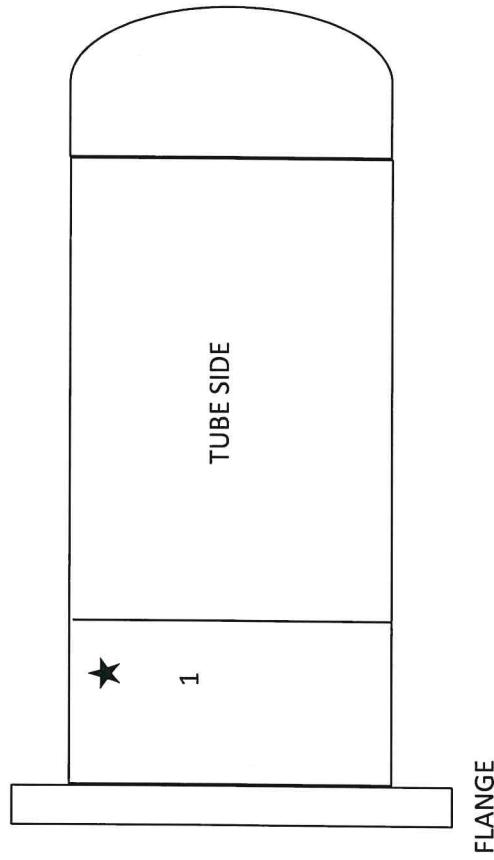
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International Inspection Services Ltd

Date :- 14.03.2020
Report No.: - AD-476
Page No. :- 2 OF 2

ULTRASONIC THICKNESS SCANNING DRAWING SHEET

HP HEATER-2



★ UTG LOCATION

LEVEL H TECHNICIAN
Name :- RAJESH KANNAN & SIVANESAN
Signature :- 
Date :- 03.03.2020

International Inspection Services Ltd.

NON DESTRUCTIVE TESTING, HEAT TREATMENT, ADVANCED INSPECTION SERVICES,
CALIBRATION SERVICES AND MECHANICAL & METALLURGICAL LAB SERVICES

intertek.com

Form No.: IN-OPF-04 Rev. 13E Dtd. 20-03-2019

LIQUID PENETRANT EXAMINATION REPORT

Report No.:	AD / 53671	Date:	11.03.2020	Page:	1	Of	<u>2</u>
Client :	SHAMS POWER COMPANY	Job No. :	PROJECT :- SHAMS OUTAGE MARCH -2020				
Location :	MADINAT ZAYED	Item :	AS BELOW				
Material :	CS	Ref / Procedure No. :	INS/ASME/PT/001				
Thickness :	VARIOUS	Revision :	22				
Surface condition :	AS WELDED & CLEANED	Test Temp. :	AMBIENT (25°)				
Viewing condition :	DAY LIGHT (>1076 LUX)	Penetrant Type / Technique :	VISIBLE SOLVENT REMOVABLE				
Penetrant dwell time :	10 MIN	Dev. Time:	10 MIN				
Date of test :	11.03.2020	ACCP - Criteria :	ASME SEC VIII DIV-1				
Consumables Type & Batch	MAGNAFLUX - SPOTCHECK						

Penetrant Remover	Penetrant	Developer
SKC-S (BATCH NO-180108) JAN 2021	SKL-SP2 (BATCH NO-171201) DEC 2020	SKD-S2 (BATCH NO-180102) JAN 2021

Observation & Evaluation :

100% DPT WAS CARRIED OUT ON THE FOLLOWING ITEM

HP HEATER-2 (KKS-R1LCC40AC001)

PT WAS DONE ON TUBE END WELD JOINT

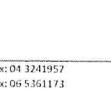
NO RELEVANT INDICATION WAS OBSERVED DURING THE TIME OF INSPECTION.

FOUND ACCEPTABLE AS PER THE SPECIFICATION.

ACCEPT REJECT

RESULT

REPORT FORMAT APPLICABLE ONLY FOR AUH & FUJ FACILITY

LEVEL II TECHNICIAN		CLIENT REP		AI / TPI	
Name :  AFZAL ANSARI	Date : 	Name : 	Date : 		
Sign : 	Date : 	Sign : 	Date : 		
Dubai Branch Sharjah Branch Abu Dhabi Branch Fujairah Branch Oman Branch Registered Office	LEVEL II No. 660 Date 11.03.2020	Tel : 04 3241955 Fax: 04 3241957 Email: inspec.dxbcoor@intertek.com	Tel : 06 5061300 Fax: 06 5361173 Email: inspec.shcoor@intertek.com	Tel : 02 6225820 Fax: 02 6225830 Email: inspec.adhcoor@intertek.com	Tel : 09 2238754 Fax: 09 2238754 Email: inspec.fulcoor@intertek.com
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BOROSCOPE TESTING REPORT

CLIENT: SHAMS POWER COMPANY

HP PRE HEATER

EQUIPMENT NO: HP-PH1 20200308 & HP-PH2 20200308

REPORT No.: INS/BOR/SHAMS/002/2020

DATE: 08/03/2020

Intertek INSPeC		Sabin V V
Level II No.	858	Sign
Date		

Intertek INSPeC		Shabin N
Level II No.	273	Date
Sign		

Prepared By:	Reviewed By:	Reviewed By:	Approved By:
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INTERTEK INSPeC	INTERTEK INSPeC	CLIENT/TPI	CLIENT
Dubai Branch : P.O.Box: 96535, Dubai, U.A.E Sharjah Branch : P.O.Box: 6130, Sharjah, U.A.E Abu Dhabi Branch : P.O.Box: 41221, Abu Dhabi, U.A.E Fujairah Branch : P.O.Box: 7907, Fujairah, U.A.E Oman Branch : P.O.Box: 193, P.C: 131, Sultanate of Oman Registered Office : 33-37 Athol Street, Douglas, IM1, 1LB, Isle of Man. Company Number 010728V.	Tel : 04 3241955 Fax: 04 3241957 Tel : 06 5061300 Fax: 06 5361173 Tel : 02 6225820 Fax: 02 6225830 Tel : 09 2238754 Fax: 09 2238754 Tel : 00968 2448 2391 Fax: 00968 2448 5855	Email: inspec_dxcoor@intertek.com Email: inspec_shjcoor@intertek.com Email: inspec_adhcoor@intertek.com Email: inspec_fujcoor@intertek.com Email: inspec_muscat@intertek.com	INSPeC IS PART OF INTERTEK GROUP

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SECTION	DESCRIPTION
1.0	BOROSCOPY TESTING REPORT (INS/BOR/SHAMS/002/2020)
2.0	CERTIFICATES • INSPECTOR CERTIFICATE

1.0 BOROSCOPY TESTING REPORT

a)HP PRE HEATER-1(HP-PH1 20200308)

b)HP PRE HEATER-2(HP-PH2 20200308)



Form No.: IN-OPF-41 Rev. 05 Dtd.: 20-03-2019

BOROSCOPE TESTING REPORT

Report No.:	INS/BOR/SHAMS/002/2020	Date:	08-Mar-20	Page:	1	Of	1
Client :	SHAMS POWER COMPANY	Equipment :	HP-PH1 20200308 & HP-PH2 20200308				
Location :	MADINAT ZAYED						
Item :	HP PRE HEATER-1 & HP PRE HEATER-2	Type of construction:	U TUBE				
Equipment :	OLYMPUS IPLEX FX	Specification :					
Serial No. :	Y104888	Photographs :	ATTACHED				

Description :-

Boroscope inspection was carried out on HP PRE HEATER-1 & HP PRE HEATER-2

Observations:-

Refer attachment for details.

Note:-

The above observations were as per the client who had witness the inspection.

TECHNICIAN / INSPECTOR

Name :	SIBIN.V.V
Sign :	
Date :	3/8/2020
Dubai Branch Sharjah Branch Abu Dhabi Branch Fujairah Branch Oman Branch Registered Office	
: P O Box: 96535, Dutsal, U.A.E : P O Box: 6120, Sharjah, U.A.E : P O Box: 41227, Abu Dhabi, U.A.E : P O Box: 7907, Fujairah, U.A.E : P O Box: 193, P.C. 131, Sultanate of Oman : 33-37 Athol Street, Douglas, IM1, 1LB, Isle of Man. Company Number 010728V.	

CLIENT REP.

Name :	
Sign :	
Date :	

AI / TPI

Name :	
Sign :	
Date :	

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a)HP PRE HEATER-1

BOROSCOPE INSPECTION REPORT

ROW-10 TUBE-9	ROW-12 TUBE-4
Observation: No Anomalies found in visual inspection	Observation: No Anomalies found in visual inspection

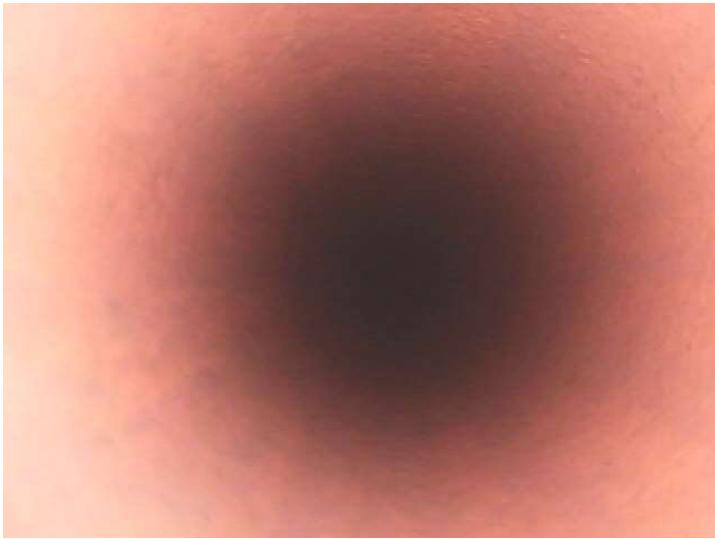
ROW-12 TUBE-26	ROW-12 TUBE-28
Observation: No Anomalies found in visual inspection	Observation: No Anomalies found in visual inspection

BOROSCOPE INSPECTION REPORT

ROW-12 TUBE-38	ROW-37 TUBE-5
	
Observation: No Anomalies found in visual inspection	Observation: No Anomalies found in visual inspection

ROW-4 TUBE-16	ROW-5 TUBE-1
	
Observation: No Anomalies found in visual inspection	Observation: No Anomalies found in visual inspection

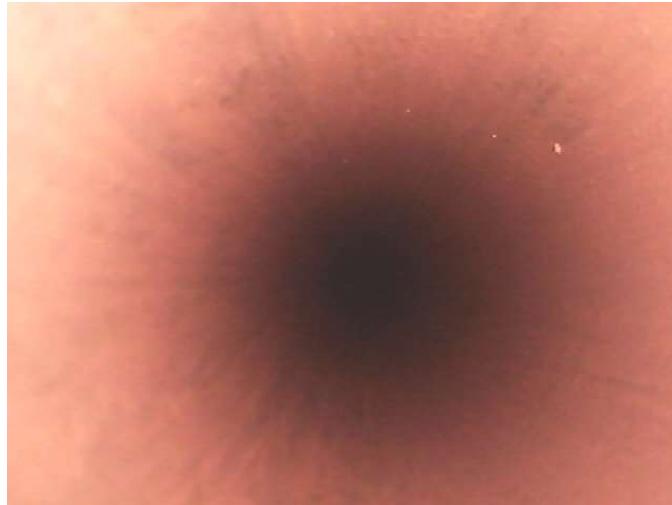
BOROSCOPE INSPECTION REPORT

ROW-6 TUBE-12	
	
Observation:	No Anomalies found in visual inspection

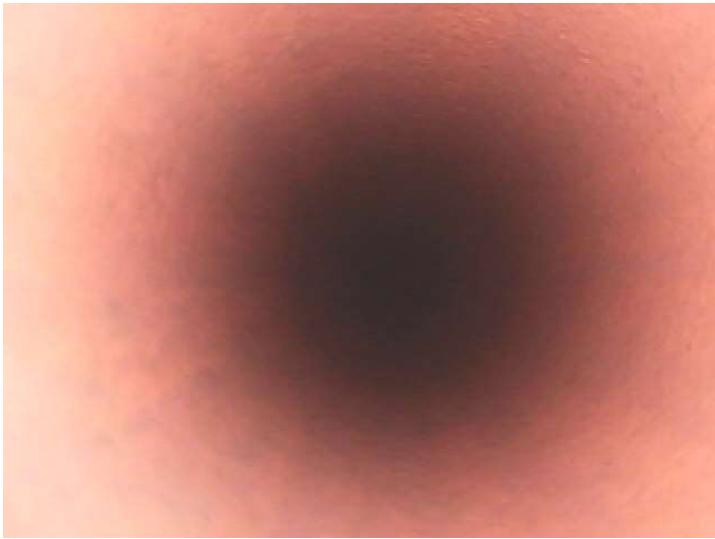
b)HP PRE HEATER-2

BOROSCOPE INSPECTION REPORT

ROW-10 TUBE-9	ROW-12 TUBE-4
	
Observation: No Anomalies found in visual inspection	Observation: No Anomalies found in visual inspection

ROW-12 TUBE-26	ROW-12 TUBE-28
	
Observation: No Anomalies found in visual inspection	Observation: No Anomalies found in visual inspection

BOROSCOPE INSPECTION REPORT

ROW-3 TUBE-1	
	
Observation:	No Anomalies found in visual inspection

2.0 CERTIFICATE

**INTERNATIONAL INSPECTION SERVICES LTD
(INTERTEK – INSPEC)
P. O. BOX 96535, DUBAI, U.A.E.**

C E R T I F I C A T E

Date of Assignment : 02nd August 2016

Certificate No : INS/VT/16/858

Issue Date : 02nd August 2016

Expiry Date : 01st August 2021

This is to certify

Mr. SIBIN V.V

Has demonstrated his ability successfully in both written and Practical examinations following training in accordance with the INTERTEK-INSPEC written Practice Document No. INS/SNT/WP/01 Revision 00 which is based on ASNT SNT TC 1A – 2006 edition in the following method and level shown below:

Method : Visual Testing. (Remote Visual Inspection by Fiber Optics)

Level : II (Two)

RESULTS	GRADE
General Examination	85.0%
Specific Examination	85.0%
Practical Examination	86.0%
Total for Average	256.0
Composite	85.33%



This certificate is only valid whilst the above person is employed by INTERTEK-INSPEC.



Intertek- INSPEC Certifying Authority

NDT Level III

Prolongation of validity

Date of renewal	Reference Document	Date of expiry	Examiner	Employer

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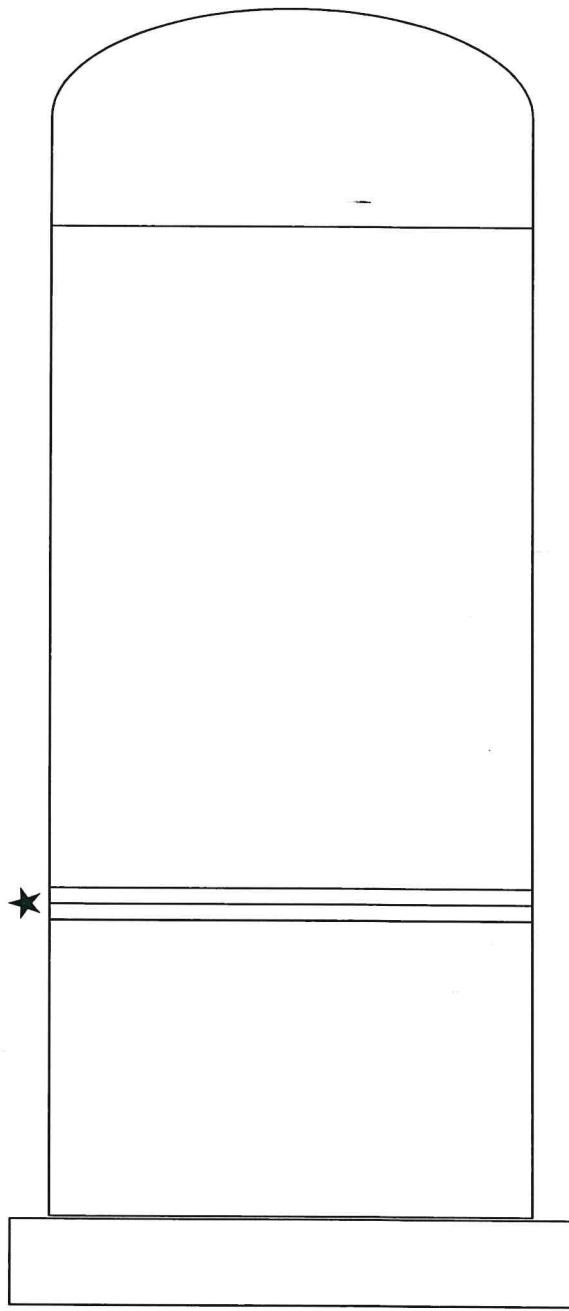
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Date :- 11.03.2020
Report No.: - AD-53671
Page No. :- 2 OF 2

LIQUID PENETRANT EXAMINATION - DRAWING SHEET

HP HEATER-2



★ PT DONE LOCATION

LEVEL II TECHNICIAN
Name : AAFZAL ANSARI
Signature No. :
Sign Date : 11.03.2020