

SHAMS POWER COMPANY
ENGINEERING DIVISION
INSPECTION & CORROSION SECTION

SHAMS 1

LOCATION : R1LCC30AC001

KKS : R1LCC30AC001

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 -1

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 -1 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, apart from one tube previously plugged upon pulling it out for further metallurgical investigation on year 2015.
- 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. 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 466 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 nine tubes were selected for borescope internal visual inspection to visually define internal condition of tubes, all found no visual defects. 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	Column	
01	04	16	No defect
02	05	01	No defect (photos attached)
03	06	12	No defect
04	10	09	No defect
05	12	04	No defect
06	12	26	No defect
07	12	28	No defect
08	12	38	No defect
09	37	05	No defect

7.0. Recommendations

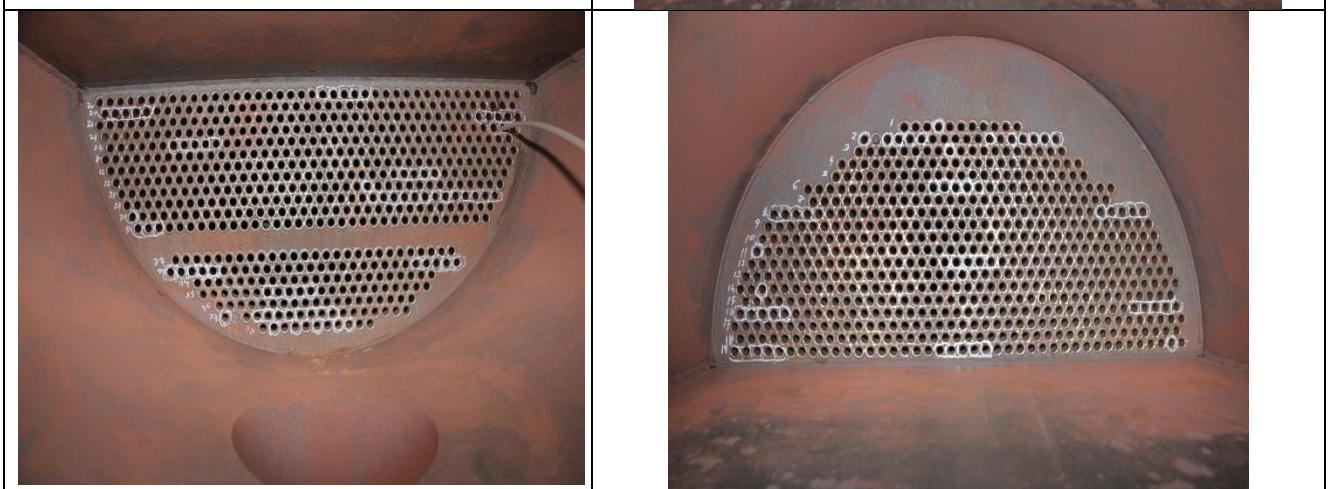
HP heater -1 should be open for inspection after four years as per SHAMS code of practice.

8.0 Inspection Grade and Interval

In accordance with the latest revision of SHAMS Code of Practice, this HP- Heater -1 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

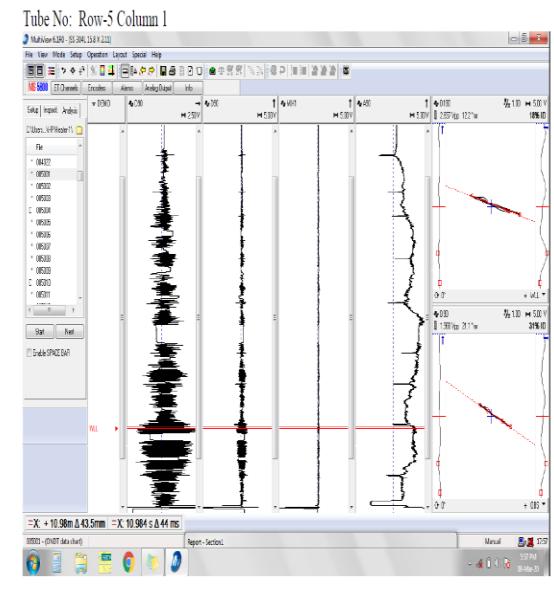
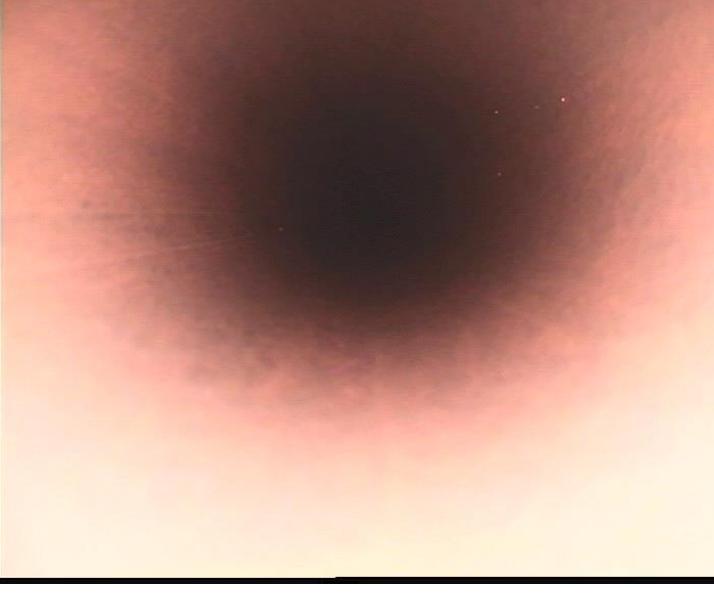
Photos



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



Tubes outside surfaces and baffles condition inside shell

<p>Tube No: Row-5 Column 1</p>  <p>The screenshot shows the software interface for eddy current testing. The main window displays a noisy signal waveform. The top menu bar includes File, View, Help, Setup, Operator, Log, Special, Help, and a toolbar with various icons. On the left, a tree view lists tube numbers: 04522, 05521, 05522, 05523, 05524, 05525, 05526, 05527, 05528, 05529, 05530, 05531, 05532, and 05533. The bottom status bar shows measurement parameters: X + 10.98m 0.43.5mm, X 10.984 s 0.44 ms.</p>	
Tube NO. Row 5, Colum 1 –Eddy current (noise)	Tube NO. Row 5, Colum 1– internal boroscope (good condition)

Attachments:

- **Eddy Current Report**
- **Borescope Report**
- **Ultrasonic Report**
- **Dye penetrant Report**



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:
--------------	--------------	--------------	--------------

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 Tel : 06 5061300 Tel : 02 6225820 Tel : 09 2238754 Tel : 00968 2448 2391	Fax: 04 3241957 Fax: 06 5361173 Fax: 02 6225830 Fax: 09 2238754 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

Please see terms & conditions. This report is valid only if signed and stamped (Numbered Stamp) by Level II / Level III.

For Complaints & Suggestions:
Please email to:suggestions.inspec@intertek.com

INSPEC IS PART OF INTERTEK GROUP

TABLE OF CONTENTS

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 :	

INSPEC IS PART OF INTERTEK GROUP

For Complaints & Suggestions:
Please email to: suggestions.inspec@intertek.com

Please see terms & conditions. This report is valid only if signed and stamped (Numbered Stamp) by Technician / Inspector

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

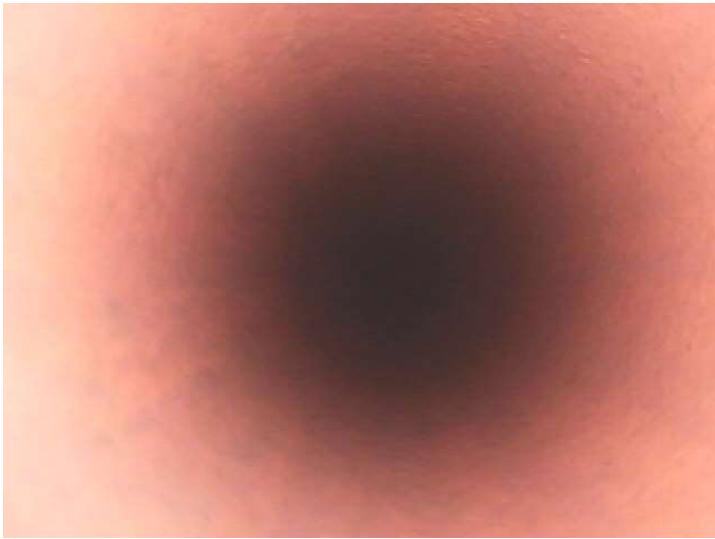
ROW-12 TUBE-26	ROW-12 TUBE-28
Observation: No Anomalies found in visual inspection	Observation: No Anomalies found in visual inspection

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

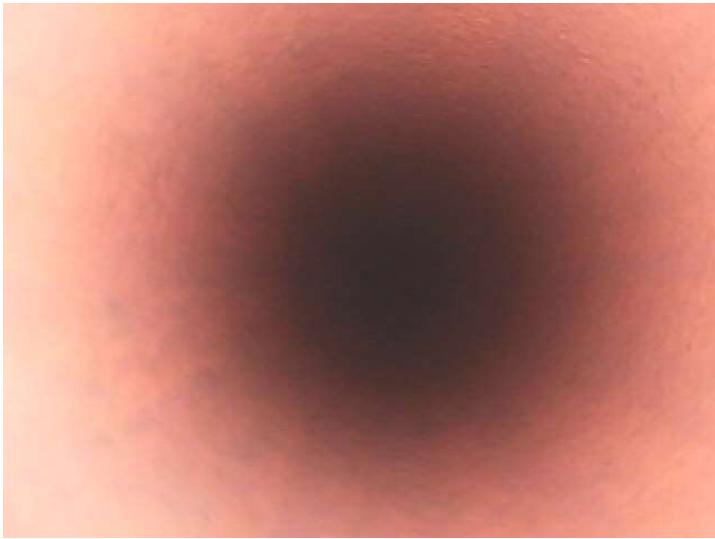
b)HP PRE HEATER-2

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

ECT REPORT

Client: SHAMS POWER	DATE: 09/03/2020				
Site: Madinat Zayed, Abu Dhabi					
Equipment Serial No: HP Heater 1	Tube Orientation: U Tube				
Operator\Analyst: Yasir.A					
Tube Dimension: - OD: 15.9mm Thickness: 2.11 mm Tube Length:			Material: SS-304		
Method: ECT	Equipment\System: MS5800 (Sr/No:899458)		Probe: TEF-108-50		
Total No of Tubes: 1216 Nos.	Tubes Inspected: 466 Nos.		Maximum defect 49%		
Comments: Tubes were found as fairly cleaned condition. Most of the tubes are exhibiting noisy signals suspected the presence of ferromagnetic contents in the tube material. All of these tube data are appeared as ID Corrosion in ECT analysis whereas which could not be relevant if any changes occurred on electrical conductivity and magnetic permeability of the material under test. More over there is chances to miss real defect indications if any exist within the noisy signals region.					
<i>9 tubes were selected for boroscopy and found no visual defects in ID surface. ECT data images are attached in this report. Some tubes in the bottom row are showing the signs of OD Pitting.</i>					
Result: See details below					
Tube counting: Rows are counted from top to bottom and columns from left to right at east side Tube sheet					
WLL: Wall Loss, NDD: No Defect Detected, RST: Restricted					

Row	Column	Defect	Eval.	Remarks
1	1	0%	-	NDD
1	2	0%	-	NDD
1	3	0%	-	NDD
1	4	46%	ID	WLL
1	5	22%	ID	WLL
1	6	15%	ID	WLL
1	7	0%	-	NDD
1	8	0%	-	NDD
1	9	13%	ID	WLL
1	10	0%	-	NDD
1	11	11%	ID	WLL
2	1	15%	ID	WLL
2	3	14%	ID	WLL
2	4	24%	ID	WLL
2	5	11%	ID	WLL
2	6	26%	ID	WLL
2	7	28%	ID	WLL
2	8	1%	ID	WLL
2	9	28%	ID	WLL
2	10	27%	ID	WLL
2	11	13%	ID	WLL
2	12	22%	ID	WLL
2	13	14%	ID	WLL

Page 1 of 17

Dubai Branch	: P O Box: 96535, Dubai, U.A.E	Tel : 04 3241955	Fax: 04 3241957	Email: inspec.dxbcoor@intertek.com
Sharjah Branch	: P O Box: 6130, Sharjah, U.A.E	Tel : 06 5061300	Fax: 06 5361173	Email: inspec.shicoor@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: 7907, Fujairah, U.A.E	Tel : 09 2238754	Fax: 09 2238754	Email: inspec.fuicoor@intertek.com
Oman Branch	: P O Box: 193, P.C: 131, Sultanate of Oman	Tel : 00968 2448 2391	Fax: 00968 2448 5855	Email: inspec.muscat@intertek.com
Registered Office	: 33-37 Athol Street, Douglas, IM1, 1LB, Isle of Man. Company Number 010728V.			

INSPEC IS PART OF INTERTEK GROUP

For Complaints & Suggestions:
Please email to:
suggestions.inspec@intertek.com

Refer Doc-19 for Intertek General Terms and Conditions of Services.
This report is valid only if signed and stamped (Numbered Stamp) by Technician/Inspector.

2	14	31%	ID	WLL
2	15	27%	ID	WLL
2	16	12%	ID	WLL
2	17	23%	ID	WLL
2	18	12%	ID	WLL
3	1	38%	ID	WLL
3	2	31%	ID	WLL
3	3	0%	-	NDD
3	4	8%	ID	WLL
3	5	0%	-	NDD
3	6	0%	-	NDD
3	7	40%	ID	WLL
3	8	14%	ID	WLL
3	9	44%	ID	WLL
3	10	16%	ID	WLL
3	11	0%	-	NDD
3	12	37%	ID	WLL
3	13	32%	ID	WLL
3	14	35%	ID	WLL
3	15	0%	-	NDD
3	16	42%	ID	WLL
3	17	19%	ID	WLL
3	18	0%	-	NDD
3	19	35%	ID	WLL
4	1	0%	-	NDD
4	2	23%	ID	WLL
4	3	38%	ID	WLL
4	4	0%	-	NDD
4	5	39%	ID	WLL
4	6	34%	ID	WLL
4	7	25%	ID	WLL
4	8	38%	ID	WLL
4	9	0%	-	NDD
4	10	16%	ID	WLL
4	11	15%	ID	WLL
4	12	20%	ID	WLL
4	13	17%	ID	WLL
4	14	14%	ID	WLL
4	15	14%	ID	WLL
4	16	20%	ID	WLL
4	17	29%	ID	WLL
4	18	23%	ID	WLL
4	19	14%	ID	WLL
4	20	31%	ID	WLL
4	21	12%	ID	WLL

4	22	15%	ID	WLL
5	1	18%	ID	WLL
5	2	7%	ID	WLL
5	3	13%	ID	WLL
5	4	0%	-	NDD
5	5	15%	ID	WLL
5	6	12%	ID	WLL
5	7	15%	ID	WLL
5	8	36%	ID	WLL
5	9	17%	ID	WLL
5	10	0%	-	NDD
5	11	12%	ID	WLL
5	12	19%	ID	WLL
5	13	0%	-	NDD
5	14	34%	ID	WLL
5	15	12%	ID	WLL
5	16	13%	ID	WLL
5	17	24%	ID	WLL
5	18	14%	ID	WLL
5	19	37%	ID	WLL
5	20	10%	ID	WLL
5	21	25%	ID	WLL
5	22	9%	ID	WLL
5	23	12%	ID	WLL
6	1	0%	-	NDD
6	2	15%	ID	WLL
6	3	0%	-	NDD
6	4	11%	ID	WLL
6	5	0%	-	NDD
6	6	12%	ID	WLL
6	7	0%	-	NDD
6	8	0%	-	NDD
6	9	9%	ID	WLL
6	10	0%	-	NDD
6	11	41%	ID	WLL
6	12	18%	ID	WLL
6	13	44%	ID	WLL
6	14	20%	ID	WLL
6	15	0%	-	NDD
6	16	44%	ID	WLL
6	17	22%	ID	WLL
6	18	11%	ID	WLL
6	19	24%	ID	WLL
6	20	44%	ID	WLL
6	21	0%	-	NDD

6	22	14%	ID	WLL
6	23	12%	ID	WLL
6	24	12%	ID	WLL
6	25	0%	-	NDD
6	26	43%	ID	WLL
6	27	0%	-	NDD
6	28	0%	-	NDD
7	1	26%	ID	WLL
7	2	0%	-	NDD
7	3	0%	-	NDD
7	4	20%	ID	WLL
7	5	29%	ID	WLL
7	6	0%	-	NDD
7	7	0%	-	NDD
7	8	0%	-	NDD
7	9	13%	ID	WLL
7	10	17%	ID	WLL
7	11	19%	ID	WLL
7	12	14%	ID	WLL
7	13	0%	-	NDD
7	14	15%	ID	WLL
7	15	0%	-	NDD
7	16	0%	-	NDD
7	17	0%	-	NDD
7	18	31%	ID	WLL
7	19	16%	ID	WLL
7	20	11%	ID	WLL
7	21	10%	ID	WLL
7	22	42%	ID	WLL
7	23	10%	ID	WLL
7	24	0%	-	NDD
7	25	0%	-	NDD
7	26	13%	ID	WLL
7	27	18%	ID	WLL
8	1	18%	ID	WLL
8	2	17%	ID	WLL
8	3	24%	ID	WLL
8	4	28%	ID	WLL
8	5	28%	ID	WLL
8	6	20%	ID	WLL
8	7	13%	ID	WLL
8	9	0%	-	NDD
8	10	0%	-	NDD
8	11	25%	ID	WLL
8	12	30%	ID	WLL

8	13	37%	ID	WLL
8	14	39%	ID	WLL
8	15	20%	ID	WLL
8	16	29%	ID	WLL
8	17	10%	ID	WLL
8	18	16%	ID	WLL
8	19	19%	ID	WLL
8	20	37%	ID	WLL
8	21	45%	ID	WLL
8	22	37%	ID	WLL
8	23	27%	ID	WLL
8	24	17%	ID	WLL
8	25	43%	ID	WLL
8	26	26%	ID	WLL
8	27	15%	ID	WLL
8	28	33%	ID	WLL
8	29	16%	ID	WLL
8	30	14%	ID	WLL
8	31	9%	ID	WLL
8	32	37%	ID	WLL
8	33	0%	-	NDD
8	34	26%	ID	WLL
9	1	20%	ID	WLL
9	2	18%	ID	WLL
9	3	17%	ID	WLL
9	4	23%	ID	WLL
9	5	11%	ID	WLL
9	6	19%	ID	WLL
9	7	36%	ID	WLL
9	8	13%	ID	WLL
9	9	9%	ID	WLL
9	10	27%	ID	WLL
9	11	32%	ID	WLL
9	12	11%	ID	WLL
9	13	41%	ID	WLL
9	14	43%	ID	WLL
9	15	29%	ID	WLL
9	16	10%	ID	WLL
9	17	34%	ID	WLL
9	18	12%	ID	WLL
9	19	9%	ID	WLL
9	20	12%	ID	WLL
9	21	11%	ID	WLL
9	22	16%	ID	WLL
9	23	41%	ID	WLL

9	24	13%	ID	WLL
9	25	25%	ID	WLL
9	26	0%	-	NDD
9	27	21%	ID	WLL
9	28	12%	ID	WLL
9	29	34%	ID	WLL
9	30	30%	ID	WLL
9	31	18%	ID	WLL
9	32	12%	ID	WLL
9	33	13%	ID	WLL
9	34	38%	ID	WLL
9	35	20%	ID	WLL
10	1	12%	ID	WLL
10	2	11%	ID	WLL
10	3	15%	ID	WLL
10	4	17%	ID	WLL
10	5	21%	ID	WLL
10	6	10%	ID	WLL
10	7	16%	ID	WLL
10	8	32%	ID	WLL
10	9	26%	ID	PIT
10	10	36%	ID	WLL
10	11	21%	ID	WLL
10	12	31%	ID	WLL
10	13	39%	ID	WLL
10	14	15%	ID	WLL
10	15	34%	ID	WLL
10	16	26%	ID	WLL
10	17	30%	ID	WLL
10	18	11%	ID	WLL
10	19	11%	ID	WLL
10	20	42%	ID	WLL
10	21	38%	ID	WLL
10	22	24%	ID	WLL
10	23	13%	ID	WLL
10	24	34%	ID	WLL
10	25	23%	ID	WLL
10	26	7%	ID	WLL
10	27	32%	ID	WLL
10	28	32%	ID	WLL
10	29	14%	ID	WLL
10	30	20%	ID	WLL
10	31	8%	ID	WLL
10	32	35%	ID	WLL
10	33	15%	ID	WLL

10	34	19%	ID	WLL
10	35	31%	ID	WLL
10	36	34%	ID	WLL
11	1	34%	ID	WLL
11	2	22%	ID	WLL
11	3	10%	ID	WLL
11	4	41%	ID	WLL
11	5	17%	ID	WLL
11	6	41%	ID	WLL
11	7	29%	ID	WLL
11	8	22%	ID	WLL
11	9	36%	ID	WLL
11	10	31%	ID	WLL
11	11	19%	ID	WLL
11	12	13%	ID	WLL
11	13	35%	ID	WLL
11	14	23%	ID	WLL
11	15	32%	ID	WLL
11	16	13%	ID	WLL
11	17	37%	ID	WLL
11	18	28%	ID	WLL
11	19	25%	ID	WLL
11	20	26%	ID	WLL
11	21	16%	ID	WLL
11	22	40%	ID	WLL
11	23	40%	ID	WLL
11	24	28%	ID	WLL
11	25	21%	ID	WLL
11	26	30%	ID	WLL
11	27	36%	ID	WLL
11	28	32%	ID	WLL
11	29	24%	ID	WLL
11	30	32%	ID	WLL
11	31	13%	ID	WLL
11	32	30%	ID	WLL
11	33	13%	ID	WLL
11	34	32%	ID	WLL
11	35	9%	ID	WLL
11	36	9%	ID	WLL
11	37	35%	ID	WLL
12	1	25%	ID	WLL
12	2	21%	ID	WLL
12	3	0%	-	NDD
12	4	34%	ID	WLL
12	5	8%	ID	WLL

12	6	0%	-	NDD
12	7	27%	ID	WLL
12	8	34%	ID	WLL
12	9	31%	ID	WLL
12	10	34%	ID	WLL
12	11	0%	-	NDD
12	12	18%	ID	WLL
12	13	38%	ID	WLL
12	14	8%	ID	WLL
12	15	22%	ID	WLL
12	16	13%	ID	WLL
12	17	16%	ID	WLL
12	18	22%	ID	WLL
12	19	0%	-	NDD
12	20	24%	ID	WLL
12	21	10%	ID	WLL
12	22	36%	ID	WLL
12	23	16%	ID	WLL
12	24	24%	ID	WLL
12	25	10%	ID	WLL
12	26	26%	ID	WLL
12	27	13%	ID	WLL
12	28	40%	ID	WLL
12	29	23%	ID	WLL
12	30	21%	ID	WLL
12	31	11%	ID	WLL
12	32	28%	ID	WLL
12	33	22%	ID	WLL
12	34	20%	ID	WLL
12	35	30%	ID	WLL
12	36	12%	ID	WLL
12	37	15%	ID	WLL
12	38	35%	ID	WLL
13	1	18%	ID	WLL
13	2	26%	ID	WLL
13	3	25%	-	WLL
13	4	17%	ID	WLL
13	5	18%	ID	WLL
13	6	26%	ID	WLL
13	7	17%	ID	WLL
13	8	35%	ID	WLL
13	9	28%	ID	WLL
13	10	27%	ID	WLL
13	11	32%	ID	WLL
13	12	13%	ID	WLL

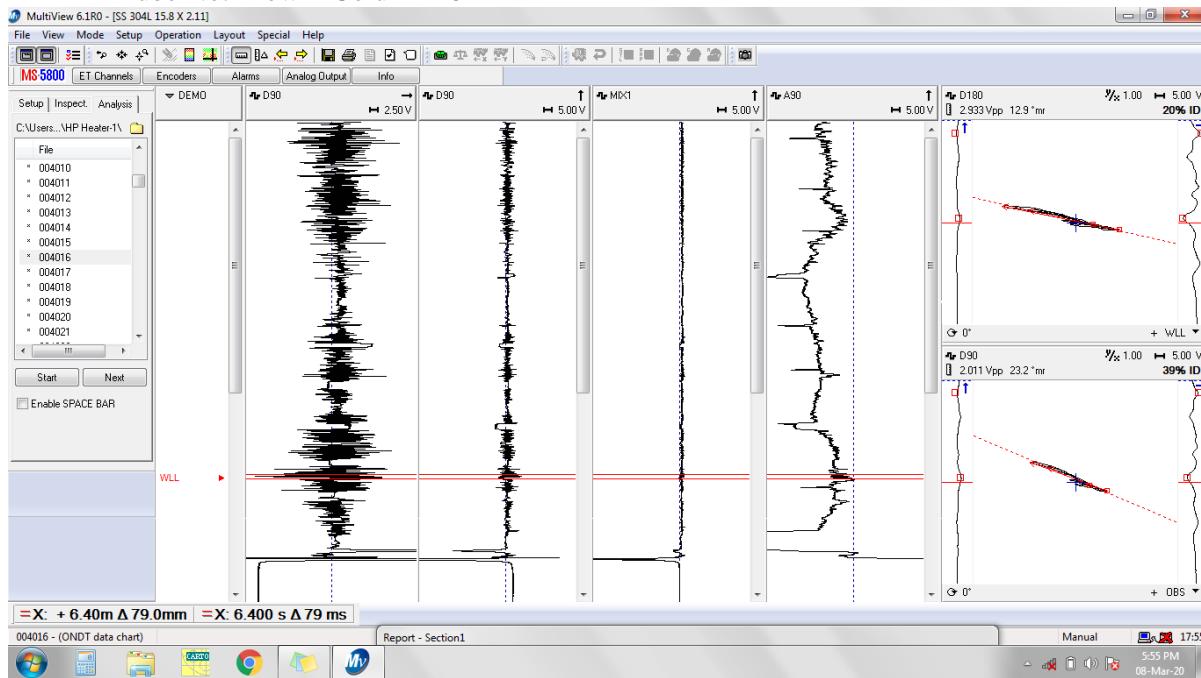
13	13	24%	ID	WLL
13	14	12%	ID	WLL
13	15	28%	ID	WLL
13	16	19%	ID	WLL
13	17	11%	ID	WLL
13	18	10%	ID	WLL
13	19	17%	ID	WLL
13	20	25%	ID	WLL
13	21	15%	ID	WLL
13	22	22%	ID	WLL
13	23	23%	ID	WLL
13	24	13%	ID	WLL
13	25	30%	ID	WLL
13	26	0%	-	NDD
13	27	33%	ID	WLL
13	28	10%	ID	WLL
13	29	29%	ID	WLL
13	30	29%	ID	WLL
13	31	14%	ID	WLL
13	32	25%	ID	WLL
13	33	23%	ID	WLL
13	34	25%	ID	WLL
13	35	26%	ID	WLL
13	36	11%	ID	WLL
13	37	19%	ID	WLL
13	38	25%	ID	WLL
13	39	26%	ID	WLL
14	1	17%	ID	WLL
14	2	0%	-	NDD
14	3	49%	ID	WLL
14	4	32%	ID	WLL
14	5	25%	ID	WLL
14	6	20%	ID	WLL
14	7	14%	ID	WLL
14	8	24%	ID	WLL
14	9	28%	ID	WLL
14	10	14%	ID	WLL
14	11	28%	ID	WLL
14	12	16%	ID	WLL
14	13	13%	ID	WLL
14	14	35%	ID	WLL
14	15	26%	ID	WLL
14	16	35%	ID	WLL
14	17	21%	ID	WLL
14	18	16%	ID	WLL

14	19	14%	ID	WLL
14	20	33%	ID	WLL
14	21	19%	ID	WLL
14	22	34%	ID	WLL
14	23	10%	ID	WLL
14	24	7%	ID	WLL
16	1	14%	ID	WLL
16	2	23%	ID	WLL
16	3	8%	ID	WLL
16	4	19%	ID	WLL
16	5	28%	ID	WLL
16	36	36%	ID	WLL
16	37	20%	ID	WLL
16	38	30%	ID	WLL
16	39	34%	ID	WLL
16	40	33%	ID	WLL
19	1	11%	ID	WLL
19	2	18%	ID	WLL
19	3	13%	ID	WLL
19	4	37%	ID	WLL
19	5	19%	ID	WLL
19	19	21%	ID	WLL
19	20	17%	ID	WLL
19	21	15%	ID	WLL
19	22	26%	ID	WLL
19	23	25%	ID	WLL
19	40	46%	ID	WLL
20	22	0%	-	NDD
20	23	14%	ID	WLL
20	24	19%	ID	WLL
20	25	0%	-	NDD
20	26	13%	ID	WLL
21	1	15%	ID	WLL
21	2	24%	ID	WLL
21	3	20%	ID	WLL
21	4	19%	ID	WLL
21	5	19%	ID	WLL
22	37	9%	ID	WLL
22	38	0%	-	NDD
22	39	27%	ID	WLL
22	40	25%	ID	WLL
22	41	0%	-	NDD
23	38	33%	ID	WLL
23	39	39%	ID	WLL
23	40	36%	ID	WLL

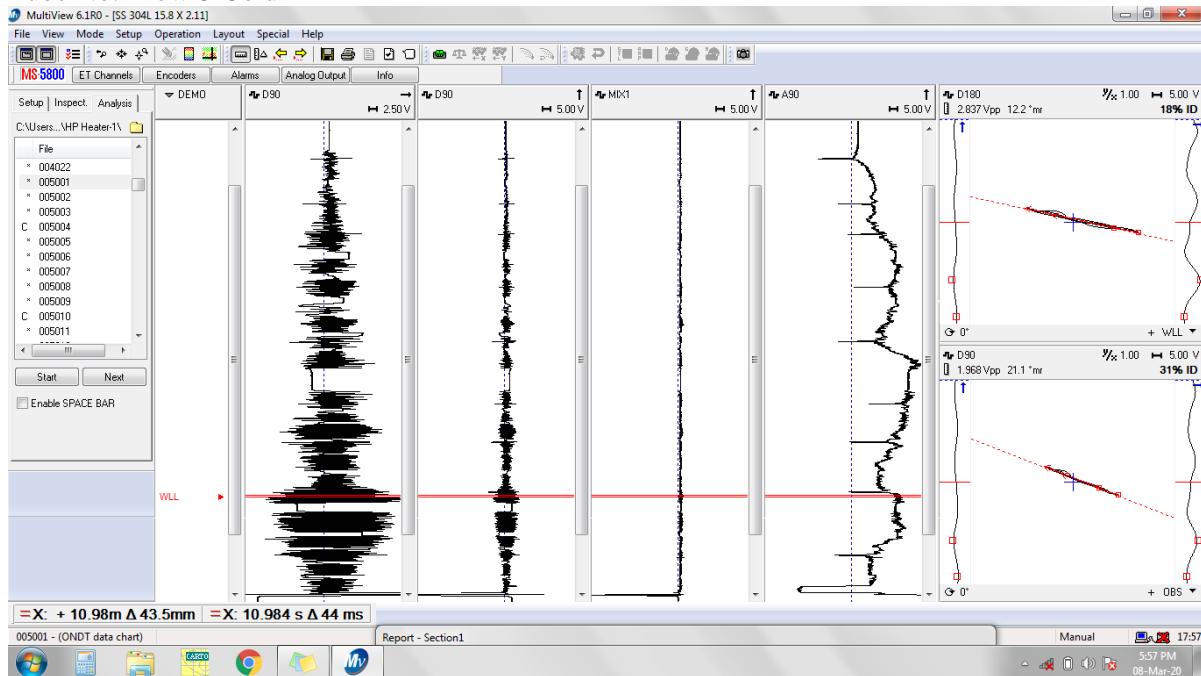
28	24	42%	ID	WLL
29	24	47%	ID	WLL
29	36	35%	ID	WLL
30	1	0%	-	OBS
31	1	49%	ID	WLL
31	3	40%	ID	WLL
33	1	0%	-	OBS
33	2	33%	ID	WLL
33	3	0%	-	NDD
33	4	28%	ID	WLL
33	5	8%	ID	WLL
33	24	14%	ID	WLL
33	25	31%	ID	WLL
33	26	0%	-	NDD
33	27	12%	ID	WLL
33	28	27%	ID	WLL
35	7	0%	-	NDD
35	8	29%	ID	WLL
35	9	11%	ID	WLL
35	10	10%	ID	WLL
35	11	20%	ID	WLL
37	1	17%	ID	WLL
37	4	9%	ID	WLL
37	5	24%	ID	WLL
37	6	35%	ID	WLL
37	7	32%	ID	WLL
37	8	33%	ID	WLL
37	9	26%	ID	WLL
37	10	23%	ID	WLL
37	11	19%	ID	WLL
37	12	24%	ID	WLL
37	13	10%	ID	WLL
37	16	40%	ID	WLL
38	2	44%	OD	WLL
38	4	36%	OD	WLL
38	6	48%	OD	WLL
38	8	42%	OD	WLL
38	9	0%	-	OBS

	TECHNICIAN	TPI	CLIENT
Name :	YASIR AHAMMED		
Signature :			
Date :	09.03.2020		

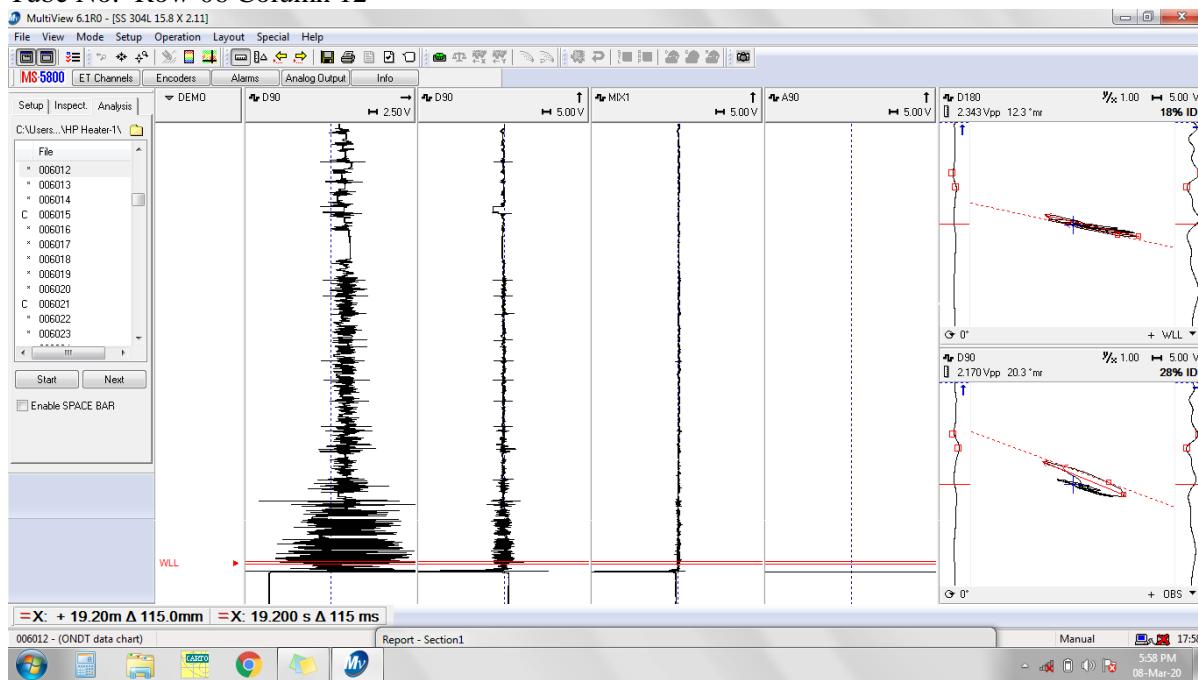
Tube No: Row-4 Column 16



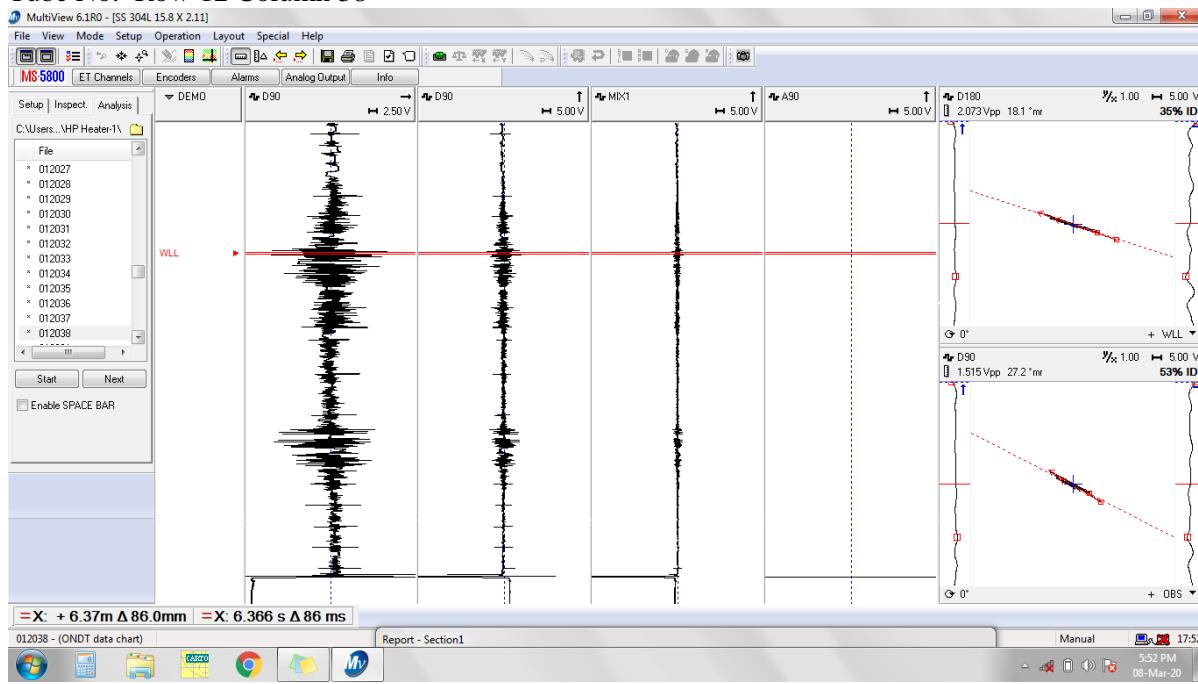
Tube No: Row-5 Column 1



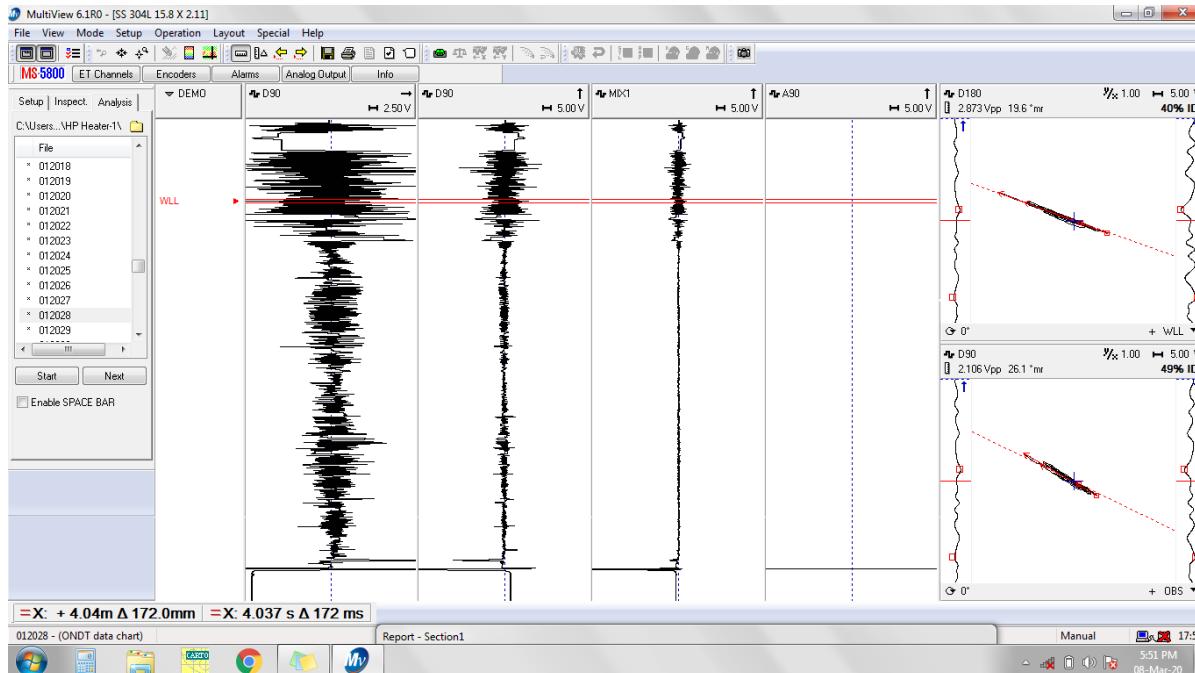
Tube No: Row-06 Column 12



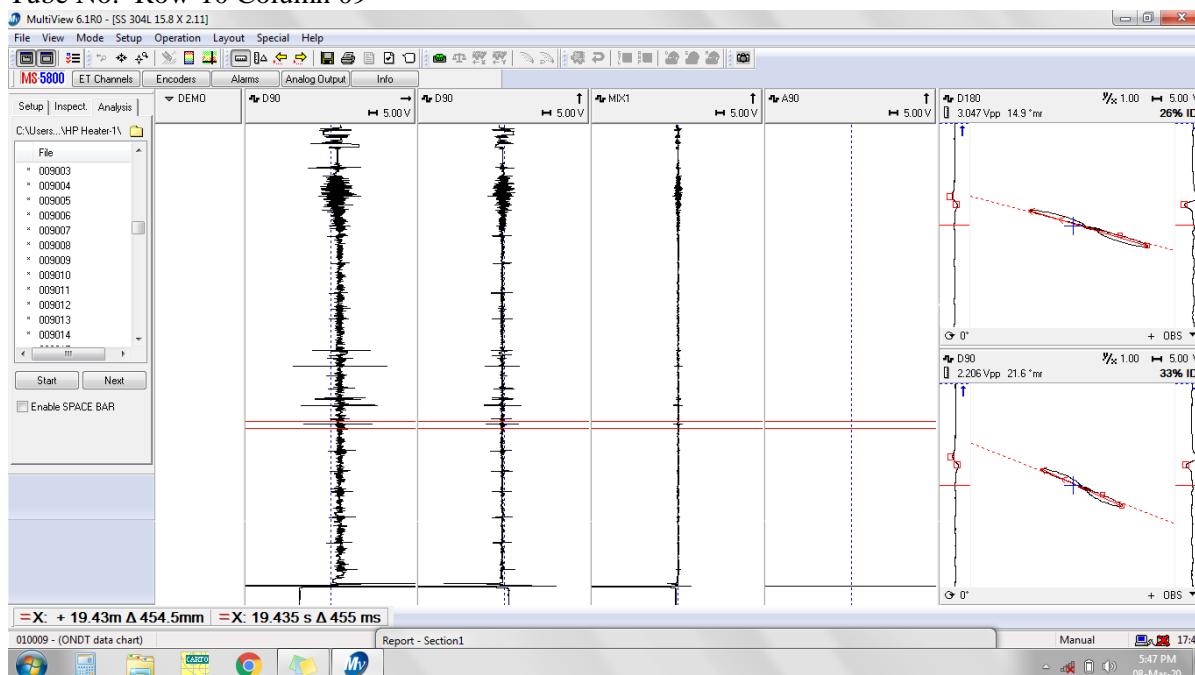
Tube No: Row-12 Column 38



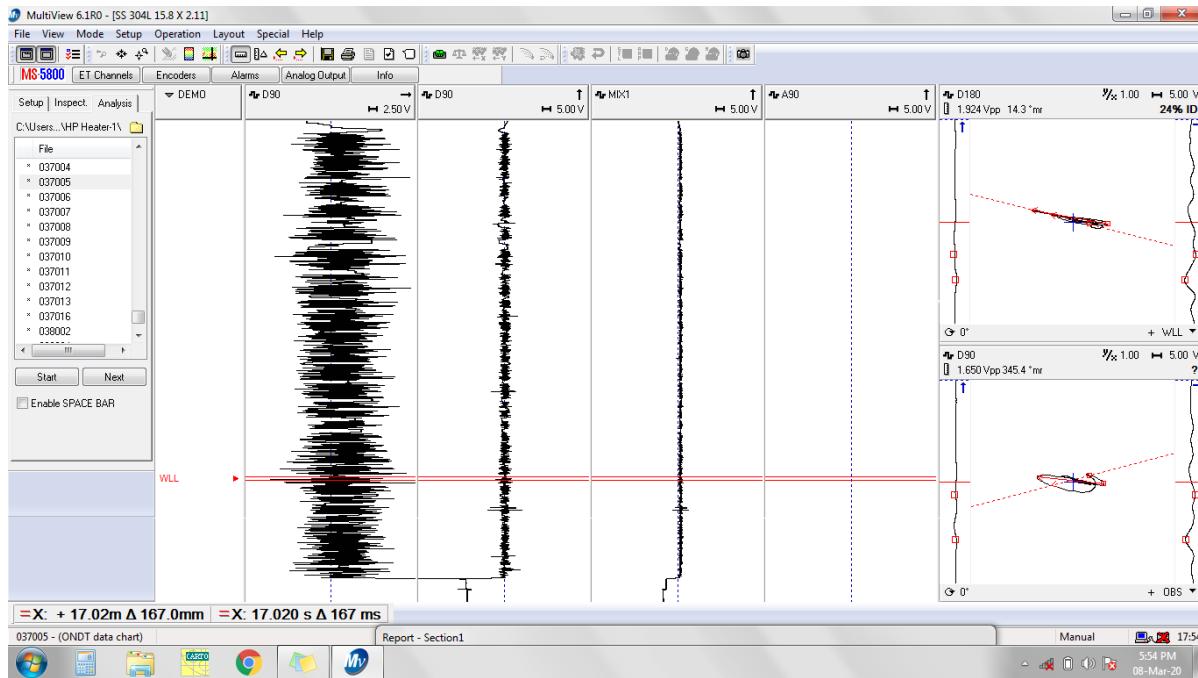
Tube No: Row-12 Column 28



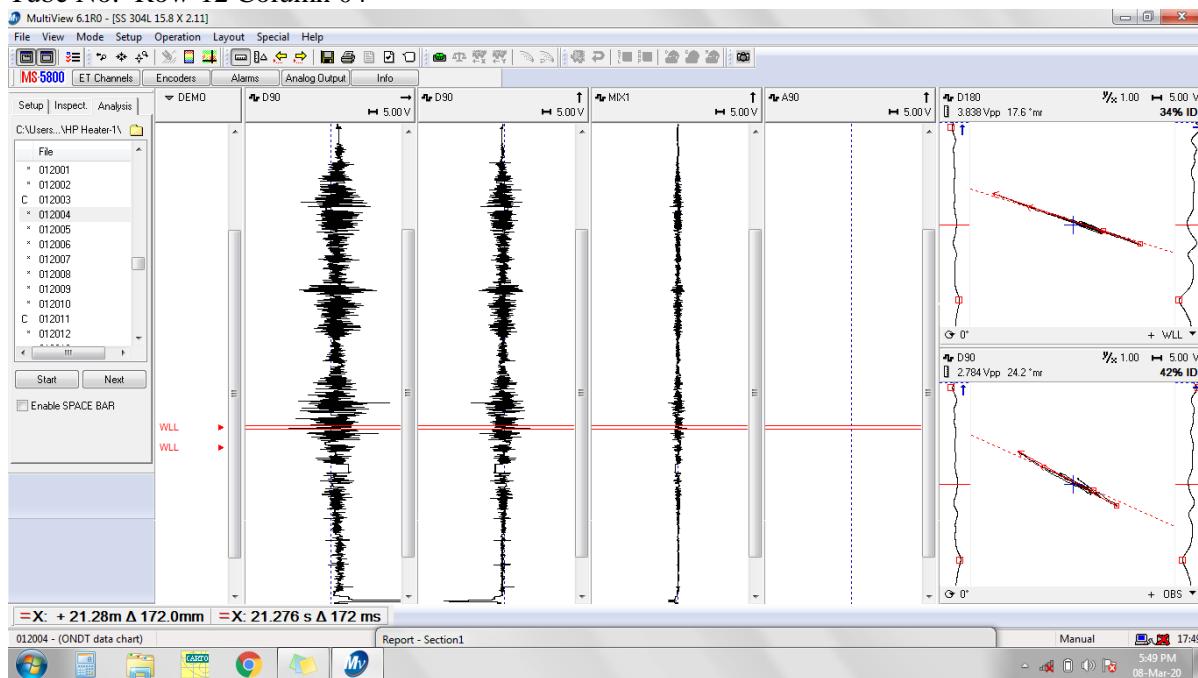
Tube No: Row-10 Column 09



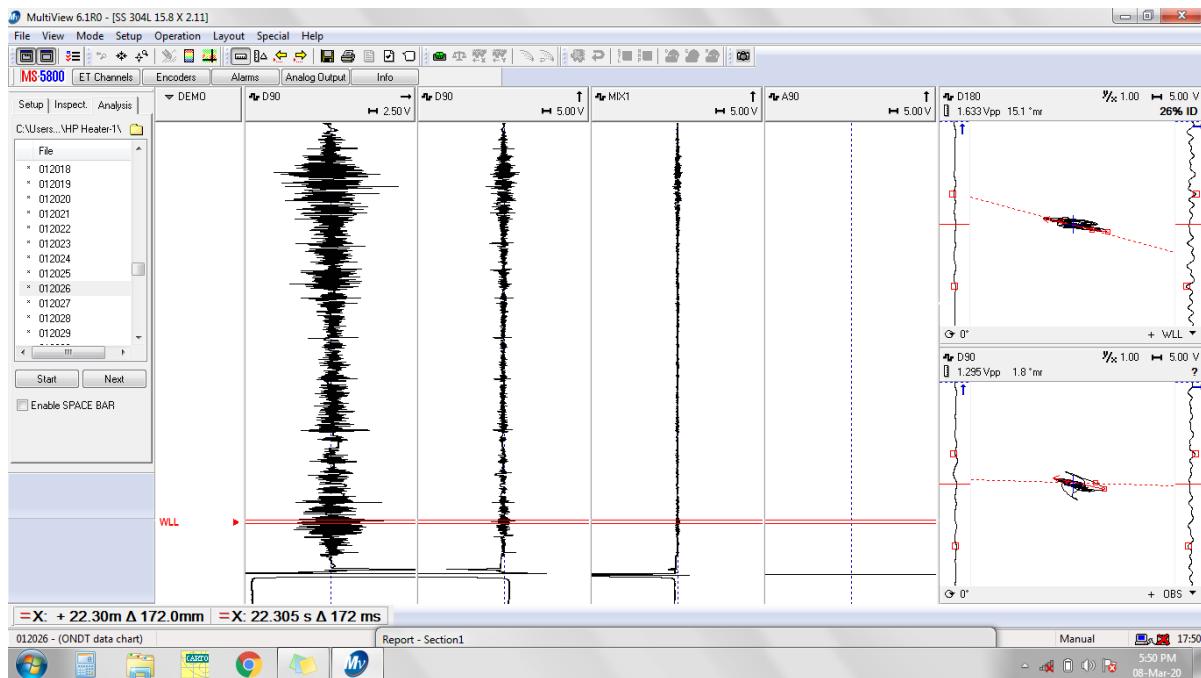
Tube No: Row-37 Column 05



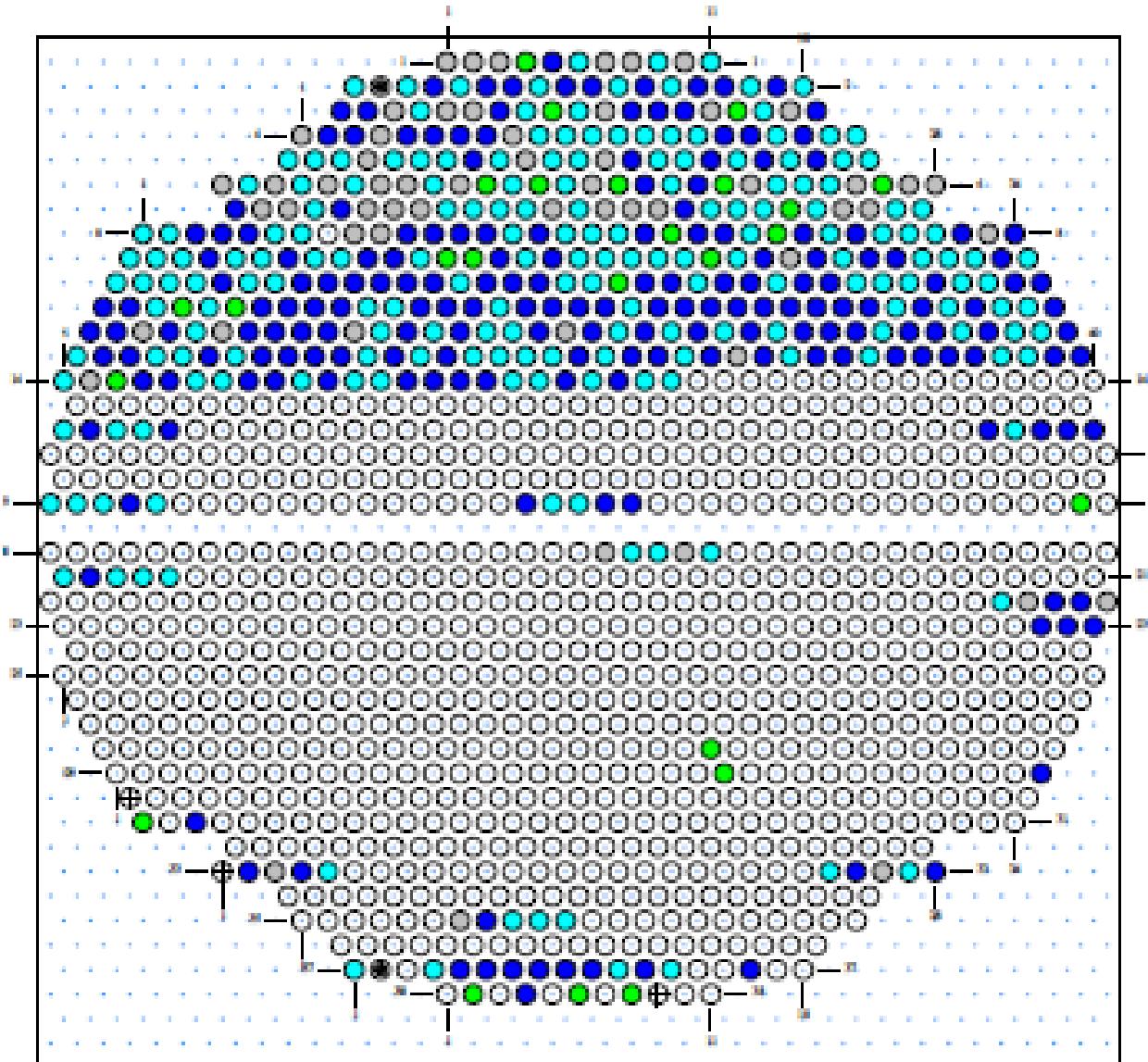
Tube No: Row-12 Column 04



Tube No: Row-12 Column 26



HEAT EXCHANGER DRAWING




 2 ● PLG Plugged
 0 ● 80 < Defect <= 100
 0 ● 60 < Defect <= 80
 23 ● 40 < Defect <= 60

192 ● 20 < Defect <= 40
 189 ● 0 < Defect <= 20
 57 ● No Defect Detected
 3 ● RST: Restricted

748 ○ Not Tested

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

ULTRASONIC THICKNESS GAUGING REPORT

Client:	SHAMS POWER COMPANY		
Date:	15.03.2020	Report No.:	AD / 480
Project:	SHAMS OUTAGE MARCH 2020	Job No.:	N/A
Location:	MADINAT ZAYED	Drawing No.:	N/A
Item ID:	HP HEATER-1	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:	15.03.2020	Page:	1 of 1
Description:			

ULTRASONIC THICKNESS GAUGING WAS CARRIED OUT ON THE FOLLOWING HP HEATER-1 (KKS R1LCC30AC001)

LOCATION	ORIENTATION	MEASURED THICKNESS (mm)
1	12 O'CLOCK	58.85
1	3 O'CLOCK	58.40
1	6 O'CLOCK	58.41
1	9 O'CLOCK	58.92

REPORT FORMAT APPLICABLE ONLY FOR AUH & FUJ FACILITY

LEVEL II TECHNICIAN Name : RAJESH KANNAN Sign : Date : Level II No. 15.03.2020 660 <small>Dubai Branch P.O.Box 41310, Sharjah, U.A.E. Sharjah Branch P.O.Box 41227, Abu Dhabi, U.A.E. Abu Dhabi Branch P.O.Box 7807, Fujairah, U.A.E. Fujairah Branch P.O.Box 193, P.C.131, Sultanate of Oman Oman Branch :33-37 Athol Street, Douglas, IM1, 1LB, Isle of Man. Company Number 010728V.</small>	CLIENT REPRESENTATIVE Name : Sign : Date :	AI / TPI Name : Sign : Date :
--	--	---

Tel: 04 3241955 Fax: 04 3241957 Email: Inspec.dxbcoor@intertek.com
 Tel: 06 5361300 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.fuicoor@intertek.com
 Tel: 00968 2448 2301 Fax: 00968 2448 5855 Email: Inspec.muscat@intertek.com

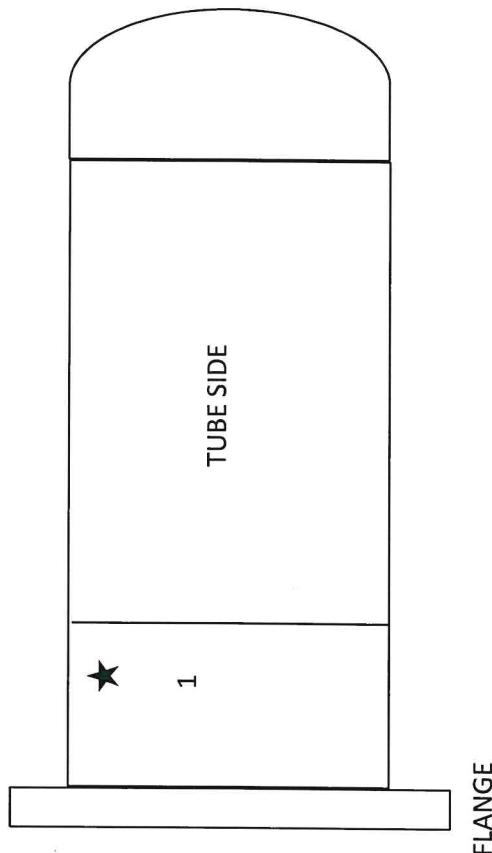
INSPiC IS PART OF INTERTEK GROUP

For Complaints & Suggestions:
 Please email to: suggestions_inspec@intertek.com

Please see terms & conditions. This report is valid only if signed and stamped (Numbered Stamp) by Level II / Level III.

ULTRASONIC THICKNESS SCANNING DRAWING SHEET

HP HEATER-1



★ UTG LOCATION

LEVEL II TECHNICIAN
Name : RAJESH KAMNANI & SIVANESAN
Level II No. Sign
660 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 / 53678	Date:	15.03.2020	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 :	15.03.2020	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-1 (KKS-R1LCC30AC001)

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 :	SLVANESAN & RAJESH KANNAN	Name :			Name :		
Sign :		Sign :			Sign :		
Date :	Level II No. 15.03.2020 660 Date	Date :			Date :		
Dubai Branch	: P.O Box: 9100, Al Barsha, U.A.E	Tel: 04 3241955	Fax: 04 3241957	Email: inspec.dxbcoor@intertek.com	INSPEC IS PART OF INTERTEK GROUP		
Sharjah Branch	: P.O Box: 6130, Sharjah, U.A.E	Tel: 06 5061300	Fax: 06 5361173	Email: inspec.shjcoor@intertek.com			
Abu Dhabi Branch	: P.O Box: 41177, Abu Dhabi, U.A.E	Tel: 02 6225820	Fax: 02 6225830	Email: inspec.adhcoor@intertek.com			
Fujairah Branch	: P.O Box: 7107, Fujairah, U.A.E	Tel: 09 2238754	Fax: 09 2238754	Email: inspec.fulcoor@intertek.com			
Oman Branch	: P.O Box: 193, P.C. 131, Sultanate of Oman	Tel: 00968 2448 2391	Fax: 00968 2448 5855	Email: inspec.muscat@intertek.com			
Registered Office	: 33-37 Athal Street, Douglas, IM1, 1LB, Isle of Man. Company Number 010728V.				For Comments & Suggestions: Please email to suggestions.inspec@intertek.com		

Refer Doc-19 for Intertek General Terms and Conditions of Services. This report is valid only if signed and stamped (Numbered Stamp) by Level II / Level III.

Intertek
INSPEC

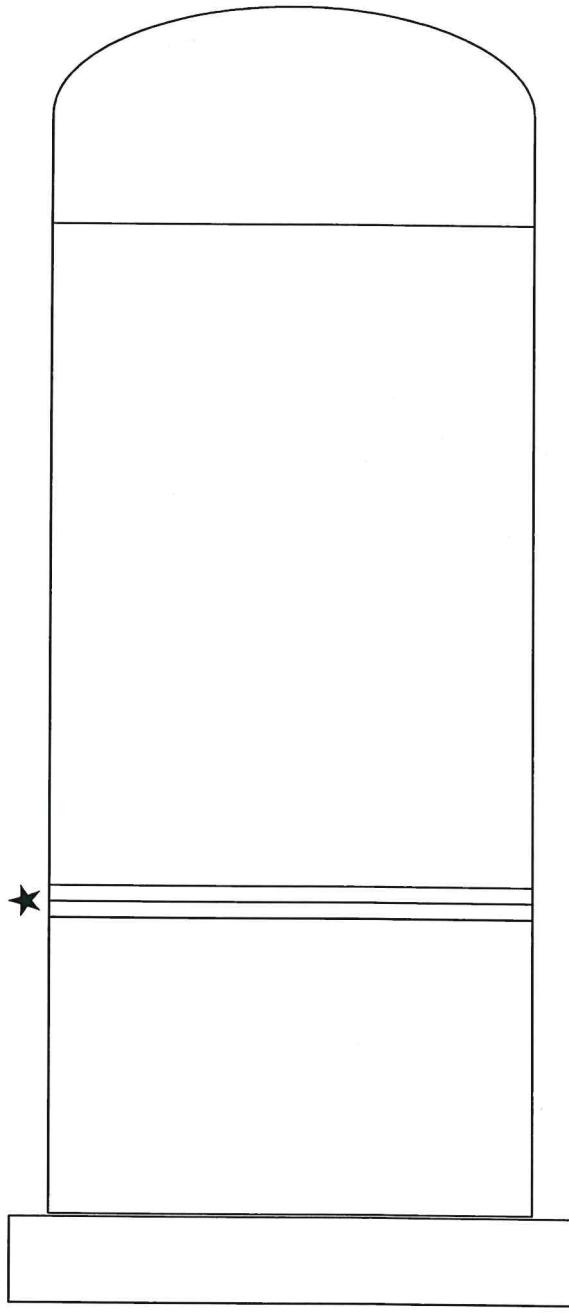
International Inspection Services Ltd

Intertek.com

Date :- 15.03.2020
Report No.: - AD-53678
Page No. :- 2 OF 2

Liquid Penetrant Examination - Drawing Sheet

HP HEATER-1



★ PT DONE LOCATION

LEVEL II TECHNICIAN
Name : SIVANESAN & RAJESH KANNAN
Sign :
Level II No. _____
Date : 15/03/2020