



# Ti Thermal Imaging LTD

Unit 8, Weybridge Business Centre, 66 York Road, Weybridge, Surrey, KT13 9DY

Tel: 0845 458 6315 Fax: 0871 9004978 E-mail: [info@thermalimaging.co.uk](mailto:info@thermalimaging.co.uk) Web: [www.thermalimaging.co.uk](http://www.thermalimaging.co.uk)



## **THERMOGRAPHIC INSPECTION FOR:**

**FLOWLINE T-PIECES  
304/306**

**LOCATION:**

**TI - SAMPLE**

**DATE:**

**11/06/10**

**TI JOB NO.**

**TI-14055**



Report generated by Ti Thermal Imaging LTD.

Company Registered in England: 04450573 VAT No. 828 6288 87





# Ti Thermal Imaging LTD

Unit 8, Weybridge Business Centre, 66 York Road, Weybridge, Surrey, KT13 9DY

Tel: 0845 458 6315 Fax: 0871 9004978 E-mail: [info@thermalimaging.co.uk](mailto:info@thermalimaging.co.uk) Web: [www.thermalimaging.co.uk](http://www.thermalimaging.co.uk)



## Introduction to your Ti Thermal Imaging LTD risk management thermographic inspection

### Inspection Overview

This investigation is employing the use of thermographics and infra-red in order to assess oil and gas LCV Valves and well flowline T-pieces external surface temperatures with a view to exposing areas of excess internal erosion.

### Theory

The 1<sup>st</sup> stage separator operate at around 40°C+, sometimes higher and therefore the external pipework temperature should be near but not equal to this operating temperature as the length of time in operation will ensure that it is fully equilibrated. Areas of wall loss will show up as anomalies with a higher temperature than what is considered normal because there is less material to insulate the temperatures travelling to the surface of the LCV, a higher external temperature will therefore be observed. External ambient temperatures ordinarily do not have an effect on the surface temperatures because any colder temperatures found are outweighed by the operating temperature. There is an exception to this rule and this is when the pipework is made from a highly reflective material such as Stainless Steel which has a lower emissivity. The unclean surfaces provide higher emissivity so that temperatures can be read however these can be inconclusive and pipework in this category should be monitored for changes rather than outright temperature.

### Inspection methods

Initial visual inspection of the site took place in order to familiarise with any irregularities or access problems. The LCV and flowline T-pieces occupy areas whereby all elevations are visible. Images have been captured of most areas around the LCV and T-pieces where a good reading can be obtained but certain elevations could not be imaged.

### Reporting

A complete baseline archive has been compiled of all areas where the pipework can be seen. These baselines include measured temperature which is recorded as the lowest surface temperature found on the pipework and they can be used for reference and trending purposes on future inspections. Each image is analysed and areas of sufficient external surface temperature anomaly have been highlighted in a separate visual documentation page but again these have been baselined so that trending can occur on subsequent inspections. If temperature shows as over the operating temperature then the anomaly has been marked as an important fault rather than individually grading the fault with a fluctuating severity rating.

Object Parameters	
Weather	Dry
Wind	4kts
Ambient Temperature	21°C
Humidity	81%
Operating Temp	40-50 °C

### Thermographic Inspection Specification:

1. IR camera: Flir ThermoCAM P640 series
2. Software: InspecTrend
3. Thermographer: ITC Level II
4. Extech Instruments for humidity/wind speed etc
5. Leico laser distance measurements



Report generated by Ti Thermal Imaging LTD.

Company Registered in England: 04450573 VAT No. 828 6288 87





## Ti Thermal Imaging LTD

Unit 8, Weybridge Business Centre, 66 York Road, Weybridge, Surrey, KT13 9DY

Tel: 0845 458 6315 Fax: 0871 9004978 E-mail: [info@thermalimaging.co.uk](mailto:info@thermalimaging.co.uk) Web: [www.thermalimaging.co.uk](http://www.thermalimaging.co.uk)



# Cover Page for Visual Executive and Operations summary of problems found



Report generated by Ti Thermal Imaging LTD.

Company Registered in England: 04450573 VAT No. 828 6288 87





INFRARED THERMOGRAPHIC INSPECTION  
OF  
VISUAL PROBLEMS

Page 1

Provided for

Report Date: 14/10/2010

**TI , TI Site 5 Process**

**Overview:**

The Infrared Inspection was performed by TI Thermal Imaging, by a certified infrared Thermographer. All of the items inspected are listed in this InspecTrend report. Any anomalies are listed in order of priority based on the component's temperature rise, as measured from a reference component of equal type and load at the time of the inspection. TI Thermal Imaging assumes no liability directly or indirectly as a result of this inspection.

**Current Inspection No: 1357 October 14, 2010**

Prior Inspection No:

Priority	Temp Rise	Current Inspection	Prior Inspection	Percent of Change
1-Critical		0 = 0%	NA	NA
2-Serious		4 =100%	NA	NA
3-Important		0 = 0%	NA	NA
4-Minor		0 = 0%	NA	NA
Total Tested Problems:		4	NA	NA
Number of New Documented Problems:		4 =100%	NA	NA
Number of Tested re-occurring Problems:		0 = 0%	NA	NA

Number of prior problems which were Not Tested this inspection : NA

Number of Total Open Problems : 4

Number of prior problems which tested Normal this inspection : NA

I hereby certify the above project was inspected by myself or under my direction and that the enclosed data is the direct result of this inspection.

**TI Thermal Imaging**

Administrator

Certification Level/No.:

\* Summary of reoccurring problems on following page(s)



## Ti Thermal Imaging LTD

Unit 8, Weybridge Business Centre, 66 York Road, Weybridge, Surrey, KT13 9DY

Tel: 0845 458 6315 Fax: 0871 9004978 E-mail: [info@thermalimaging.co.uk](mailto:info@thermalimaging.co.uk) Web: [www.thermalimaging.co.uk](http://www.thermalimaging.co.uk)



### List of Open Problems

Full list of thermal, mechanical and visual issues found



Report generated by Ti Thermal Imaging LTD.

Company Registered in England: 04450573 VAT No. 828 6288 87





TI

TI Site 5 Process

## List of All Open Problems

Page: 1 of 1

Report Date: 14/10/2010

Prior Inspection No :

Current Inspection No : 1357      October 14, 2010

### Operation Priority Key

CTO = Critical to operation

ETO = Essential to operation

NON = Non-essential to operation

UNC = Un-Classified

Prob#	Asset ID		Insp#	Temp Rise	% Load	Severity	Status
V 4	304	Equipment: WELL FLOWLINE T-PIECE \ 304 NORTH Component: Increased external surface temperature at AR1	1357			2-Serious	TESTED
V 3	304	Equipment: WELL FLOWLINE T-PIECE \ 304 SOUTH Component: Increased external surface temperature at AR1	1357			2-Serious	TESTED
V 1	306	Equipment: WELL FLOWLINE T-PIECE \ 306 NORTH Component: Increased external surface temperature at AR1	1357			2-Serious	TESTED
V 2	306	Equipment: WELL FLOWLINE T-PIECE \ 306 WEST Component: Increased external surface temperature at AR1	1357			2-Serious	TESTED



## Ti Thermal Imaging LTD

Unit 8, Weybridge Business Centre, 66 York Road, Weybridge, Surrey, KT13 9DY

Tel: 0845 458 6315 Fax: 0871 9004978 E-mail: [info@thermalimaging.co.uk](mailto:info@thermalimaging.co.uk) Web: [www.thermalimaging.co.uk](http://www.thermalimaging.co.uk)



# Inspection Inventory Pages

## Equipment listing and test status



Report generated by Ti Thermal Imaging LTD.

Company Registered in England: 04450573 VAT No. 828 6288 87





## Current Inspection Inventory Status By Inspection Order

Page: 1

TI

TI Site 5 Process

Report Date: 14/10/2010

Inspected By : Administrator

Work Order	Asset ID	Equipment Description
NI	-	WELL FLOWLINE T-PIECE
NI	306	306 SOUTH
NI	306	306 NORTH
NI	306	306 WEST
NI	304	304 SOUTH
NI	304	304 NORTH

### Other

NI = Not Issued

### Test Status Note

SCE = Safety Critical

### Problem Type Key

TD = T/D Electrical

M = Mechanical

V = Visual Inspection

### Operation Priority Key

CTO = Critical to operation

ETO = Essential to operation

NON = Non-essential to operation

UNC = Un-Classified

### Equipment Test Status Key

TBT = To Be Tested

NT/NL = Not Tested/No Load

NT/TC = Not Tested/Time Constraint

NT/UR = Not Tested/Under Repair

NT/LO = Not Tested/Locked Out

NT/NA = Not Tested/Not Available

NT/NS = Not Tested/Not Specified

NSFI = Not Selected for this insp.

CTO	Tested	Problem #	Test Status Notes
CTO	TESTED		
CTO	TESTED		
CTO	TESTED	V1	
CTO	TESTED	V2	
CTO	TESTED	V3	
CTO	TESTED	V4	





## Ti Thermal Imaging LTD

Unit 8, Weybridge Business Centre, 66 York Road, Weybridge, Surrey, KT13 9DY

Tel: 0845 458 6315 Fax: 0871 9004978 E-mail: [info@thermalimaging.co.uk](mailto:info@thermalimaging.co.uk) Web: [www.thermalimaging.co.uk](http://www.thermalimaging.co.uk)



# Documentation pages for Visual findings

## Details of Visual problems found



Report generated by Ti Thermal Imaging LTD.

Company Registered in England: 04450573 VAT No. 828 6288 87





## Visual Problem Documentation

Page 1

TI

TI Site 5 Process

InspectionNo: 1357

Report Date: 14/10/2010

Classification: Oil and Gas Pipework

Observations: Increased external surface temperature at AR1

What is the Cause: Suspected wall thickness loss through internal erosion

Recommendations: Continue to monitor external surface temperature for further increase in temperature

### Location/Equipment Information

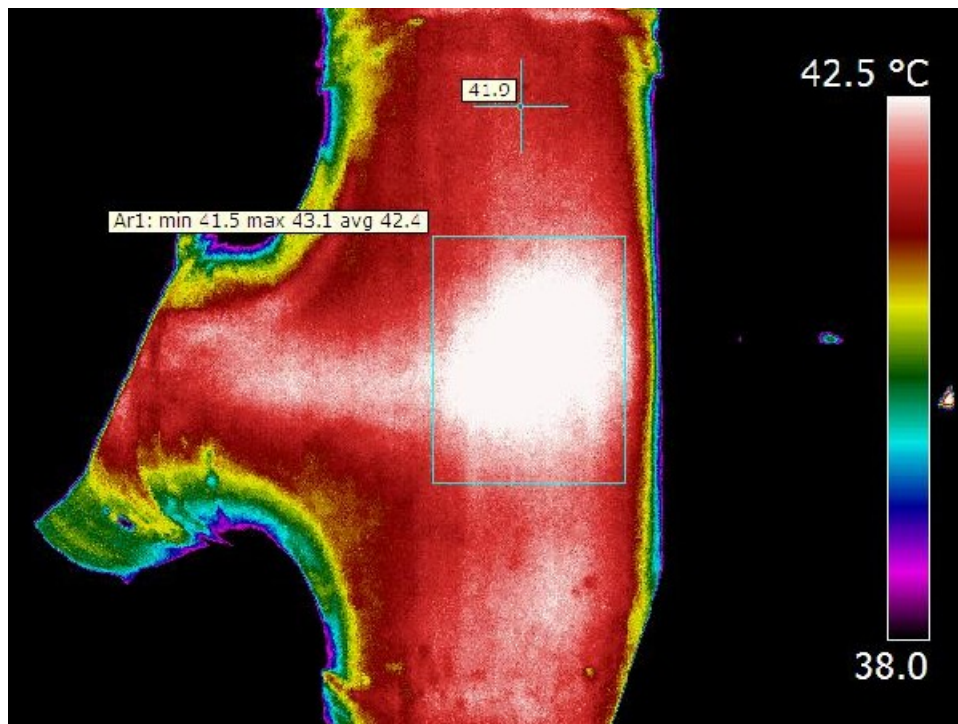
Asset ID: 306

WELL FLOWLINE T-PIECE  
306 NORTH

Work Order#:

### Current Prob No: Visual/1

Is Chronic: No  
Operation Priority: Critical to operation  
Repair Priority: 2-Serious



File: IR\_19006A.jpg

Date: 11/06/2010

Time: 08:51 PM

File: DC\_19007.jpg

Date: 11/06/2010

Time: 08:51 PM

Technician: Administrator  
Certification Level/No.:



## Page 2

**Work Order#:**

### Location/Equipment Information

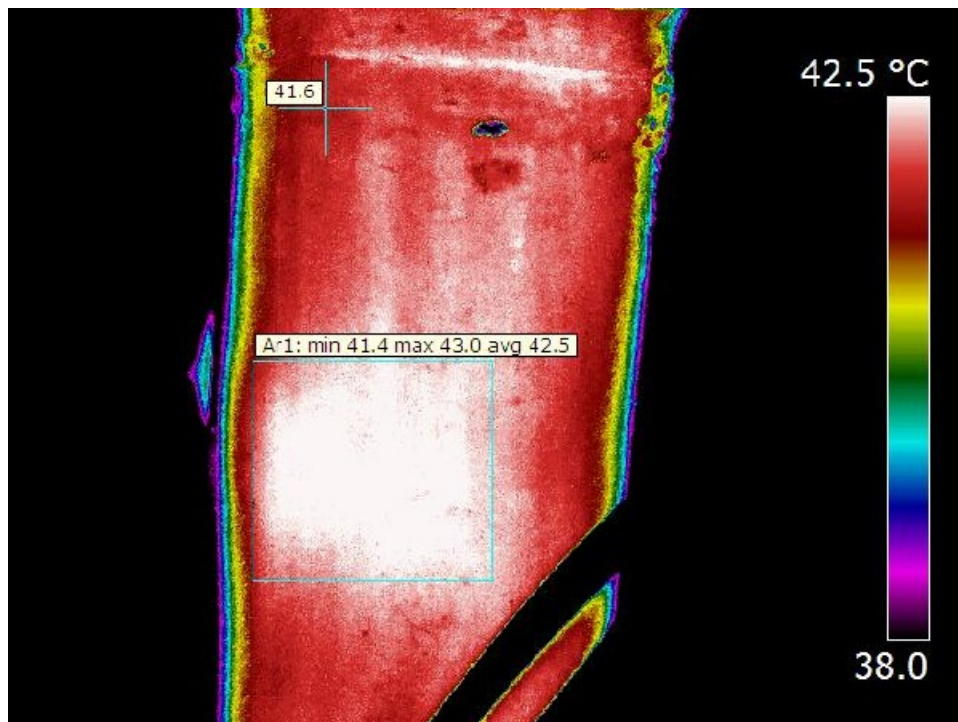
Asset ID: 306  
WELL FLOWLINE T-PIECE  
306 WEST

**Current Prob No: Visual/2**

Is Chronic:	<b>No</b>
Operation Priority:	<b>Critical to operation</b>
Repair Priority:	<b>2-Serious</b>

InspectionNo: 1357  
Report Date: 14/10/2010

<b>Classification:</b>	Oil and Gas Pipework
<b>Observations:</b>	Increased external surface temperature at AR1
<b>What is the Cause:</b>	Suspected wall thickness loss through internal erosion
<b>Recommendations:</b>	Continue to monitor external surface temperature for further increase in temperature



File: IR\_19008A.jpg      Date: 11/06/2010      Time: 08:52 PM  
File: DC\_19009.jpg      Date: 11/06/2010      Time: 08:52 PM

Technician:	Administrator
Certification Level/No.:	



TI  
TI Site 5 Process

## Visual Problem Documentation

Page 3

Work Order#:

### Location/Equipment Information

Asset ID: 304  
WELL FLOWLINE T-PIECE  
304 SOUTH

### Current Prob No: Visual/3

Is Chronic: No  
Operation Priority: Critical to operation  
Repair Priority: 2-Serious

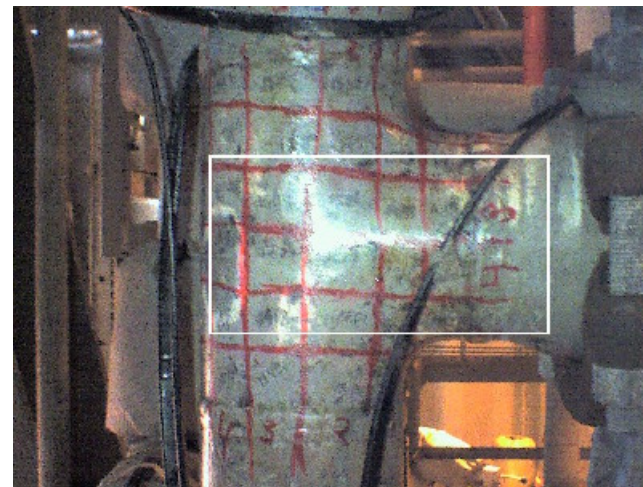
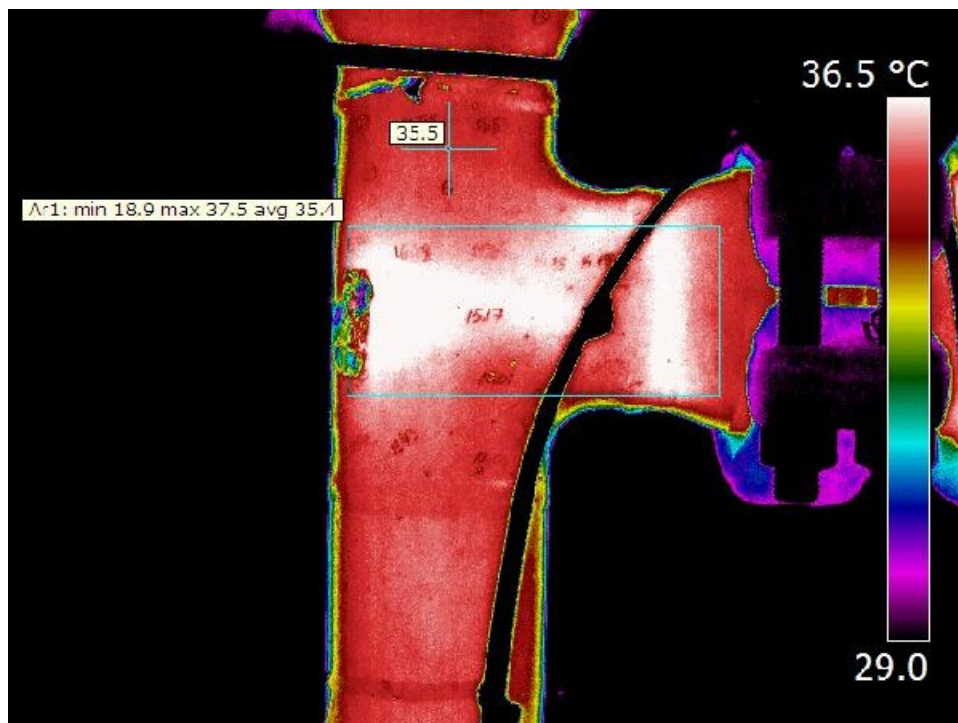
InspectionNo: 1357  
Report Date: 14/10/2010

Classification: Oil and Gas Pipework

Observations: Increased external surface temperature at AR1

What is the Cause: Suspected wall thickness loss through internal erosion

Recommendations: Continue to monitor external surface temperature for further increase in temperature



File: IR\_19010A.jpg Date: 11/06/2010 Time: 08:53 PM  
File: DC\_19011.jpg Date: 11/06/2010 Time: 08:53 PM

Technician: Administrator  
Certification Level/No.:





## Visual Problem Documentation

Page 4

TI

TI Site 5 Process

InspectionNo: 1357  
Report Date: 14/10/2010

Classification: Oil and Gas Pipework

Observations: Increased external surface temperature at AR1

What is the Cause: Suspected wall thickness loss through internal erosion

Recommendations: Continue to monitor external surface temperature for further increase in temperature

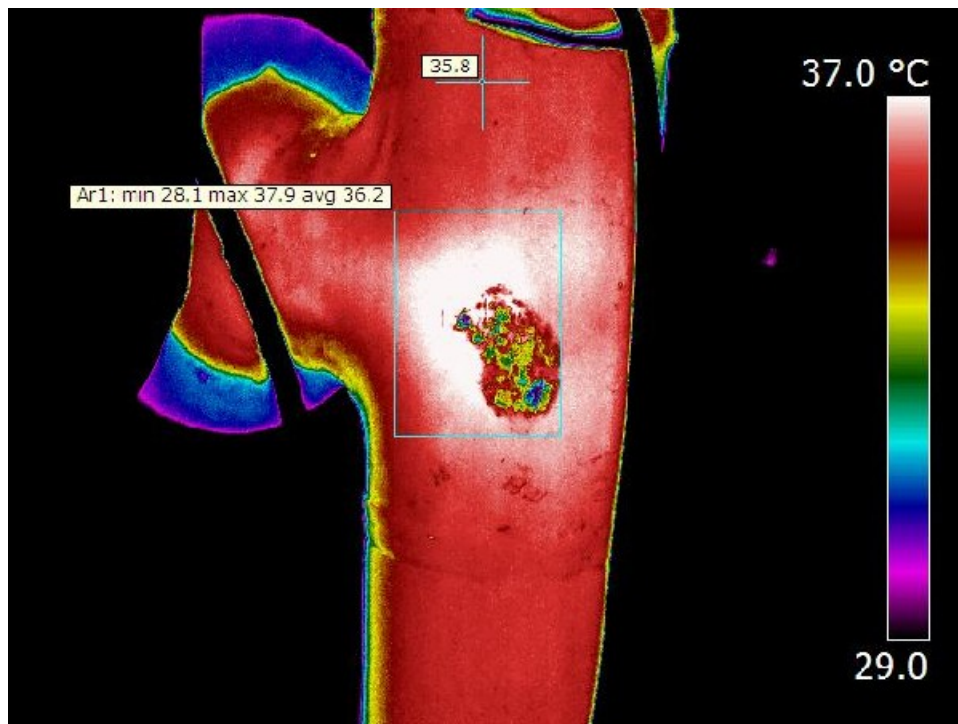
### Location/Equipment Information

Asset ID: 304  
WELL FLOWLINE T-PIECE  
304 NORTH

Work Order#:

### Current Prob No: Visual/4

Is Chronic: No  
Operation Priority: Critical to operation  
Repair Priority: 2-Serious



File: IR\_19012A.jpg  
File: DC\_19013.jpg

Date: 11/06/2010 Time: 08:54 PM  
Date: 11/06/2010 Time: 08:54 PM

Technician: Administrator  
Certification Level/No.:



## Ti Thermal Imaging LTD

Unit 8, Weybridge Business Centre, 66 York Road, Weybridge, Surrey, KT13 9DY

Tel: 0845 458 6315 Fax: 0871 9004978 E-mail: [info@thermalimaging.co.uk](mailto:info@thermalimaging.co.uk) Web: [www.thermalimaging.co.uk](http://www.thermalimaging.co.uk)



# Benchmark Baseline Trending

## Full list of equipment baseline trends



Report generated by Ti Thermal Imaging LTD.

Company Registered in England: 04450573 VAT No. 828 6288 87





## Equipment Baseline Trending Report By Inspection Order

Page: 1

TI

TI Site 5 Process

Prior Inspection No:

Current Inspection No: 1357      October 14, 2010

Report Date: 14/10/2010

**WELL FLOWLINE T-PIECE \ 306 SOUTH**

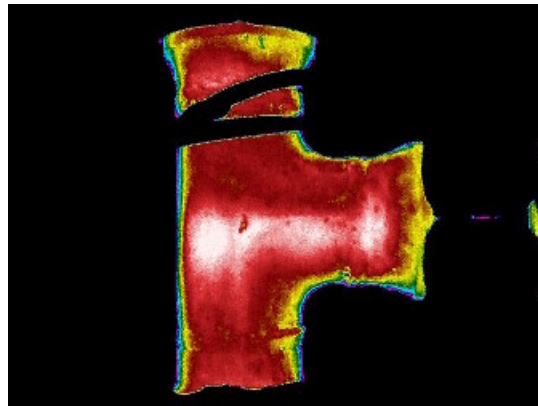
Equipment ID: 306

Work Order: NI

### Key

CTO = Critical to operation  
ETO = Essential to operation  
NON = Non-essential to operation  
UNC = Un-Classified  
NI = Not Issued

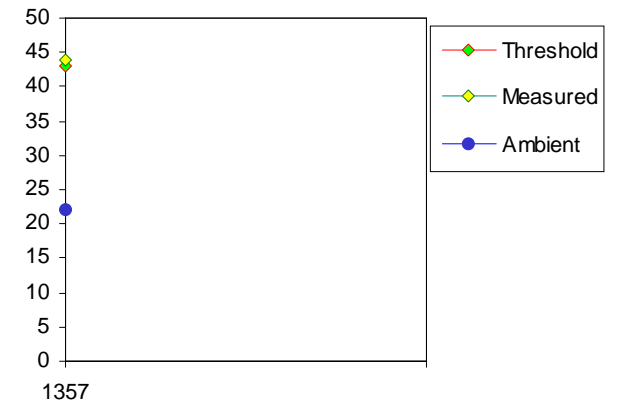
Operation Priority: CTO



IR\_19004.jpg



DC\_19005.jpg



### Inspection History:

Inspection No	Date Inspected	Test Status	Measured Temp	Threshold Temp	Ambient Temp	Status Note	Customer Notes
1357	14/10/2010	TESTED	44 C	43 C	22 C		



## Equipment Baseline Trending Report By Inspection Order

Page: 2

TI

TI Site 5 Process

Prior Inspection No:

Current Inspection No: 1357      October 14, 2010

Report Date: 14/10/2010

**WELL FLOWLINE T-PIECE \ 306 NORTH**

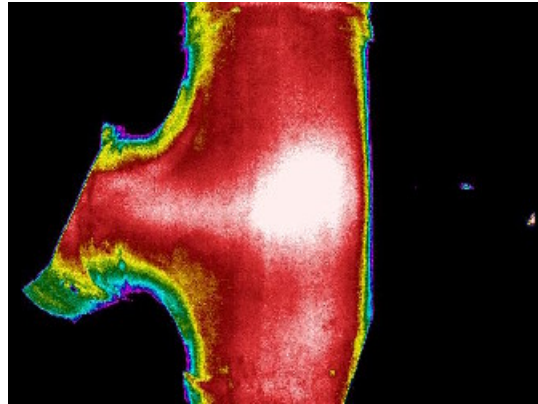
Equipment ID: 306

Work Order: NI

### Key

CTO = Critical to operation  
ETO = Essential to operation  
NON = Non-essential to operation  
UNC = Un-Classified  
NI = Not Issued

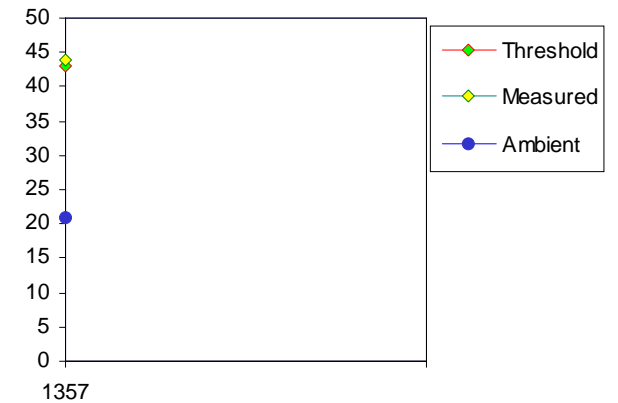
Operation Priority: CTO



IR\_19006.jpg



DC\_19007.jpg



### Inspection History:

Inspection No	Date Inspected	Test Status	Measured Temp	Threshold Temp	Ambient Temp	Status Note	Customer Notes
1357	14/10/2010	TESTED	44 C	43 C	21 C		





## Equipment Baseline Trending Report By Inspection Order

Page: 3

TI

TI Site 5 Process

Prior Inspection No:

Current Inspection No: 1357      October 14, 2010

Report Date: 14/10/2010

**WELL FLOWLINE T-PIECE \ 306 WEST**

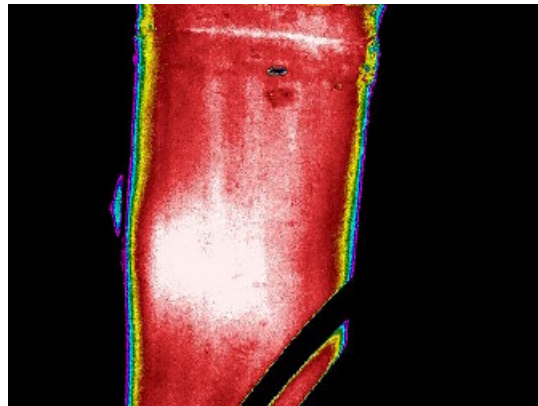
Equipment ID: 306

Work Order: NI

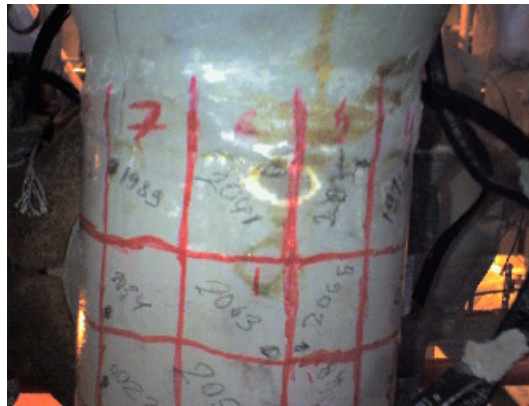
### Key

CTO = Critical to operation  
ETO = Essential to operation  
NON = Non-essential to operation  
UNC = Un-Classified  
NI = Not Issued

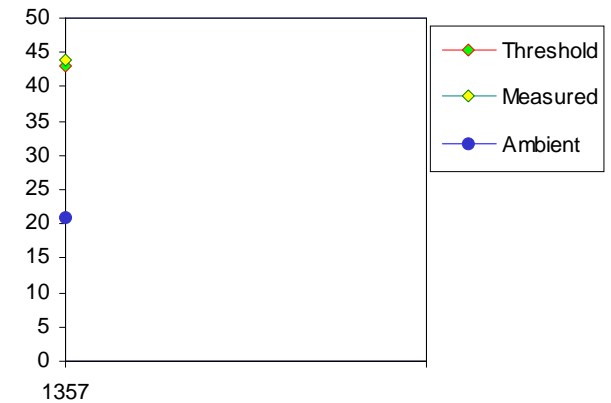
Operation Priority: CTO



IR\_19008.jpg



DC\_19009.jpg



### Inspection History:

Inspection No	Date Inspected	Test Status	Measured Temp	Threshold Temp	Ambient Temp	Status Note	Customer Notes
1357	14/10/2010	TESTED	44 C	43 C	21 C		



## Equipment Baseline Trending Report By Inspection Order

Page: 4

TI

TI Site 5 Process

Prior Inspection No:

Current Inspection No: 1357      October 14, 2010

Report Date: 14/10/2010

**WELL FLOWLINE T-PIECE \ 304 SOUTH**

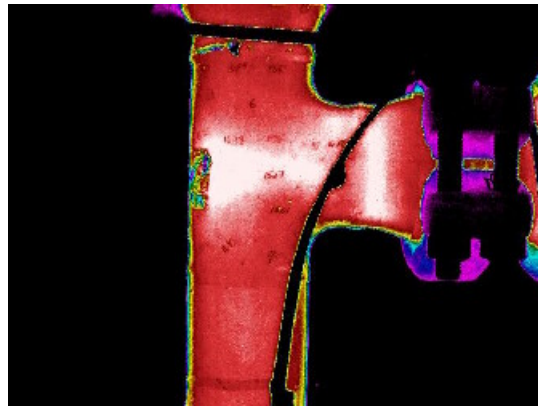
Equipment ID: 304

Work Order: NI

### Key

CTO = Critical to operation  
ETO = Essential to operation  
NON = Non-essential to operation  
UNC = Un-Classified  
NI = Not Issued

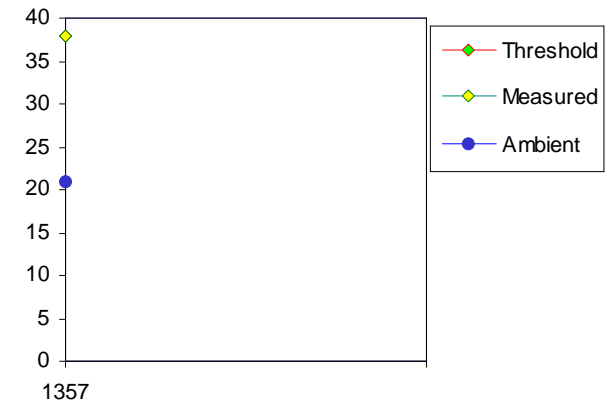
Operation Priority: CTO



IR\_19010.jpg



DC\_19011.jpg



### Inspection History:

Inspection No	Date Inspected	Test Status	Measured Temp	Threshold Temp	Ambient Temp	Status Note	Customer Notes
1357	14/10/2010	TESTED	38 C	38 C	21 C		



## Equipment Baseline Trending Report By Inspection Order

Page: 5

TI

TI Site 5 Process

Prior Inspection No:

Current Inspection No: 1357      October 14, 2010

Report Date: 14/10/2010

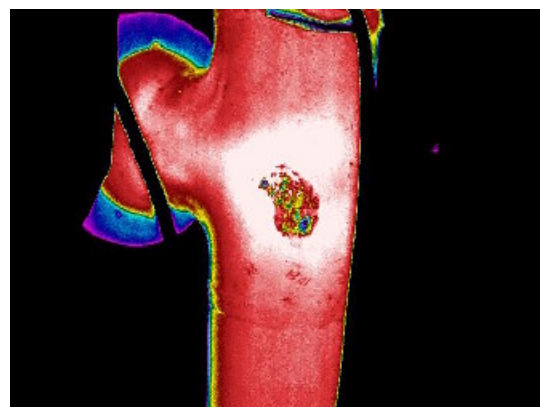
**WELL FLOWLINE T-PIECE \ 304 NORTH**

Equipment ID: 304

Work Order: NI

### Key

CTO = Critical to operation  
ETO = Essential to operation  
NON = Non-essential to operation  
UNC = Un-Classified  
NI = Not Issued

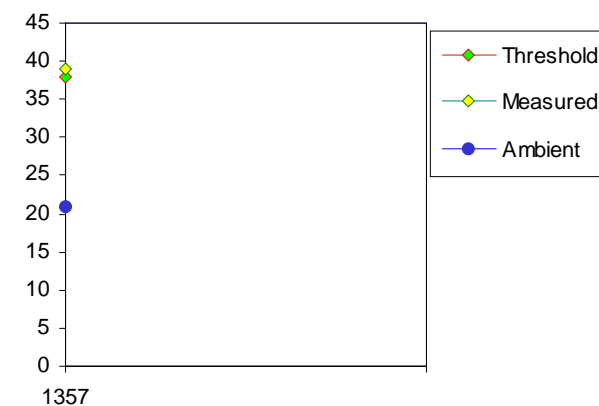


IR\_19012.jpg



DC\_19013.jpg

Operation Priority: CTO



### Inspection History:

Inspection No	Date Inspected	Test Status	Measured Temp	Threshold Temp	Ambient Temp	Status Note	Customer Notes
1357	14/10/2010	TESTED	39 C	38 C	21 C		



# Ti Thermal Imaging LTD

Unit 8, Weybridge Business Centre, 66 York Road, Weybridge, Surrey, KT13 9DY

Tel: 0845 458 6315 Fax: 0871 9004978 E-mail: [info@thermalimaging.co.uk](mailto:info@thermalimaging.co.uk) Web: [www.thermalimaging.co.uk](http://www.thermalimaging.co.uk)



## Client Work Appraisal

We are continually trying to improve our service and ensure that all our inspections are carried out to the highest standards. Please use the form below to add your comments, anonymously if you prefer and send back to us at the address above or:

Email: [info@thermalimaging.co.uk](mailto:info@thermalimaging.co.uk)

Fax: +44 870 9004971

Ti Job Number: (Optional)	Excellent	Good	Mediocre	Poor	Comments
Office:					
Response time to enquiry					
Content of information sent on enquiry					
Telephone and email manner					
Price					
Value					
Engineer:					
Time keeping					
Appearance					
Code of conduct					
Subject knowledge					
Method of work					
Engineer flexibility					
Inspection Specification:					
Equipment and software					
Report content					
Report delivery time					
Report retrieval					
Other Comments:					



Report generated by Ti Thermal Imaging LTD.

Company Registered in England: 04450573 VAT No. 828 6288 87

