

เอกสารแนบที่ 19

รายงานผลการตรวจสอบท่อดูดคอนกรีตเสริมเหล็ก

INSPECTION REPORT

FOR

CHEVRON (THAILAND) LIMITED

CORROSION UNDER SUPPORT (CUS)
PIPELINE INTEGRITY MANAGEMENT

OF

PIPELINE

AT

CHEVRON SRT TERMINAL
SURATTHANI

29 JUNE 2023

INSPECTION REPORT
FOR
CHEVRON (THAILAND) LIMITED
CORROSION UNDER SUPPORT (CUS)
PIPELINE INTEGRITY MANAGEMENT
OF
PIPELINE
AT
CHEVRON SRT TERMINAL
SURATTHANI

29 June 2023
Report No: 2305047_Rev.00

PREPARED BY
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Date: July 13, 2023

QA/ QC

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Date: July 13, 2023

Final

Approved: Mr. Gasidis Meesuk

Date: July 13, 2023



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1. INTRODUCTION

At the request of Chevron (Thailand) Limited, DEXON Technology carried out Long Range Ultrasonic Testing (LRUT) on pipeline follows the integrity management recommendation. The inspection was conducted at the Chevron SRT terminal in Suratthani province. The primary requirement for this inspection was to obtain data and follow up any indications sought for further investigation on pipe. As the client requested advanced inspection technique CUS was utilized.

NOTE* Due to insufficient access follow up UTM Method could be carried by DEXON team at the time of inspection.

2. INSPECTION SUMMARY

To clarify the pipe condition, therefore, the CUS method was used. The inspection result has been summarized as the following detail.

Line ID	VI finding	CUS Inspection finding			
		LRUT finding			UTM (mm)
		Category 1	Category 2	Category 3	
Diesel Inlet 6"	Corrosion and painting deterioration beneath the pipe sleeve.	2	3	-	6.60
Diesel Outlet 6"	Corrosion and painting deterioration beneath the pipe sleeve.	-	3	-	6.65
G Base 91 Inlet 6"	Corrosion and painting deterioration beneath the pipe sleeve.	-	2	2	6.63
G Base 91 Outlet 6"	Corrosion and painting deterioration beneath the pipe sleeve.	1	4	-	6.73

Remark:

1. Keep monitoring, as the significant indications from LRUT data log has been noticed.
2. Re-painting and re-sealing on pipe sleeve, at the area of corrosion and deterioration were found.

Note:

Category: Signal amplitude of defect

Category 1: Signal amplitude of defect area wall lose 3-9%.

Category 2: Signal amplitude of defect area wall lose 9-18%.

Category 3: Signal amplitude of defect area wall lose > 18%.

Follow up priority: To present Low to High of the condition external or internal corrosion on base metal pipe.

Low: To present don't need to follow by another method but record only

Medium: To present, if possible, need to follow up by another method and/or record the result in report for monitoring next further.

High: To present urgent follow up at the time and/or record the result.

3. DETAILED LOGS

3.1 Diesel Inlet 6"

	<h1 style="text-align: center;">LRUT INSPECTION REPORT</h1>	Report/ Project	Sheet
		2305047	1/ 10
STT-CC-003-01-01 (Diesel Inlet)			

Date of inspections: 29-Jun-23



Piping data			
Line ID :	STT-CC-003-01-01 (Diesel Inlet)	Line Description :	Diesel Inlet pipe
Product :	Diesel	Diameter/Schedule :	6" T nom: 7.11 mm
Material :	Carbon Steel	Insulation :	-

Design and calculations				
Design Pressure P :	-	$T_{min} = \frac{PD}{2(SE+PY)}$	Tmin : (pressure)	-
Diameter OD : (Table 1 API574)	-		Tmat /Ts (API 574 Table 6):	-
Stress S : (Table A1)	-		T minimum measured :	-
Q factor E : (Table A1A or a1B)	-		Service life :	-
Coefficient Y : (Table 304.1.1)	-		Corrosion Rate :	-

UT settings			
Procedure :	P-INT-12	Material Temperature :	Ambient
Equipment type, S/N :	-	Probe type, S/N :	TR D-790
Cal block, S/N :	-	Calibration step :	Low 6 High 8

LRUT summary			
Approximate length :	25.8 m	Nr. of tool locations :	2 Locations
Equipment type, S/N :	MK4 Teletest Focus, TF-AB 10679	Probe collar, nr of channels :	6" collar, 8 Channel
Nr of LRUT indications :	5	Category 1:	2
		Category 2:	3
		Category 3:	0

Pipe inspection summary	
1. Visual Inspection (VT) > Corrosion and painting deterioration beneath the pipe sleeve.	
2. Long Range Ultrasonic Testing (LRUT) > Cat 1=2 > Cat 2=3	
3. Ultrasonic Thickness Measurement (UTM) > Not found the significant of wall loss at the test location. Min. Thk. was 6.60 mm at UTM point 2.	

Recommendations			
1. Visual Inspection (VT) > Re-painting and re-sealing on pipe sleeve, at the area of corrosion and deterioration were found.			
2. Long Range Ultrasonic Testing (LRUT) > Keep monitoring, as the significant indications from LRUT data log has been noticed.			
3. Ultrasonic Thickness Measurement (UTM) > Keep monitoring.			
LRU Technician Name: Mr. Pummarin P. Date: 29-Jun-23 Sign: 		LRU Supervisor Name: Mr. Anuwat M. Date: 29-Jun-23 Sign: 	
Client Name: Date: Sign: 		Client Name: Date: Sign: 	

	LRUT INSPECTION REPORT					Report/ Project	Sheet
						2305047	2/ 10
STT-CC-003-01-01 (Diesel Inlet)							
Degradation	N/A	Normal	Minor	Moderate	Severe	Remark	
<input type="checkbox"/> Corrosion	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Corrosion beneath the pipe sleeve.	
<input checked="" type="checkbox"/> CUS	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
<input type="checkbox"/> Paint	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Painting deterioration beneath the pipe sleeve.	
<input checked="" type="checkbox"/> Insulation	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
<input type="checkbox"/> Supports	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
<input checked="" type="checkbox"/> Vibration	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
<input type="checkbox"/> Misalignment	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
<input checked="" type="checkbox"/> Mech. Damage	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
<input checked="" type="checkbox"/> Leak	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
<input checked="" type="checkbox"/> Other	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
Severity to be determined as follows:							
	Minor:	For findings that don't require action		Highlighted in yellow in ISO			
	Moderate	For findings that require action (specify time)		Highlighted in Orange in ISO			
	Severe	For findings that require immediate action					
<div><div>N ↖</div><div></div></div>							
LINE NO : Diesel							

STT-CC-003-01-01 (Diesel Inlet)



Name of part / Location

Findings

Pipe

Normal condition

Name of part / Location

Findings

Pipe

Normal condition



Name of part / Location

Findings

Pipe

Normal condition



Name of part / Location

Findings

Pipe

Normal condition



Name of part / Location

Findings

Beneath pipe sleeve

Corrosion and painting deterioration




Name of part / Location

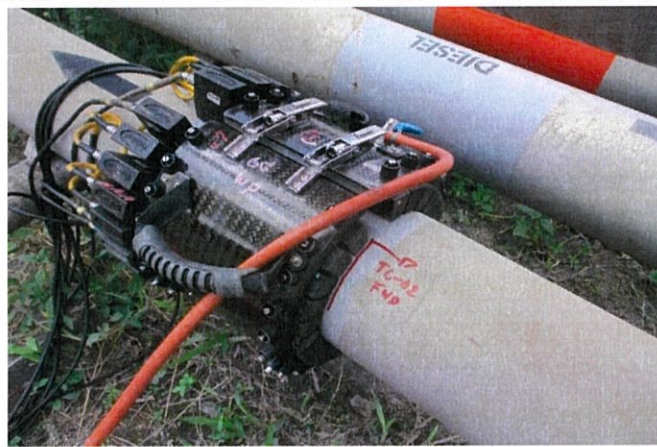
Findings

Beneath pipe sleeve

Corrosion and painting deterioration

	LRUT PICTURE LOG	Report/ Project	Sheet
		2305047	4/ 10
STT-CC-003-01-01 (Diesel Inlet)			
			
Name of part / Location	Findings	Name of part / Location	Findings
Underground pipe	Normal condition	Underground pipe	Normal condition
			
Name of part / Location	Findings	Name of part / Location	Findings
Underground pipe	Normal condition	Underground pipe	Normal condition
			
Name of part / Location	Findings	Name of part / Location	Findings
Underground pipe	Normal condition	Underground pipe	Normal condition

STT-CC-003-01-01 (Diesel Inlet)



Name of part / Location

Findings

Pipe

Normal condition

Name of part / Location

Findings

Pipe

Normal condition



Name of part / Location

Findings

Pipe

Normal condition



Name of part / Location

Findings

Beneath pipe sleeve

Corrosion and painting deterioration



Name of part / Location

Findings

Beneath pipe sleeve

Corrosion and painting deterioration



Name of part / Location

Findings

Beneath pipe sleeve

Corrosion and painting deterioration

STT-CC-003-01-01 (Diesel Inlet)

ISO drawing

N


2

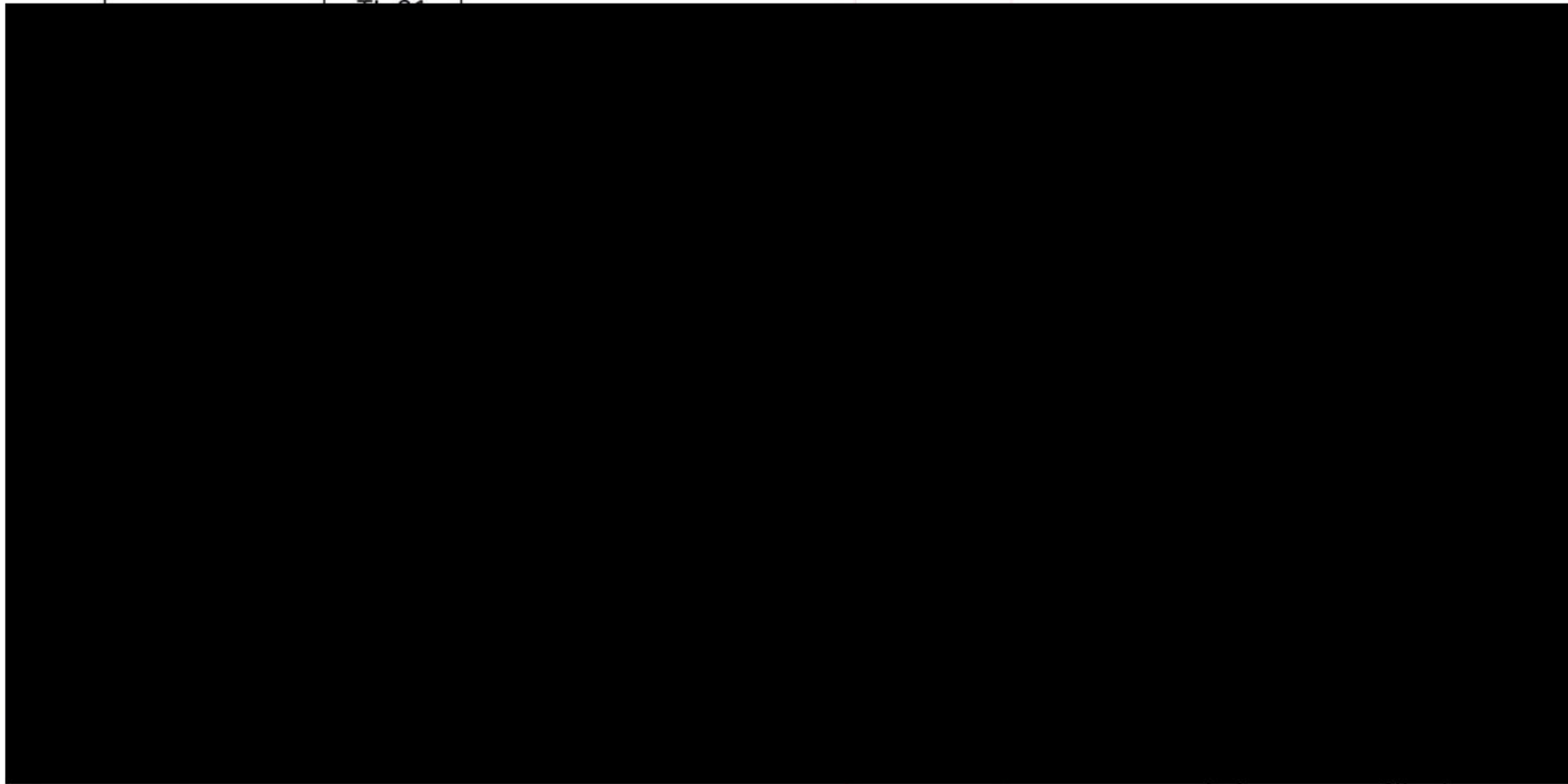
LINE NO : Diesel

TECHNICAL DATA

[illegible]

STT-CC-003-01-01 (Diesel Inlet)

ISO drawing

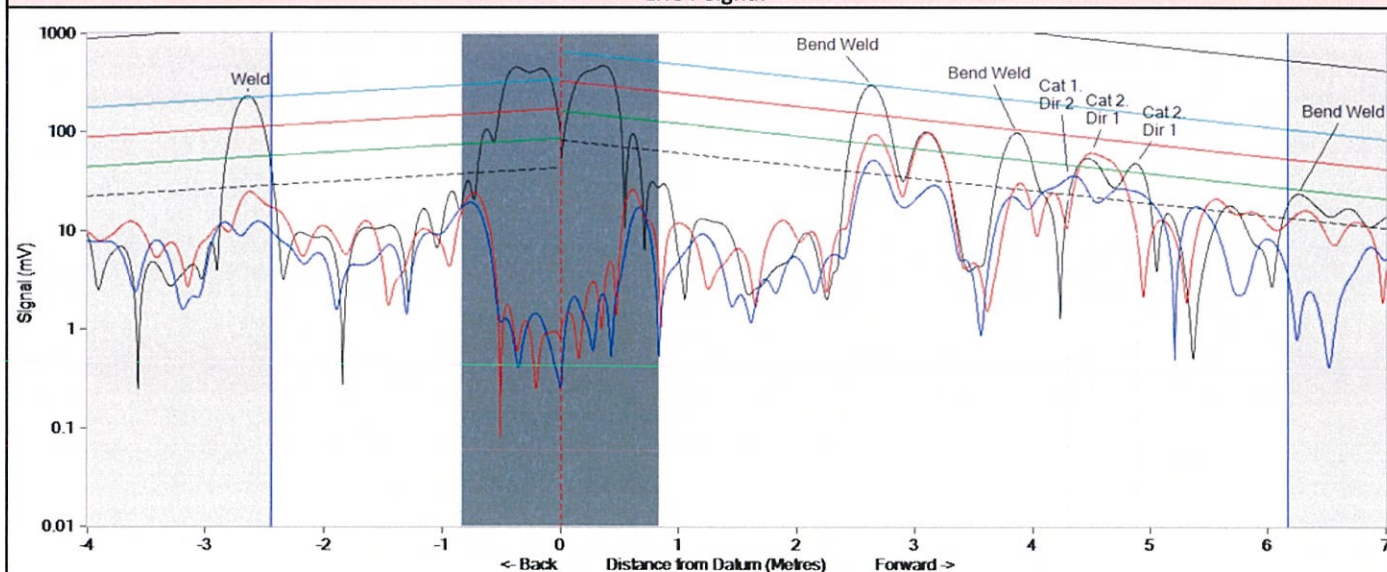


= Category 3


TL-02

LINE NO : Diesel

Total Range:	-4.8m to 12.4m
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3.2 Diesel Outlet 6"

	<h1 style="text-align: center;">LRUT INSPECTION REPORT</h1>	Report/ Project	Sheet
		2305047	1/ 10
STT-CC-003-01-01 (Diesel Outlet)			

Date of inspections: 29-Jun-23


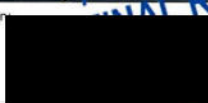
Piping data			
Line ID :	STT-CC-003-01-01 (Diesel Outlet)	Line Description :	Diesel Outlet pipe
Product :	Diesel	Diameter/Schedule :	6" T nom: 7.11 mm
Material :	Carbon Steel	Insulation :	-


Design and calculations			
Design Pressure P :	-	Tmin : (pressure)	-
Diameter OD : (Table 1 API574)	-	Tmat /Ts (API 574 Table 6):	-
Stress S : (Table A1)	-	T minimum measured :	-
Q factor E : (Table A1A or a1B)	-	Service life :	-
Coefficient Y : (Table304.1.1)	-	Corrosion Rate :	-
$Tmin = \frac{PD}{2(SE+PY)}$			

UT settings			
Procedure :	P-INT-12	Material Temperature :	Ambient
Equipment type, S/N :	-	Probe type, S/N :	TR D-790
Cal block, S/N :	-	Calibration step :	Low 6 High 8

LRUT summary			
Approximate length :	24.4 m	Nr. of tool locations :	2 Locations
Equipment type, S/N :	MK4 Teletest Focus, TF-AB 10679	Probe collar, nr of channels :	6" collar, 8 Channel
Nr of LRUT indications :	3	Category 1: 0	Category 2: 3 Category 3: 0

Pipe inspection summary	
1. Visual Inspection (VT) > Corrosion and painting deterioration beneath the pipe sleeve.	
2. Long Range Ultrasonic Testing (LRUT) >Cat 2=3	
3. Ultrasonic Thickness Measurement (UTM) > Not found the significant of wall loss at the test location. Min. Thk. was 6.65 mm at UTM point 2.	

Recommendations			
1. Visual Inspection (VT) > Re-painting and re-sealing on pipe sleeve, at the area of corrosion and deterioration were found.			
2. Long Range Ultrasonic Testing (LRUT) > Keep monitoring, as the significant indications from LRUT data log has been noticed.			
3. Ultrasonic Thickness Measurement (UTM) > Keep monitoring.			
LRUT Technician Name : Mr. Pummarin P. Date : 29-Jun-23 Sign: 		LRUT Supervisor Name : Mr. Anuwat M. Date : 29-Jun-23 Sign: 	
Client Name : Date : Sign:		Client Name : Date : Sign:	

	LRUT INSPECTION REPORT					Report/ Project	Sheet
						2305047	2/ 10
STT-CC-003-01-01 (Diesel Outlet)							
Degradation	N/A	Normal	Minor	Moderate	Severe	Remark	
<input type="checkbox"/> Corrosion	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Corrosion beneath the pipe sleeve.	
<input checked="" type="checkbox"/> CUS	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
<input type="checkbox"/> Paint	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Painting deterioration beneath the pipe sleeve.	
<input checked="" type="checkbox"/> Insulation	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
<input type="checkbox"/> Supports	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
<input checked="" type="checkbox"/> Vibration	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
<input type="checkbox"/> Misalignment	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
<input checked="" type="checkbox"/> Mech. Damage	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
<input checked="" type="checkbox"/> Leak	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
<input checked="" type="checkbox"/> Other	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
Severity to be determined as follows:							
Minor:		For findings that don't require action		Highlighted in yellow in ISO			
Moderate		For findings that require action (specify time)		Highlighted in Orange in ISO			
Severe		For findings that require immediate action					
<div><div>N</div><div></div></div>							
LINE NO : Diesel							

STT-CC-003-01-01 (Diesel Outlet)



Name of part / Location

Findings

Pipe

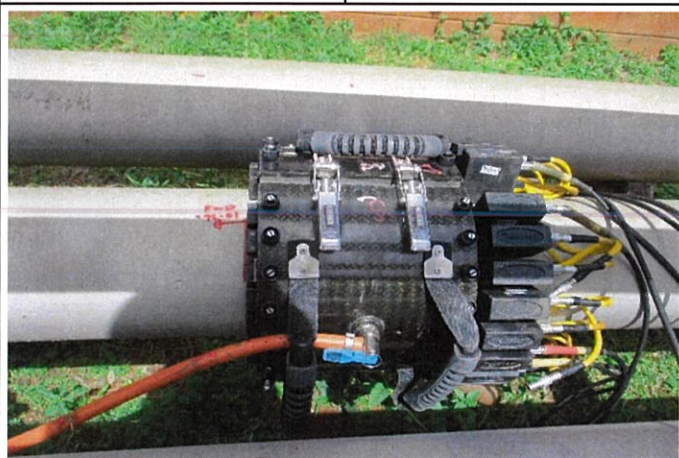
Normal condition

Name of part / Location

Findings

Pipe

Normal condition



Name of part / Location

Findings

Pipe

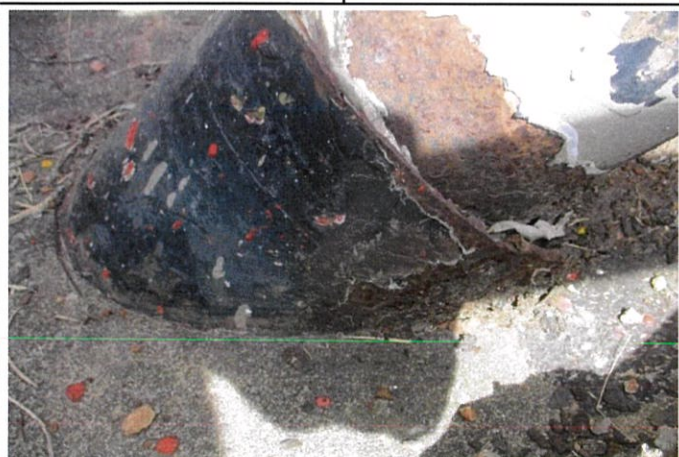
Normal condition

Name of part / Location

Findings

Pipe

Normal condition



Name of part / Location

Findings

Beneath pipe sleeve

Corrosion and painting deterioration

Name of part / Location

Findings

Beneath pipe sleeve

Corrosion and painting deterioration

STT-CC-003-01-01 (Diesel Outlet)



Name of part / Location

Findings

Underground pipe

Normal condition

Name of part / Location

Findings

Underground pipe

Normal condition



Name of part / Location

Findings

Underground pipe

Normal condition

Name of part / Location

Findings

Underground pipe

Normal condition



Name of part / Location

Findings

Underground pipe

Normal condition

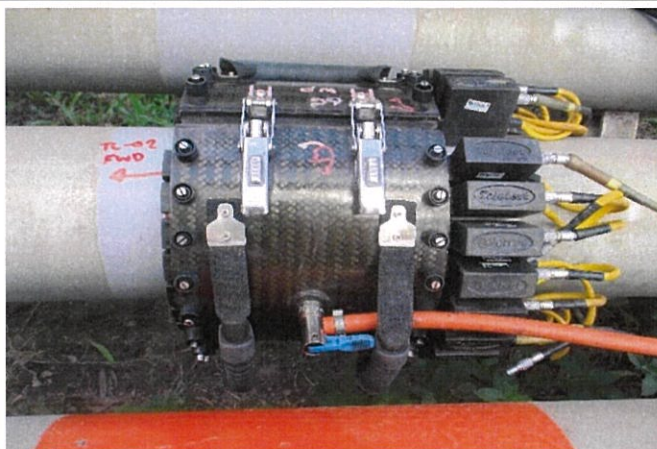
Name of part / Location

Findings

Underground pipe

Normal condition

STT-CC-003-01-01 (Diesel Outlet)



Name of part / Location	Findings	Name of part / Location	Findings
Pipe	Normal condition	Pipe	Normal condition



Name of part / Location	Findings	Name of part / Location	Findings
Pipe	Normal condition	Beneath pipe sleeve	Corrosion and painting deterioration

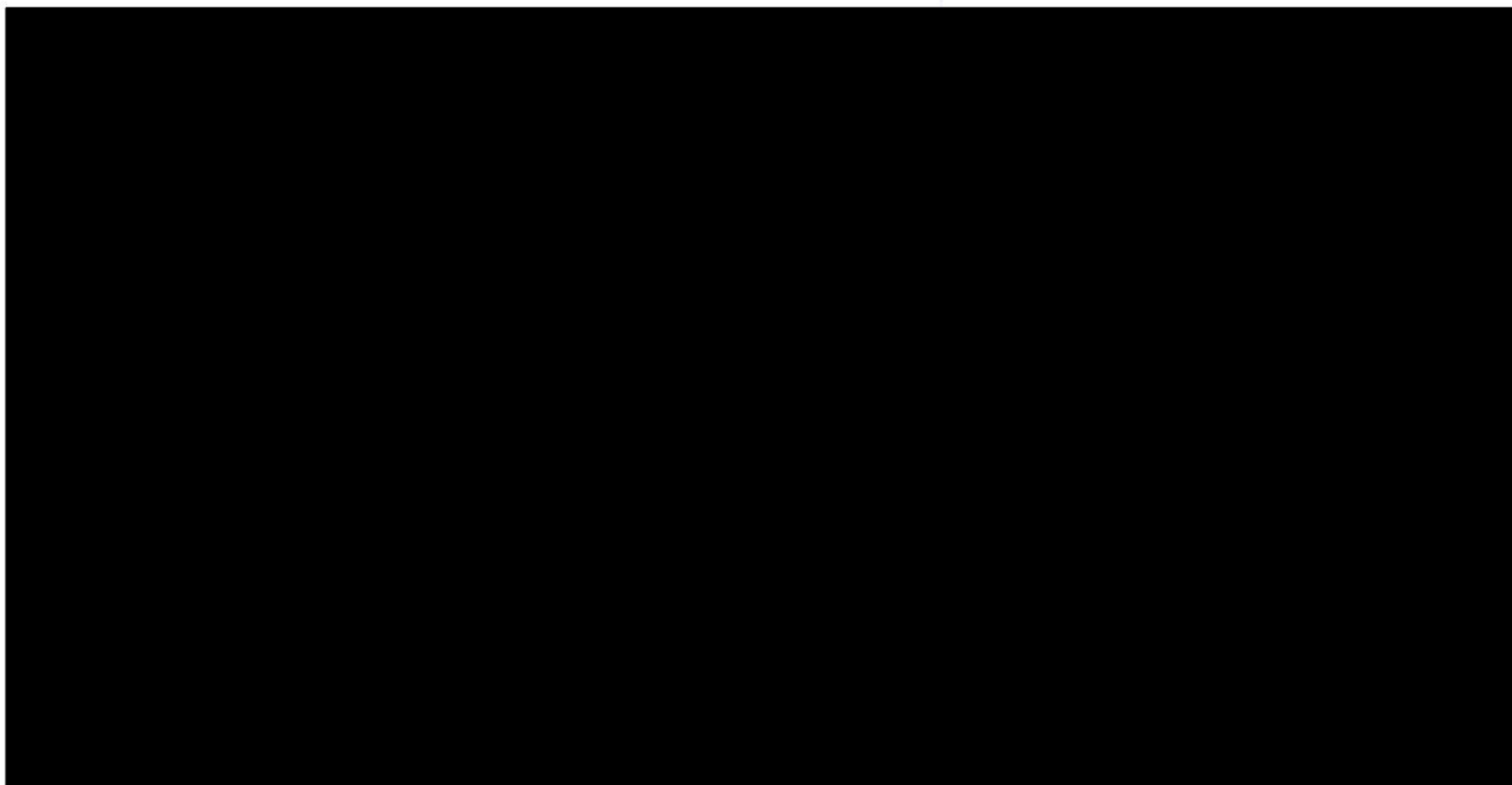


Name of part / Location	Findings	Name of part / Location	Findings
Beneath pipe sleeve	Corrosion and painting deterioration	Beneath pipe sleeve	Corrosion and painting deterioration

STT-CC-003-01-01 (Diesel Outlet)

ISO drawing

N
↖



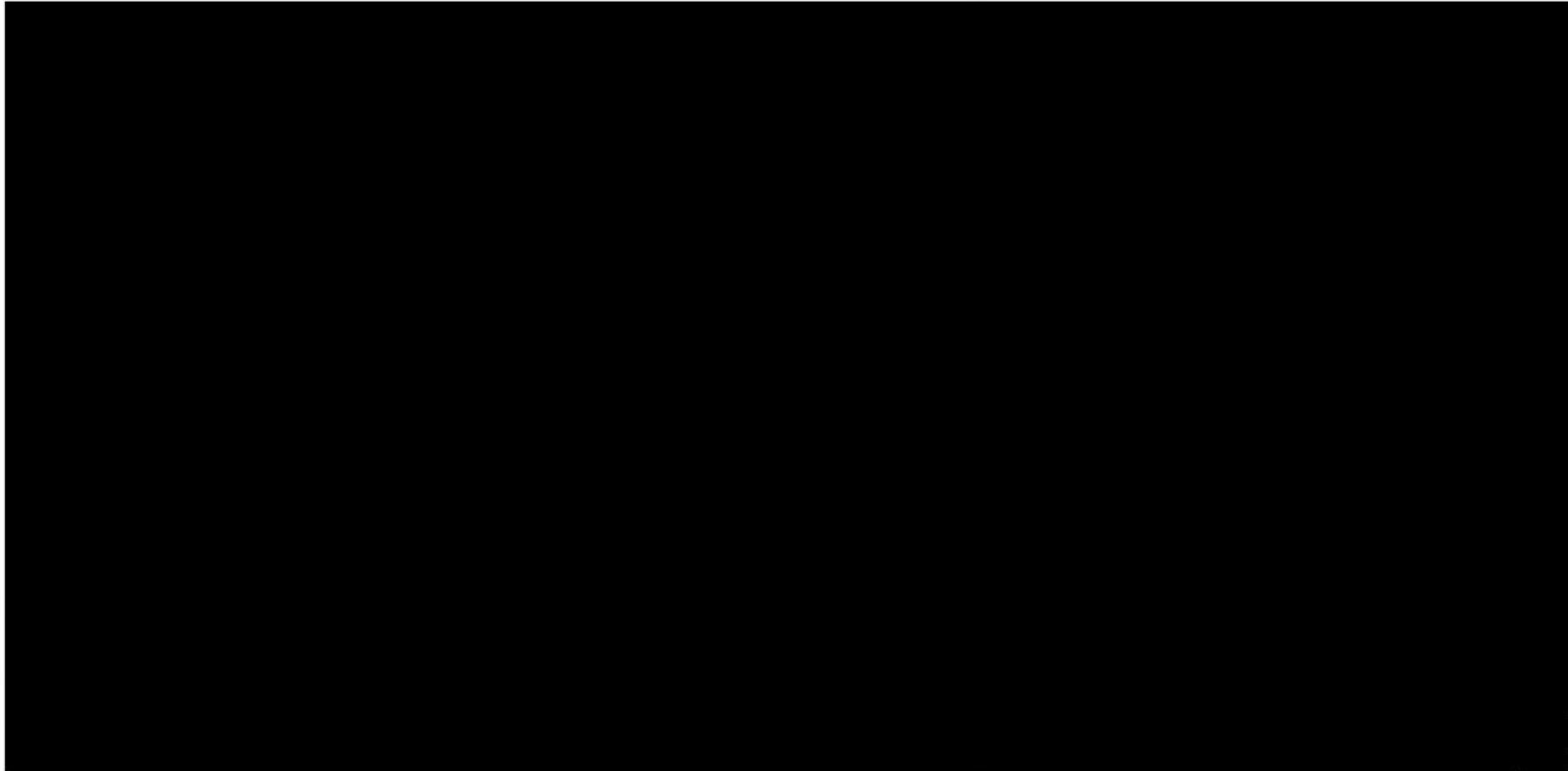
LINE NO : Diesel

TECHNICAL DATA

DEXON Technology Public Company Limited
www.dexon-technology.com

STT-CC-003-01-01 (Diesel Outlet)

ISO drawing



= Category 3

-02

LINE NO : Diesel

Total Range:	-4.9m to 12.3m
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Total Range:	-2.2m to 5.0m
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3.3 G Base 91 Inlet 6''

	<h1 style="text-align: center;">LRUT INSPECTION REPORT</h1>	Report/ Project	Sheet
		2305047	1/ 10
STT-CC-001-03-01 (G Base 91 Inlet)			

Date of inspections: 29-Jun-23



Piping data			
Line ID :	STT-CC-001-03-01 (G Base 91 Inlet)	Line Description :	G Base 91 Inlet pipe
Product :	G Base 91	Diameter/Schedule :	6" T nom: 7.11 mm
Material :	Carbon Steel	Insulation :	-

Design and calculations			
Design Pressure P :	-	Tmin : (pressure)	-
Diameter OD : (Table 1 API574)	-	Tmat /Ts (API 574 Table 6):	-
Stress S : (Table A1)	-	T minimum measured :	-
Q factor E : (Table A1A or a1B)	-	Service life :	-
Coefficient Y : (Table304.1.1)	-	Corrosion Rate :	-

UT settings			
Procedure :	P-INT-12	Material Temperature :	Ambient
Equipment type, s/n :	-	Probe type, s/n :	TR D-790
Cal block, s/n :	-	Calibration step :	Low 6 High 8

LRUT summary			
Approximate length :	24.4 m	Nr. of tool locations :	2 Locations
Equipment type, s/n :	MK4 Teletest Focus, TF-AB 10679	Probe collar, nr of channels :	6" collar, 8 Channel
Nr of LRUT indications :	4	Category 1: 0	Category 2: 2 Category 3: 2

Pipe inspection summary	
1. Visual Inspection (VT) > Corrosion and painting deterioration beneath the pipe sleeve.	
2. Long Range Ultrasonic Testing (LRUT) >Cat 2=2 >Cat 3=2	
3. Ultrasonic Thickness Measurement (UTM) > Not found the significant of wall loss at the test location. Min. Thk. was 6.63 mm at UTM point 2.	

Recommendations			
1. Visual Inspection (VT) > Re-painting and re-sealing on pipe sleeve, at the area of corrosion and deterioration were found.			
2. Long Range Ultrasonic Testing (LRUT) > Keep monitoring, as the significant indications from LRUT data log has been noticed.			
3. Ultrasonic Thickness Measurement (UTM) > Keep monitoring.			
LRUT Technician Name : Mr. Pummarin P. Date : 29-Jun-23 Sign: 		LRUT Supervisor Name : Mr. Anuwat M. Date : 29-Jun-23 Sign: 	
Client Name : Date : Sign:		Client Name : Date : Sign:	

LRUT INSPECTION REPORT

Report/ Project

Sheet

2305047

2/ 10

STT-CC-001-03-01 (G Base 91 Inlet)

Degradation	N/A	Normal	Minor	Moderate	Severe	Remark
<input type="checkbox"/> Corrosion	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Corrosion beneath the pipe sleeve.
<input checked="" type="checkbox"/> CUS	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/> Paint	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Painting deterioration beneath the pipe sleeve.
<input checked="" type="checkbox"/> Insulation	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/> Supports	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/> Vibration	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/> Misalignment	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/> Mech. Damage	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/> Leak	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/> Other	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

Severity to be determined as follows:

Minor:

Moderate

Severe

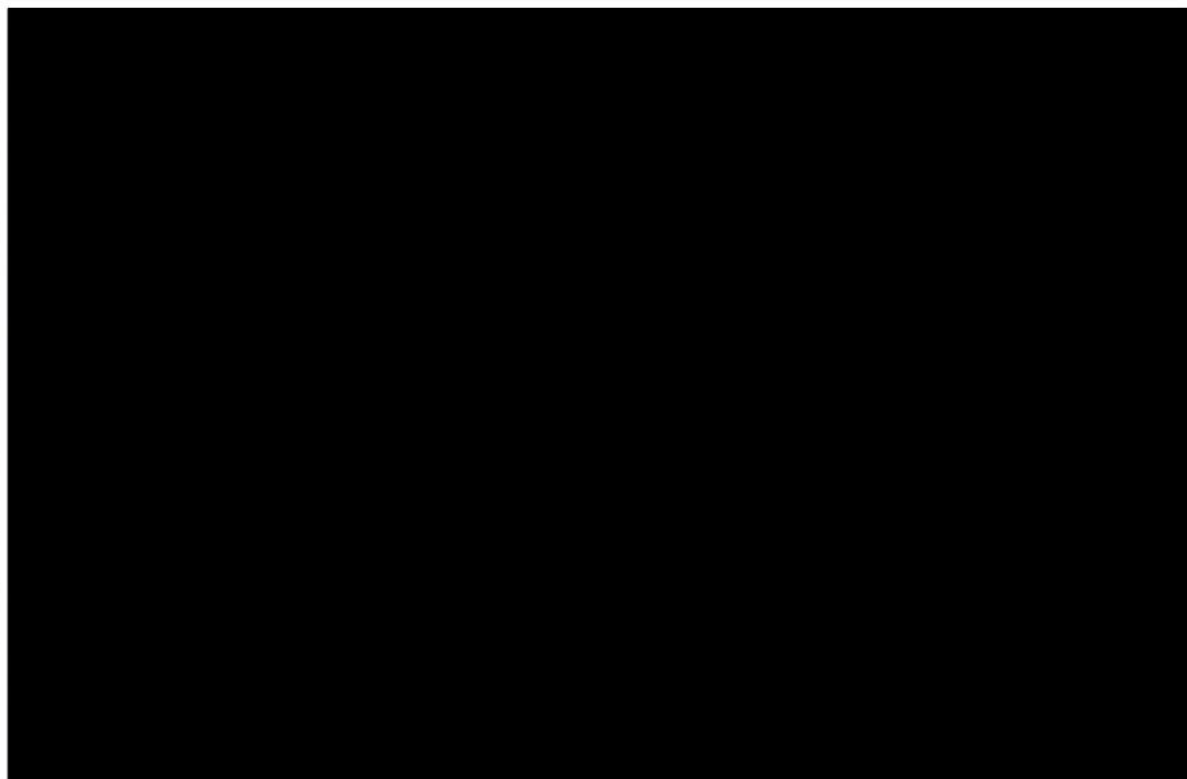
For findings that don't require action

For findings that require action (specify time)

For findings that require immediate action

Highlighted in yellow in ISO

Highlighted in Orange in ISO



STT-CC-001-03-01 (G Base 91 Inlet)



Name of part / Location

Findings

Pipe

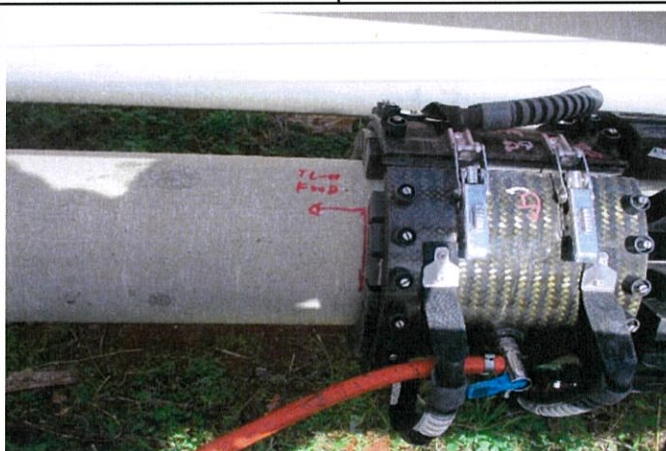
Normal condition

Name of part / Location

Findings

Pipe

Normal condition



Name of part / Location

Findings

Pipe

Normal condition



Name of part / Location

Findings

Pipe

Normal condition



Name of part / Location

Findings

Beneath pipe sleeve

Corrosion and painting deterioration



Name of part / Location

Findings

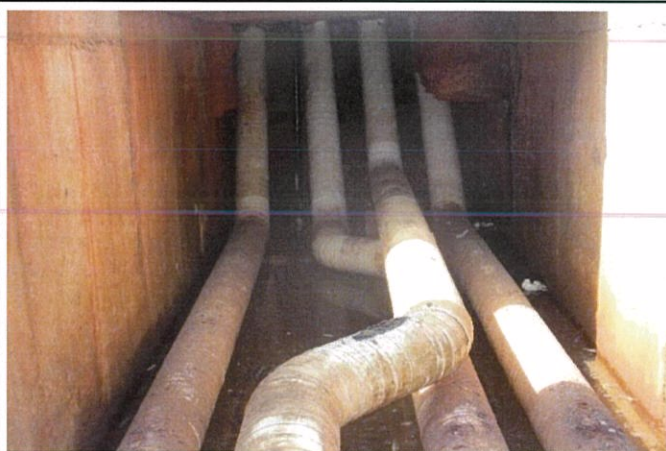
Beneath pipe sleeve

Corrosion and painting deterioration

STT-CC-001-03-01 (G Base 91 Inlet)



Name of part / Location	Findings	Name of part / Location	Findings
Underground pipe	Normal condition	Underground pipe	Normal condition

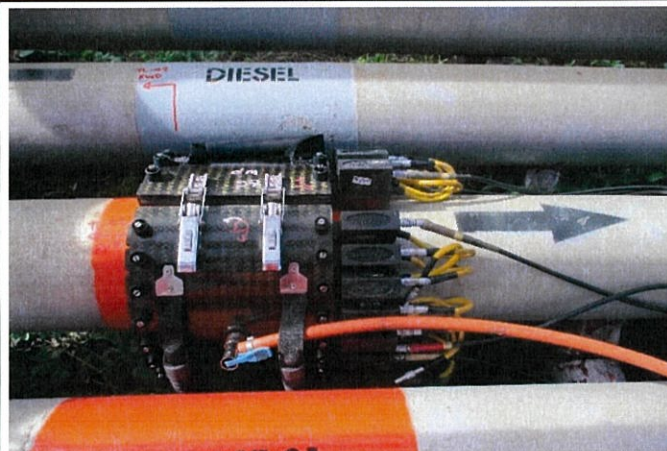


Name of part / Location	Findings	Name of part / Location	Findings
Underground pipe	Normal condition	Underground pipe	Normal condition



Name of part / Location	Findings	Name of part / Location	Findings
Underground pipe	Normal condition	Underground pipe	Normal condition

STT-CC-001-03-01 (G Base 91 Inlet)



Name of part / Location	Findings	Name of part / Location	Findings
Pipe	Normal condition	Pipe	Normal condition



Name of part / Location	Findings	Name of part / Location	Findings
Pipe	Normal condition	Pipe	Normal condition

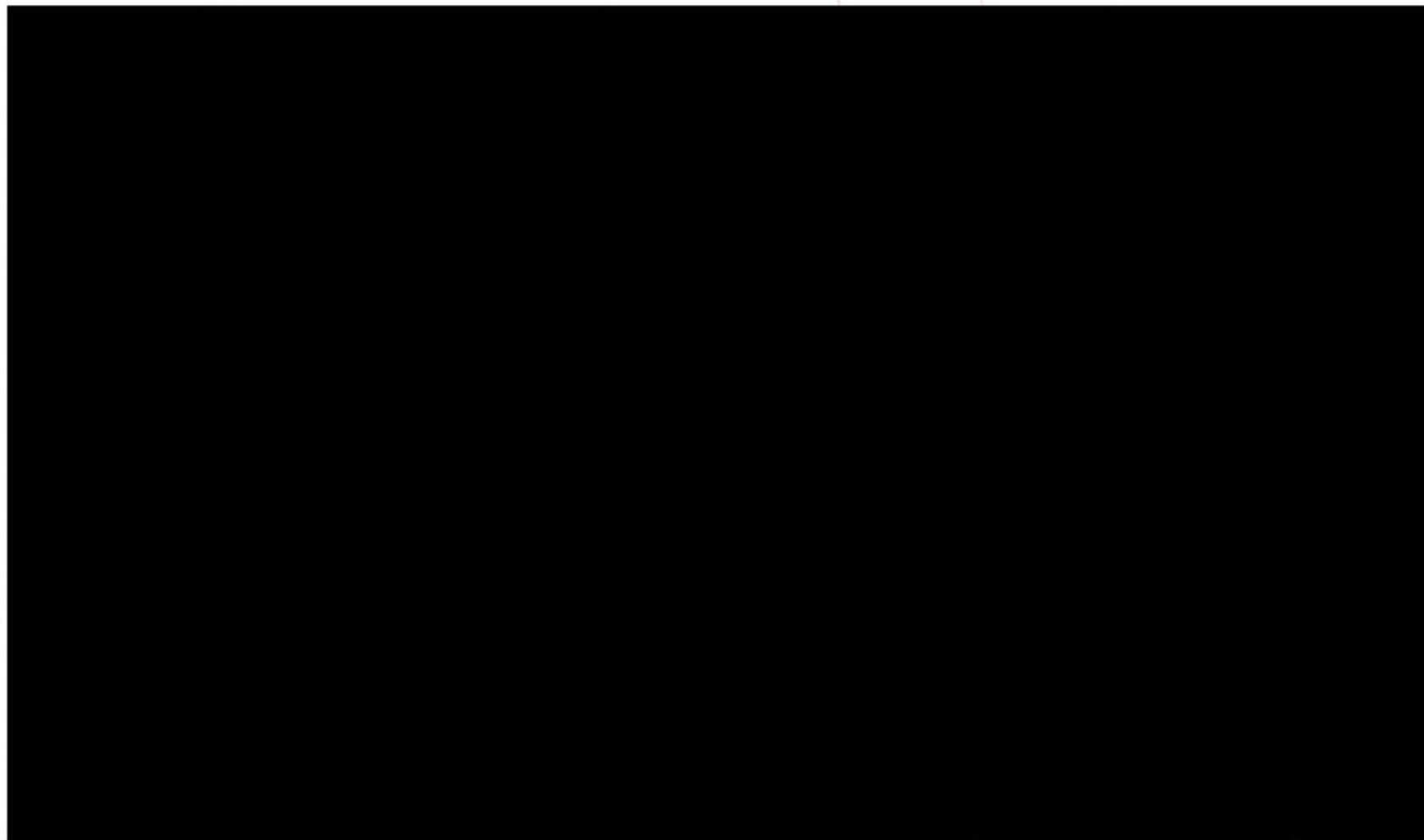


Name of part / Location	Findings	Name of part / Location	Findings
Beneath pipe sleeve	Corrosion and painting deterioration	Beneath pipe sleeve	Corrosion and painting deterioration

STT-CC-001-03-01 (G Base 91 Inlet)

ISO drawing

N
↖



LINE NO : G-Base 91

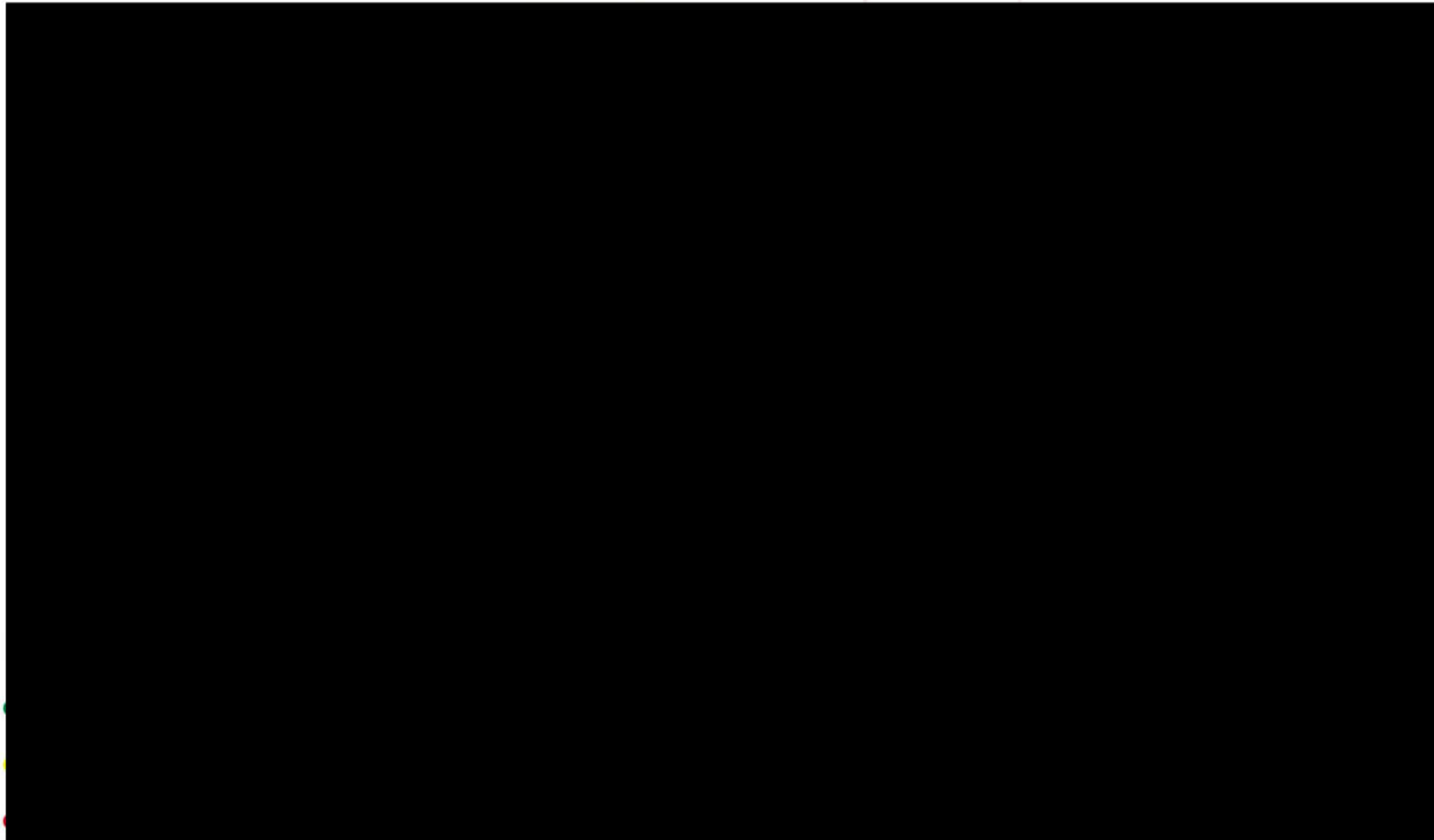
TECHNICAL DATA

[illegible]

STT-CC-001-03-01 (G Base 91 Inlet)

ISO drawing

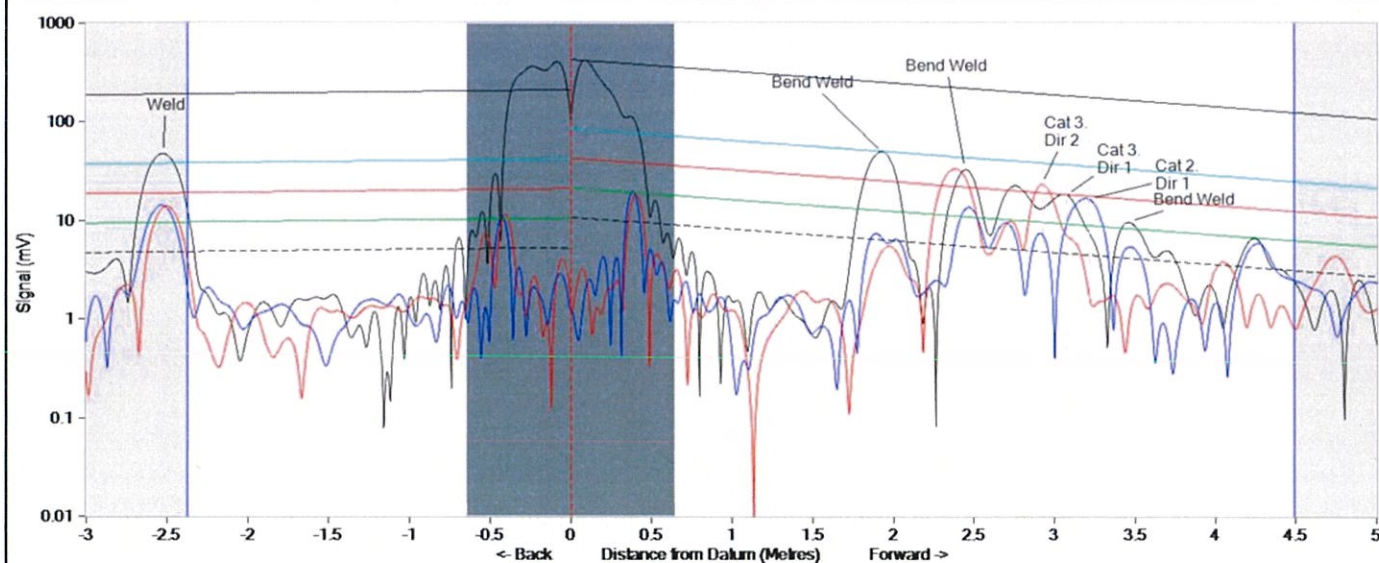
N
↖




TL-02

LINE NO : G-Base 91

Total Range:	-4.8m to 12.3m
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3.4 G Base 91 Outlet 6"

	<h1 style="text-align: center;">LRUT INSPECTION REPORT</h1>	Report/ Project	Sheet
		2305047	1/ 10
STT-CC-001-03-01 (G Base 91 Outlet)			

Date of inspections: 29-Jun-23

Piping data

Line ID :	STT-CC-001-03-01 (G Base 91 Outlet)	Line Description :	G Base 91 Outlet pipe
Product :	G Base 91	Diameter/Schedule :	6" T nom: 7.11 mm
Material :	Carbon Steel	Insulation :	-

Design and calculations

Design Pressure P :	-	Tmin : (pressure)	-
Diameter OD : (Table 1 API574)	-	Tmat /Ts (API 574 Table 6):	-
Stress S : (Table A1)	-	T minimum measured :	-
Q factor E : (Table A1A or a1B)	-	Service life :	-
Coefficient Y : (Table 304.1.1)	-	Corrosion Rate :	-

$$T_{min} = \frac{PD}{2(SE+PY)}$$

UT settings

Procedure :	P-INT-12	Material Temperature :	Ambient
Equipment type, s/n :	-	Probe type, s/n :	TR D-790
Cal block, s/n :	-	Calibration step :	Low 6 High 8

LRUT summary

Approximate length :	22.8 m	Nr. of tool locations :	2 Locations
Equipment type, s/n :	MK4 Teletest Focus, TF-AB 10679	Probe collar, nr of channels :	6" collar, 8 Channel
Nr of LRUT indications :	5	Category 1:	1
		Category 2:	4
		Category 3:	0

Pipe inspection summary

1. Visual Inspection (VT)

> Corrosion and painting deterioration beneath the pipe sleeve.

2. Long Range Ultrasonic Testing (LRUT)

> Cat 1=1
> Cat 2=4

3. Ultrasonic Thickness Measurement (UTM)

> Not found the significant of wall loss at the test location. Min. Thk. was 6.73 mm at UTM point 2.

Recommendations

1. Visual Inspection (VT)

> Re-painting and re-sealing on pipe sleeve, at the area of corrosion and deterioration were found.

2. Long Range Ultrasonic Testing (LRUT)

> Keep monitoring, as the significant indications from LRUT data log has been noticed.

3. Ultrasonic Thickness Measurement (UTM)

> Keep monitoring.

LRUT Technician		LRUT Supervisor		Client		Client	
Name	Mr. Pummarin P.	Name	Mr. Anuwat M.	Name		Name	
Date :	29-Jun-23	Date :	29-Jun-23	Date :		Date :	
Sign:		Sign:		Sign:		Sign:	

STT-CC-001-03-01 (G Base 91 Outlet)

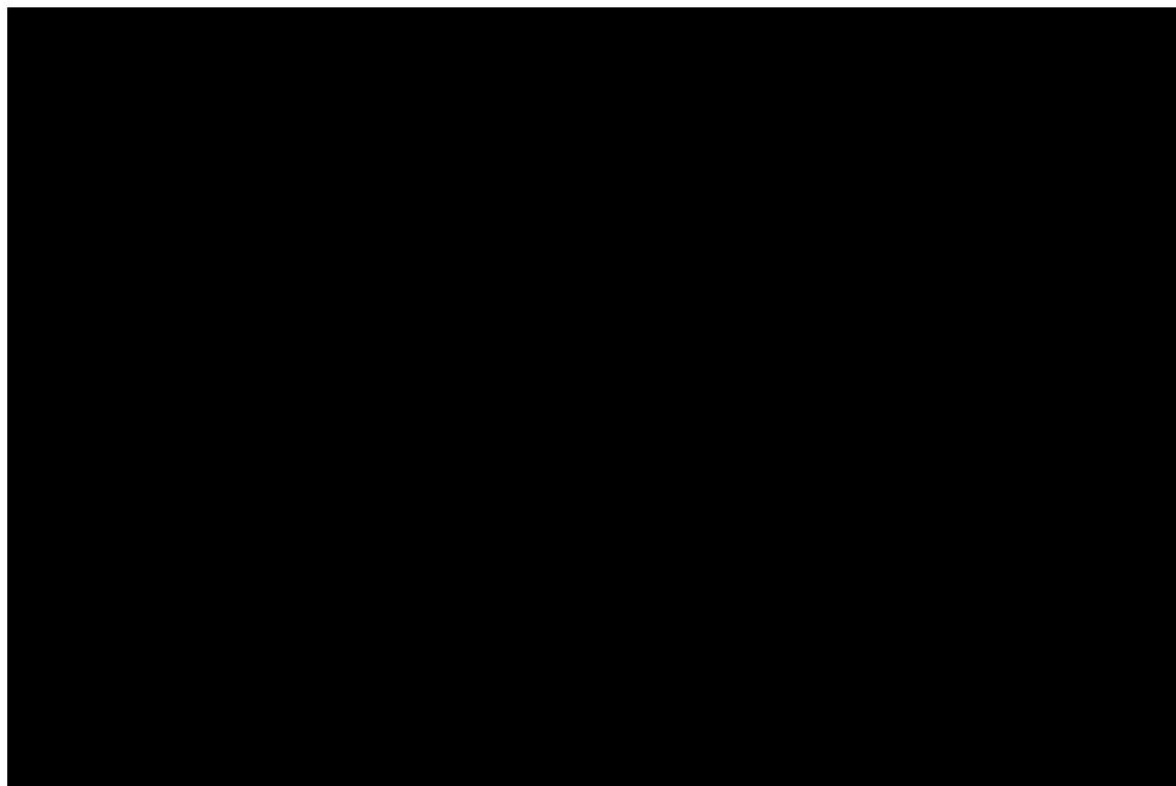
Degradation	N/A	Normal	Minor	Moderate	Severe	Remark
<input type="checkbox"/> Corrosion	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Corrosion beneath the pipe sleeve.
<input checked="" type="checkbox"/> CUS	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/> Paint	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Painting deterioration beneath the pipe sleeve.
<input checked="" type="checkbox"/> Insulation	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/> Supports	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/> Vibration	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/> Misalignment	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/> Mech. Damage	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/> Leak	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/> Other	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

Severity to be determined as follows:

Minor:
Moderate
Severe

For findings that don't require action
For findings that require action (specify time)
For findings that require immediate action

Highlighted in yellow in ISO
Highlighted in Orange in ISO



	LRUT PICTURE LOG		Report/ Project	Sheet
			2305047	3/ 10
STT-CC-001-03-01 (G Base 91 Outlet)				
				
Name of part / Location	Findings	Name of part / Location	Findings	
Pipe	Normal condition	Pipe	Normal condition	
				
Name of part / Location	Findings	Name of part / Location	Findings	
Pipe	Normal condition	Beneath pipe sleeve	Corrosion and painting deterioration	
				
Name of part / Location	Findings	Name of part / Location	Findings	
Beneath pipe sleeve	Corrosion and painting deterioration	Beneath pipe sleeve	Corrosion and painting deterioration	

STT-CC-001-03-01 (G Base 91 Outlet)



Name of part / Location

Findings

Name of part / Location

Findings

Underground pipe

Normal condition

Underground pipe

Normal condition



Name of part / Location

Findings

Name of part / Location

Findings

Underground pipe

Normal condition

Underground pipe

Normal condition



Name of part / Location

Findings

Name of part / Location



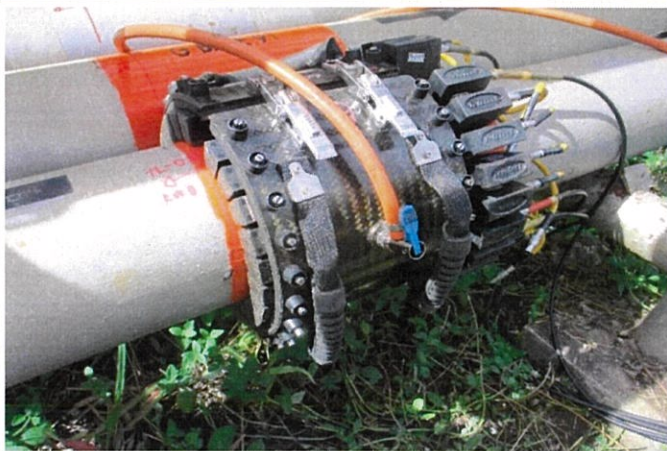
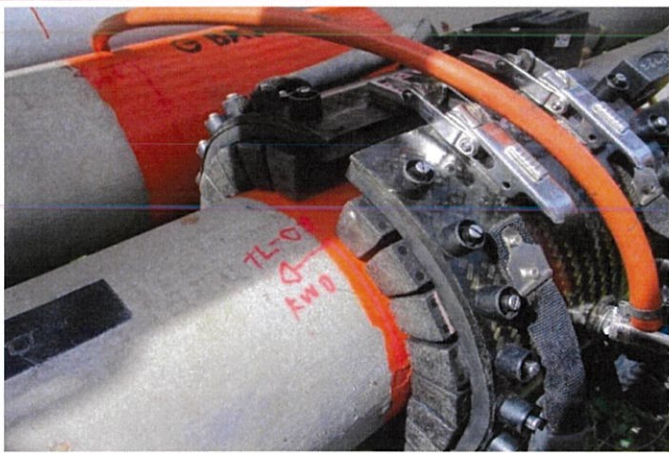



Findings

Underground pipe

Normal condition

Underground pipe

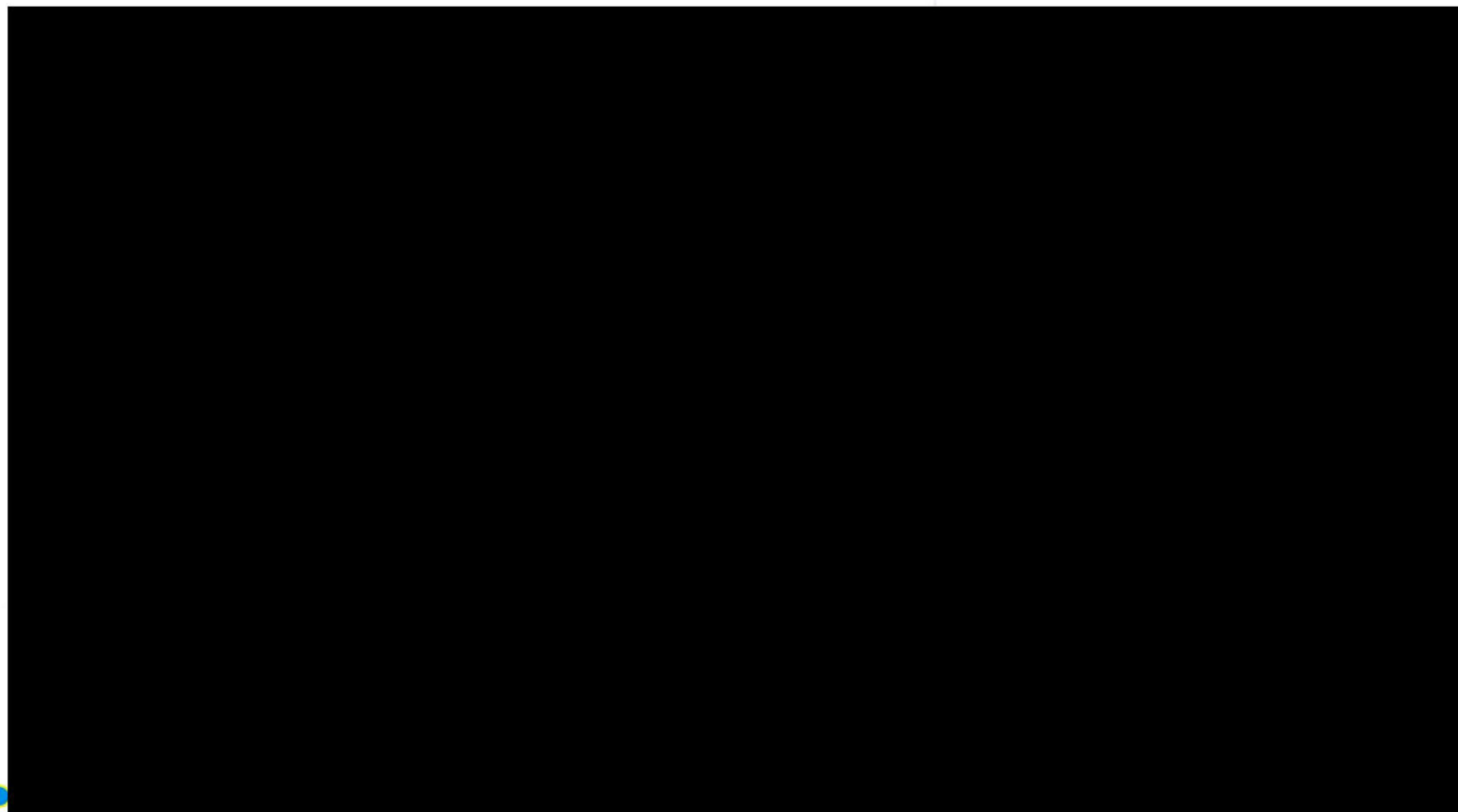
Normal condition

	LRUT PICTURE LOG		Report/ Project	Sheet
			2305047	5/ 10
STT-CC-001-03-01 (G Base 91 Outlet)				
				
Name of part / Location	Findings	Name of part / Location	Findings	
Pipe	Normal condition	Pipe	Normal condition	
				
Name of part / Location	Findings	Name of part / Location	Findings	
Pipe	Normal condition	Pipe	Normal condition	
				
Name of part / Location	Findings	Name of part / Location	Findings	
Beneath pipe sleeve	Corrosion and painting deterioration	Beneath pipe sleeve	Corrosion and painting deterioration	

STT-CC-001-03-01 (G Base 91 Outlet)

ISO drawing

N
↖



LINE NO : G-Base 91

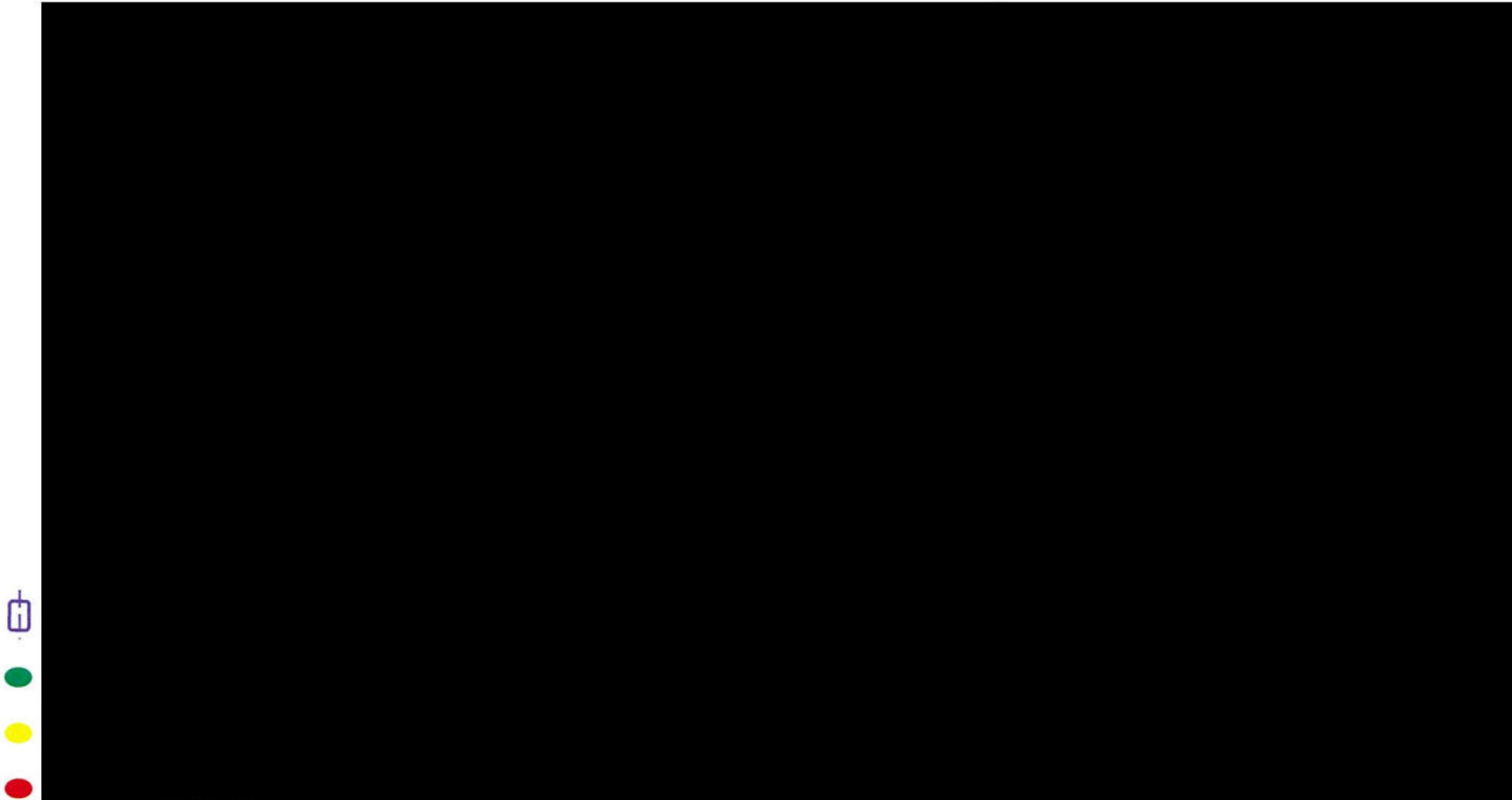
TECHNICAL DATA

F-PINT12-01 Rev.07

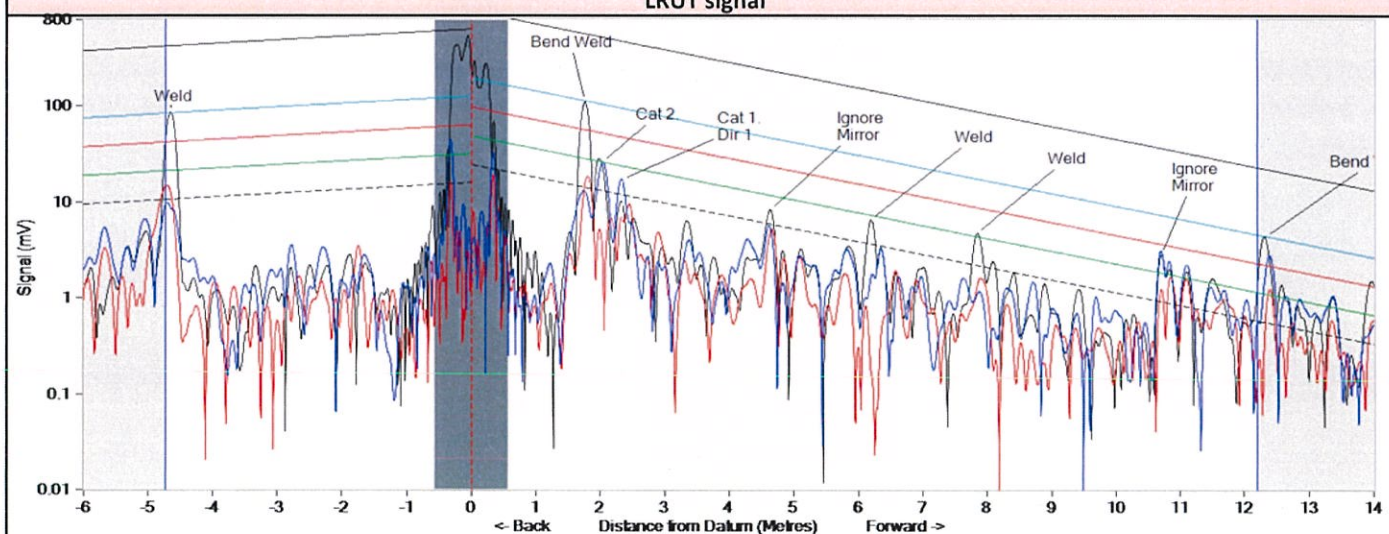
STT-CC-001-03-01 (G Base 91 Outlet)

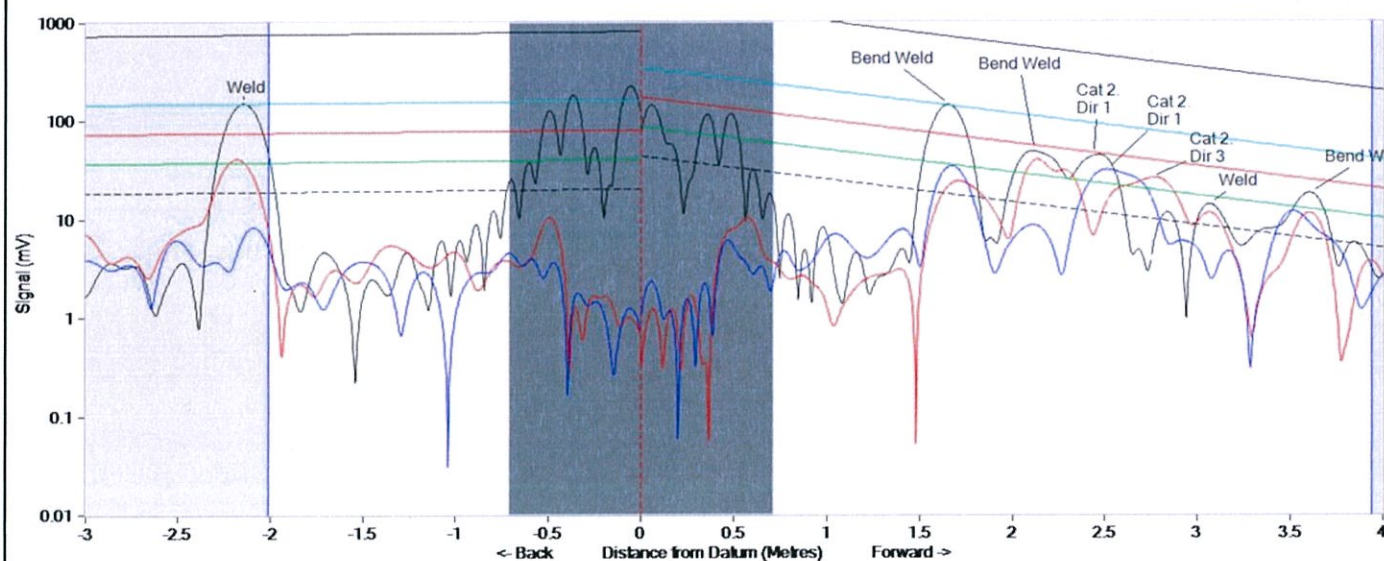
ISO drawing

N

LINE NO : G-Base 91





4. CERTIFICATIONS



Certificate of Proficiency

ISO 9712 CERTIFICATION FOR NDT PERSONNEL

CSWIP CERT NO 111106/2

This is to certify that:

Anuwat Mahaphet

Date of birth 13 July 1986

Of:

Dacon Inspection Services Ltd

has demonstrated proficiency as a Guided Wave Testing (GWT) Inspector Level 2 in accordance with the CSWIP requirements published in Document CSWIP-ES-NDT-12-04, 2nd Edition, May 2010 and amendments in force on the examination date.

This certificate covers:

The Guided Wave Testing of Pipes and Pipelines in accordance with CSWIP-ES-NDT-12-04 and Procedure No: P-INT-39.

Date of issue 10 August 2021

Date of expiry 21 April 2026

Signed

(For CSWIP)

SIGNATURE OF HOLDER

(Person named above)

Date

NEW EMPLOYERS SHOULD ALWAYS ASK TO SEE THE CERTIFICATE HOLDER'S

TWI CERTIFICATION LTD IDENTITY CARD, AND VERIFY CERTIFICATE VALIDITY AT WWW.CSWIP.COM

PLEASE READ THE NOTES OVERLEAF

Photocopies are unauthorised by
TWI Certification Ltd

Issued by:

TWI Certification Ltd, Granta Park, Great Abington, Cambridge CB21 6AL, UK

The use of the UKAS Accreditation Mark indicates accreditation in respect of those activities covered by Accreditation Certificate No. 025
This certificate is the property of TWI Certification Ltd and must be surrendered on request

CERTIFICATE *of* COMPLETION

THIS ACKNOWLEDGES THAT

PUMMARIN PIPATPONGKOL

FROM

Dexon Technology Public Company Limited

HAS SUCCESSFULLY COMPLETED 32 HOURS ON FOUR DAYS COURSE ENTITLED

“ Long Range Ultrasonic Testing (LRUT) Training ”

GIVEN ON THIS DAY, 11ST AUGUST 2022

AT DEXON TRAINING CENTER CO., LTD.

([REDACTED])

Instructor

([REDACTED])

General Manager

Certificate of Conformity

Document No 202301018

The equipment detailed below has been tested in accordance with the Manufacturer's specification by the scope of tests indicated, and has been found to meet or exceed the said specification.

Equipment Description: MK4 Teletest® Focus+ Long Range Ultrasonic Unit

ASS-0453-0002-E

Serial Number - TF-AB10679AP

Eddyfi Technologies Project No - 50008281

Scope of Tests:

TES-0453-0014	- PSU Testing ASS-0453-0014
TES-0453-0011	- TX Amps Assembly and testing ASS-0453-0011
TES-0453-0018	- Controller testing and programming ASS-0453-0018
TES-0453-0002	- Assembled MK4 Unit ASS-0453-0002
LWI-0453-0013	- Receiver card Programming ASS-0453-0013
LWI-0453-0041	- Front Panel Controller Programming ASS-0453-0041

Date of test: 25/01/2023
(See notes)

Expiry Date: 25/01/2024

Notes:

- This certificate shall have a period of validity not exceeding 12 months from the date of issue.
- Acceptance values are as given in the manufacturer's specification.
- The system software ensures self-calibration of the Teletest® Unit and this shall be verified by the operator on site, by means of a functional test of all octants of each ring of the transducer tool.
- In the event of the equipment not meeting the requirements of the functional test, the unit shall not be used for data collection and shall be returned to Eddyfi Technologies (Cambridge) Ltd for fault finding.
- A new Certificate of Conformity shall be issued following re-calibration or repair.

Authorised by:



Date: 25/01/2023

Barry Elborn – Operations Manager For Eddyfi Cambridge



Certificate of Calibration

Work Order No. : IN2023-06-02

Certificate No. : DEXTH171-2023

Page : Page 1 of 2

1. Client

Name : Dexon Technology Public Company Limited
Address : 78/4 Moo 6, Sukhumvit Road, Ban Chang, Rayong, 21130, THAILAND

2. Calibration Subject

Equipment : Ultrasonic thickness gauge
Manufacturer : Olympus
Model : 38 DL PLUSE
Serial No. : 151073403
ID No. : UTM 61
Description : Probe type D790-SM 5MHz Probe Serial No : 921708

3. Received Date : 06 June 2023**4. Calibration Date** : 06 June 2023

5. Environmental Conditions : Ambient Temperature (20 ± 2) °C
Relative Humidity (55 ± 20) %
Location : Permanent Laboratory

6. Calibration Procedure

Calibration Method and / or Brief Description. This Certificate is Traceable to the International System of Unit (SI).

In house method : The calibration result with attached was done accord to Dexon Technology Public Company Limited.by standard W-TEC02-03 Ultrasonic Thickness Measurement According to Direct measurement method with gauge block.

7. List of Use Standards / Specifications

Item	Instrument	Manufacturer	Model	Serial No.	Certificate No.	Due Date
1.	Calibration Block	Precision	A1018	150916-1	230322CA06	24-Mar-24
2.	Data logger	Almemo	2470	H1110057	230322DA08	22-Mar-24

8. Calibration Results : Refer attached file**9. Measurement Uncertainty** : Refer attached file

Calibration Performed By

Approved By

Name : Mr. Worawat Vatcharatassanakul
Position : Calibration Engineer
Issue Date : 6 June 2023

Name : Mr. David Kuakamchad
Position : Operation-QA/QC & Store Manager.

The report uncertainty of measurement was based on a standard uncertainty multiplied by a coverage k=2, providing a level of confidence of approximately 95%

This result of calibration was found accurate as show on date and place of calibration only. This certificate may not be reproduced other in full, except with the prior written approval form the Laboratory Manager of Dexon technology public company limited.

Calibration Results

Cert. No. : DEXTH171-2023

Page : 2 of 2

Result of Calibration : Without adjustment

Scale range : 2 - 100 mm

Resolution : 0.01 mm

Measurement Result

Range	Nominal length (mm)	UUC*Reading (mm)	Deviation (mm)	Measurement Uncertainty (μ m)
2 mm to 100 mm	1.9981	1.99	0.01	22.0
	4.0102	3.99	0.02	22.0
	6.0190	5.99	0.03	22.0
	7.9960	8.00	0.00	22.0
	9.9960	10.00	0.00	22.0
	19.9945	19.99	0.01	22.0
	29.9927	29.99	0.01	22.0
	39.9950	40.00	-0.01	22.0
	49.9950	50.00	0.00	22.0
	60.0088	60.00	0.01	22.0
	70.0000	70.00	0.00	22.0
	80.0010	80.01	0.00	22.0
	90.0193	90.00	0.02	22.0
	99.9749	100.00	-0.02	22.0

Remark : Deviation = Nominal length - UUC*Reading
Gauge Setup : Default
Meas Option : Standard
Gain (dB) : 66
Gage Velocity : 5.960 mm/ μ s
Gage Zero after Calibration : 25630

This certifies that Calibration of the above Ultrasonic gaging system has been verified within the tolerance and measurement range indicated below, using calibration standards with measured thickness traceable to the Calibration standards material is A1018.

Calibration interval will vary based on usage handling and storage conditions. The Certificate shall not be reproduced, except in full, without the written approval of Operation-QA/QC & Store Manager Department.

Uncertainty of Measurement

The uncertainty stated is the expanded uncertainty obtained by multiplying the standard uncertainty by the coverage factor $k = 2.00$. It has been determined in accordance with EA publication EA-4/02 "Expression of the Uncertainty of Measurement in Calibration" and M3003 "The Expression of Uncertainty and Confidence in Measurement". The value of the measurand lies within the assigned range of values with a probability of 95%.

End of Certificate.