APPENDIX 5B – 12-INCH DIAMETER CURVED WIDE PLATE TEST RESULTS

Curved Wide Plate Test Summary Sheet

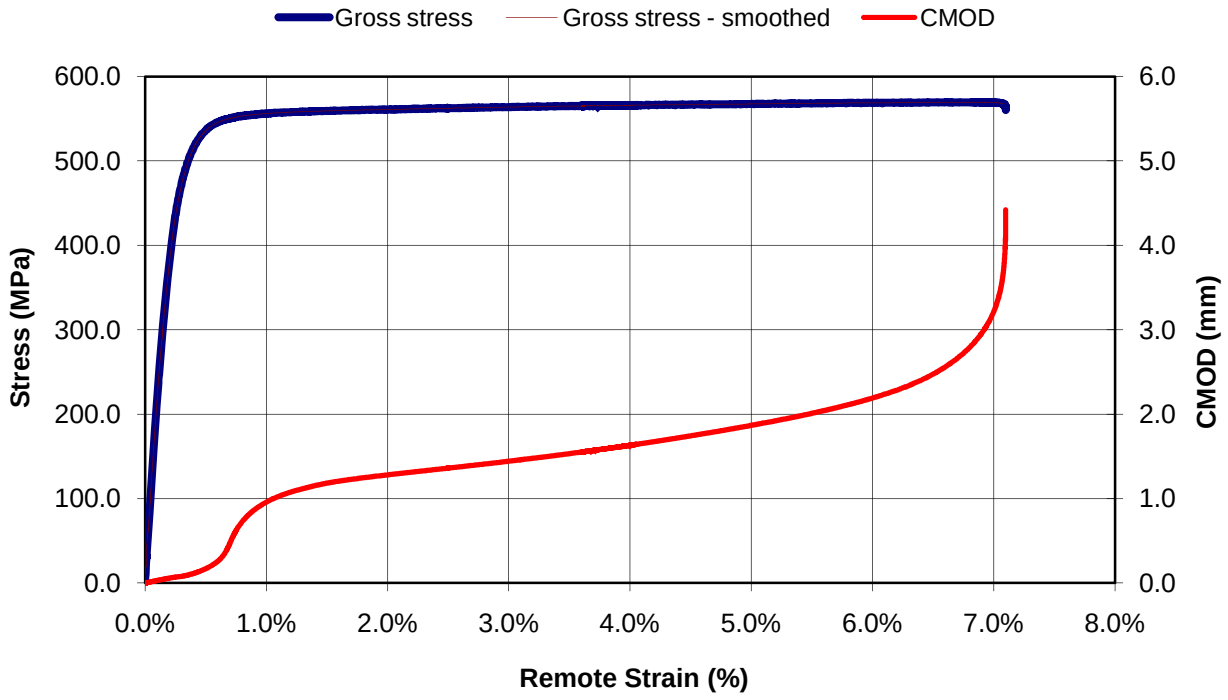
Spec. No. **3.1a**

Specimen Details		
Pipe diameter, OD	323.9	mm
Wall thickness, t	12.73	mm
Type	High Y/T	
Grade	X65	
SMYS	448	MPa
SMTS	531	MPa
F yield (hoop | axial)	509 | 547	MPa
F tensile (hoop | axial)	588 | 593	MPa
Test temperature	21	ºC
Reduced section length	1,028	mm
Redcued section width	224.0	mm
Target flaw size	3 x 35	mm
Target flaw location	WCL	

Test terminated following strain localization in flaw region.

	Load Peak	End Point	
Total Load	1,623	1,598	kN
Gross Stress	569.4	560.3	MPa
Strain LTU	6.23%	6.48%	
Strain LBU	7.39%	7.72%	
Strain LTBU	6.81%	7.10%	
CMOD	2.80	4.42	mm

Strain Notation:
Strain LTU: average strain in uniform strain zone of top plate (LTU series LVDTs)
Strain LBU: average strain in uniform strain zone of bottom plate (LBU series LVDTs)
Strain LTBU: average strain in uniform strain zones of both plates (LTU and LBU series LVDTs)



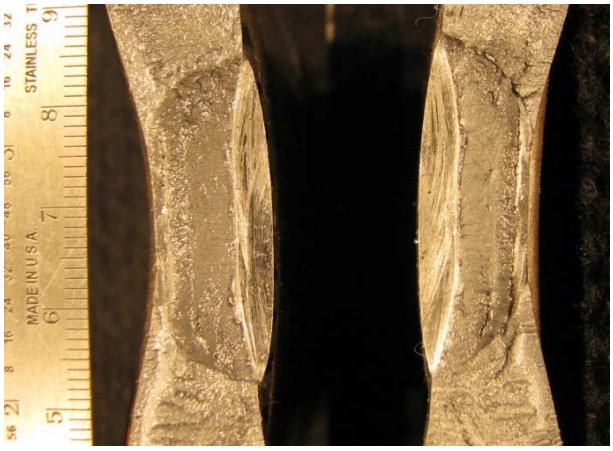
**Average strain from LVDTs in uniform strain zones of both plates (i.e. LTBU strain)*

C-FER Technologies	Pre-test Measurements Taken By: JW	Date: 10-Oct-07	PRCI/DOT
	Approval for Testing: RTP	Date: 7-Dec-07	3.1a

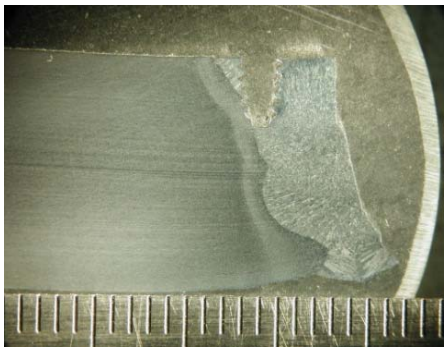
Photographs

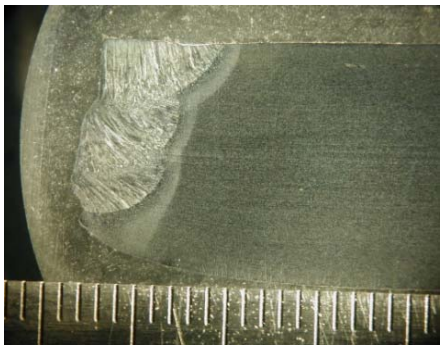
Test Set-up

Pre-test Flaw and Clip Gauge Set-up



Flaw Fracture Surface





Flaw Macro

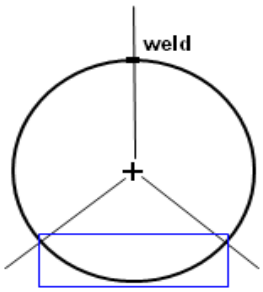
C-FER Technologies	Pre-test Measurements Taken By: JW	Date: 10-Oct-07	**PRCI/DOT**
	Approval for Testing: RTP	Date: 7-Dec-07	**3.1a**

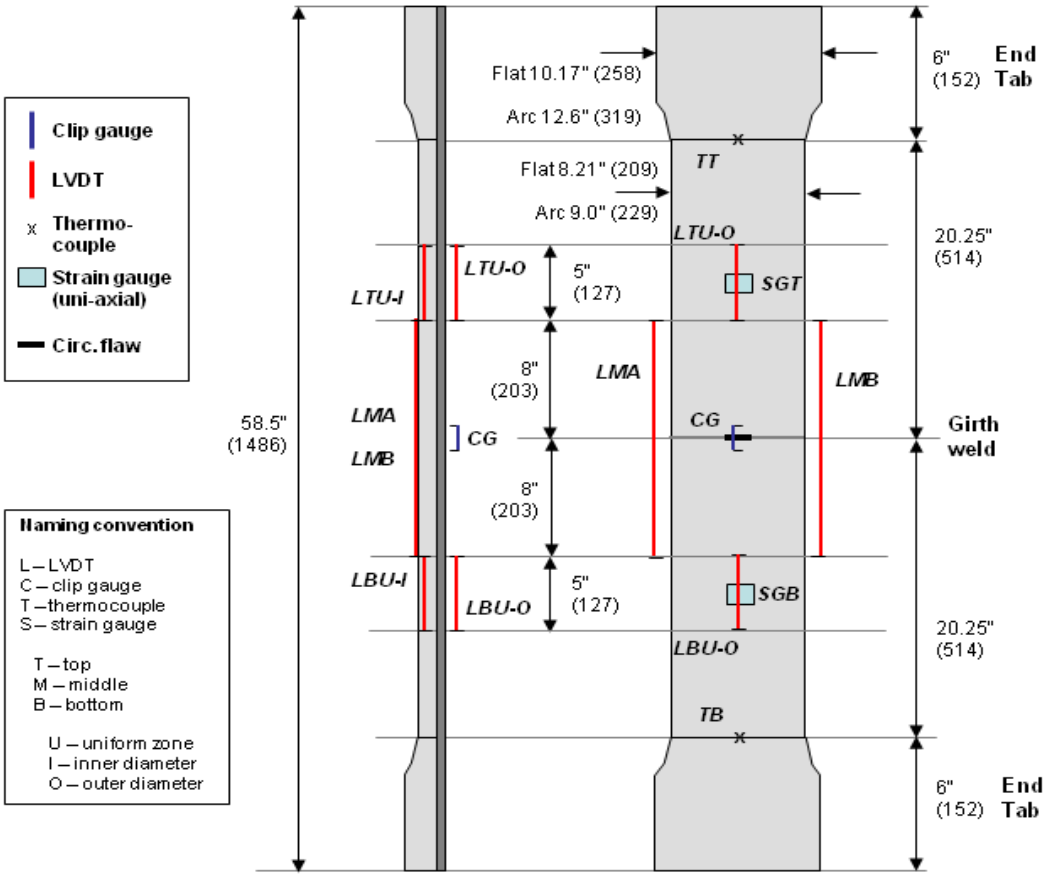
Instrumentation Layout

PRCI/DOT Tensile Strain Limits

12 inch CWP Test Instrumentation

Version 1.0

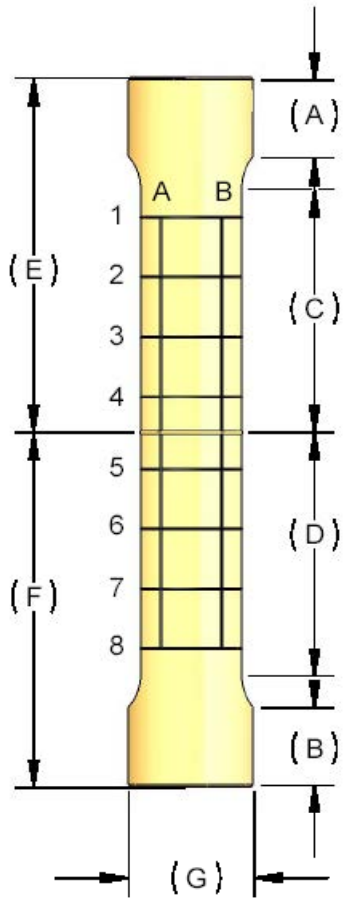




C-FER Technologies	Pre-test Measurements Taken By: JW	Date: 10-Oct-07	PRCI/DOT
	Approval for Testing: RTP	Date: 7-Dec-07	3.1a

Specimen Measurements

TOP



Wall Thickness (mm)		
Grid line	A	B
1	12.83	12.73
2	12.73	12.67
3	12.75	12.73
4	12.70	12.67
5	12.75	12.75
6	12.70	12.75
7	12.73	12.70
8	12.73	12.75
Average		**12.73**

Gauge Width (mm)	
Grid line	OD
1	224
2	224
3	224
4	224
5	224
6	224
7	224
8	224
Average	**224**

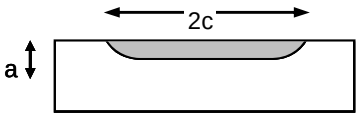
Gauge Length (mm)	
LMA	408
LMB	409
LTID	127
LTOD	127
LBID	126
LBOD	127

Reduced Section Length (mm)	
Top [C]	515
Bottom[D]	513

Tab Length (mm)	
Top [A]	146
Bottom [B]	139

Area (mm^2)	2,851.201

BOTTOM



Defect Size (mm)		
Length	2c	34.91
Depth	a_1	1.54
	a_2	2.00
	a_3	3.10
	a_4	3.05
	a_5	3.09
	a_6	1.95
	a_7	1.43
	a_8	
	a_9	
	a_{10}	
Defect Area (mm^2)		**81.62**

average depth = 3.08

C-FER Technologies	Pre-test Measurements Taken By: JW	Date: 10-Oct-07	**PRCI/DOT**
	Approval for Testing: RTP	Date: 7-Dec-07	**3.1a**

Curved Wide Plate Test Summary Sheet

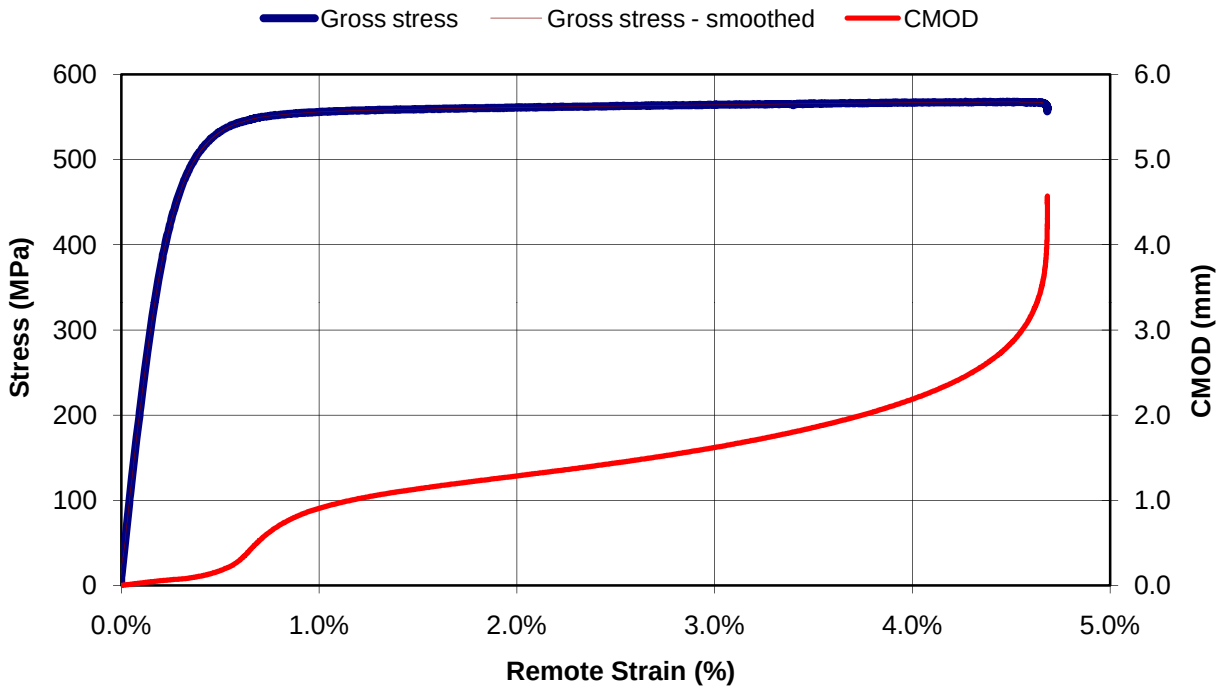
Spec. No. **3.1b**

Specimen Details		
Pipe diameter, OD	323.9	mm
Wall thickness, t	12.77	mm
Type	High Y/T	
Grade	X65	
SMYS	448	MPa
SMTS	531	MPa
F yield (hoop | axial)	509 | 547	MPa
F tensile (hoop | axial)	588 | 593	MPa
Test temperature	21	ºC
Reduced section length	1,034	mm
Redcued section width	223.9	mm
Target flaw size	3 x 35	mm
Target flaw location	WCL	

Test terminated following strain localization in flaw region.

	Load Peak	End Point	
Total Load	1,623	1,591	kN
Gross Stress	567.6	556.5	MPa
Strain LTU	5.05%	5.25%	
Strain LBU	3.95%	4.11%	
Strain LTBU	4.50%	4.68%	
CMOD	2.84	4.57	mm

Strain Notation:
Strain LTU: average strain in uniform strain zone of top plate (LTU series LVDTs)
Strain LBU: average strain in uniform strain zone of bottom plate (LBU series LVDTs)
Strain LTBU: average strain in uniform strain zones of both plates (LTU and LBU series LVDTs)



**Average strain from LVDTs in uniform strain zones of both plates (i.e. LTBU strain)*

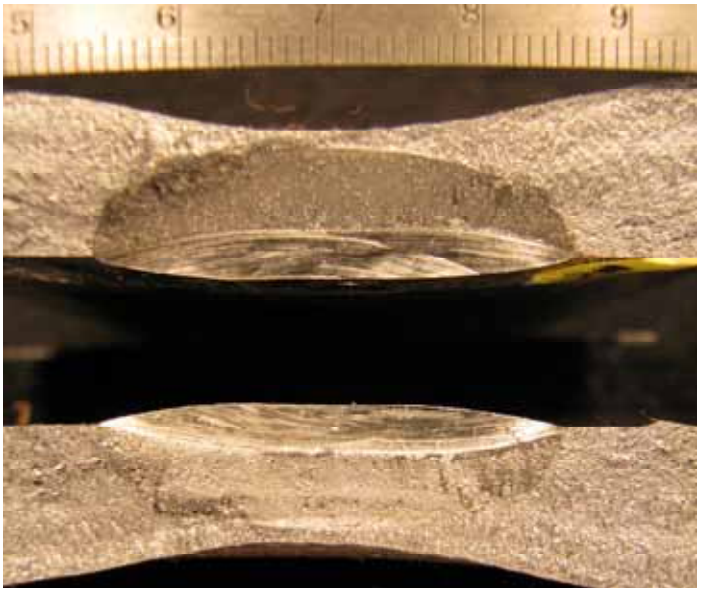
C-FER Technologies	Pre-test Measurements Taken By: JW	Date: 10-Dec-07	PRCI/DOT
	Approval for Testing: RTP	Date: 10-Dec-07	3.1b

Photographs

Pre-test Flaw and Clip Gauge Set-up

Post-test Flaw

Test Set-up



Flaw Fracture Surface

Flaw Macro Images

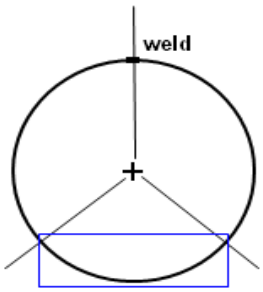
C-FER Technologies	Pre-test Measurements Taken By: JW	Date: 10-Dec-07	**PRCI/DOT**
	Approval for Testing: RTP	Date: 10-Dec-07	**3.1b**

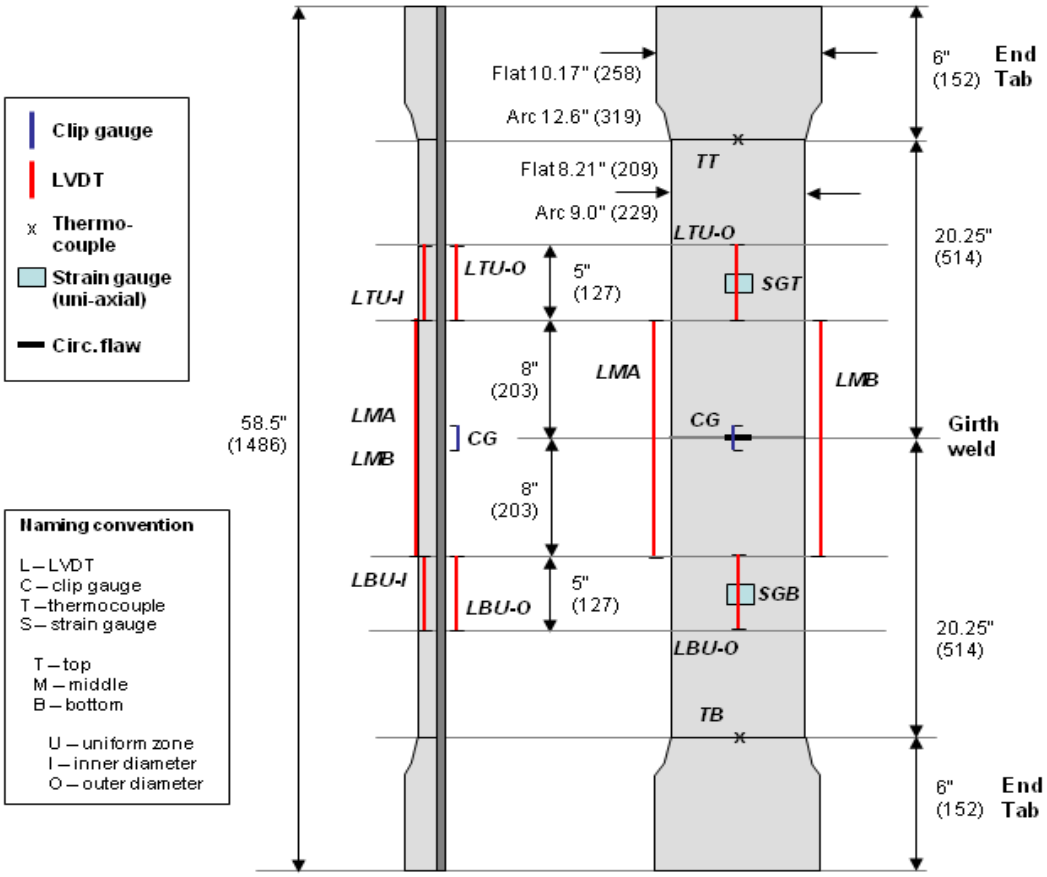
Instrumentation Layout

PRCI/DOT Tensile Strain Limits

12 inch CWP Test Instrumentation

Version 1.0

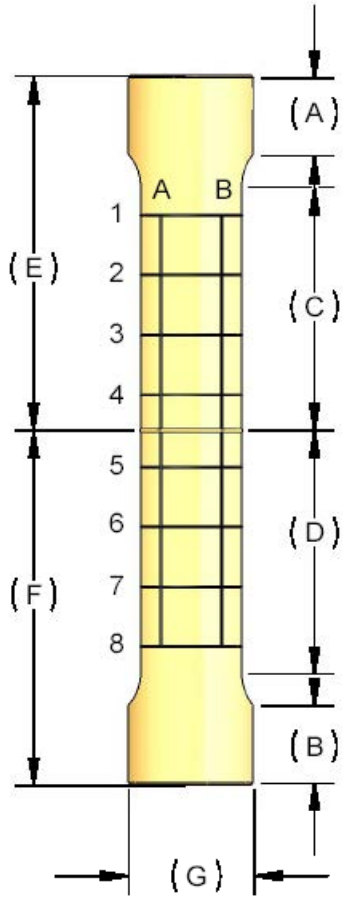




C-FER Technologies	Pre-test Measurements Taken By: JW	Date: 10-Dec-07	PRCI/DOT
	Approval for Testing: RTP	Date: 10-Dec-07	3.1b

Specimen Measurements

TOP



Wall Thickness (mm)		
Grid line	A	B
1	12.78	12.75
2	12.78	12.78
3	12.78	12.75
4	12.70	12.70
5	12.78	12.80
6	12.80	12.83
7	12.80	12.78
8	12.75	12.83
Average		**12.77**

Gauge Width (mm)	
Grid line	OD
1	224
2	224
3	223
4	224
5	224
6	224
7	224
8	224
Average	**224**

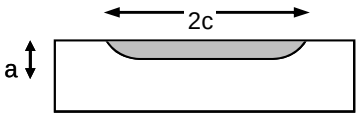
Gauge Length (mm)	
LMA	407
LMB	408
LTID	127
LTOD	128
LBID	127
LBOD	127

Reduced Section Length (mm)	
Top [C]	519
Bottom[D]	515

Tab Length (mm)	
Top [A]	137
Bottom [B]	144

Area (mm^2)	2,859.561

BOTTOM



Defect Size (mm)		
Length	2c	34.79
Depth	a_1	1.43
	a_2	1.76
	a_3	2.94
	a_4	3.12
	a_5	2.93
	a_6	1.78
	a_7	1.51
	a_8	
	a_9	
	a_{10}	
Defect Area (mm^2)		**79.36**

average depth = 3.00

C-FER Technologies	Pre-test Measurements Taken By: JW	Date: 10-Dec-07	**PRCI/DOT**
	Approval for Testing: RTP	Date: 10-Dec-07	**3.1b**

Curved Wide Plate Test Summary Sheet

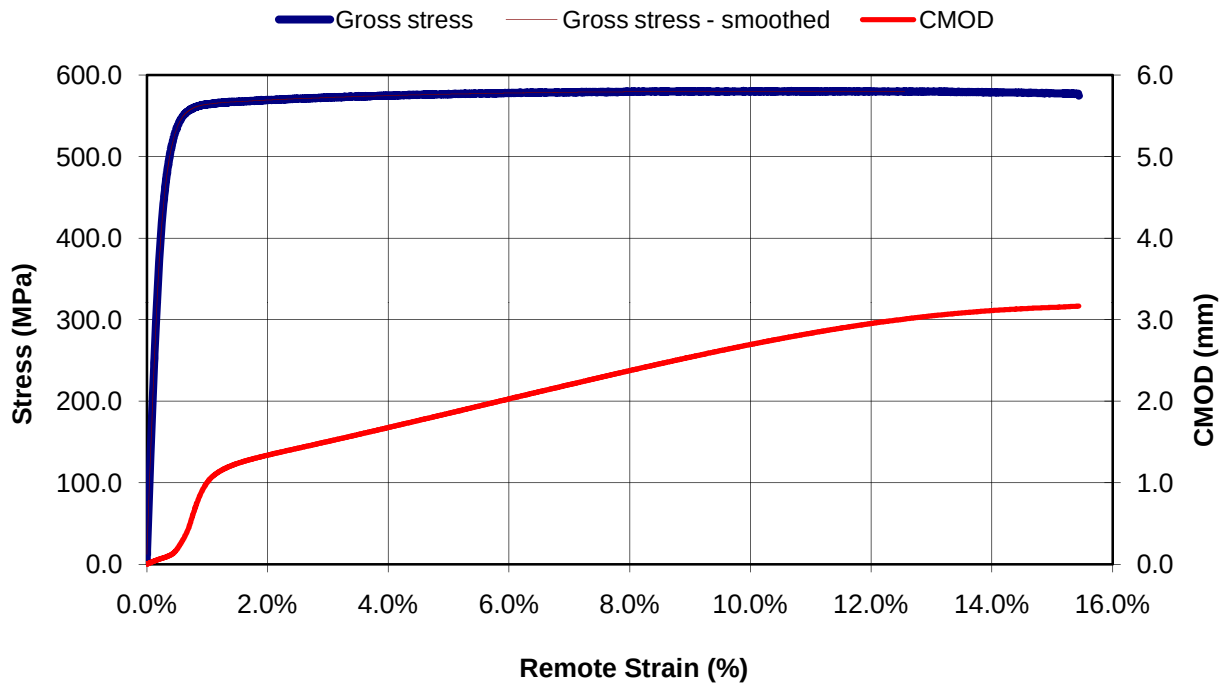
Spec. No. **3.2a**

Specimen Details		
Pipe diameter, OD	323.9	mm
Wall thickness, t	12.72	mm
Type	High Y/T	
Grade	X65	
SMYS	448	MPa
SMTS	531	MPa
F yield (hoop | axial)	509 | 547	MPa
F tensile (hoop | axial)	588 | 593	MPa
Test temperature	21	ºC
Reduced section length	1,027	mm
Redcued section width	223.6	mm
Target flaw size	3 x 35	mm
Target flaw location	HAZ	

Test terminated following strain localization in body region.

	Load Peak	End Point	
Total Load	1,650	1,635	kN
Gross Stress	580.2	574.9	MPa
Strain LTU	12.72%	18.76%	
Strain LBU	10.53%	12.12%	
Strain LTBU	11.62%	15.44%	
CMOD	2.91	3.17	mm

Strain Notation:
Strain LTU: average strain in uniform strain zone of top plate (LTU series LVDTs)
Strain LBU: average strain in uniform strain zone of bottom plate (LBU series LVDTs)
Strain LTBU: average strain in uniform strain zones of both plates (LTU and LBU series LVDTs)



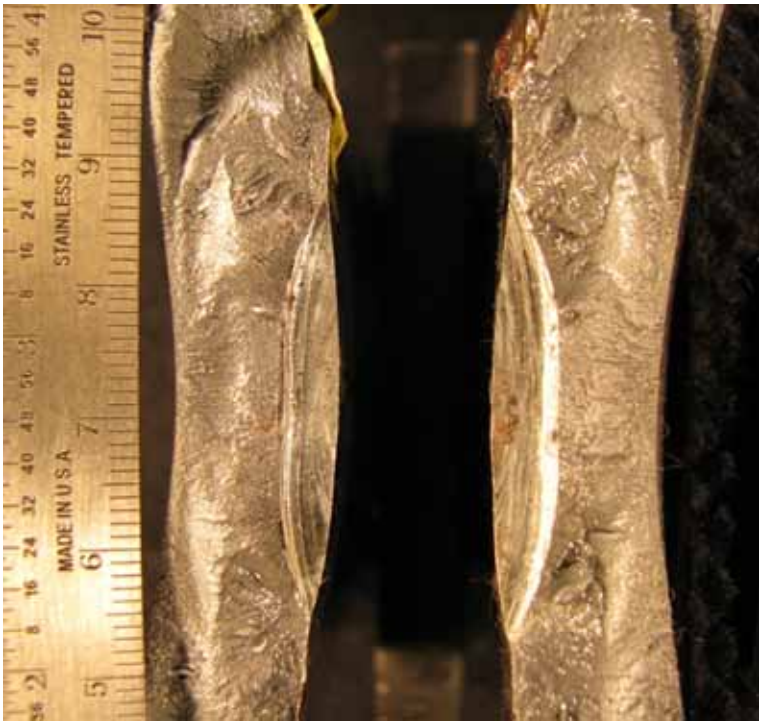
**Average strain from LVDTs in uniform strain zones of both plates (i.e. LTBU strain)*

C-FER Technologies	Pre-test Measurements Taken By: JW	Date: 10-Oct-07	PRCI/DOT
	Approval for Testing: RTP	Date: 11-Dec-07	3.2a

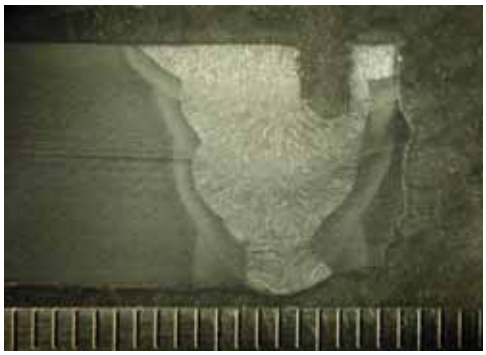
Photographs

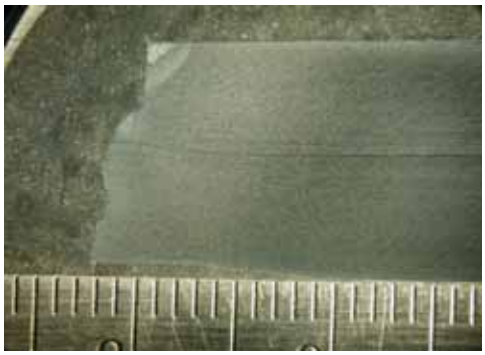
Test Set-up

Post-test Flaw



Flaw Fracture Surface





Flaw Macro Images

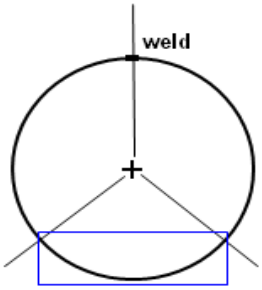
C-FER Technologies	Pre-test Measurements Taken By: JW	Date: 10-Oct-07	**PRCI/DOT**
	Approval for Testing: RTP	Date: 11-Dec-07	**3.2a**

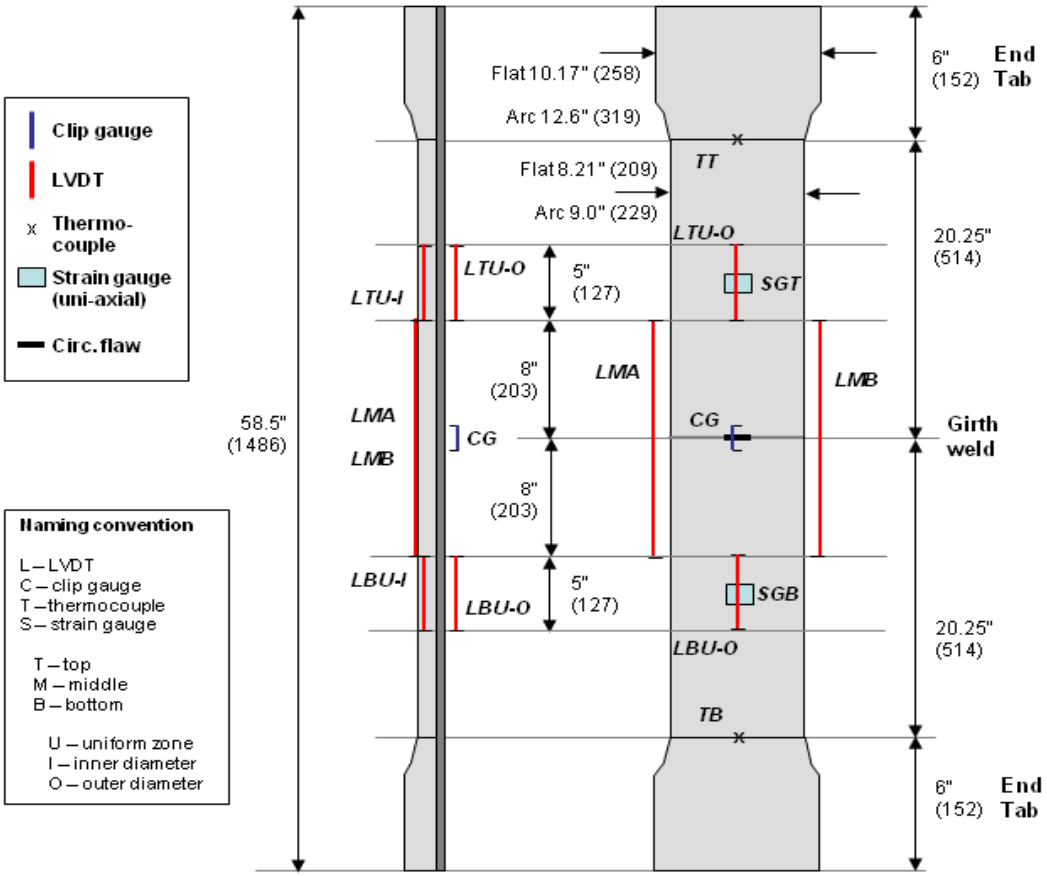
Instrumentation Layout

PRCI/DOT Tensile Strain Limits

12 inch CWP Test Instrumentation

Version 1.0

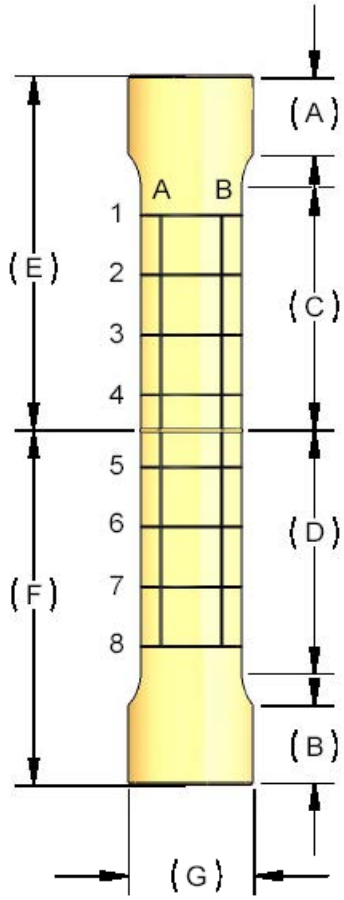




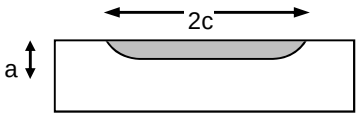
C-FER Technologies	Pre-test Measurements Taken By: JW	Date: 10-Oct-07	PRCI/DOT
	Approval for Testing: RTP	Date: 11-Dec-07	3.2a

Specimen Measurements

TOP



BOTTOM



Wall Thickness (mm)		
Grid line	A	B
1	12.70	12.70
2	12.73	12.73
3	12.75	12.73
4	12.65	12.67
5	12.67	12.73
6	12.70	12.73
7	12.75	12.75
8	12.78	12.73
Average		**12.72**

Gauge Width (mm)	
Grid line	OD
1	224
2	223
3	223
4	224
5	224
6	223
7	224
8	224
Average	**223.6**

Gauge Length (mm)	
LMA	407
LMB	408
LTID	126
LTOD	126
LBID	127
LBOD	127

Reduced Section Length (mm)	
Top [C]	512
Bottom[D]	515

Tab Length (mm)	
Top [A]	138
Bottom [B]	144

Area (mm^2)	2,843.943

Defect size (mm)		
Length	2c	35.98
Depth	a_1	1.38
	a_2	1.99
	a_3	2.93
	a_4	3.07
	a_5	3.06
	a_6	2.02
	a_7	1.54
	a_8	
	a_9	
	a_{10}	
Defect area (mm^2)		**83.49**

average depth = 3.02

C-FER Technologies	Pre-test Measurements Taken By: JW	Date: 10-Oct-07	**PRCI/DOT**
	Approval for Testing: RTP	Date: 11-Dec-07	**3.2a**

Curved Wide Plate Test Summary Sheet

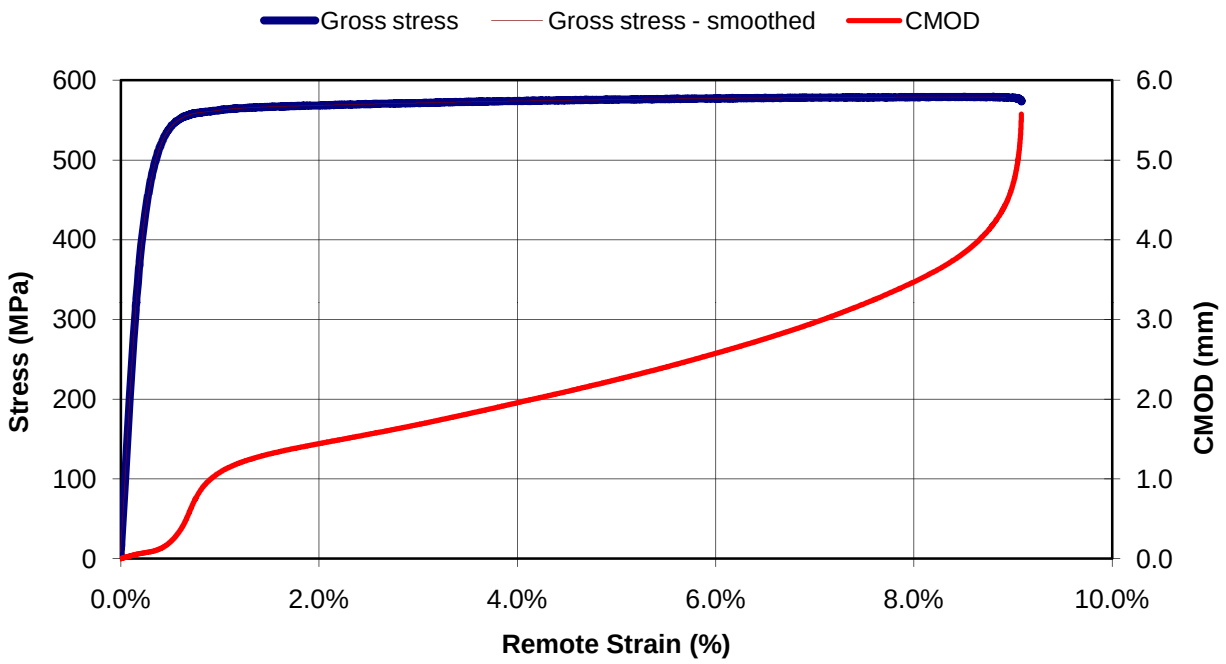
Spec. No. **3.2b**

Specimen Details		
Pipe diameter, OD	323.9	mm
Wall thickness, t	12.71	mm
Type	High Y/T	
Grade	X65	
SMYS	448	MPa
SMTS	531	MPa
F yield (hoop | axial)	509 | 547	MPa
F tensile (hoop | axial)	588 | 593	MPa
Test temperature	22	ºC
Reduced section length	1,032	mm
Redcued section width	224.3	mm
Target flaw size	3 x 35	mm
Target flaw location	HAZ	

Test terminated following strain localization in flaw region.

	Load Peak	End Point	
Total Load	1,651	1,636	kN
Gross Stress	579.1	573.9	MPa
Strain LTU	9.17%	9.91%	
Strain LBU	7.76%	8.26%	
Strain LTBU	8.46%	9.08%	
CMOD	3.80	5.57	mm

Strain Notation:
Strain LTU: average strain in uniform strain zone of top plate (LTU series LVDTs)
Strain LBU: average strain in uniform strain zone of bottom plate (LBU series LVDTs)
Strain LTBU: average strain in uniform strain zones of both plates (LTU and LBU series LVDTs)



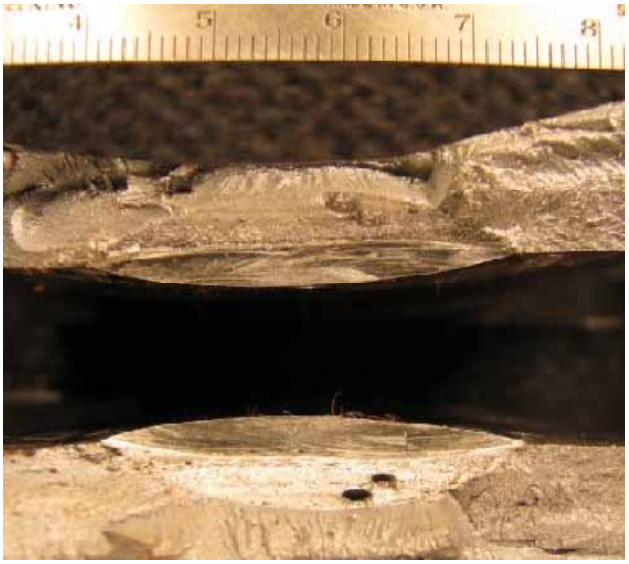
**Average strain from LVDTs in uniform strain zones of both plates (i.e. LTBU strain)*

C-FER Technologies	Pre-test Measurements Taken By: JW	Date: 10-Oct-07	PRCI/DOT
	Approval for Testing: RTP	Date: 12-Dec-07	3.2b

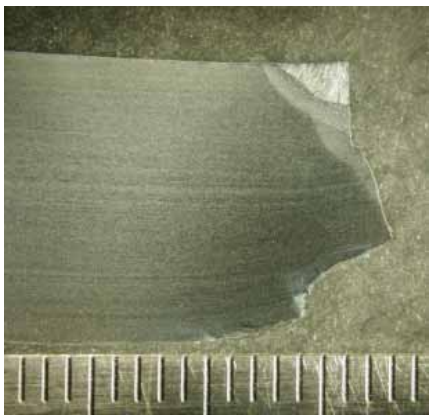
Photographs

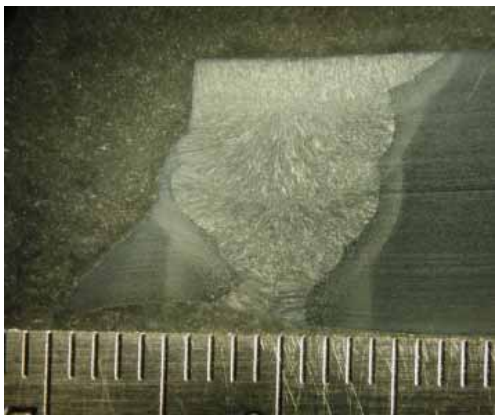
Test Set-up

Post-test Flaw



Flaw Fracture Surface





Flaw Macro Images

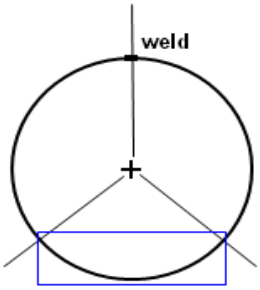
C-FER Technologies	Pre-test Measurements Taken By: JW	Date: 10-Oct-07	**PRCI/DOT**
	Approval for Testing: RTP	Date: 12-Dec-07	**3.2b**

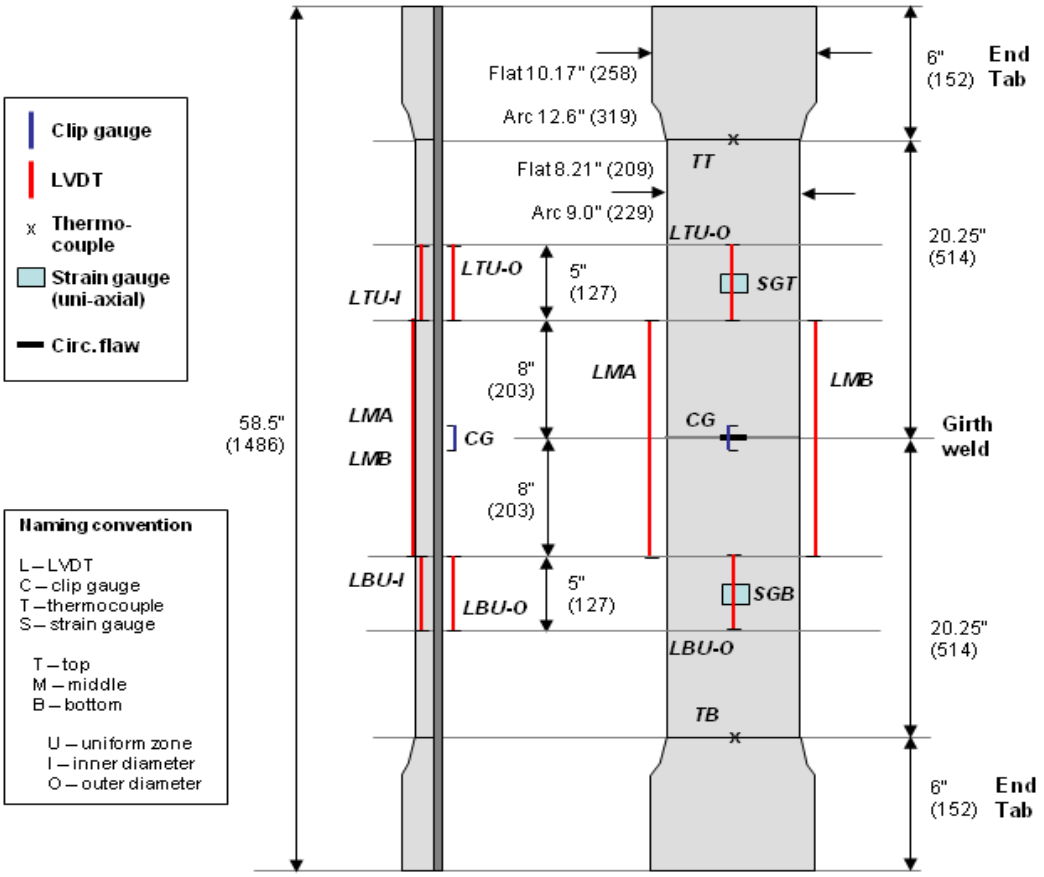
Instrumentation Layout

PRCI/DOT Tensile Strain Limits

12 inch CWP Test Instrumentation

Version 1.0

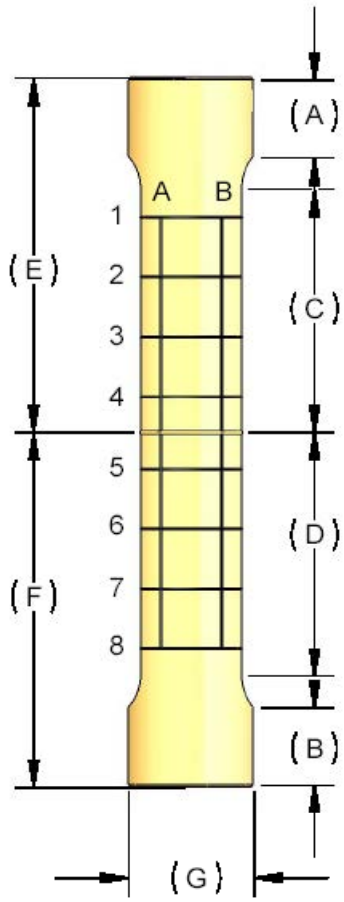




C-FER Technologies	Pre-test Measurements Taken By: JW	Date: 10-Oct-07	PRCI/DOT
	Approval for Testing: RTP	Date: 12-Dec-07	3.2b

Specimen Measurements

TOP



Wall Thickness (mm)		
Grid line	A	B
1	12.73	12.67
2	12.70	12.75
3	12.67	12.70
4	12.78	12.75
5	12.70	12.70
6	12.73	12.67
7	12.75	12.67
8	12.73	12.67
Average		**12.71**

Gauge Width (mm)	
Grid line	OD
1	224
2	224
3	225
4	225
5	224
6	224
7	224
8	224
Average	**224**

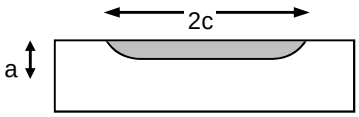
Gauge Length (mm)	
LMA	410
LMB	409
LTID	128
LTOD	129
LBID	127
LBOD	127

Reduced Section Length (mm)	
Top [C]	517
Bottom[D]	515

Tab Length (mm)	
Top [A]	144
Bottom [B]	145

Area (mm^2)	2,850.467

BOTTOM



Defect Size (mm)		
Length	2c	34.88
Depth	a_1	1.46
	a_2	1.94
	a_3	2.91
	a_4	2.96
	a_5	2.94
	a_6	1.81
	a_7	1.50
	a_8	
	a_9	
	a_{10}	
Defect Area (mm^2)		**78.26**

average depth = 2.94

C-FER Technologies	Pre-test Measurements Taken By: JW	Date: 10-Oct-07	**PRCI/DOT**
	Approval for Testing: RTP	Date: 12-Dec-07	**3.2b**

Curved Wide Plate Test Summary Sheet

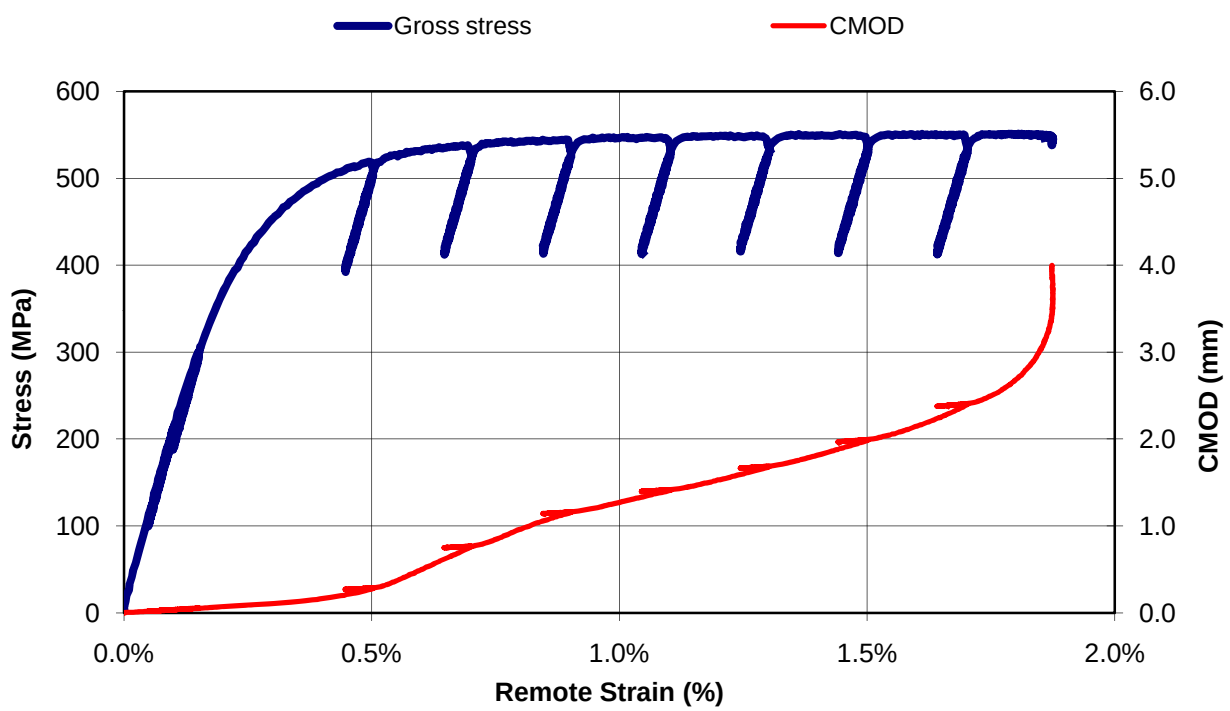
Spec. No. **3.3a**

Specimen Details		
Pipe diameter, OD	323.9	mm
Wall thickness, t	13.00	mm
Type	High Y/T	
Grade	X65	
SMYS	448	MPa
SMTS	531	MPa
F yield (hoop | axial)	509 | 547	MPa
F tensile (hoop | axial)	588 | 593	MPa
Test temperature	23	ºC
Reduced section length	1,041	mm
Redcued section width	224.9	mm
Target flaw size	3 x 50	mm
Target flaw location	WCL	

Test terminated following strain localization in flaw region.

	Load Peak	End Point	
Total Load	1,613	1,579	kN
Gross Stress	551.3	539.7	MPa
Strain LTU	1.80%	1.86%	
Strain LBU	1.83%	1.88%	
Strain LTBU	1.81%	1.87%	
CMOD	2.74	4.00	mm

Strain Notation:
Strain LTU: average strain in uniform strain zone of top plate (LTU series LVDTs)
Strain LBU: average strain in uniform strain zone of bottom plate (LBU series LVDTs)
Strain LTBU: average strain in uniform strain zones of both plates (LTU and LBU series LVDTs)

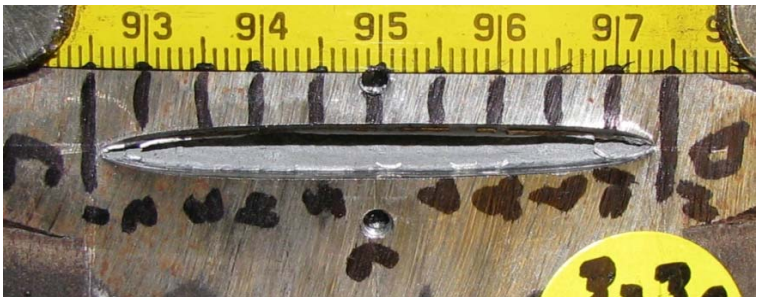


**Average strain from LVDTs in uniform strain zones of both plates (i.e. LTBU strain)*

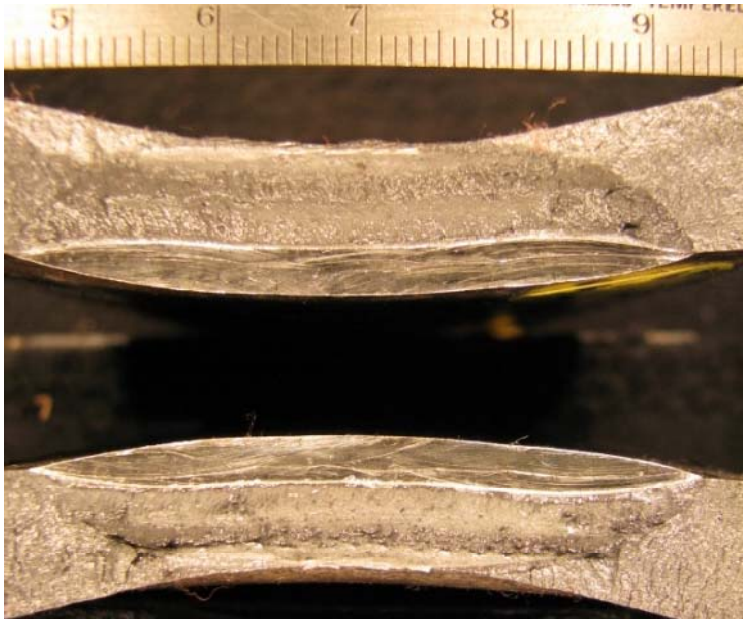
C-FER Technologies	Pre-test Measurements Taken By: JP	Date: 6-Oct-08	PRCI/DOT
	Approval for Testing: RTP	Date: 6-Oct-08	3.3a

Photographs

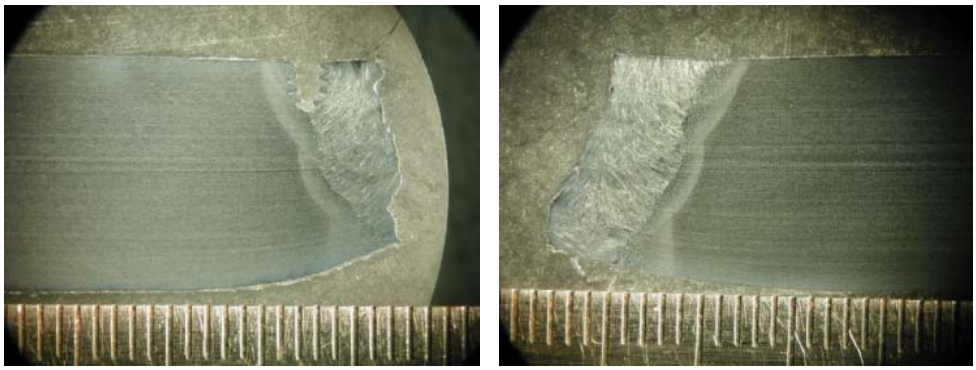
Test Set-up



Post-test Flaw



Flaw Fracture Surface



Flaw Macro Image

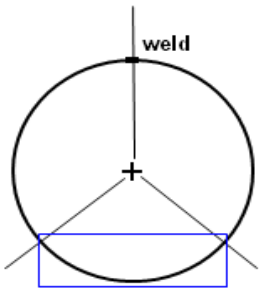
C-FER Technologies	Pre-test Measurements Taken By: JP	Date: 6-Oct-08	**PRCI/DOT**
	Approval for Testing: RTP	Date: 6-Oct-08	**3.3a**

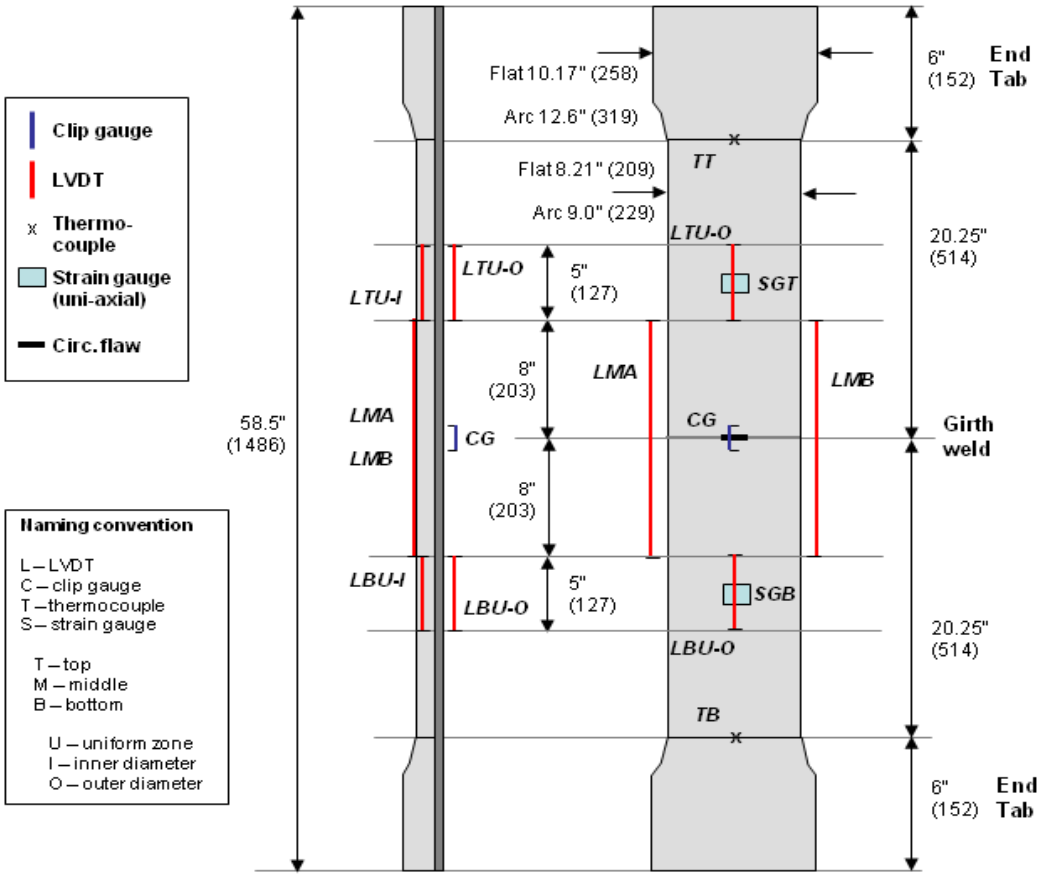
Instrumentation Layout

PRCI/DOT Tensile Strain Limits

12 inch CWP Test Instrumentation

Version 1.0

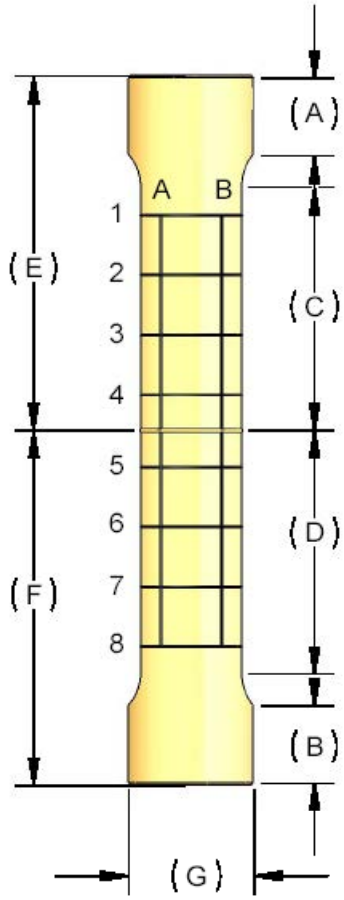




C-FER Technologies	Pre-test Measurements Taken By: JP	Date: 6-Oct-08	PRCI/DOT
	Approval for Testing: RTP	Date: 6-Oct-08	3.3a

Specimen Measurements

TOP



Wall Thickness (mm)		
Grid line	A	B
1	13.03	13.05
2	13.05	12.99
3	13.01	13.01
4	13.00	13.06
5	12.92	12.91
6	12.95	13.11
7	12.90	13.00
8	13.04	13.03
Average		**13.00**

Gauge Width (mm)	
Grid line	OD
1	225.0
2	225.0
3	225.0
4	224.5
5	225.0
6	225.0
7	225.0
8	225.0
Average	**224.9**

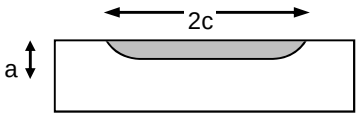
Gauge Length (mm)	
LMA	407
LMB	407
LTID	127
LTOD	127
LBID	127
LBOD	129

Reduced Section Length (mm)	
Top [C]	519
Bottom[D]	522

Tab Length (mm)	
Top [A]	146
Bottom [B]	146

Area (mm^2)	2,925.031

BOTTOM



Defect Size (mm)		
Length	2c	49.89
Depth	a_1	1.35
	a_2	1.99
	a_3	3.10
	a_4	3.05
	a_5	2.94
	a_6	3.06
	a_7	3.06
	a_8	3.12
	a_9	1.99
	a_{10}	1.53
Defect Area (mm^2)		**126.82**

average depth = 3.06

C-FER Technologies	Pre-test Measurements Taken By: JP	Date: 6-Oct-08	**PRCI/DOT**
	Approval for Testing: RTP	Date: 6-Oct-08	**3.3a**

Curved Wide Plate Test Summary Sheet

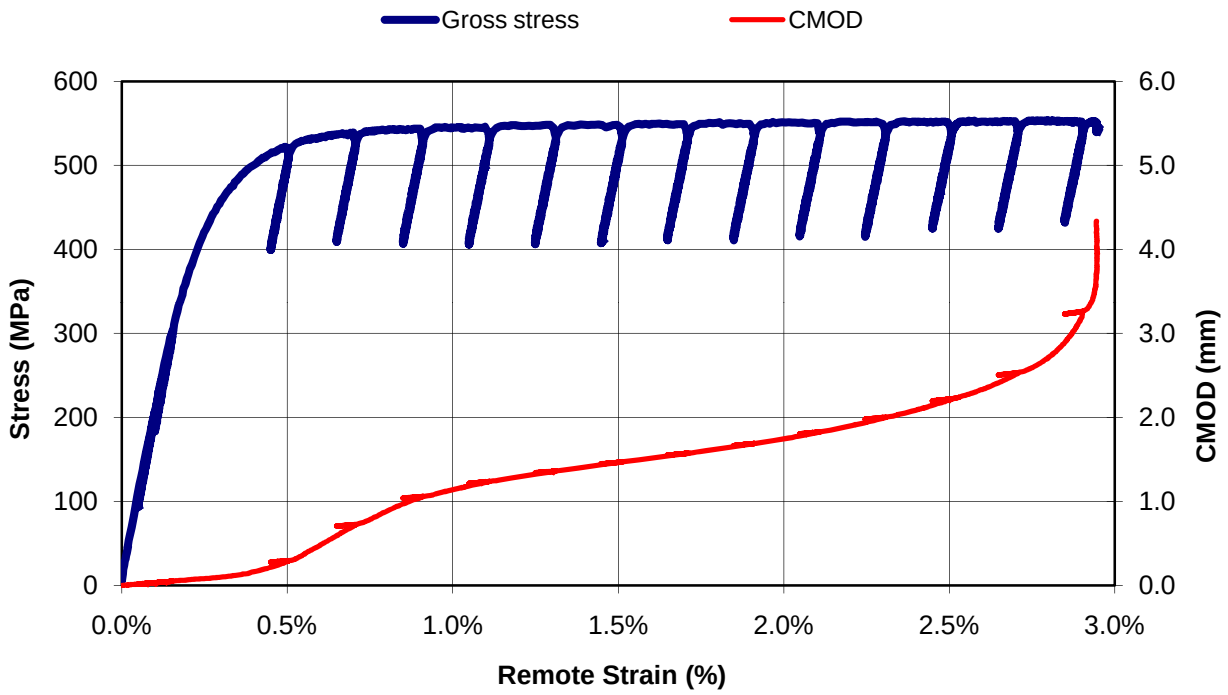
Spec. No. **3.3b**

Specimen Details		
Pipe diameter, OD	323.9	mm
Wall thickness, t	12.95	mm
Type	High Y/T	
Grade	X65	
SMYS	448	MPa
SMTS	531	MPa
F yield (hoop | axial)	509 | 547	MPa
F tensile (hoop | axial)	588 | 593	MPa
Test temperature	22	ºC
Reduced section length	1,044	mm
Redcued section width	224.9	mm
Target flaw size	3 x 50	mm
Target flaw location	WCL	

Test terminated following strain localization in flaw region.

	Load Peak	End Point	
Total Load	1,613	1,572	kN
Gross Stress	554.0	539.7	MPa
Strain LTU	2.77%	2.91%	
Strain LBU	2.83%	2.98%	
Strain LTBU	2.80%	2.94%	
CMOD	2.71	4.33	mm

Strain Notation:
Strain LTU: average strain in uniform strain zone of top plate (LTU series LVDTs)
Strain LBU: average strain in uniform strain zone of bottom plate (LBU series LVDTs)
Strain LTBU: average strain in uniform strain zones of both plates (LTU and LBU series LVDTs)



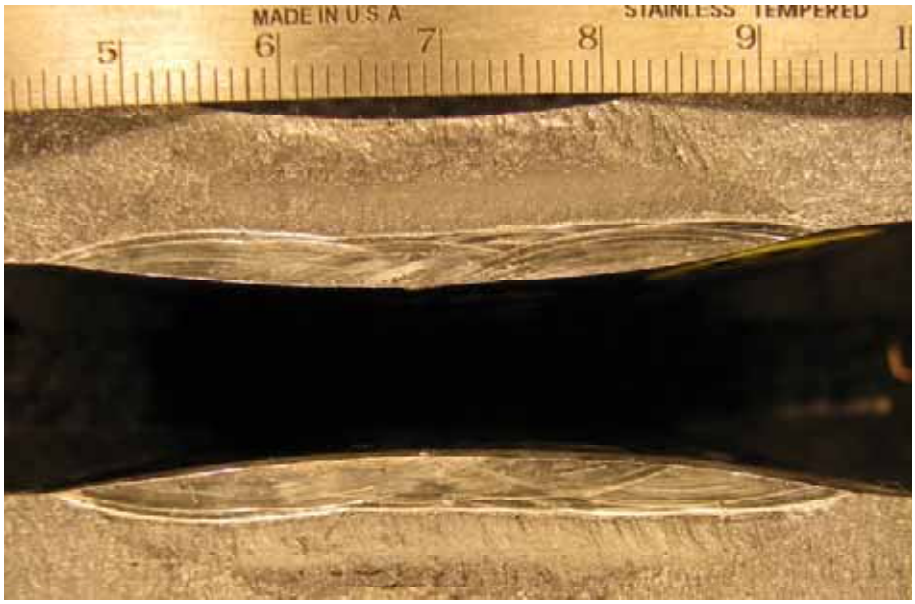
**Average strain from LVDTs in uniform strain zones of both plates (i.e. LTBU strain)*

C-FER Technologies	Pre-test Measurements Taken By: JP	Date: 8-Oct-08	PRCI/DOT
	Approval for Testing: RTP	Date: 8-Oct-08	3.3b

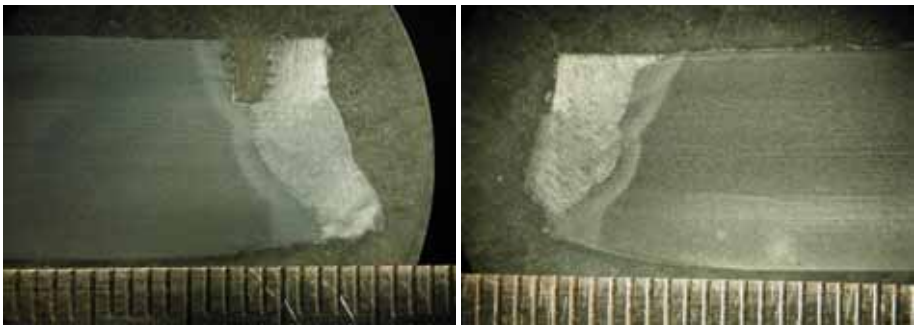
Photographs

Test Set-up

Post-test Flaw



Flaw Fracture Surface



Flaw Macro Images

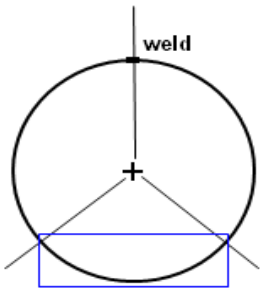
C-FER Technologies	Pre-test Measurements Taken By: JP	Date: 8-Oct-08	**PRCI/DOT**
	Approval for Testing: RTP	Date: 8-Oct-08	**3.3b**

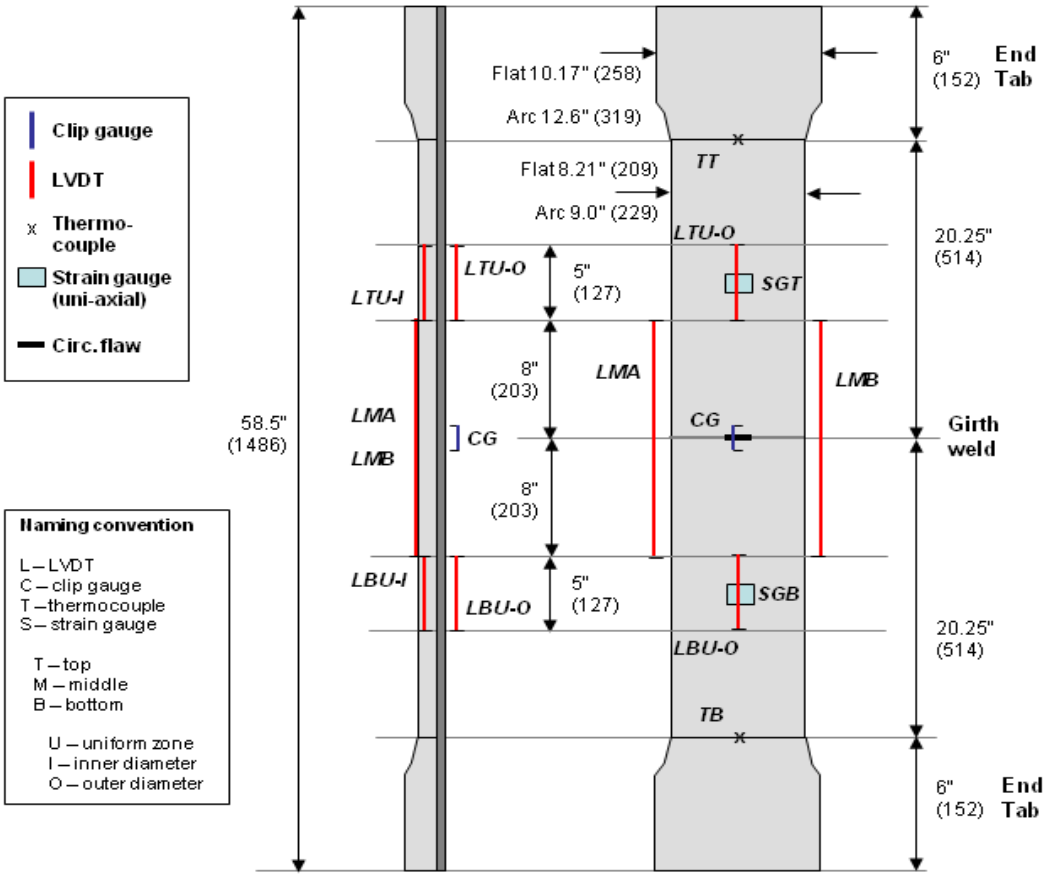
Instrumentation Layout

PRCI/DOT Tensile Strain Limits

12 inch CWP Test Instrumentation

Version 1.0

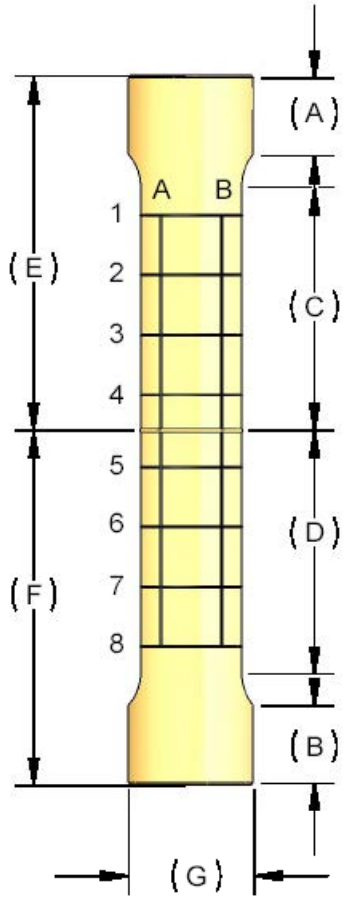




C-FER Technologies	Pre-test Measurements Taken By: JP	Date: 8-Oct-08	PRCI/DOT
	Approval for Testing: RTP	Date: 8-Oct-08	3.3b

Specimen Measurements

TOP



Wall Thickness (mm)		
Grid line	A	B
1	13.11	12.82
2	13.07	12.84
3	13.04	12.85
4	13.04	12.86
5	13.02	12.88
6	12.99	12.84
7	13.02	12.93
8	13.02	12.84
Average		**12.95**

Gauge Width (mm)	
Grid line	OD
1	225.0
2	225.0
3	225.5
4	225.0
5	225.0
6	225.0
7	224.0
8	224.5
Average	**224.9**

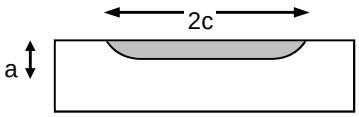
Gauge Length (mm)	
LMA	407
LMB	406
LTID	126
LTOD	125
LBID	127
LBOD	127

Reduced Section Length (mm)	
Top [C]	522
Bottom[D]	522

Tab Length (mm)	
Top [A]	159
Bottom [B]	145

Area (mm^2)	2,911.710

BOTTOM



Defect Size (mm)		
Length	2c	50.21
Depth	a_1	1.51
	a_2	1.99
	a_3	3.10
	a_4	3.07
	a_5	2.97
	a_6	2.93
	a_7	2.93
	a_8	3.09
	a_9	1.93
	a_{10}	1.55
Defect Area (mm^2)		**126.27**

average depth = 3.02

C-FER Technologies	Pre-test Measurements Taken By: JP	Date: 8-Oct-08	**PRCI/DOT**
	Approval for Testing: RTP	Date: 8-Oct-08	**3.3b**

Curved Wide Plate Test Summary Sheet

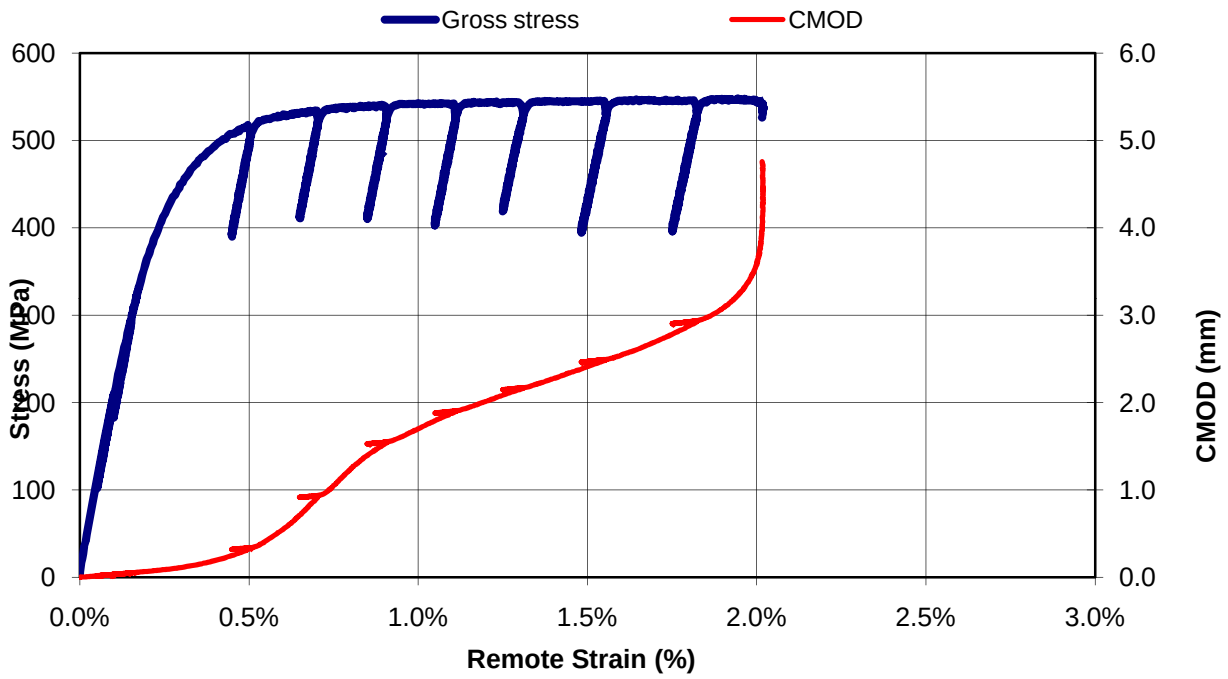
Spec. No. **3.4a**

Specimen Details		
Pipe diameter, OD	323.9	mm
Wall thickness, t	12.98	mm
Type	High Y/T	
Grade	X65	
SMYS	448	MPa
SMTS	531	MPa
F yield (hoop | axial)	509 | 547	MPa
F tensile (hoop | axial)	588 | 593	MPa
Test temperature	21	ºC
Reduced section length	1,042	mm
Redcued section width	225.0	mm
Target flaw size	3 x 50	mm
Target flaw location	HAZ	

Test terminated following strain localization in flaw region.

	Load Peak	End Point	
Total Load	1,600	1,536	kN
Gross Stress	547.9	526.1	MPa
Strain LTU	1.78%	1.84%	
Strain LBU	2.11%	2.19%	
Strain LTBU	1.94%	2.02%	
CMOD	3.23	4.76	mm

Strain Notation:
Strain LTU: average strain in uniform strain zone of top plate (LTU series LVDTs)
Strain LBU: average strain in uniform strain zone of bottom plate (LBU series LVDTs)
Strain LTBU: average strain in uniform strain zones of both plates (LTU and LBU series LVDTs)



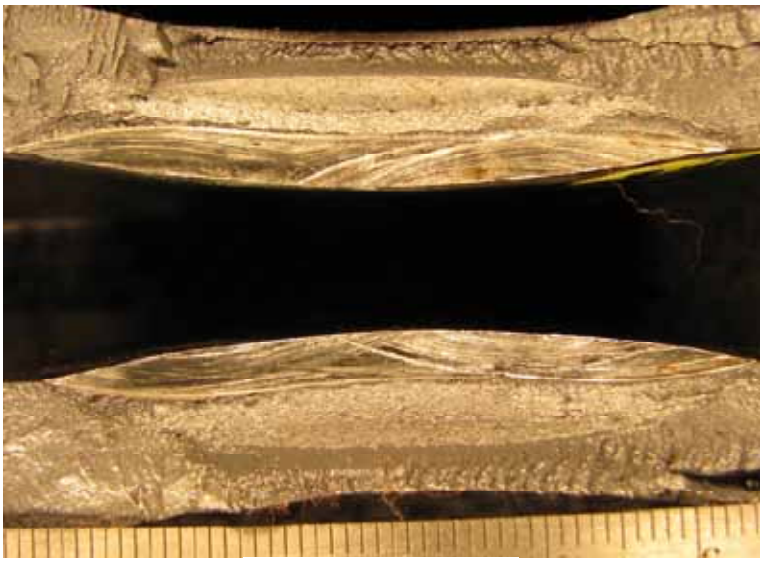
**Average strain from LVDTs in uniform strain zones of both plates (i.e. LTBU strain)*

C-FER Technologies	Pre-test Measurements Taken By: JP	Date: 9-Oct-08	PRCI/DOT
	Approval for Testing: RTP	Date: 9-Oct-08	3.4a

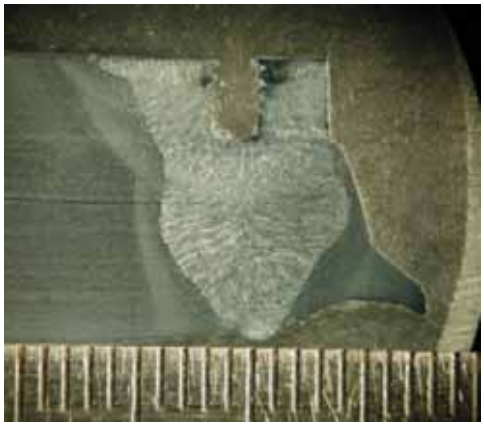
Photographs

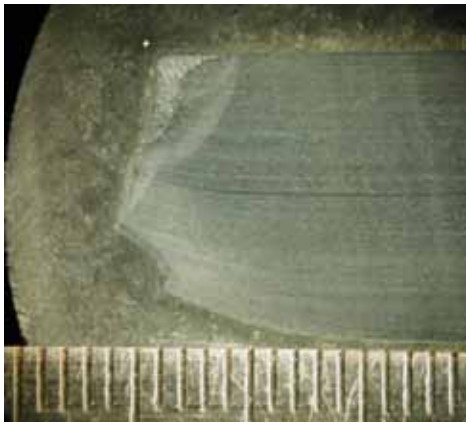
Test Set-up

Post-test Flaw



Flaw Fracture





Flaw Macro Images

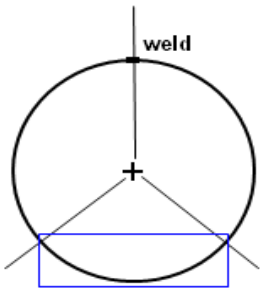
C-FER Technologies	Pre-test Measurements Taken By: JP	Date: 9-Oct-08	**PRCI/DOT**
	Approval for Testing: RTP	Date: 9-Oct-08	**3.4a**

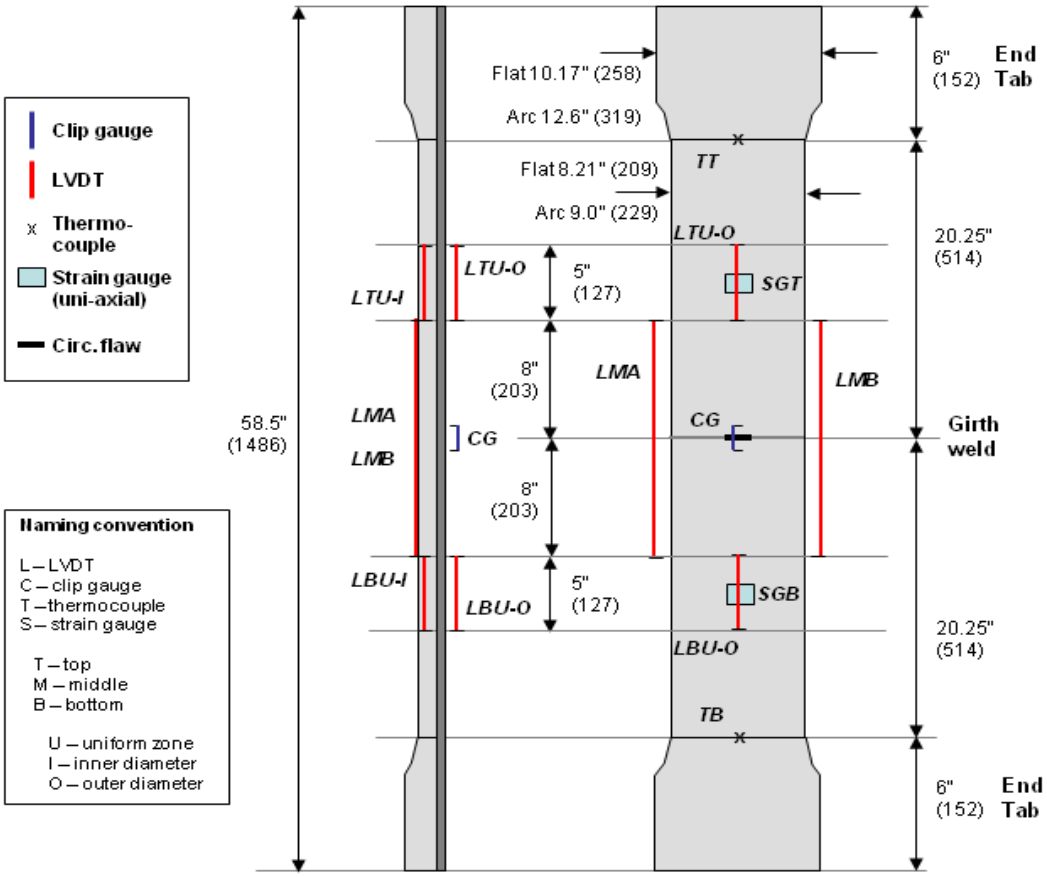
Instrumentation Layout

PRCI/DOT Tensile Strain Limits

12 inch CWP Test Instrumentation

Version 1.0

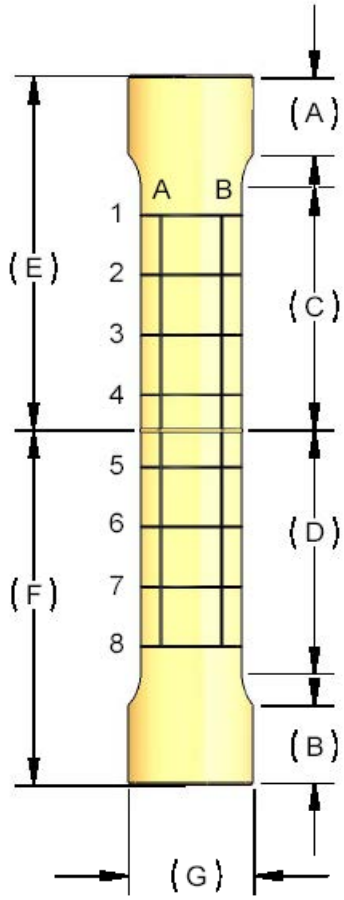




C-FER Technologies	Pre-test Measurements Taken By: JP	Date: 9-Oct-08	PRCI/DOT
	Approval for Testing: RTP	Date: 9-Oct-08	3.4a

Specimen Measurements

TOP



Wall Thickness (mm)		
Grid line	A	B
1	12.92	13.03
2	12.94	12.97
3	13.01	12.98
4	12.95	12.98
5	12.96	12.96
6	12.98	12.95
7	12.94	13.03
8	12.96	13.04
Average		**12.98**

Gauge Width (mm)	
Grid line	OD
1	226
2	225
3	224
4	225
5	225
6	225
7	225
8	225
Average	**225**

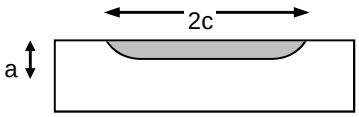
Gauge Length (mm)	
LMA	407
LMB	408
LTID	127.5
LTOD	129
LBID	128
LBOD	126

Reduced Section Length (mm)	
Top [C]	522
Bottom[D]	520

Tab Length (mm)	
Top [A]	151
Bottom [B]	155

Area (mm^2)	2,919.375

BOTTOM



Defect Size (mm)		
Length	2c	50.43
Depth	a_1	1.42
	a_2	1.88
	a_3	3.09
	a_4	3.12
	a_5	3.12
	a_6	2.93
	a_7	2.97
	a_8	3.11
	a_9	1.96
	a_{10}	1.44
Defect Area (mm^2)		**128.53**

average depth = 3.06

C-FER Technologies	Pre-test Measurements Taken By: JP	Date: 9-Oct-08	**PRCI/DOT**
	Approval for Testing: RTP	Date: 9-Oct-08	**3.4a**

Curved Wide Plate Test Summary Sheet

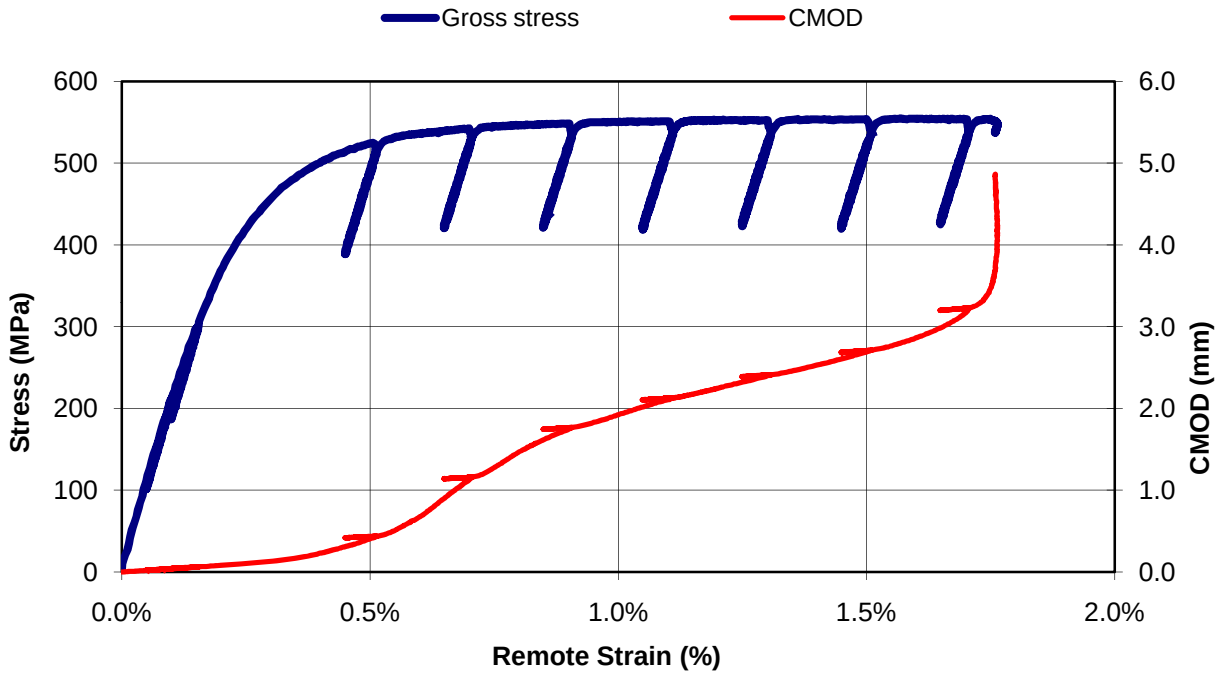
Spec. No. **3.4b**

Specimen Details		
Pipe diameter, OD	323.9	mm
Wall thickness, t	12.96	mm
Type	High Y/T	
Grade	X65	
SMYS	448	MPa
SMTS	531	MPa
F yield (hoop | axial)	509 | 547	MPa
F tensile (hoop | axial)	588 | 593	MPa
Test temperature	21	ºC
Reduced section length	1,038	mm
Redcued section width	224.9	mm
Target flaw size	3 x 50	mm
Target flaw location	HAZ	

Test terminated following strain localization in flaw region.

	Load Peak	End Point	
Total Load	1,616	1,565	kN
Gross Stress	554.7	537.0	MPa
Strain LTU	1.56%	1.75%	
Strain LBU	1.58%	1.77%	
Strain LTBU	1.57%	1.76%	
CMOD	2.80	4.86	mm

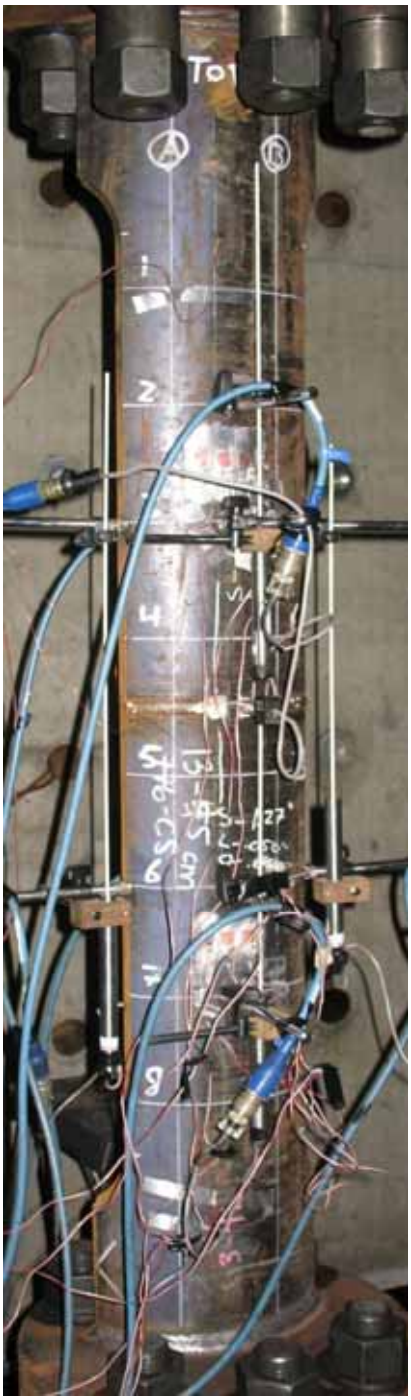
Strain Notation:
Strain LTU: average strain in uniform strain zone of top plate (LTU series LVDTs)
Strain LBU: average strain in uniform strain zone of bottom plate (LBU series LVDTs)
Strain LTBU: average strain in uniform strain zones of both plates (LTU and LBU series LVDTs)



**Average strain from LVDTs in uniform strain zones of both plates (i.e. LTBU strain)*

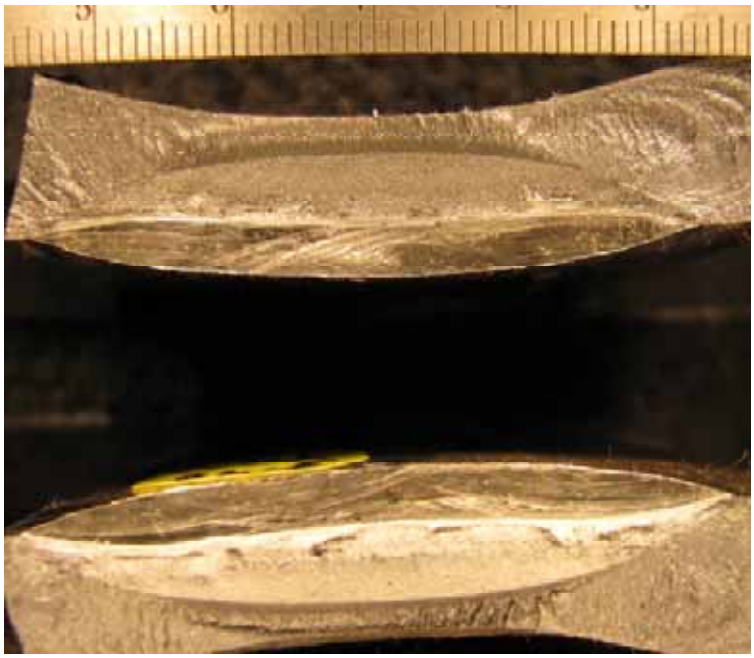
C-FER Technologies	Pre-test Measurements Taken By: JP	Date: 14-Oct-08	PRCI/DOT
	Approval for Testing: RTP	Date: 14-Oct-08	3.4b

Photographs

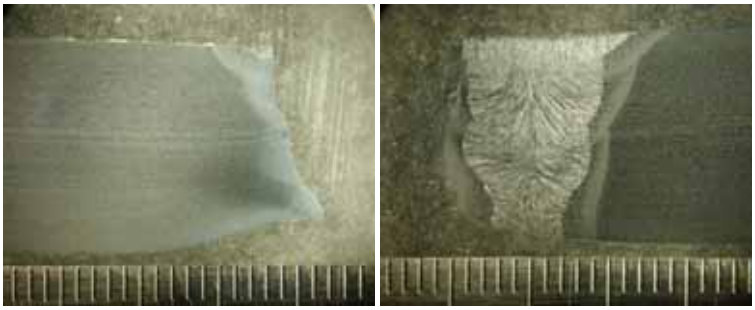


Test Set-up

Post-test Flaw



Flaw Fracture Surface



Flaw Macro Images

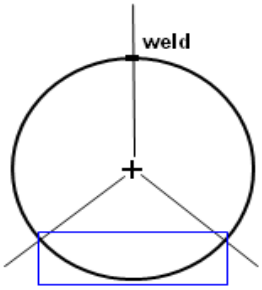
C-FER Technologies	Pre-test Measurements Taken By: JP	Date: 14-Oct-08	**PRCI/DOT**
	Approval for Testing: RTP	Date: 14-Oct-08	**3.4b**

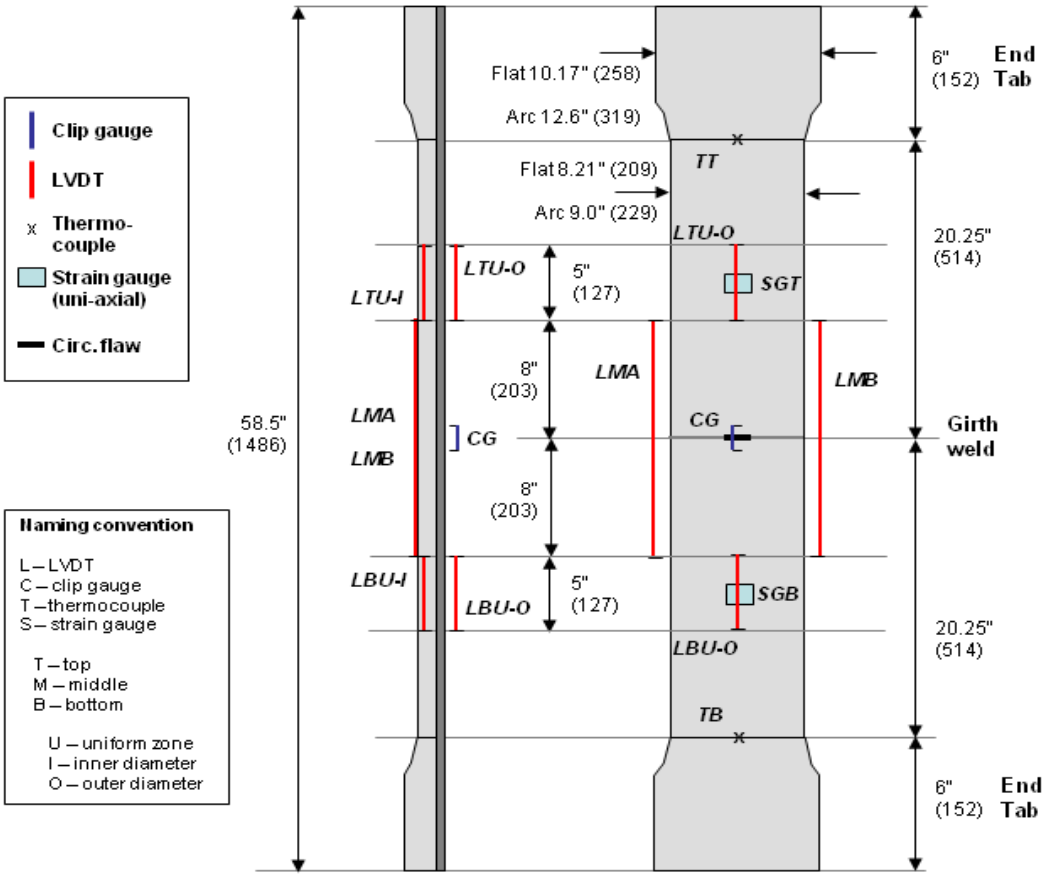
Instrumentation Layout

PRCI/DOT Tensile Strain Limits

12 inch CWP Test Instrumentation

Version 1.0

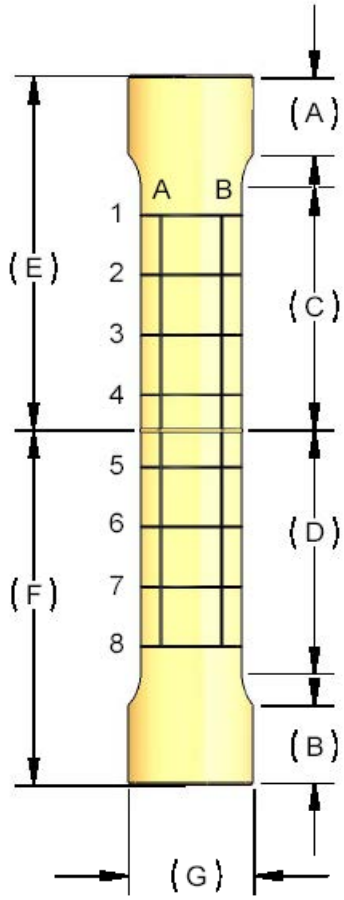




C-FER Technologies	Pre-test Measurements Taken By: JP	Date: 14-Oct-08	PRCI/DOT
	Approval for Testing: RTP	Date: 14-Oct-08	3.4b

Specimen Measurements

TOP



Wall Thickness (mm)		
Grid line	A	B
1	12.98	12.92
2	13.02	12.96
3	13.09	12.91
4	13.01	12.82
5	13.06	12.87
6	13.00	12.87
7	12.96	12.88
8	13.04	12.89
Average		**12.96**

Gauge Width (mm)	
Grid line	OD
1	225.0
2	224.5
3	225.0
4	225.0
5	225.0
6	225.0
7	225.0
8	225.0
Average	**224.9**

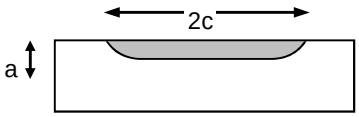
Gauge Length (mm)	
LMA	407
LMB	408
LTID	126.5
LTOD	125
LBID	127
LBOD	127

Reduced Section Length (mm)	
Top [C]	519
Bottom[D]	519

Tab Length (mm)	
Top [A]	153
Bottom [B]	154

Area (mm^2)	2,914.065

BOTTOM



Defect Size (mm)		
Length	2c	49.60
Depth	a_1	1.38
	a_2	2.00
	a_3	2.96
	a_4	3.05
	a_5	3.08
	a_6	2.91
	a_7	3.06
	a_8	3.06
	a_9	1.92
	a_{10}	1.41
Defect Area (mm^2)		**124.62**

average depth = 3.02

C-FER Technologies	Pre-test Measurements Taken By: JP	Date: 14-Oct-08	**PRCI/DOT**
	Approval for Testing: RTP	Date: 14-Oct-08	**3.4b**

Curved Wide Plate Test Summary Sheet

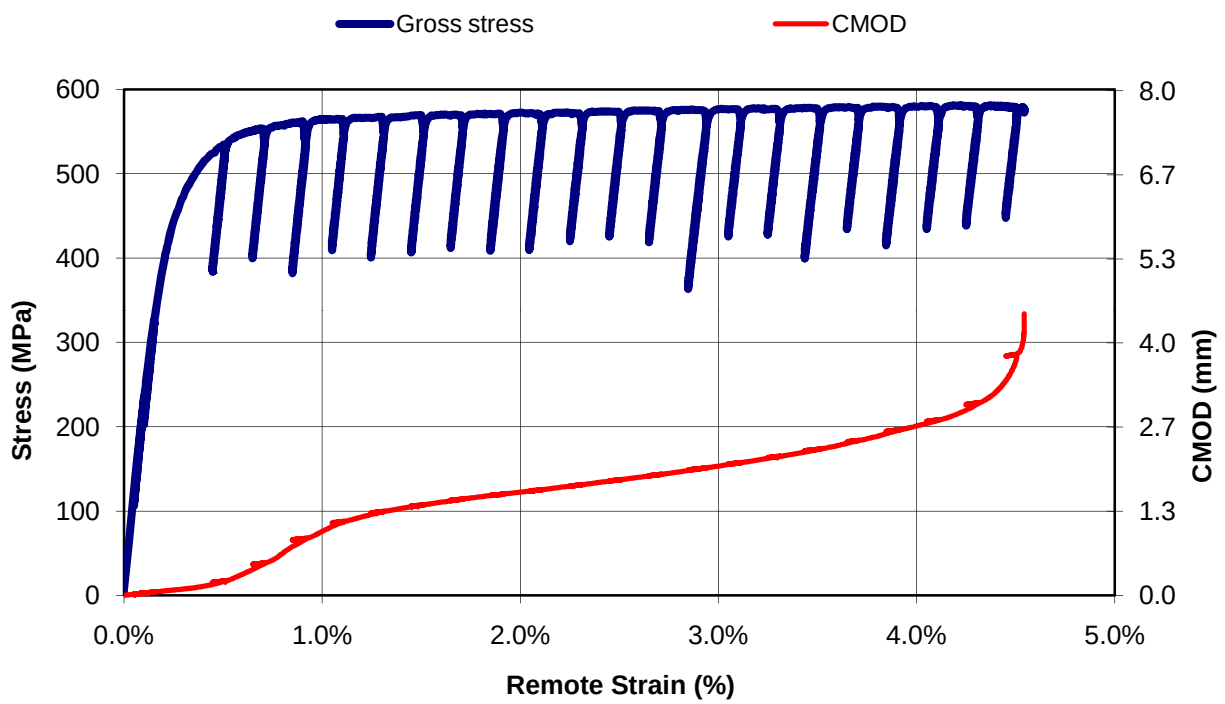
Spec. No. **3.5a**

Specimen Details		
Pipe diameter, OD	323.9	mm
Wall thickness, t	12.99	mm
Type	High Y/T	
Grade	X65	
SMYS	448	MPa
SMTS	531	MPa
F yield (hoop | axial)	509 | 547	MPa
F tensile (hoop | axial)	588 | 593	MPa
Test temperature	-20	ºC
Reduced section length	1,039	mm
Redcued section width	224.9	mm
Target flaw size	3 x 50	mm
Target flaw location	HAZ	

Test terminated following strain localization in flaw region.

	Load Peak	End Point	
Total Load	1,698	1,677	kN
Gross Stress	581.1	574.0	MPa
Strain LTU	4.21%	4.55%	
Strain LBU	4.15%	4.53%	
Strain LTBU	4.18%	4.54%	
CMOD	2.84	4.45	mm

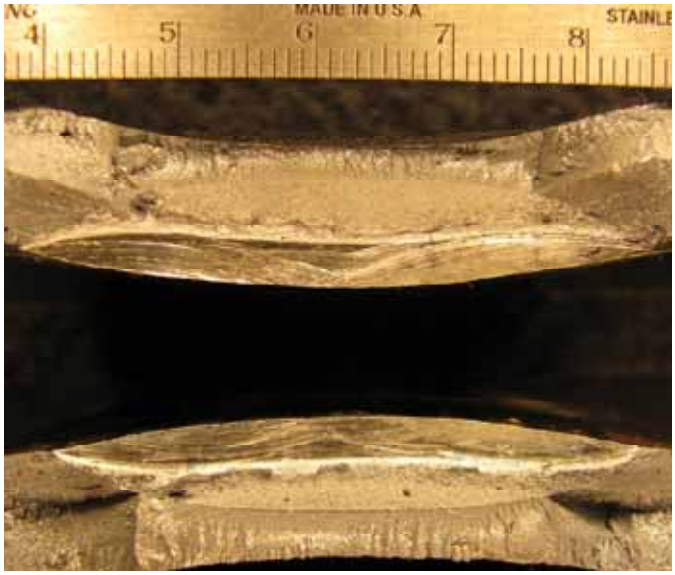
Strain Notation:
Strain LTU: average strain in uniform strain zone of top plate (LTU series LVDTs)
Strain LBU: average strain in uniform strain zone of bottom plate (LBU series LVDTs)
Strain LTBU: average strain in uniform strain zones of both plates (LTU and LBU series LVDTs)



**Average strain from LVDTs in uniform strain zones of both plates (i.e. LTBU strain)*

C-FER Technologies	Pre-test Measurements Taken By: JP	Date: 20-Oct-08	PRCI/DOT
	Approval for Testing: RTP	Date: 20-Oct-08	3.5a

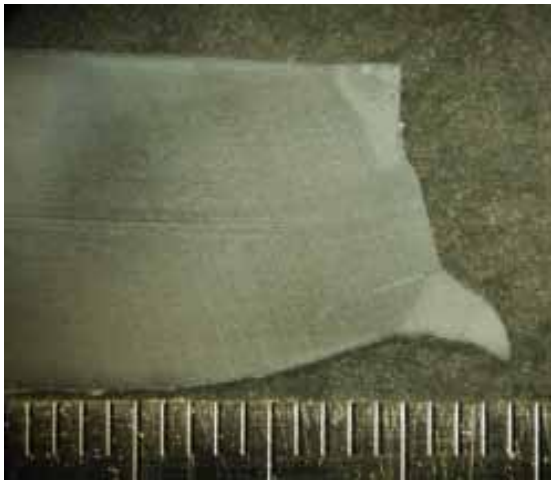
Photographs

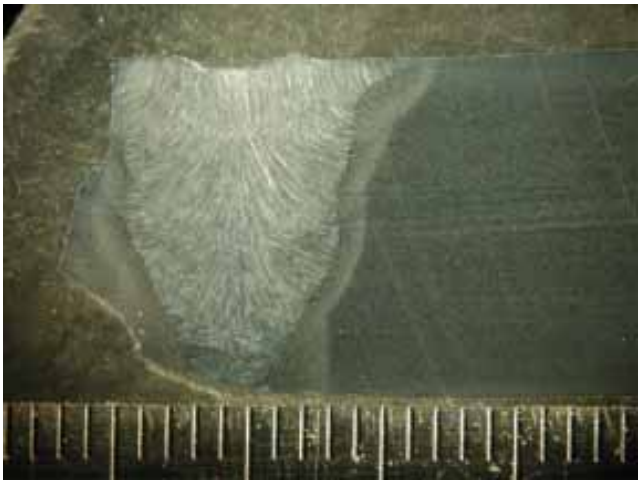


Flaw Fracture Surface

Test Set-up
Front

Test Set-up
Back





Flaw Macro Images

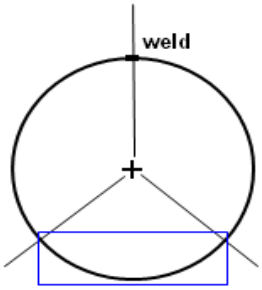
C-FER Technologies	Pre-test Measurements Taken By: JP	Date: 20-Oct-08	**PRCI/DOT**
	Approval for Testing: RTP	Date: 20-Oct-08	**3.5a**

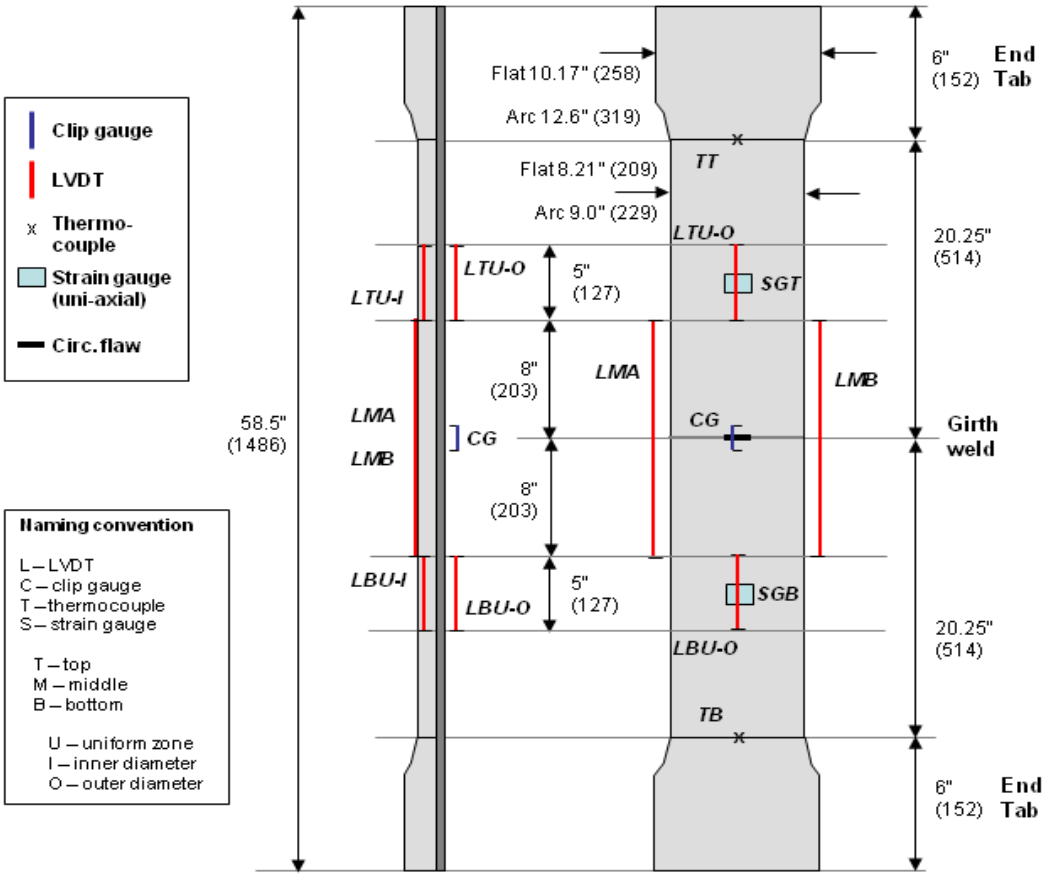
Instrumentation Layout

PRCI/DOT Tensile Strain Limits

12 inch CWP Test Instrumentation

Version 1.0

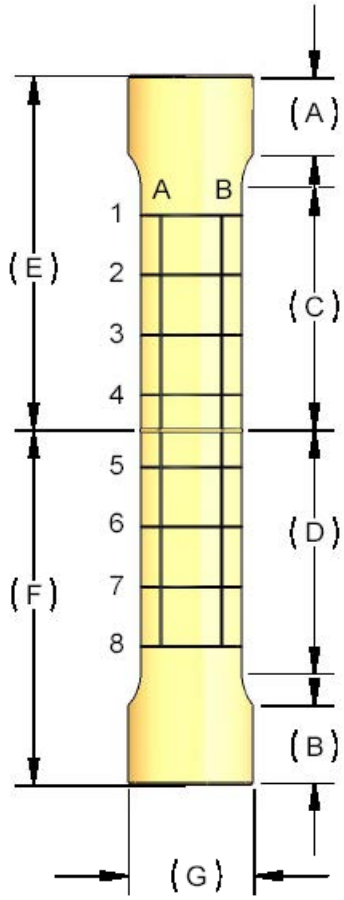




C-FER Technologies	Pre-test Measurements Taken By: JP	Date: 20-Oct-08	PRCI/DOT
	Approval for Testing: RTP	Date: 20-Oct-08	3.5a

Specimen Measurements

TOP



Wall Thickness (mm)		
Grid line	A	B
1	12.99	13.02
2	12.97	13.01
3	13.02	12.96
4	13.03	12.95
5	12.98	13.07
6	12.96	13.03
7	12.90	13.00
8	12.99	12.99
Average		**12.99**

Gauge Width (mm)	
Grid line	OD
1	225.0
2	225.0
3	225.0
4	224.5
5	225.0
6	225.0
7	225.0
8	225.0
Average	**224.9**

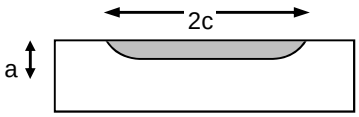
Gauge Length (mm)	
LMA	410
LMB	412
LTID	
LTOD	129
LBID	
LBOD	128

Reduced Section Length (mm)	
Top [C]	519
Bottom[D]	520

Tab Length (mm)	
Top [A]	144
Bottom [B]	154

Area (mm^2)	2,922.360

BOTTOM



Defect Size (mm)		
Length	2c	50.18
Depth	a_1	1.45
	a_2	1.93
	a_3	2.95
	a_4	3.12
	a_5	2.97
	a_6	2.99
	a_7	3.01
	a_8	3.01
	a_9	1.89
	a_{10}	1.57
Defect Area (mm^2)		**125.93**

average depth = 3.01

C-FER Technologies	Pre-test Measurements Taken By: JP	Date: 20-Oct-08	**PRCI/DOT**
	Approval for Testing: RTP	Date: 20-Oct-08	**3.5a**

Curved Wide Plate Test Summary Sheet

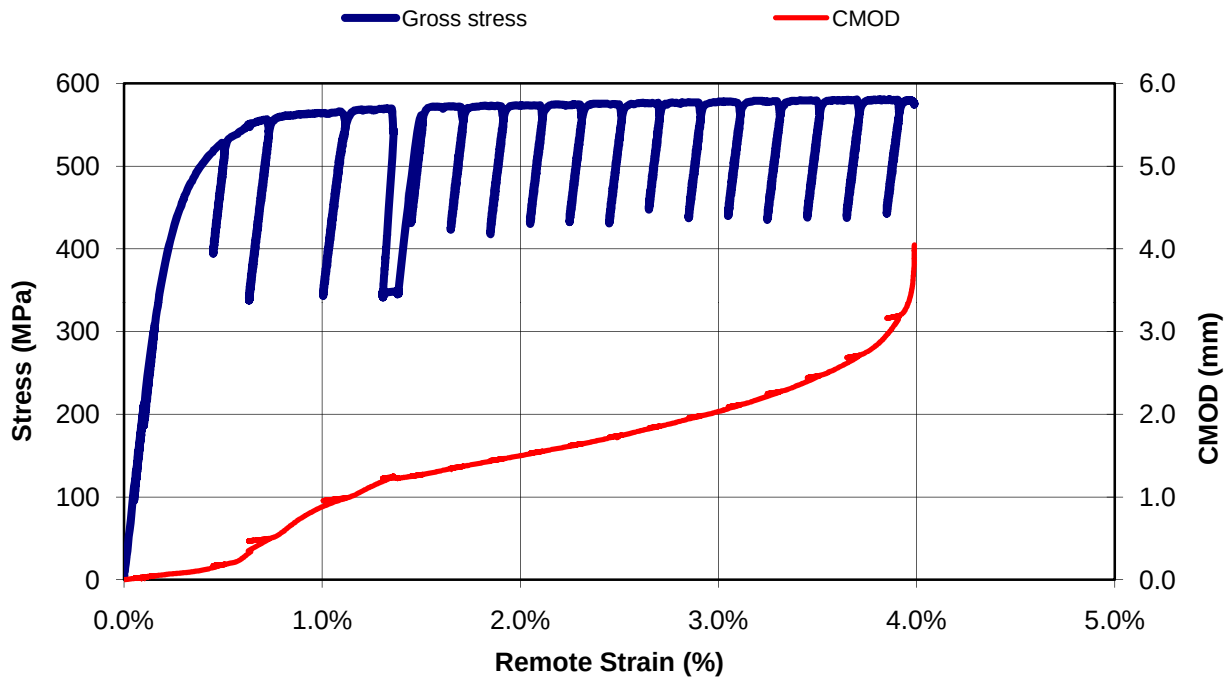
Spec. No. **3.5b**

Specimen Details		
Pipe diameter, OD	323.9	mm
Wall thickness, t	13.02	mm
Type	High Y/T	
Grade	X65	
SMYS	448	MPa
SMTS	531	MPa
F yield (hoop | axial)	509 | 547	MPa
F tensile (hoop | axial)	588 | 593	MPa
Test temperature	-20	ºC
Reduced section length	1,042	mm
Redcued section width	224.8	mm
Target flaw size	3 x 50	mm
Target flaw location	HAZ	

Test terminated following strain localization in flaw region.

	Load Peak	End Point	
Total Load	1,701	1,682	kN
Gross Stress	580.8	574.5	MPa
Strain LTU	3.93%	4.13%	
Strain LBU	3.69%	3.85%	
Strain LTBU	3.81%	3.99%	
CMOD	2.86	4.05	mm

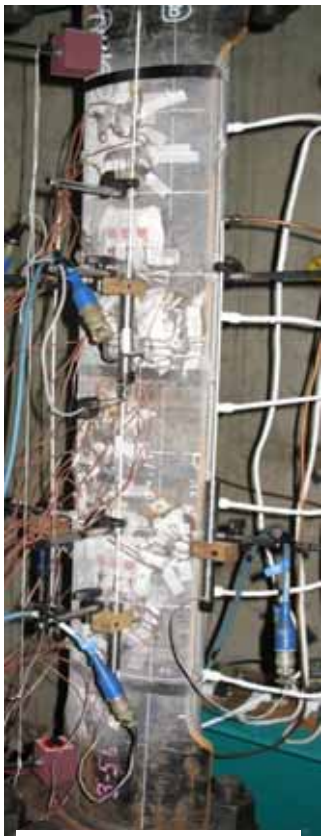
Strain Notation:
Strain LTU: average strain in uniform strain zone of top plate (LTU series LVDTs)
Strain LBU: average strain in uniform strain zone of bottom plate (LBU series LVDTs)
Strain LTBU: average strain in uniform strain zones of both plates (LTU and LBU series LVDTs)



**Average strain from LVDTs in uniform strain zones of both plates (i.e. LTBU strain)*

C-FER Technologies	Pre-test Measurements Taken By: JP	Date: 22-Oct-08	PRCI/DOT
	Approval for Testing: RTP	Date: 22-Oct-08	3.5b

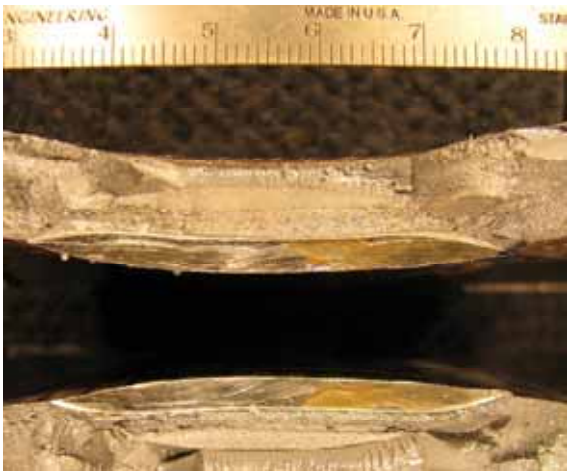
Photographs



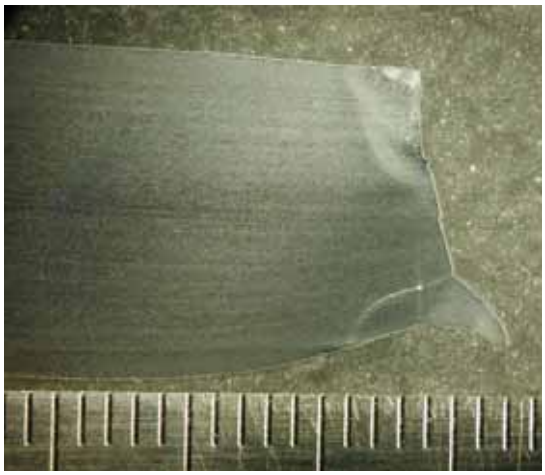
Test Set-up (Front)

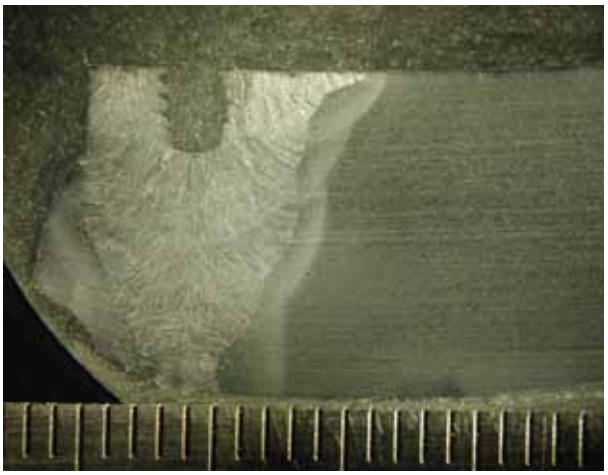
Test Set-up (Back)

Post-test Flaw



Flaw Fracture Surface





Flaw Macro Images

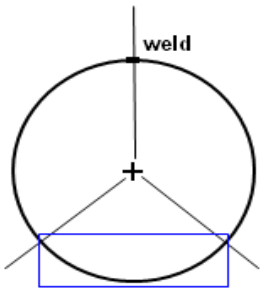
C-FER Technologies	Pre-test Measurements Taken By: JP	Date: 22-Oct-08	**PRCI/DOT**
	Approval for Testing: RTP	Date: 22-Oct-08	**3.5b**

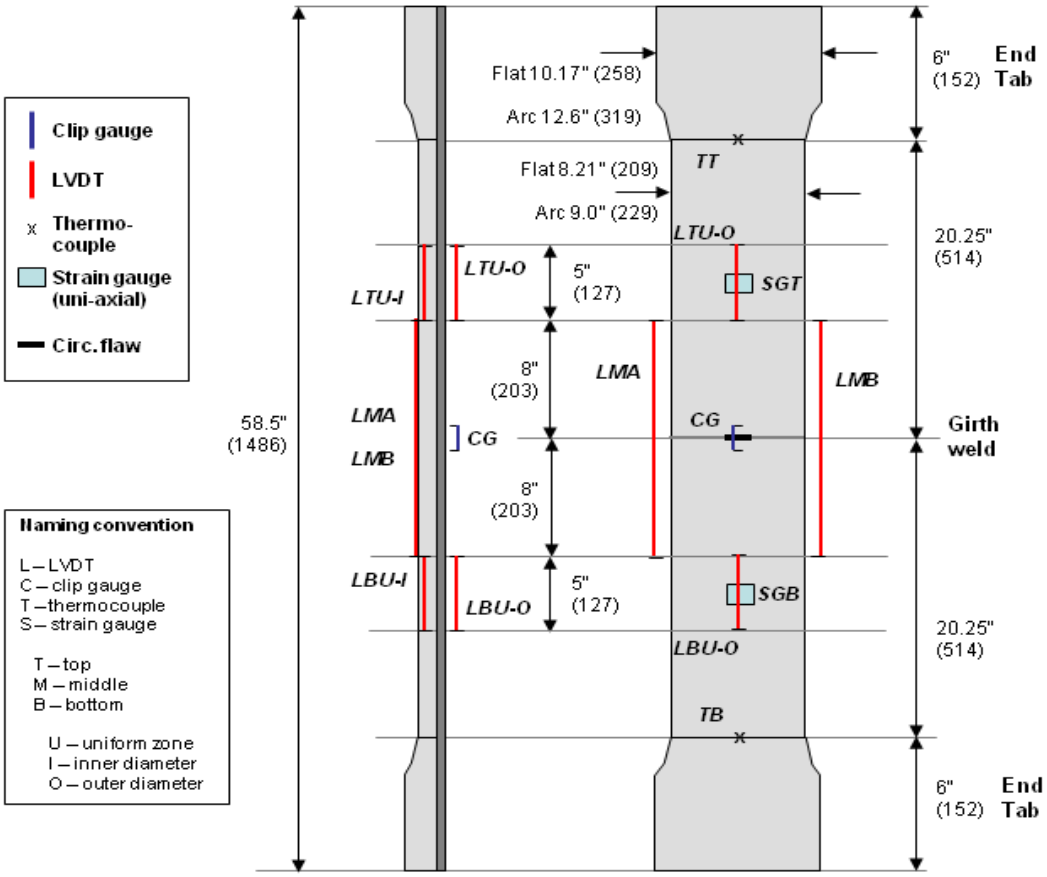
Instrumentation Layout

PRCI/DOT Tensile Strain Limits

12 inch CWP Test Instrumentation

Version 1.0

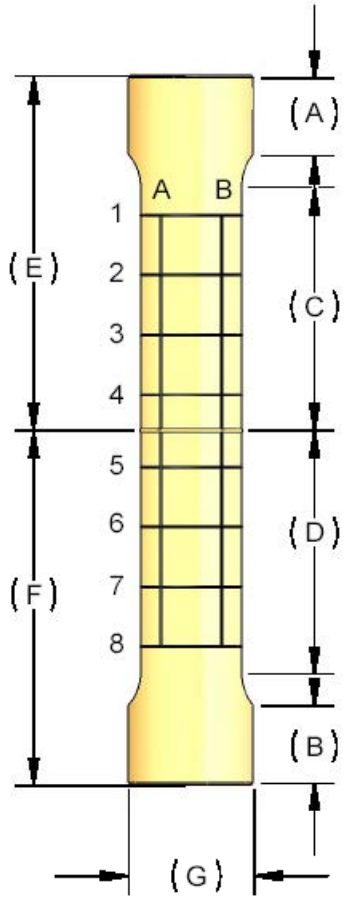




C-FER Technologies	Pre-test Measurements Taken By: JP	Date: 22-Oct-08	PRCI/DOT
	Approval for Testing: RTP	Date: 22-Oct-08	3.5b

Specimen Measurements

TOP



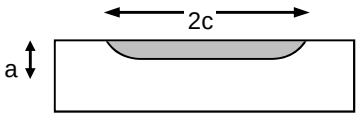
Wall Thickness (mm)		
Grid line	A	B
1	13.00	13.04
2	13.04	13.03
3	12.98	13.06
4	13.06	13.04
5	13.02	12.94
6	13.15	13.05
7	12.97	13.05
8	12.96	13.00
Average		**13.02**

Gauge Width (mm)	
Grid line	OD
1	225.0
2	224.5
3	225.0
4	225.0
5	224.5
6	225.0
7	225.0
8	224.5
Average	**224.8**

Gauge Length (mm)	
LMA	409
LMB	410
LTID	
LTOD	128
LBID	
LBOD	127

Area (mm^2)	2,928.042

BOTTOM



Defect Size (mm)		
Length	2c	50.37
Depth	a_1	1.40
	a_2	1.90
	a_3	3.08
	a_4	2.93
	a_5	3.04
	a_6	3.02
	a_7	3.12
	a_8	2.99
	a_9	1.85
	a_{10}	1.37
Defect Area (mm^2)		**127.33**

average depth = 3.03

C-FER Technologies	Pre-test Measurements Taken By: JP	Date: 22-Oct-08	**PRCI/DOT**
	Approval for Testing: RTP	Date: 22-Oct-08	**3.5b**