APPENDIX 5C – 24-INCH DIAMETER CURVED WIDE PLATE TEST RESULTS

Curved Wide Plate Test Summary Sheet

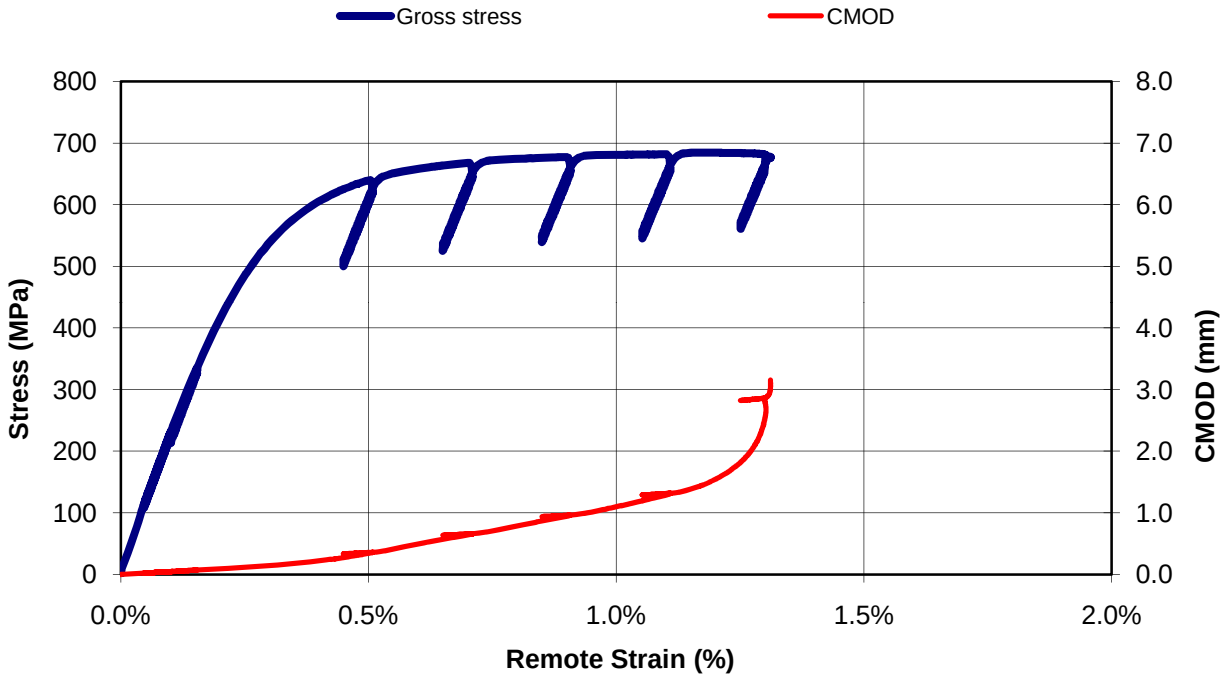
Spec. No. **4.1**

Specimen Details		
Pipe diameter, OD	609.6	mm
Wall thickness, t	12.84	mm
Type	High Y/T	
Grade	X80	
SMYS	551	MPa
SMTS	621	MPa
F yield (hoop | axial)	668 | 616	MPa
F tensile (hoop | axial)	689 | 669	MPa
Test temperature	20	ºC
Reduced section length	1,383	mm
Reduced section width	304.3	mm
Target flaw size	4 x 50	mm
Target flaw location	WCL	

Test terminated following strain localization in flaw region.

	Load Peak	End Point	
Total Load	2,674	2,639	kN
Gross Stress	684.5	676	MPa
Strain LTU	1.57%	1.83%	
Strain LBU	0.77%	0.79%	
Strain LTBU	1.17%	1.31%	
CMOD	1.43	3.15	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: 23-Mar-09	PRCI/DOT
	Approval for Testing: RTP	Date: 23-Mar-09	4.1

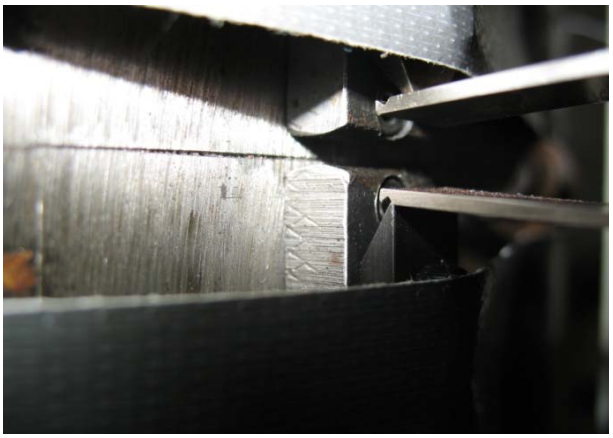
Photographs

Test Set-up Back

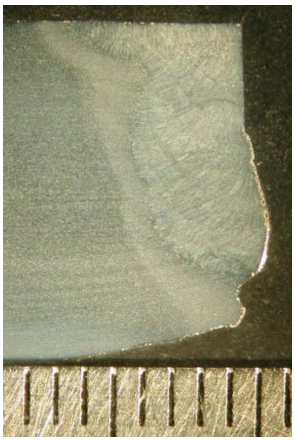
Test Set-up Front

Post-test Flaw

Flaw Fracture Surface



Pre-test Flaw and Clip Gauge Set-up



Flaw Macro Images

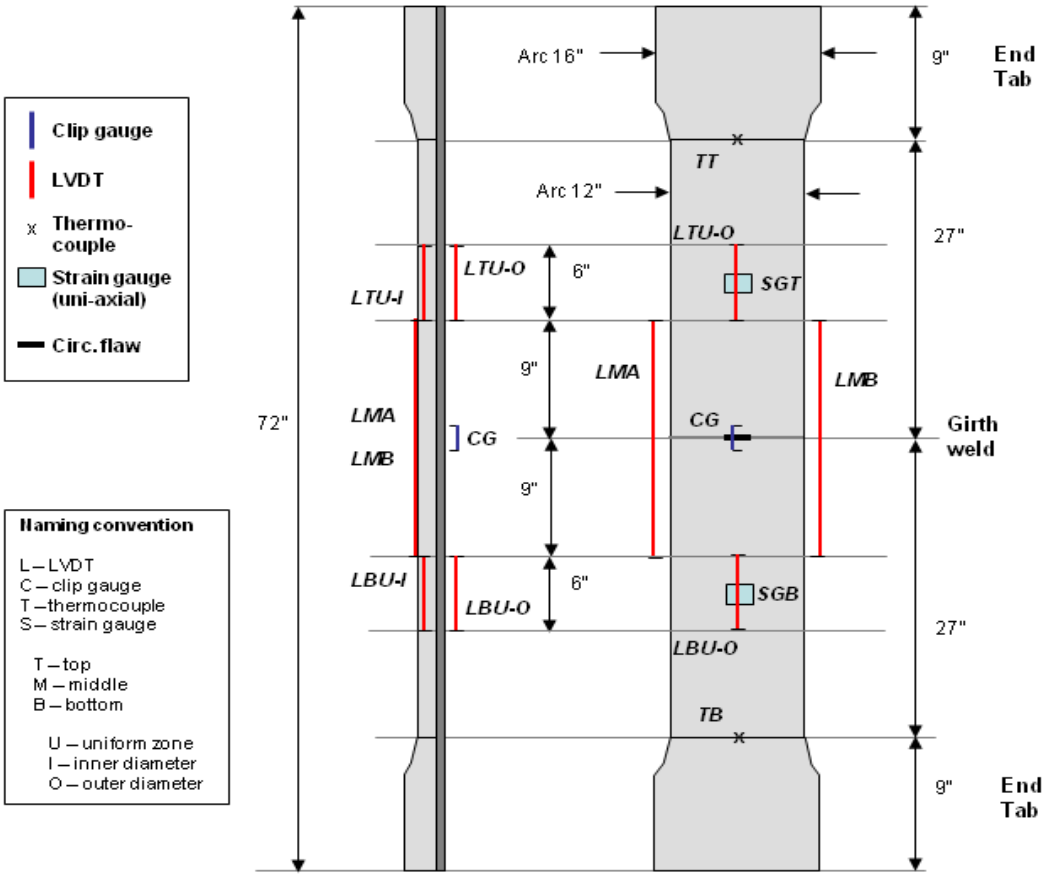
C-FER Technologies	Pre-test Measurements Taken By: JP	Date: 23-Mar-09	**PRCI/DOT**
	Approval for Testing: RTP	Date: 23-Mar-09	**4.1**

Instrumentation Layout

PRCI/DOT Tensile Strain Limits

24 inch CWP Test Instrumentation

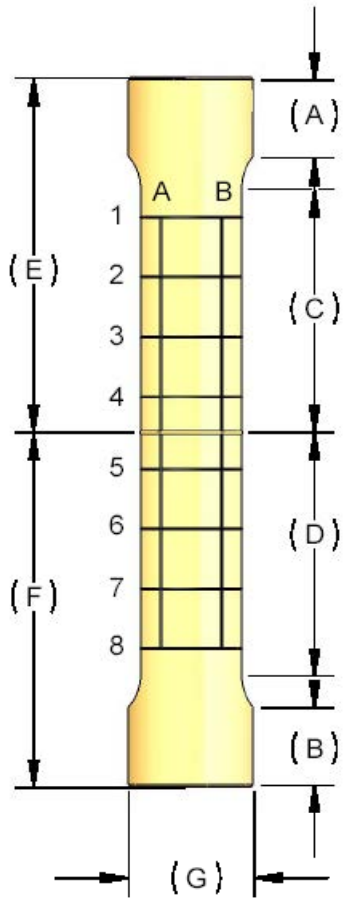
Version 1.0



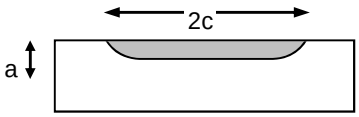
C-FER Technologies	Pre-test Measurements Taken By: JP	Date: 23-Mar-09	PRCI/DOT
	Approval for Testing: RTP	Date: 23-Mar-09	4.1

Specimen Measurements

TOP



BOTTOM



Wall Thickness (mm)		
Grid line	A	B
1	12.85	12.80
2	12.88	12.80
3	12.85	12.80
4	12.85	12.83
5	12.88	12.85
6	12.85	12.88
7	12.93	12.80
8	12.78	12.78
9	12.83	12.78
10	12.70	12.65
Average		**12.84**

Gauge Width (mm)	
Grid line	OD
1	304.5
2	304.0
3	304.0
4	304.5
5	305.0
6	304.0
7	304.0
8	304.0
9	304.0
10	304.5
Average	**304.3**

Gauge Length (mm)	
LMA	462
LMB	462
LTID	149
LTOD	152
LBID	151
LBOD	154

Reduced Section Length (mm)	
Top [C]	690
Bottom[D]	693

Tab Length (mm)	
Top [A]	220
Bottom [B]	229

Area (mm^2)	3,905.996

Defect Size (mm)		
Length	2c	50.86
Depth	a_1	1.57
	a_2	2.12
	a_3	3.98
	a_4	3.85
	a_5	4.01
	a_6	3.88
	a_7	3.87
	a_8	3.87
	a_9	2.12
	a_{10}	1.36
Defect Area (mm^2)		**162.35**

average depth = 3.91

C-FER Technologies	Pre-test Measurements Taken By: JP	Date: 23-Mar-09	**PRCI/DOT**
	Approval for Testing: RTP	Date: 23-Mar-09	**4.1**

Curved Wide Plate Test Summary Sheet

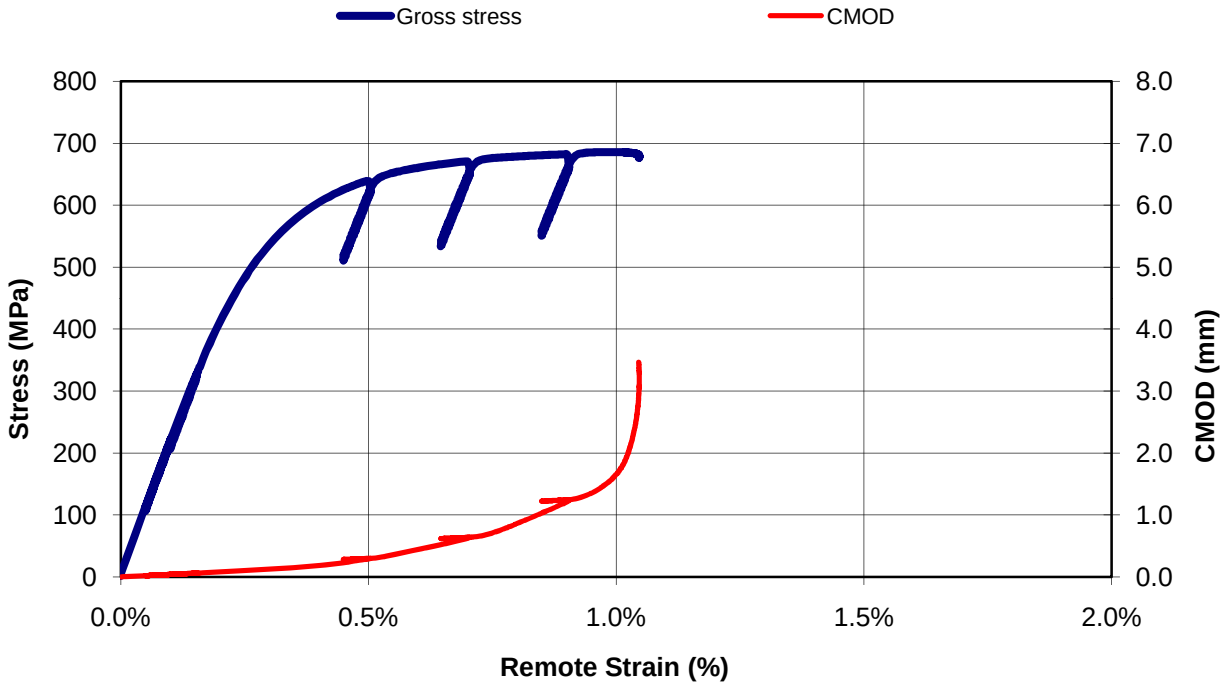
Spec. No. **4.2**

Specimen Details		
Pipe diameter, OD	609.6	mm
Wall thickness, t	12.84	mm
Type	High Y/T	
Grade	X80	
SMYS	551	MPa
SMTS	621	MPa
F yield (hoop | axial)	668 | 616	MPa
F tensile (hoop | axial)	689 | 669	MPa
Test temperature	20	ºC
Reduced section length	1,384	mm
Reduced section width	304.5	mm
Target flaw size	3.5 x 50	mm
Target flaw location	WCL	

Test terminated following strain localization in flaw region.

	Load Peak	End Point	
Total Load	2,681	2,644	kN
Gross Stress	685.8	676.2	MPa
Strain LTU	1.12%	1.20%	
Strain LBU	0.86%	0.89%	
Strain LTBU	0.99%	1.05%	
CMOD	1.60	3.46	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)*

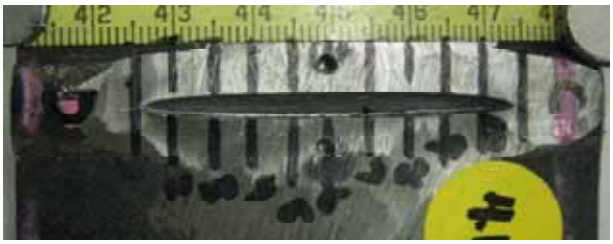
C-FER Technologies	Pre-test Measurements Taken By: JP	Date: 30-Mar-09	PRCI/DOT
	Approval for Testing: RTP	Date: 30-Mar-09	4.2

Photographs

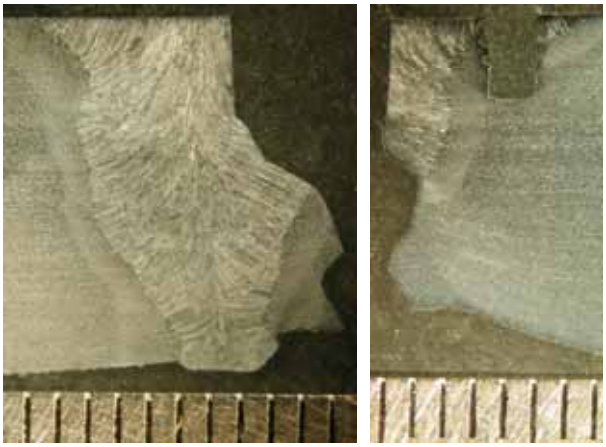
Test Set-up (Back)

Test Set-up (Front)

Flaw Fracture Surface



Post-test Flaw



Flaw Macro Images

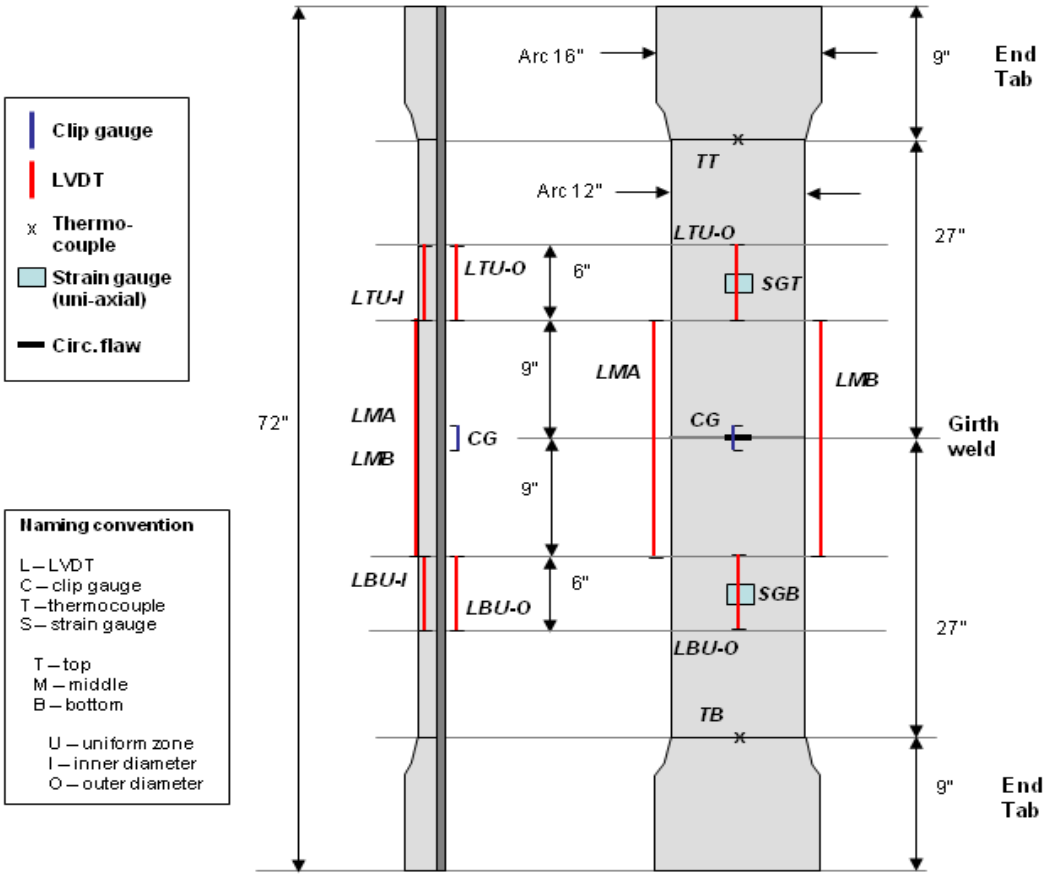
C-FER Technologies	Pre-test Measurements Taken By: JP	Date: 30-Mar-09	**PRCI/DOT**
	Approval for Testing: RTP	Date: 30-Mar-09	**4.2**

Instrumentation Layout

PRCI/DOT Tensile Strain Limits

24 inch CWP Test Instrumentation

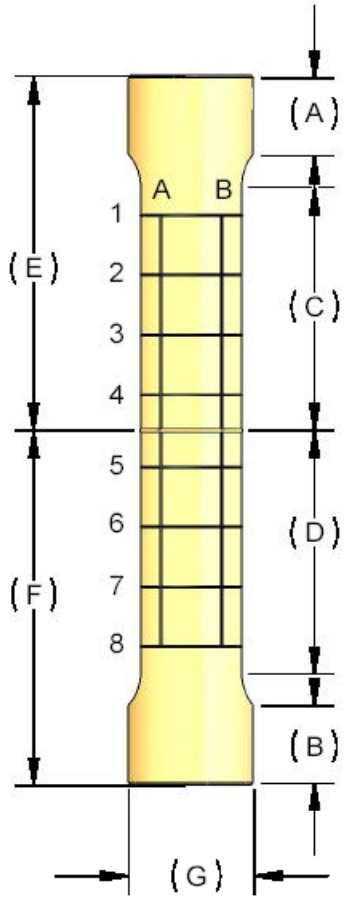
Version 1.0



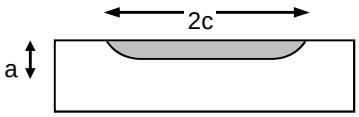
C-FER Technologies	Pre-test Measurements Taken By: JP	Date: 30-Mar-09	PRCI/DOT
	Approval for Testing: RTP	Date: 30-Mar-09	4.2

Specimen Measurements

TOP



BOTTOM



Wall Thickness (mm)		
Grid line	A	B
1	12.85	12.80
2	12.88	12.80
3	12.85	12.80
4	12.85	12.83
5	12.88	12.85
6	12.85	12.88
7	12.93	12.80
8	12.78	12.78
9	12.83	12.78
10	12.70	12.65
Average		**12.84**

Gauge Width (mm)	
Grid line	OD
1	304.5
2	304.5
3	304.5
4	304.5
5	304.5
6	304.5
7	305.0
8	304.0
9	304.5
10	304.5
Average	**304.5**

Gauge Length (mm)	
LMA	462
LMB	455
LTID	152.5
LTOD	151.5
LBID	153
LBOD	154

Reduced Section Length (mm)	
Top [C]	690
Bottom[D]	694

Tab Length (mm)	
Top [A]	221
Bottom [B]	221

Area (mm^2)	3,909.205

Defect Size (mm)			
Length	2c	50.21	
Depth	a_1	1.51	
	a_2	2.24	
	a_3	3.31	average depth = 3.40
	a_4	3.34	
	a_5	3.38	
	a_6	3.39	
	a_7	3.34	
	a_8	3.62	
	a_9	2.02	
	a_{10}	1.34	
Defect Area (mm^2)		**140.72**	

C-FER Technologies	Pre-test Measurements Taken By: JP	Date: 30-Mar-09	**PRCI/DOT**
	Approval for Testing: RTP	Date: 30-Mar-09	**4.2**

Curved Wide Plate Test Summary Sheet

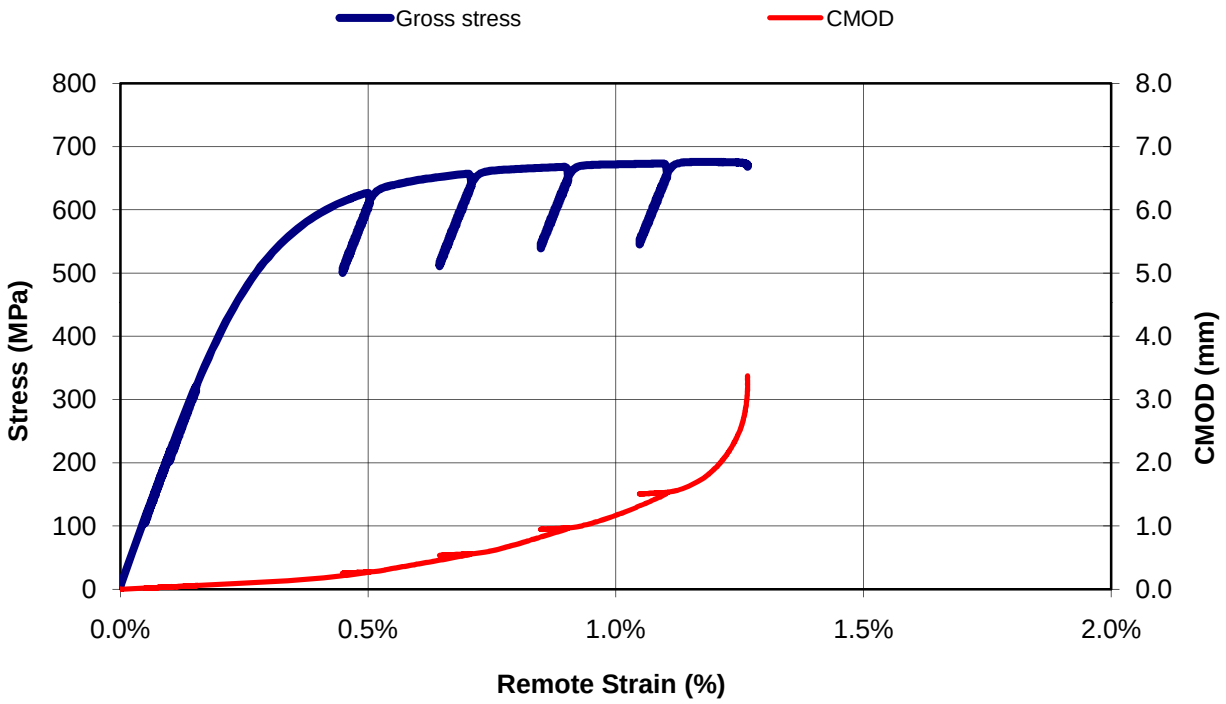
Spec. No. **4.3a**

Specimen Details		
Pipe diameter, OD	609.6	mm
Wall thickness, t	12.86	mm
Type	High Y/T	
Grade	X80	
SMYS	551	MPa
SMTS	621	MPa
F yield (hoop | axial)	668 | 616	MPa
F tensile (hoop | axial)	689 | 669	MPa
Test temperature	20	ºC
Reduced section length	1,390	mm
Reduced section width	305.1	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	2,652	2,621	kN
Gross Stress	675.9	668.0	MPa
Strain LTU	1.43%	1.54%	
Strain LBU	0.95%	0.99%	
Strain LTBU	1.19%	1.27%	
CMOD	1.82	3.38	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: 1-Apr-09	PRCI/DOT
	Approval for Testing: RTP	Date: 1-Apr-09	4.3a

Photographs

Test Set-up (Back)

Test Set-up (Front)

Post-test Flaw

Flaw Fracture Surface

Flaw Macro Images

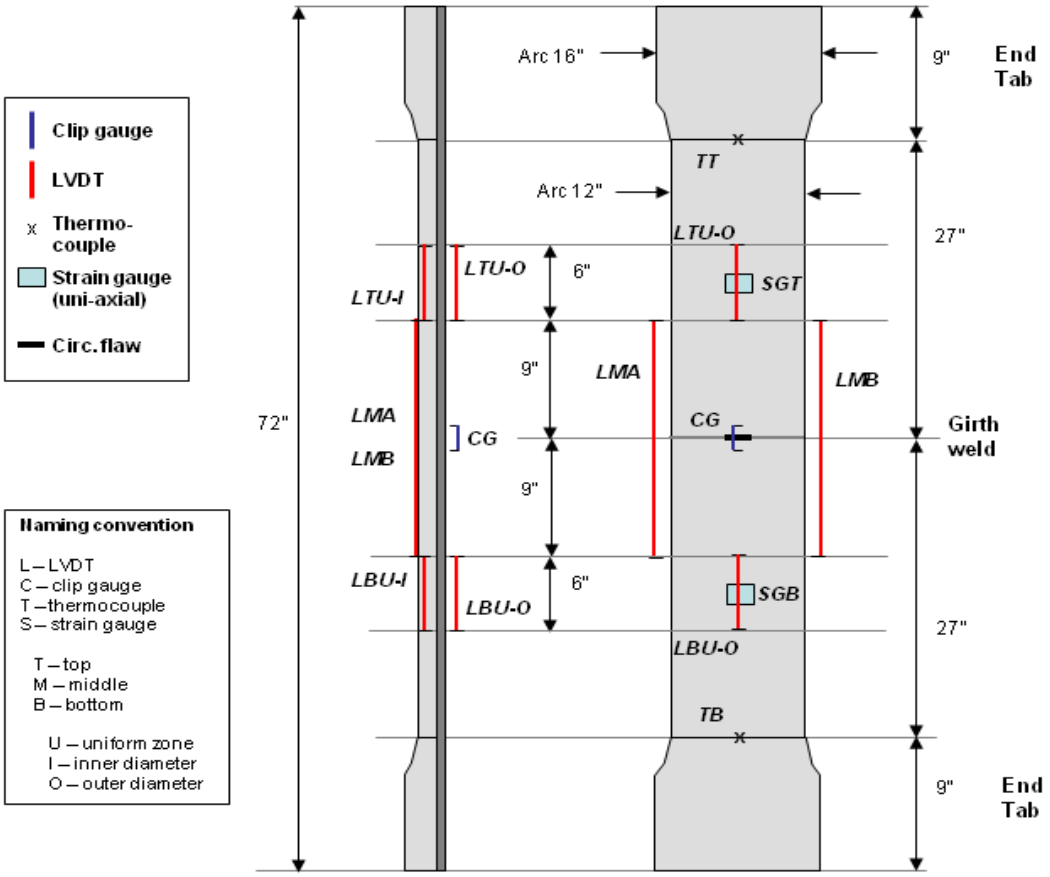
C-FER Technologies	Pre-test Measurements Taken By: JP	Date: 1-Apr-09	**PRCI/DOT**
	Approval for Testing: RTP	Date: 1-Apr-09	**4.3a**

Instrumentation Layout

PRCI/DOT Tensile Strain Limits

24 inch CWP Test Instrumentation

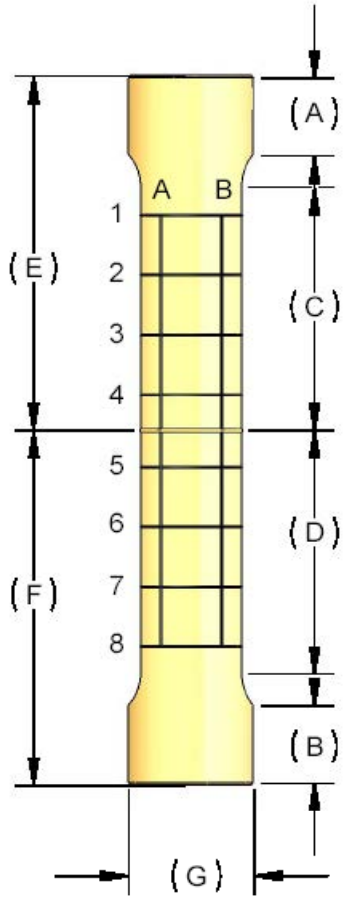
Version 1.0



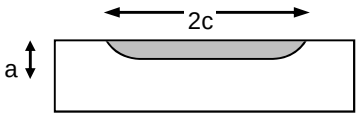
C-FER Technologies	Pre-test Measurements Taken By: JP	Date: 1-Apr-09	PRCI/DOT
	Approval for Testing: RTP	Date: 1-Apr-09	4.3a

Specimen Measurements

TOP



BOTTOM



Wall Thickness (mm)		
Grid line	A	B
1	12.88	12.90
2	12.93	12.88
3	12.93	12.95
4	12.90	12.88
5	12.88	12.78
6	12.83	12.80
7	12.83	12.78
8	12.80	12.80
9	12.88	12.85
10	12.95	12.95
Average		**12.86**

Gauge Width (mm)	
Grid line	OD
1	306
2	305
3	305
4	305
5	305
6	305
7	305
8	306
9	305
10	305
Average	**305**

Gauge Length (mm)	
LMA	454
LMB	452
LTID	153.5
LTOD	154
LBID	152
LBOD	154

Reduced Section Length (mm)	
Top [C]	694
Bottom[D]	696

Tab Length (mm)	
Top [A]	228
Bottom [B]	224

Area (mm^2)	3,923.205

Defect Size (mm)		
Length	2c	50.40
Depth	a_1	1.34
	a_2	1.76
	a_3	2.96
	a_4	3.14
	a_5	3.08
	a_6	2.98
	a_7	3.14
	a_8	3.04
	a_9	1.86
	a_{10}	1.52
Defect Area (mm^2)		**128.44**

average depth = 3.06

C-FER Technologies	Pre-test Measurements Taken By: JP	Date: 1-Apr-09	**PRCI/DOT**
	Approval for Testing: RTP	Date: 1-Apr-09	**4.3a**

Curved Wide Plate Test Summary Sheet

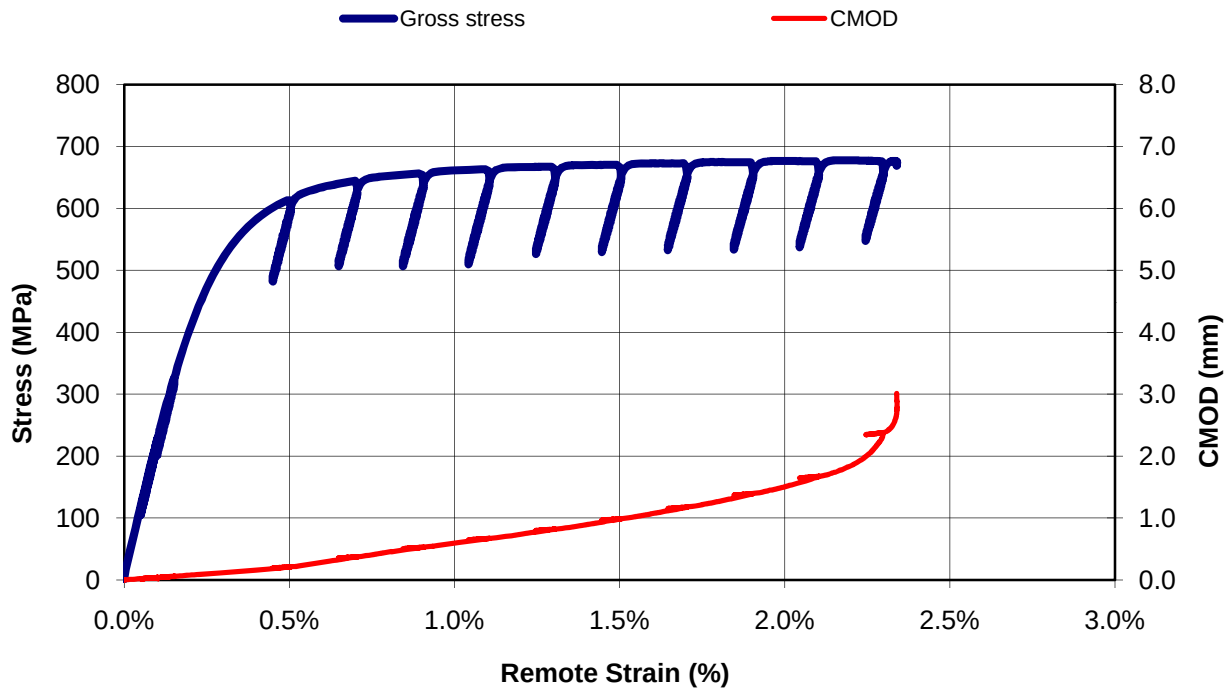
Spec. No. **4.3b**

Specimen Details		
Pipe diameter, OD	609.6	mm
Wall thickness, t	12.83	mm
Type	High Y/T	
Grade	X80	
SMYS	551	MPa
SMTS	621	MPa
F yield (hoop | axial)	668 | 616	MPa
F tensile (hoop | axial)	689 | 669	MPa
Test temperature	21	ºC
Reduced section length	1,383	mm
Reduced section width	305.0	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	2,652	2,617	kN
Gross Stress	677.7	668.8	MPa
Strain LTU	1.61%	1.71%	
Strain LBU	2.73%	2.97%	
Strain LTBU	2.17%	2.34%	
CMOD	1.78	3.01	mm

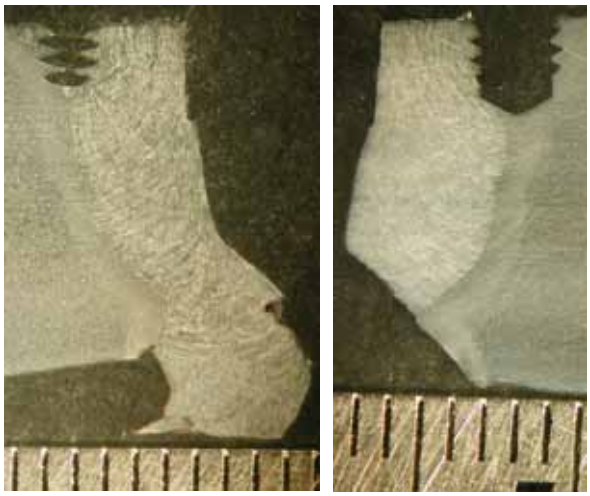
Strain Notation:
Strain LTU: average strain in uniform strain zone of top plate (LTU series LVDTs)
Strain LBU: average strain in uniform strain zone of bottom plate (LBU series LVDTs)
Strain LTBU: average strain in uniform strain zones of both plates (LTU and LBU series LVDTs)



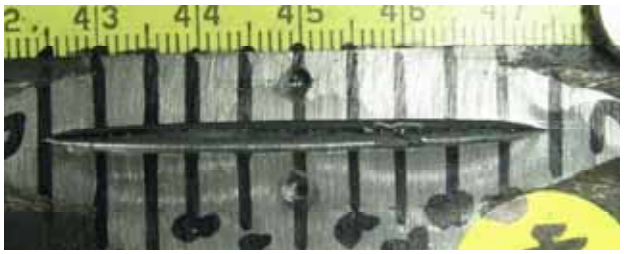
**Average strain from LVDTs in uniform strain zones of both plates (i.e. LTBU strain)*

C-FER Technologies	Pre-test Measurements Taken By: JP	Date: 15-Apr-09	PRCI/DOT
	Approval for Testing: RTP	Date: 15-Apr-09	4.3b

Photographs



Flaw Macro Images



Post-test Flaw

Flaw Fracture Surface

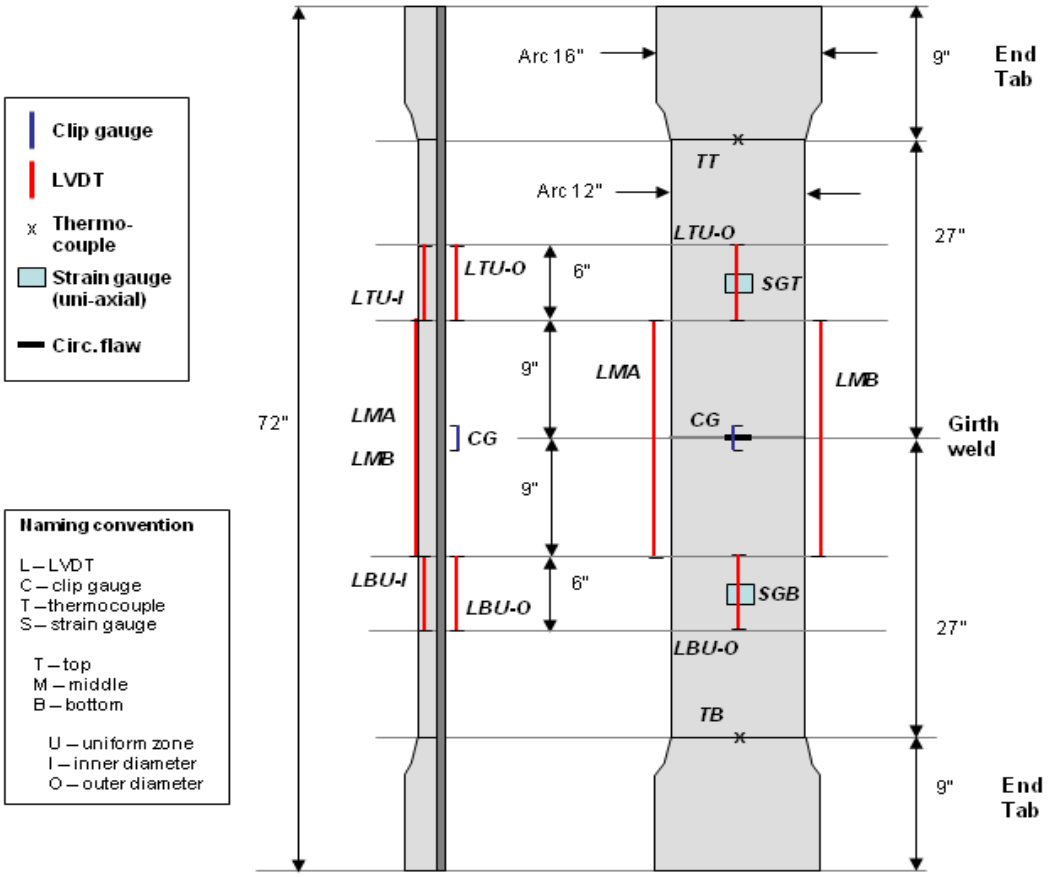
C-FER Technologies	Pre-test Measurements Taken By: JP	Date: 15-Apr-09	**PRCI/DOT**
	Approval for Testing: RTP	Date: 15-Apr-09	**4.3b**

Instrumentation Layout

PRCI/DOT Tensile Strain Limits

24 inch CWP Test Instrumentation

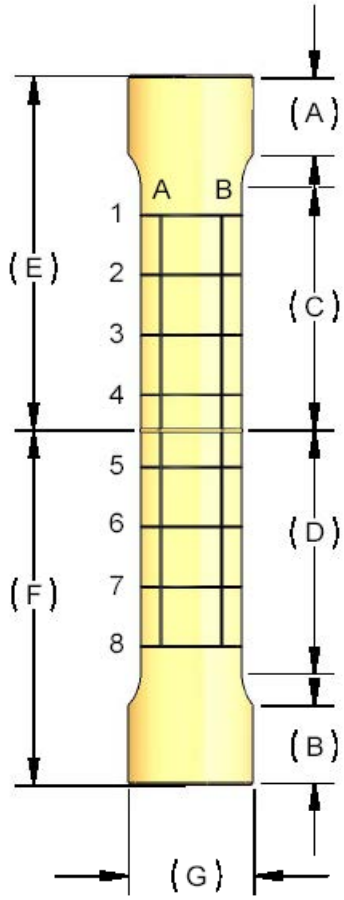
Version 1.0



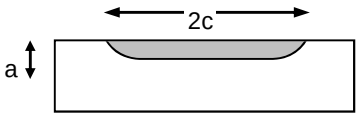
C-FER Technologies	Pre-test Measurements Taken By: JP	Date: 15-Apr-09	PRCI/DOT
	Approval for Testing: RTP	Date: 15-Apr-09	4.3b

Specimen Measurements

TOP



BOTTOM



Wall Thickness (mm)		
Grid line	A	B
1	12.93	12.83
2	12.98	12.80
3	12.95	12.80
4	12.85	12.80
5	12.95	12.75
6	12.78	12.75
7	12.80	12.75
8	12.80	12.78
9	12.85	12.95
10	12.93	12.88
Average		**12.83**

Gauge Width (mm)	
Grid line	OD
1	305.0
2	305.0
3	305.0
4	304.5
5	305.0
6	305.0
7	305.0
8	305.0
9	305.0
10	305.0
Average	**305.0**

Gauge Length (mm)	
LMA	450
LMB	451
LTID	151
LTOD	149.5
LBID	153.5
LBOD	152

Reduced Section Length (mm)	
Top [C]	692
Bottom[D]	691

Tab Length (mm)	
Top [A]	220
Bottom [B]	221

Area (mm^2)	3,913.046

Defect Size (mm)		
Length	2c	49.98
Depth	a_1	1.40
	a_2	2.05
	a_3	3.05
	a_4	2.93
	a_5	3.13
	a_6	3.13
	a_7	3.09
	a_8	2.94
	a_9	1.91
	a_{10}	1.47
Defect Area (mm^2)		**126.72**

average depth = 3.05

C-FER Technologies	Pre-test Measurements Taken By: JP	Date: 15-Apr-09	**PRCI/DOT**
	Approval for Testing: RTP	Date: 15-Apr-09	**4.3b**

Curved Wide Plate Test Summary Sheet

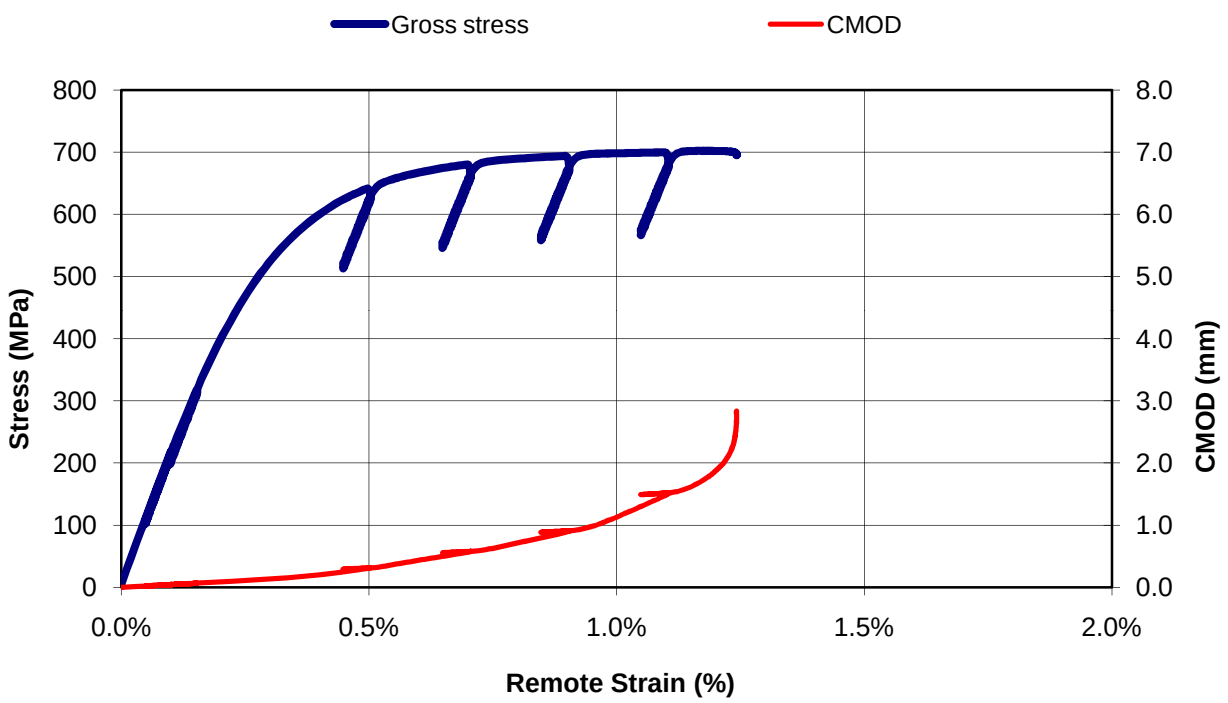
Spec. No. **4.4**

Specimen Details		
Pipe diameter, OD	609.6	mm
Wall thickness, t	12.90	mm
Type	High Y/T	
Grade	X80	
SMYS	551	MPa
SMTS	621	MPa
F yield (hoop | axial)	668 | 616	MPa
F tensile (hoop | axial)	689 | 669	MPa
Test temperature	20	ºC
Reduced section length	1,386	mm
Reduced section width	304.9	mm
Target flaw size	4 x 50	mm
Target flaw location	HAZ	

Test terminated following strain localization in flaw region.

	Load Peak	End Point	
Total Load	2,761	2,732	kN
Gross Stress	702.3	695.1	MPa
Strain LTU	1.19%	1.27%	
Strain LBU	1.15%	1.22%	
Strain LTBU	1.17%	1.24%	
CMOD	1.69	2.84	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)



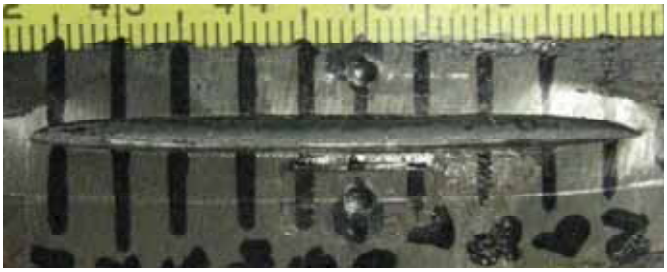
**Average strain from LVDTs in uniform strain zones of both plates (i.e. LTBU strain)*

C-FER Technologies	Pre-test Measurements Taken By: JP	Date: 24-Mar-09	PRCI/DOT
	Approval for Testing: RTP	Date: 24-Mar-09	4.4

Photographs

Test Set-up
(Back)

Test Set-up
(Front)



Post-test Flaw

Flaw Fracture

Flaw Macro Images

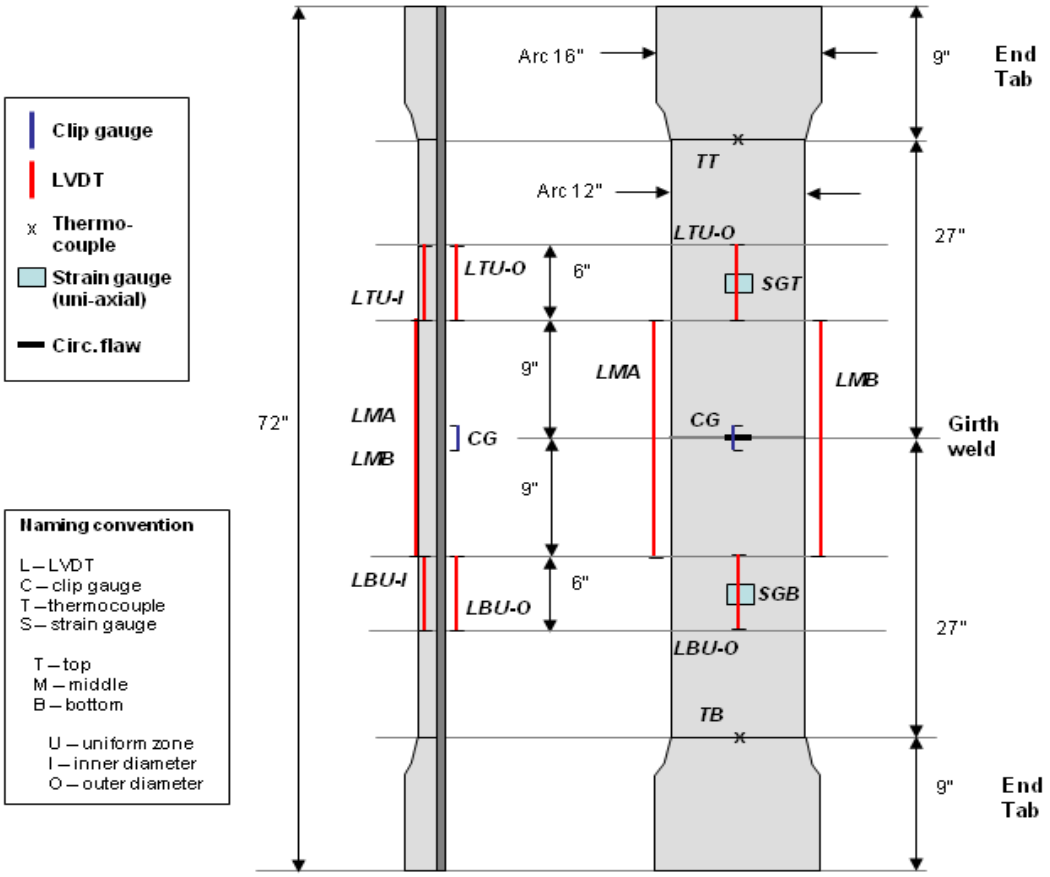
C-FER Technologies	Pre-test Measurements Taken By: JP	Date: 24-Mar-09	**PRCI/DOT**
	Approval for Testing: RTP	Date: 24-Mar-09	**4.4**

Instrumentation Layout

PRCI/DOT Tensile Strain Limits

24 inch CWP Test Instrumentation

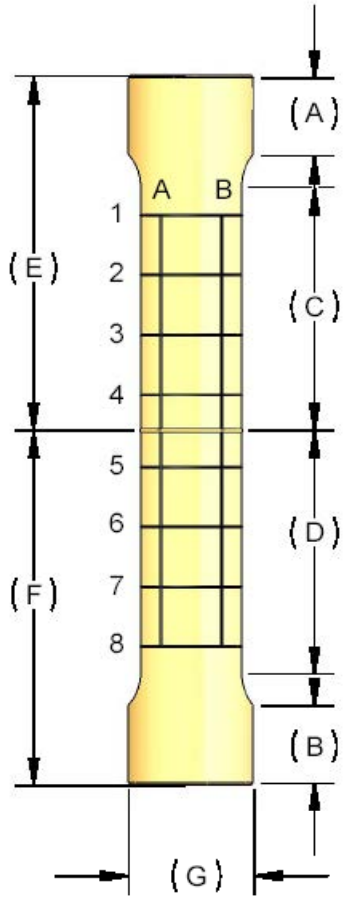
Version 1.0



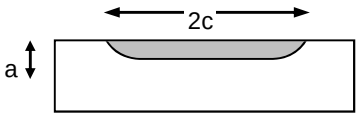
C-FER Technologies	Pre-test Measurements Taken By: JP	Date: 24-Mar-09	PRCI/DOT
	Approval for Testing: RTP	Date: 24-Mar-09	4.4

Specimen Measurements

TOP



BOTTOM



Wall Thickness (mm)		
Grid line	A	B
1	12.75	12.83
2	12.85	12.90
3	12.83	12.90
4	12.88	12.90
5	12.88	12.93
6	12.90	12.95
7	12.90	12.98
8	12.98	12.95
9	12.98	12.90
10	12.98	12.90
Average		**12.90**

Gauge Width (mm)	
Grid line	OD
1	305.0
2	305.0
3	304.5
4	305.0
5	304.5
6	305.0
7	304.5
8	305.0
9	305.0
10	305.0
Average	**304.9**

Gauge Length (mm)	
LMA	459
LMB	458
LTID	150
LTOD	153
LBID	151
LBOD	151

Reduced Section Length (mm)	
Top [C]	696
Bottom[D]	690

Tab Length (mm)	
Top [A]	216
Bottom [B]	225

Area (mm^2)	3,931.121

Defect Size (mm)			
Length	2c	50.23	
Depth	a_1	1.40	
	a_2	2.27	average depth = 3.91
	a_3	3.93	
	a_4	3.84	
	a_5	3.89	
	a_6	3.91	
	a_7	3.95	
	a_8	3.94	
	a_9	2.26	
	a_{10}	1.45	
Defect Area (mm^2)		**159.89**	

C-FER Technologies	Pre-test Measurements Taken By: JP	Date: 24-Mar-09	**PRCI/DOT**
	Approval for Testing: RTP	Date: 24-Mar-09	**4.4**

Curved Wide Plate Test Summary Sheet

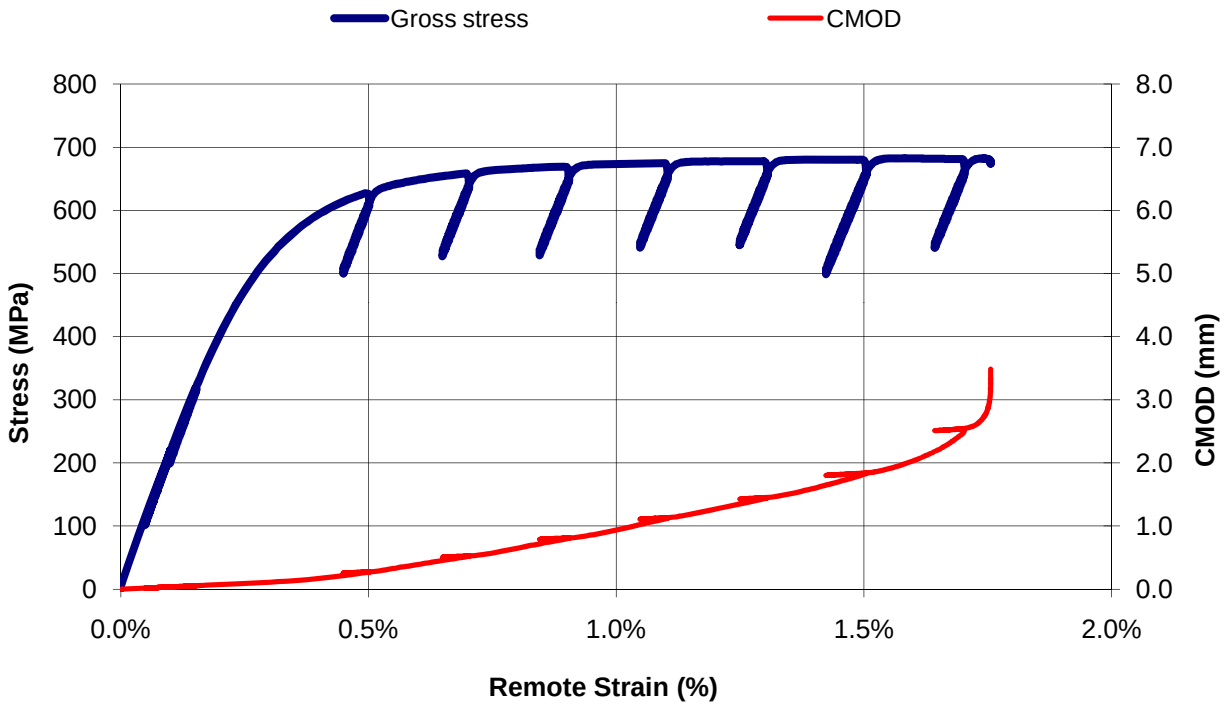
Spec. No. **4.5**

Specimen Details		
Pipe diameter, OD	609.6	mm
Wall thickness, t	12.83	mm
Type	High Y/T	
Grade	X80	
SMYS	551	MPa
SMTS	621	MPa
F yield (hoop | axial)	668 | 616	MPa
F tensile (hoop | axial)	689 | 669	MPa
Test temperature	20	ºC
Reduced section length	1,389	mm
Reduced section width	304.4	mm
Target flaw size	3.5 x 50	mm
Target flaw location	HAZ	

Test terminated following strain localization in flaw region.

	Load Peak	End Point	
Total Load	2,666	2,631	kN
Gross Stress	682.6	673.6	MPa
Strain LTU	2.03%	2.31%	
Strain LBU	1.13%	1.20%	
Strain LTBU	1.58%	1.76%	
CMOD	1.99	3.49	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)



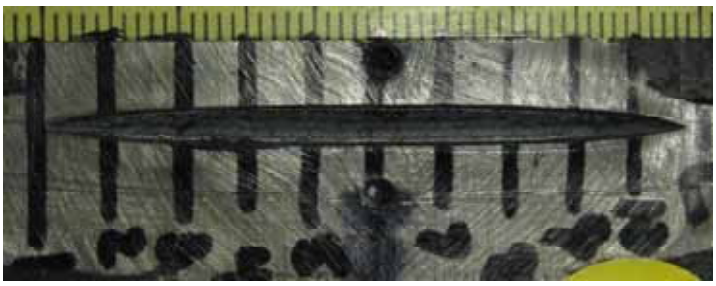
**Average strain from LVDTs in uniform strain zones of both plates (i.e. LTBU strain)*

C-FER Technologies	Pre-test Measurements Taken By: JP	Date: 27-Mar-09	PRCI/DOT
	Approval for Testing: RTP	Date: 27-Mar-09	4.5

Photographs

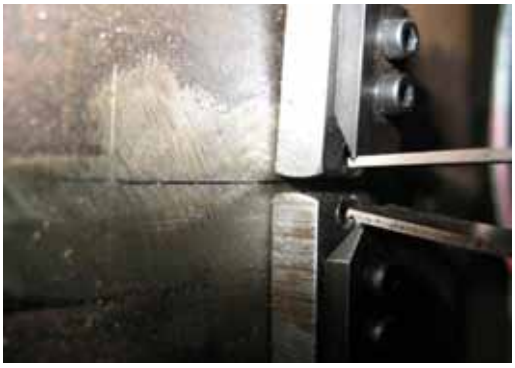
Test Set-up
(Back)

Test Set-up
(Front)

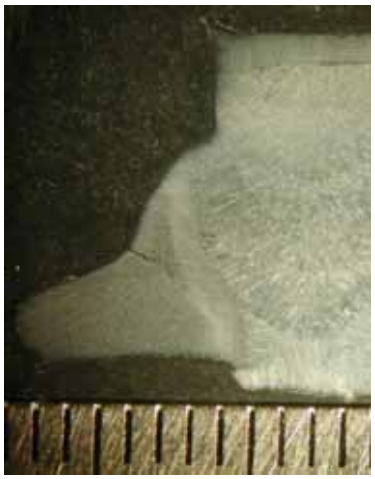


Post-test Flaw

Flaw Fracture Surface



Pre-test Flaw and Clip Gauge Set-up



Flaw Macro Images

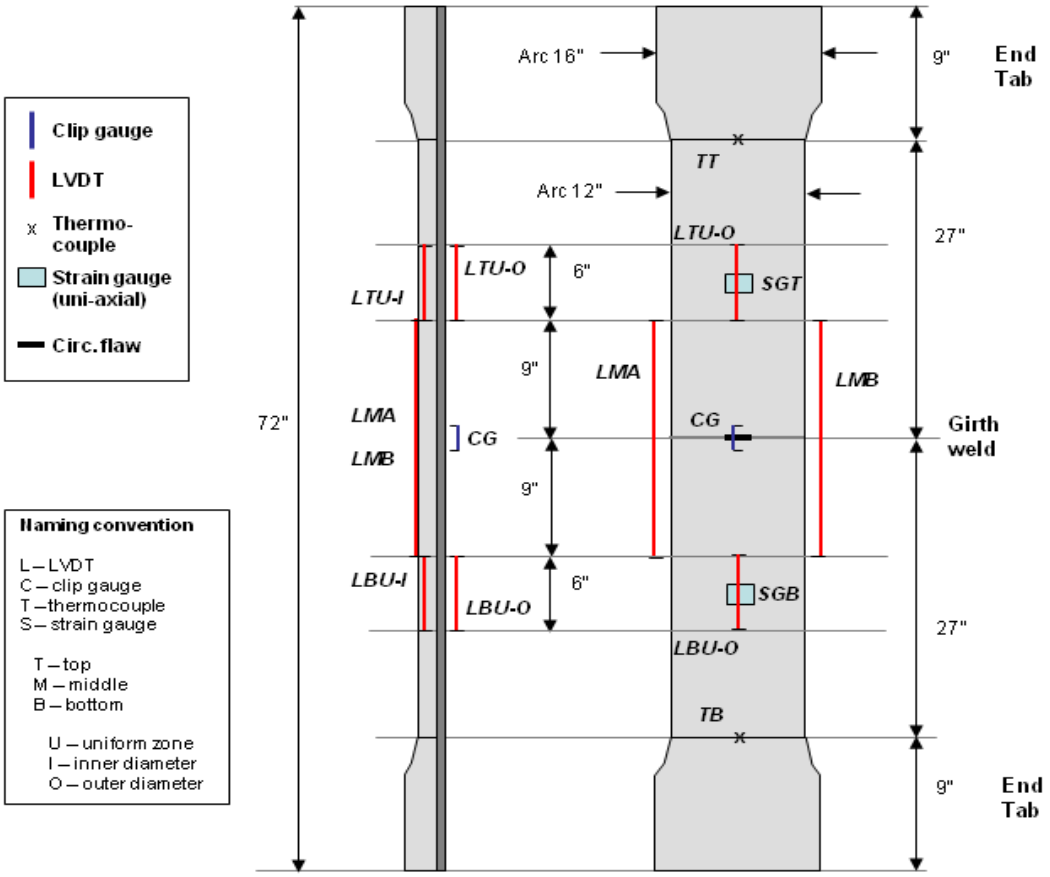
C-FER Technologies	Pre-test Measurements Taken By: JP	Date: 27-Mar-09	**PRCI/DOT**
	Approval for Testing: RTP	Date: 27-Mar-09	**4.5**

Instrumentation Layout

PRCI/DOT Tensile Strain Limits

24 inch CWP Test Instrumentation

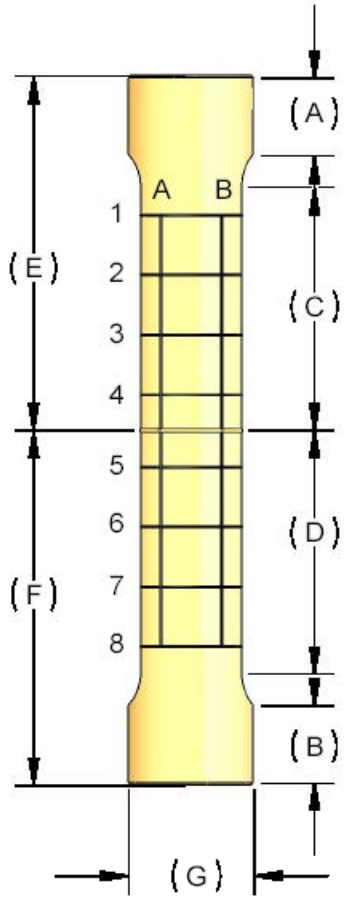
Version 1.0



C-FER Technologies	Pre-test Measurements Taken By: JP	Date: 27-Mar-09	PRCI/DOT
	Approval for Testing: RTP	Date: 27-Mar-09	4.5

Specimen Measurements

TOP



Wall Thickness (mm)		
Grid line	A	B
1	12.73	12.90
2	12.75	12.90
3	12.75	12.90
4	12.78	12.90
5	12.73	12.95
6	12.70	13.00
7	12.70	12.98
8	12.70	12.98
9	12.67	12.95
10	12.60	12.90
Average		**12.83**

Gauge Width (mm)	
Grid line	OD
1	304.0
2	304.0
3	305.0
4	305.0
5	304.5
6	304.0
7	304.5
8	304.0
9	304.0
10	304.5
Average	**304.4**

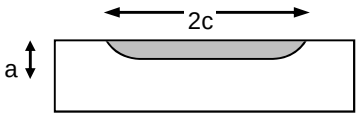
Gauge Length (mm)	
LMA	462
LMB	458
LTID	154.5
LTOD	152
LBID	153
LBOD	154

Reduced Section Length (mm)	
Top [C]	693
Bottom[D]	696

Tab Length (mm)	
Top [A]	215
Bottom [B]	225

Area (mm^2)	3,906.313

BOTTOM



Defect Size (mm)		
Length	2c	50.62
Depth	a_1	1.49
	a_2	2.28
	a_3	3.51
	a_4	3.51
	a_5	3.62
	a_6	3.60
	a_7	3.51
	a_8	3.40
	a_9	2.23
	a_{10}	1.37
Defect Area (mm^2)		**146.97**

average depth = 3.53

C-FER Technologies	Pre-test Measurements Taken By: JP	Date: 27-Mar-09	**PRCI/DOT**
	Approval for Testing: RTP	Date: 27-Mar-09	**4.5**

Curved Wide Plate Test Summary Sheet

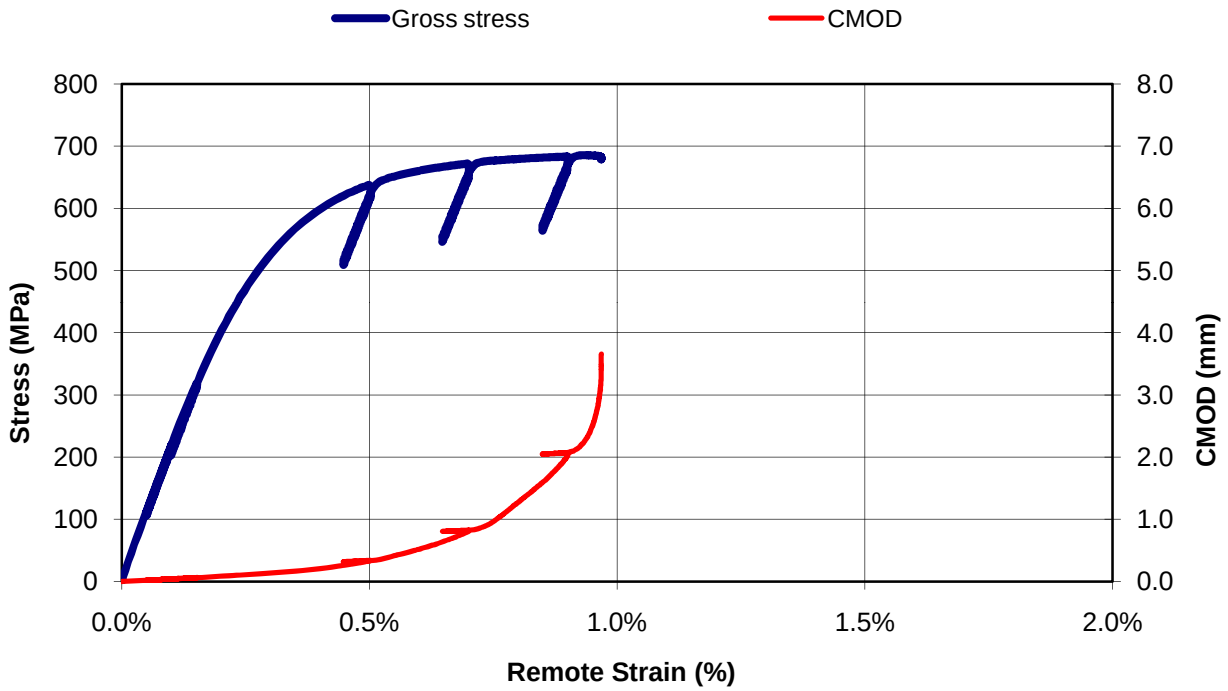
Spec. No. **4.6a**

Specimen Details		
Pipe diameter, OD	609.6	mm
Wall thickness, t	13.00	mm
Type	High Y/T	
Grade	X80	
SMYS	551	MPa
SMTS	621	MPa
F yield (hoop | axial)	668 | 616	MPa
F tensile (hoop | axial)	689 | 669	MPa
Test temperature	20	ºC
Reduced section length	1,383	mm
Reduced section width	304.7	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	2,715	2,688	kN
Gross Stress	685.6	678.7	MPa
Strain LTU	0.97%	1.01%	
Strain LBU	0.89%	0.92%	
Strain LTBU	0.93%	0.97%	
CMOD	2.25	3.66	mm

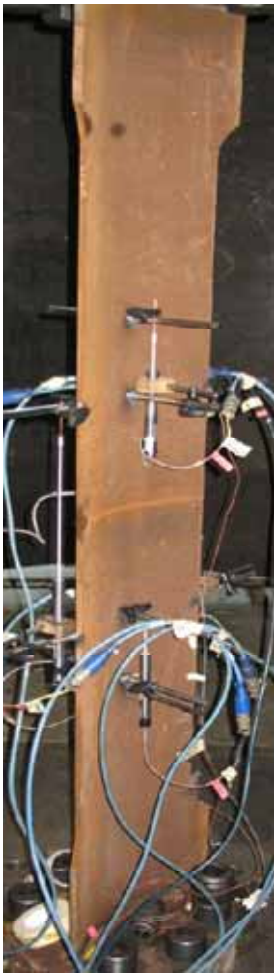
Strain Notation:
Strain LTU: average strain in uniform strain zone of top plate (LTU series LVDTs)
Strain LBU: average strain in uniform strain zone of bottom plate (LBU series LVDTs)
Strain LTBU: average strain in uniform strain zones of both plates (LTU and LBU series LVDTs)



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

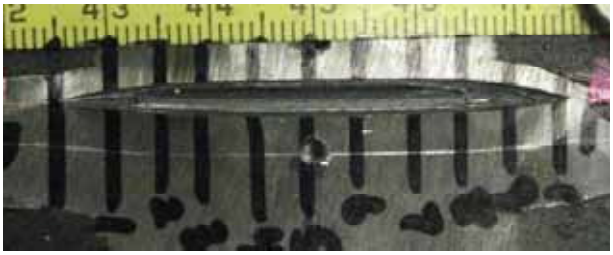
C-FER Technologies	Pre-test Measurements Taken By: JP	Date: 2-Apr-09	PRCI/DOT
	Approval for Testing: RTP	Date: 2-Apr-09	4.6a

Photographs



Test Set-up
(Back)

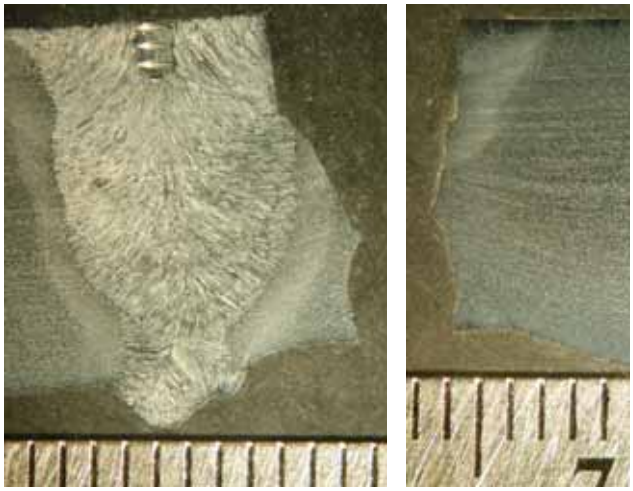
Test Set-up
(Front)



Post-test Flaw

Flaw Fracture Surface

Pre-test Flaw and Clip Gauge Set-up



Flaw Macro Images

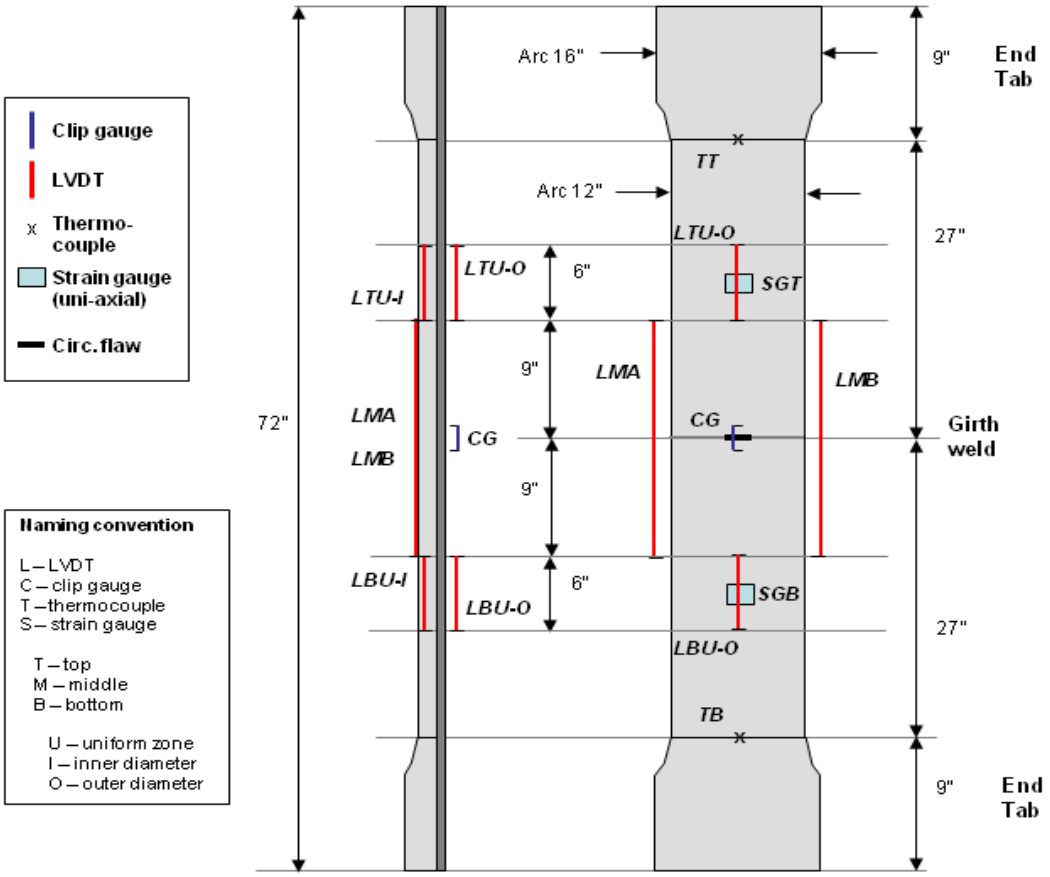
C-FER Technologies	Pre-test Measurements Taken By: JP	Date: 2-Apr-09	**PRCI/DOT**
	Approval for Testing: RTP	Date: 2-Apr-09	**4.6a**

Instrumentation Layout

PRCI/DOT Tensile Strain Limits

24 inch CWP Test Instrumentation

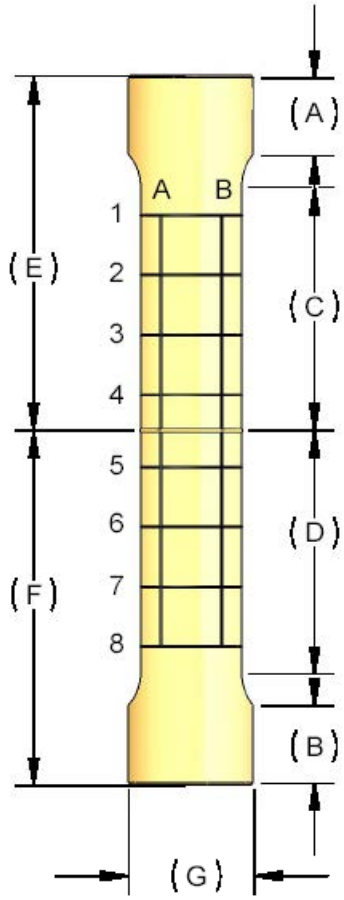
Version 1.0



C-FER Technologies	Pre-test Measurements Taken By: JP	Date: 2-Apr-09	PRCI/DOT
	Approval for Testing: RTP	Date: 2-Apr-09	4.6a

Specimen Measurements

TOP



Wall Thickness (mm)		
Grid line	A	B
1	13.00	13.11
2	12.98	13.06
3	13.00	13.06
4	12.98	13.00
5	12.98	12.98
6	12.90	12.98
7	12.93	13.03
8	12.93	13.03
9	12.98	13.06
10	13.03	13.06
Average		**13.00**

Gauge Width (mm)	
Grid line	OD
1	305.0
2	304.5
3	304.5
4	304.5
5	304.5
6	304.5
7	304.5
8	305.0
9	304.5
10	305.0
Average	**304.7**

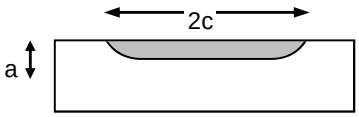
Gauge Length (mm)	
LMA	455
LMB	459
LTID	151
LTOD	154
LBID	153
LBOD	152

Reduced Section Length (mm)	
Top [C]	692
Bottom[D]	691

Tab Length (mm)	
Top [A]	218
Bottom [B]	230

Area (mm^2)	3,959.494

BOTTOM



Defect Size (mm)		
Length	2c	50.38
Depth	a_1	1.33
	a_2	1.89
	a_3	2.94
	a_4	3.13
	a_5	3.07
	a_6	3.15
	a_7	3.08
	a_8	2.93
	a_9	2.06
	a_{10}	1.38
Defect Area (mm^2)		**128.13**

average depth = 3.05

C-FER Technologies	Pre-test Measurements Taken By: JP	Date: 2-Apr-09	**PRCI/DOT**
	Approval for Testing: RTP	Date: 2-Apr-09	**4.6a**

Curved Wide Plate Test Summary Sheet

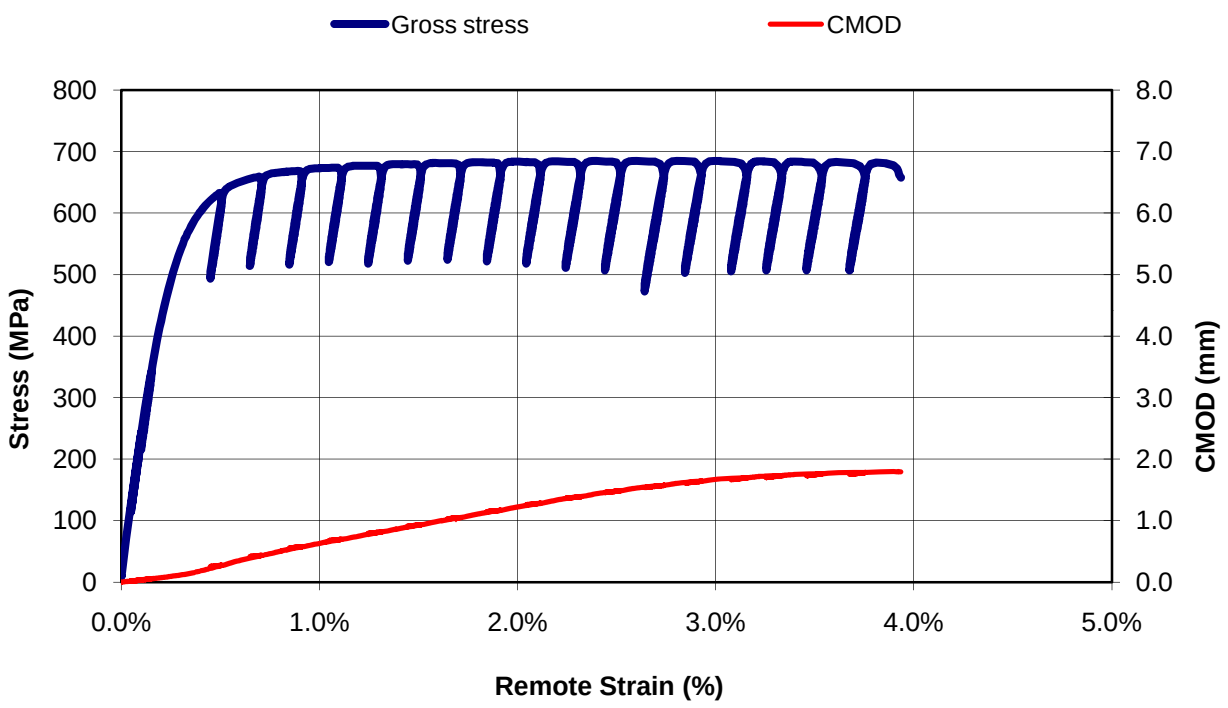
Spec. No. **4.6b**

Specimen Details		
Pipe diameter, OD	609.6	mm
Wall thickness, t	12.81	mm
Type	High Y/T	
Grade	X80	
SMYS	551	MPa
SMTS	621	MPa
F yield (hoop | axial)	668 | 616	MPa
F tensile (hoop | axial)	689 | 669	MPa
Test temperature	21	ºC
Reduced section length	1,390	mm
Reduced section width	304.2	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	2,669	2,563	kN
Gross Stress	685.0	657.8	MPa
Strain LTU	4.36%	6.57%	
Strain LBU	1.25%	1.30%	
Strain LTBU	2.81%	3.94%	
CMOD	1.61	1.79	mm

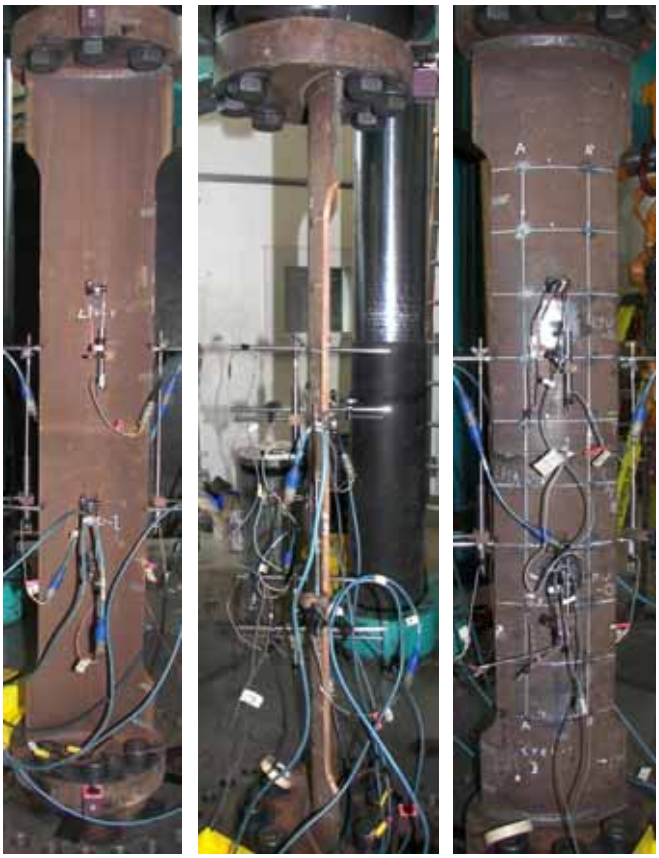
Strain Notation:
Strain LTU: average strain in uniform strain zone of top plate (LTU series LVDTs)
Strain LBU: average strain in uniform strain zone of bottom plate (LBU series LVDTs)
Strain LTBU: average strain in uniform strain zones of both plates (LTU and LBU series LVDTs)



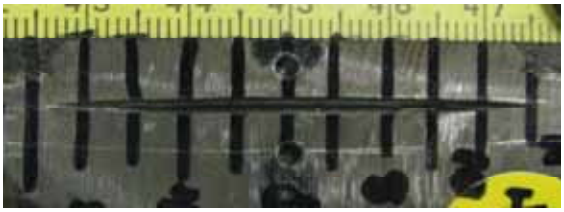
**Average strain from LVDTs in uniform strain zones of both plates (i.e. LTBU strain)*

C-FER Technologies	Pre-test Measurements Taken By: JP	Date: 19-Mar-09	PRCI/DOT
	Approval for Testing: RTP	Date: 19-Mar-09	4.6b

Photographs

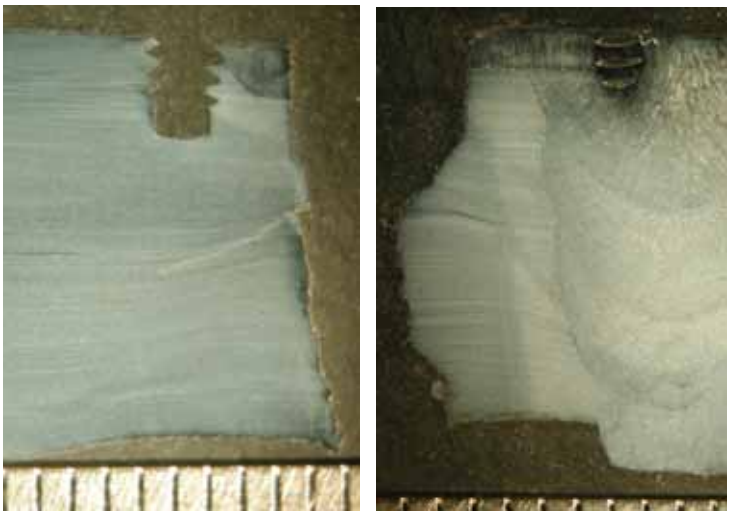


Test Set-up



Post-test Flaw

Flaw Fracture Surface



Flaw Macro Images

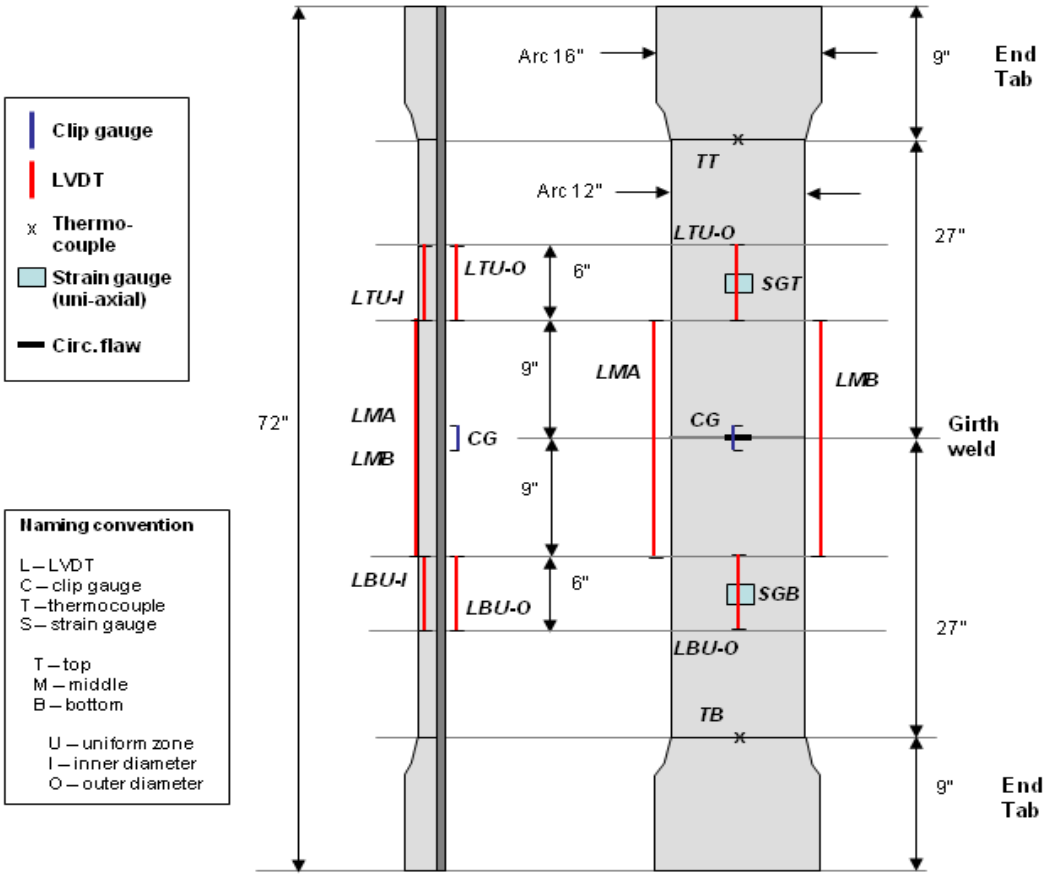
C-FER Technologies	Pre-test Measurements Taken By: JP	Date: 19-Mar-09	**PRCI/DOT**
	Approval for Testing: RTP	Date: 19-Mar-09	**4.6b**

Instrumentation Layout

PRCI/DOT Tensile Strain Limits

24 inch CWP Test Instrumentation

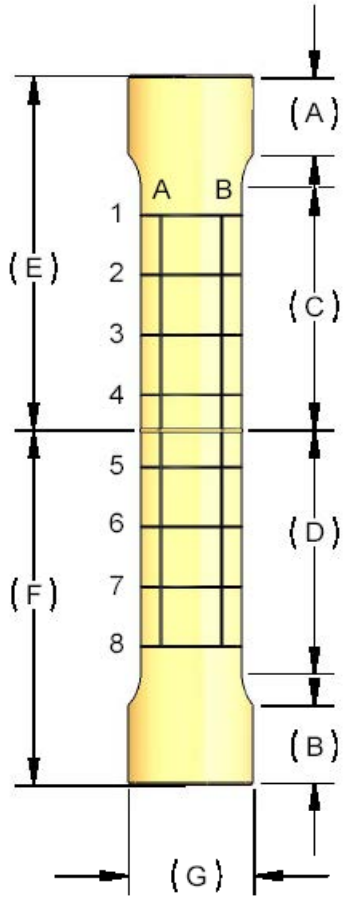
Version 1.0



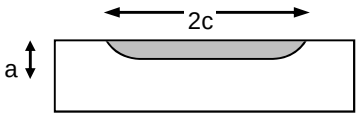
C-FER Technologies	Pre-test Measurements Taken By: JP	Date: 19-Mar-09	PRCI/DOT
	Approval for Testing: RTP	Date: 19-Mar-09	4.6b

Specimen Measurements

TOP



BOTTOM



Wall Thickness (mm)		
Grid line	A	B
1	12.90	12.75
2	12.85	12.75
3	12.80	12.70
4	12.80	12.75
5	12.83	12.83
6	12.90	12.83
7	12.88	12.78
8	12.83	12.83
9	12.85	12.78
10	12.78	12.75
Average		**12.81**

Gauge Width (mm)	
Grid line	OD
1	303.5
2	303.5
3	304.0
4	304.0
5	304.0
6	304.5
7	304.5
8	304.5
9	304.5
10	304.5
Average	**304.2**

Gauge Length (mm)	
LMA	460
LMB	458
LTID	153
LTOD	155
LBID	152
LBOD	151.5

Reduced Section Length (mm)	
Top [C]	694
Bottom[D]	696

Tab Length (mm)	
Top [A]	228
Bottom [B]	224

Area (mm^2)	3,896.987

Defect Size (mm)			
Length	2c	50.91	
Depth	a_1	1.45	
	a_2	1.89	average depth = 3.03
	a_3	3.03	
	a_4	2.99	
	a_5	2.99	
	a_6	3.06	
	a_7	3.08	
	a_8	3.04	
	a_9	2.03	
	a_{10}	1.32	
Defect Area (mm^2)		**129.03**	

C-FER Technologies	Pre-test Measurements Taken By: JP	Date: 19-Mar-09	**PRCI/DOT**
	Approval for Testing: RTP	Date: 19-Mar-09	**4.6b**