

**Report Number: 15090289**Delta Services (GB) Limited  
7 Caldbeck Road, Croft Business Park  
Bromborough  
Wirral,  
CH62 3PLDate of Issue: 13/10/2015  
Test Date : 18/09/2015  
to 09/10/2015

This report details the results of tests carried out on D/F Double used for connecting steel tubes of 48.3mm outside diameter and of at least 3.2mm nominal wall thickness at a minimum in the construction of working scaffolds and falsework required for the construction, maintenance, repair and demolition of buildings and structures.

**Description and Marks on couplings**

D/F Double

Marks : EN74-B-L 0615

**Basis of Tests**

The couplings have been tested in accordance with the relevant sections and requirements of EN 74-1 :2005.

**Information supplied by the customer**Shape: As per drawings shown at the end of this report  
Dimensions: As per drawings shown at the end of this report  
Mass: As per drawings shown at the end of this report  
Material Characteristics: As per drawings shown at the end of this report**RESULTS****Design**

The design of the coupling complied with the requirements of the relevant items in clause 6.2 of the standard.

**Dimensions and Material Characteristics**

The measured dimensions, mass and material characteristics, of the couplings, were all within the tolerances as specified by the manufacturer. (Drawings are shown at the end of this report)

**Marking**

The markings satisfy the requirements laid out in EN74-1.

**Results of all tests performed are detailed on the following pages.**

All requirements stated are minimum values.

**This report consists of the report, appendix A, appendix, B and Appendix C**Authorised Signatory  
L Mangham  
Operations Manager

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**Report Number: 15090289**
**Slipping Force Tests, tested in accordance with Clause 7.2.1**

Tested using 3.2mm steel tube (RT <sub>S1</sub> )		
Test Number	$\Delta_1 \leq 7\text{mm}$ (kN)	$1 \leq \Delta_2 \leq 2\text{mm}$ (kN)
1	22.71	24.24
2	18.09	27.8
3	19.28	28.77
4	20.6	25.59
5	20.18	25.55
6	20.94	27.54
7	19.57	22.72
8	21.6	21.57
9	29.48	30
10	21.43	28.52

<b>F<sub>S5%</sub></b>	<b>16.06</b>	<b>20.79</b>
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Tested using 4.0mm aluminium tube (RT <sub>A</sub> )		
Test Number	$\Delta_1 \leq 7\text{mm}$	$1 \leq \Delta_2 \leq 2\text{mm}$
11	22.89	30
12	23.63	30
13	22.22	30
14	23.55	30
15	23.4	30

<b>F<sub>S5%</sub></b>	<b>21.72</b>	<b>30.00</b>
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Photograph of Setup for Slipping Force



The photograph above shows the setup for slipping force but is not necessarily the coupler under test.

The F<sub>S5%</sub> figures must be equal to or greater than the requirements stated below.

Requirements from EN 74-1 table 8:

<b>Class B:</b>	$\Delta_1 \leq 7\text{mm} = 10\text{kN Minimum}$
	$1 \leq \Delta_2 \leq 2\text{mm} = 15\text{kN Minimum}$
<b>Class A:</b>	$\Delta_1 \leq 7\text{mm} = 7\text{kN Minimum}$
	$1 \leq \Delta_2 \leq 2\text{mm} = 10\text{kN Minimum}$

From the results, the prototype is Accepted to Class B for slipping force

Load-displacement curves are shown in Appendix A as charts 1 to 15



**Report Number: 15090289**
**Failure Force**, tested in accordance with clause 7.2.2

Tested using solid steel bar (RB)	
Test Number	Maximum Load $P_{f,ult}$ (kN)
16	48.54
17	45.54
18	59.06
19	54.04
20	59.08
<b><math>F_{f,5\%}</math> 31.79</b>	

The  $F_{f,5\%}$  figures must be equal to or greater than the requirements stated below.

Requirements from EN 74-1 table 8:-  
 $P_{f,ult}$  = 30.0kN minimum for Right Angle couplers & 20kN for Swivel couplers

Load-displacement curves are shown in Appendix B as charts 16 to 20

From the results, the prototype is Accepted to Class B for failure force

Photograph of setup for Failure Force



The photograph above shows the setup for failure force but is not necessarily the coupler under test.

**Pull Apart Force**, tested in accordance with clause 7.3

Tested using solid steel bar (RB)	
Test Number	Maximum Load $F_{p,c}$ (kN)
21	60
22	54.32
23	57.64
24	57.22
25	59.18
<b><math>F_{p,5\%}</math> 41.96</b>	

Requirements from EN 74-1 table 8:-  
 $P_{f,ult}$  = 20.0kN minimum

Load-displacement curves are shown in Appendix B as charts 21 to 25

From the results, the prototype is Accepted to Class B for pull apart force

Photograph of setup for Pull Apart Force



The photograph above shows the setup for pull apart force but is not necessarily the coupler under test.



**Report Number: 15090289**
**Indentation Check, tested in accordance with clause 7.5**

Tested using 2.7mm wall steel tube (RT <sub>S2</sub> )	
Test Number	Maximum Indentation $\Delta_{10}$ (mm)
26	0.84
27	0.79
28	0.86
29	0.9
30	0.77

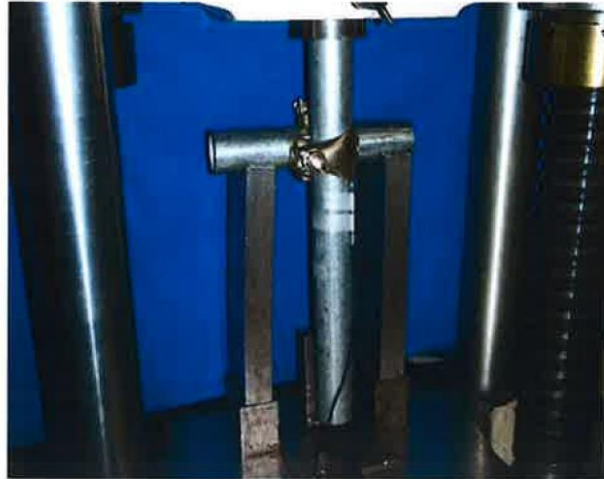
The figures must be equal to or greater than the requirements stated below.

Requirements from EN 74-1 table 8:-

P<sub>ind</sub> = ≤1.5mm

From the results, the prototype is Accepted to Class B for indentation check

Photograph of setup for Indentation Check



The photograph above shows the setup for indentation check but is not necessarily the coupler under test.

**Cruciform Bending Stiffness Tests, tested in accordance with Clause 7.4.1**

Tested using 3.2mm steel tube (RT <sub>S1</sub> )			
Test Number	C <sub>φ1,MB,C</sub> (kNm/rad)	C <sub>φ2,MB,C</sub> (kNm/rad)	M <sub>ult,c</sub> kNm
31	39.69	10.58	2.67
32	46.02	10.60	2.67
33	41.31	8.44	2.67
34	20.20	8.50	2.67
35	44.99	13.77	2.67
36	40.08	9.59	2.67
37	48.66	12.11	2.67
38	33.73	7.72	2.67
39	39.91	10.40	2.67
40	43.96	10.53	2.67

M <sub>B,5%</sub>	<b>22.92</b>	<b>6.99</b>	<b>2.67</b>
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Tested using 4.0mm aluminium tube (RT <sub>A</sub> )			
Test Number	C <sub>φ1,MB,C</sub> (kNm/rad)	C <sub>φ2,MB,C</sub> (kNm/rad)	M <sub>ult,c</sub> kNm
41	32.05	12.98	2.67
42	32.05	12.89	2.67
43	30.53	7.40	2.67
44	25.23	7.57	2.67
45	31.74	9.97	2.67

M <sub>B,5%</sub>	<b>23.46</b>	<b>5.03</b>	<b>2.67</b>
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The M<sub>B5%</sub> figures must be equal to or greater than the requirements stated

Requirements from EN 74-1 table 8:

Steel Tube	
C <sub>φ1,MB,C</sub>	= 15.0 kNm/rad
C <sub>φ2,MB,C</sub>	= 6.0 kNm/rad
M <sub>ult,c</sub>	= 1.6 kNm
Aluminium Tube	
C <sub>φ1,MB,C</sub>	= 13.0 kNm/rad
C <sub>φ2,MB,C</sub>	= 5.0 kNm/rad
M <sub>ult,c</sub>	= 1.6 kNm

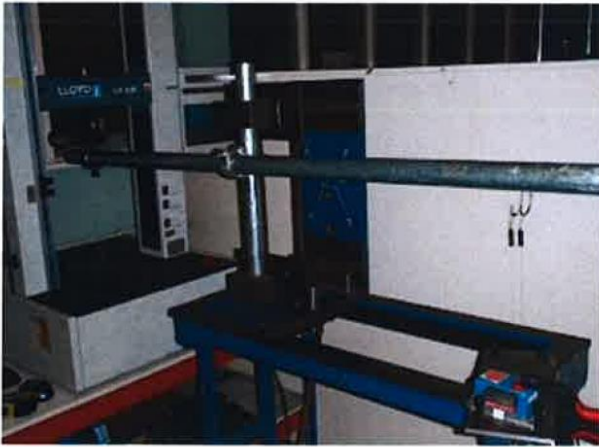
Load-displacement curves are shown in Appendix C as charts 31 to 45

From the results, the prototype is Accepted to Class B for cruciform bending stiffness and ultimate moment



**Report Number: 15090289**

Photograph of setup for Cruciform Bending Stiffness



The photograph above shows the setup for cruciform bending stiffness but is not necessarily the coupler under test.

**Rotation Stiffness and Moment Tests**, tested in accordance with Clause 7.4.2

Tested using 4.0mm aluminium tube (RT <sub>A</sub> )		
Test Number	$C_{\phi,MT,c}$	$M_{T,c}$
	kNm/rad	kNm
46	37.36	0.733
47	30.95	0.687
48	57.35	0.860
49	31.15	0.695
50	30.90	0.665

$M_{T5\%}$	<b>18.88</b>	<b>0.56</b>
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Tested using 4.0mm aluminium tube (RT <sub>A</sub> )		
Test Number	$C_{\phi,MT,c}$	$M_{T,c}$
	kNm/rad	kNm
51	19.88	0.773
52	19.72	0.571
53	22.26	0.640
54	24.25	0.653
55	20.02	0.601

$M_{T5\%}$	<b>16.91</b>	<b>0.49</b>
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The  $F_{S5\%}$  figures must be equal to or greater than the requirements stated below.

Requirements from EN 74-1 table 8:

Steel and Aluminium Tube		
$C_{\phi,MT,c}$	=	7.5 kNm/rad
$M_{T,c}$	=	0.13 kNm

Photograph of setup for Rotation Stiffness and Moment



The photograph above shows the setup for rotation stiffness and moment but is not necessarily the coupler under test.

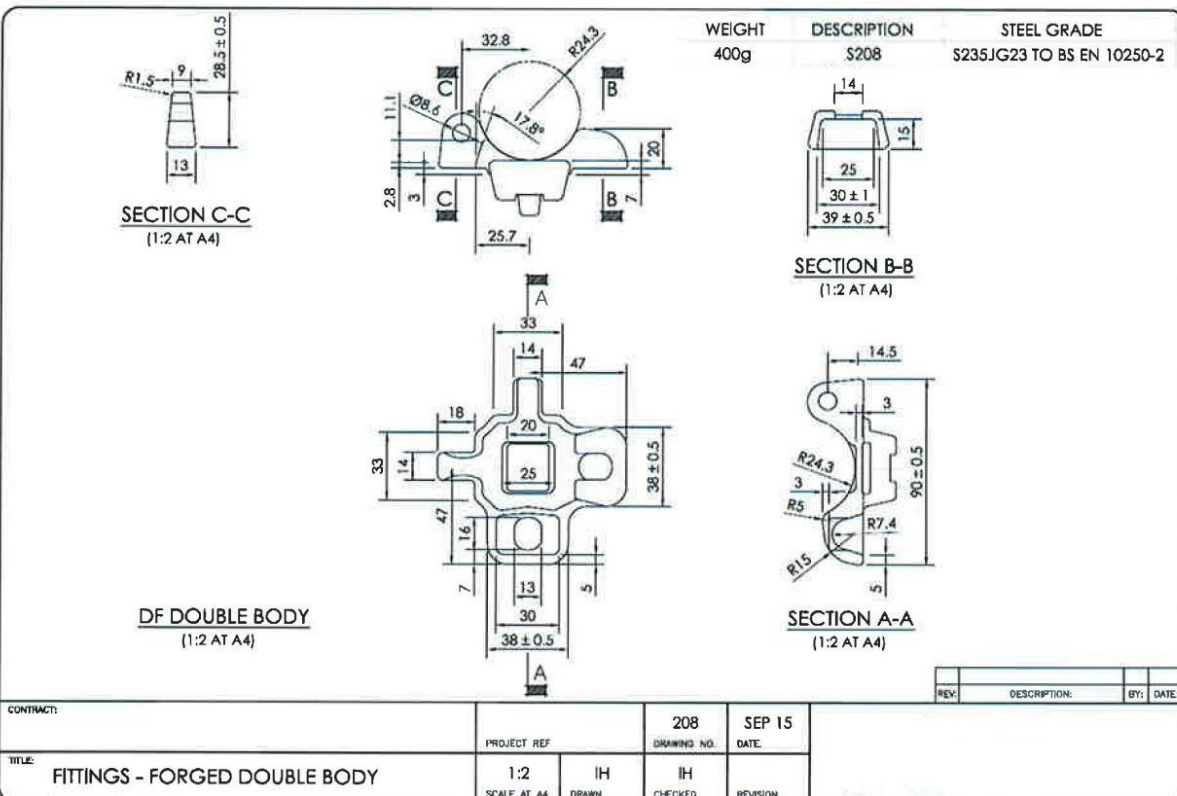
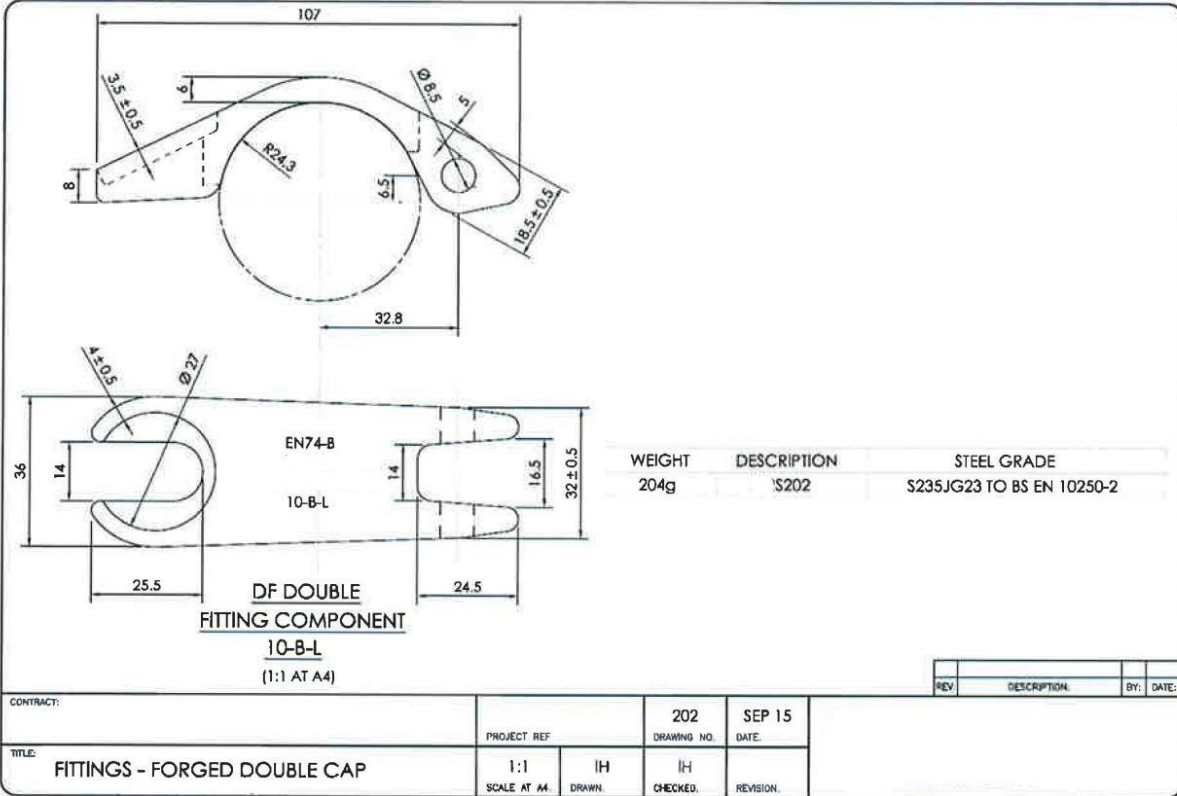
Load-displacement curves are shown in Appendix C as charts 46 to 55

From the results, the prototype is Accepted to Class B for rotation stiffness and moment



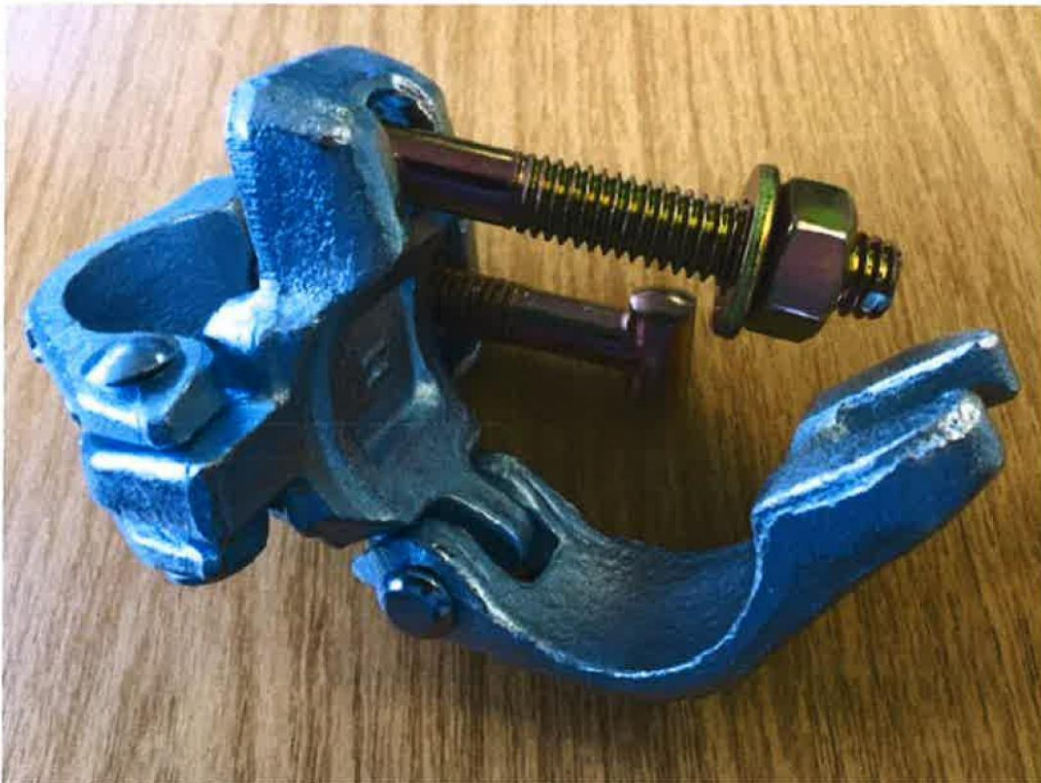
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Drawings




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Photograph of coupler under test



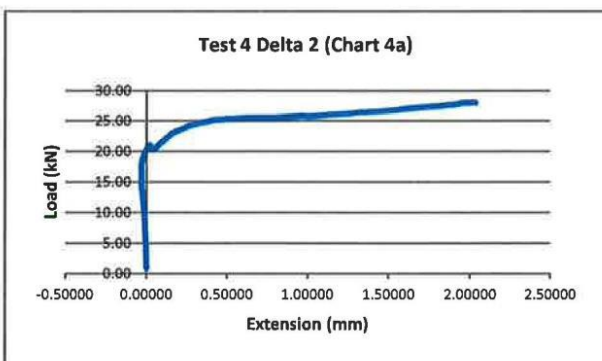
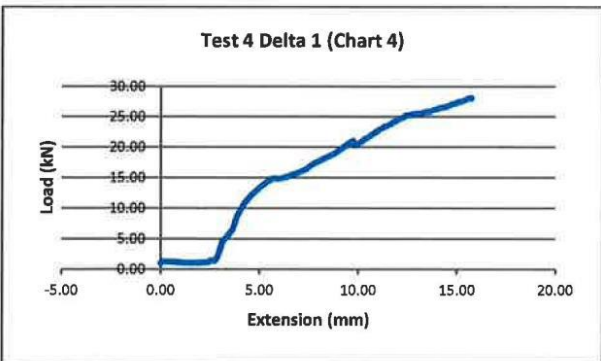
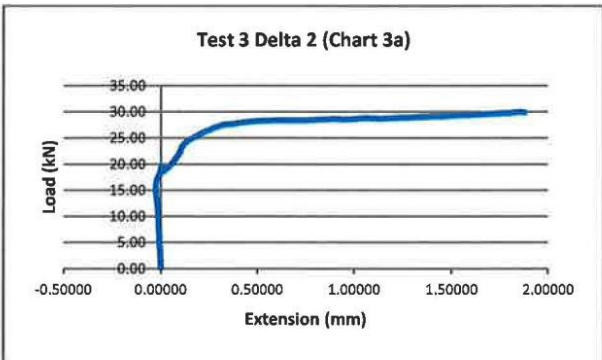
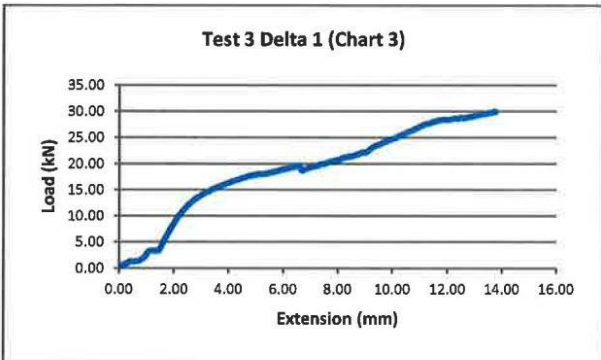
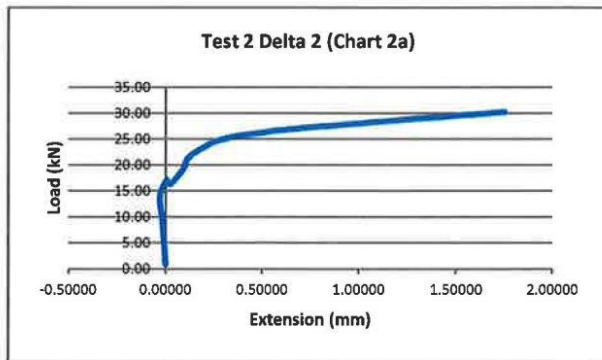
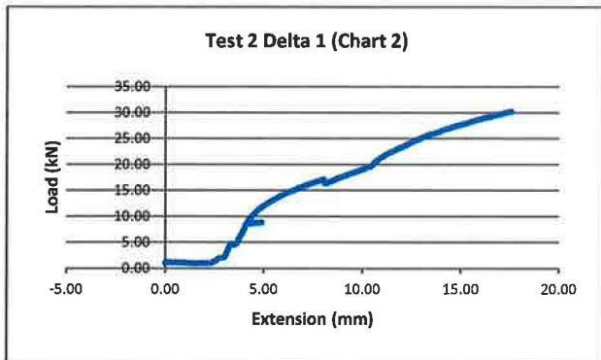
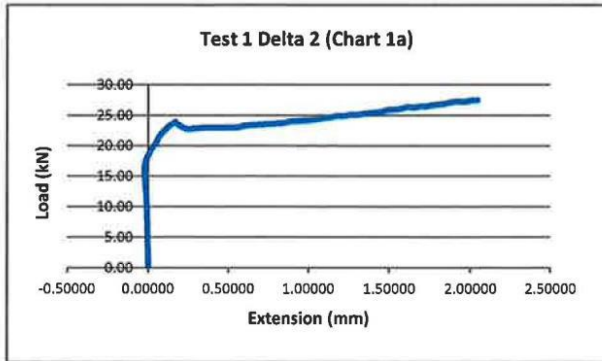
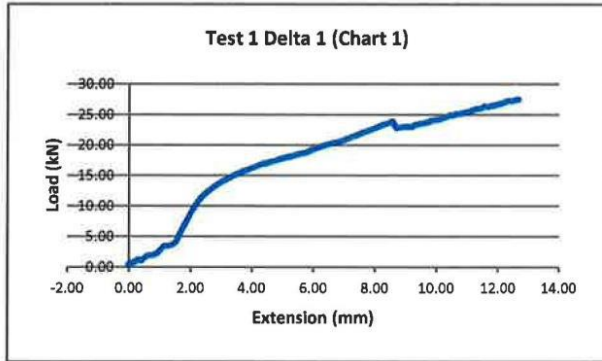
End of Report



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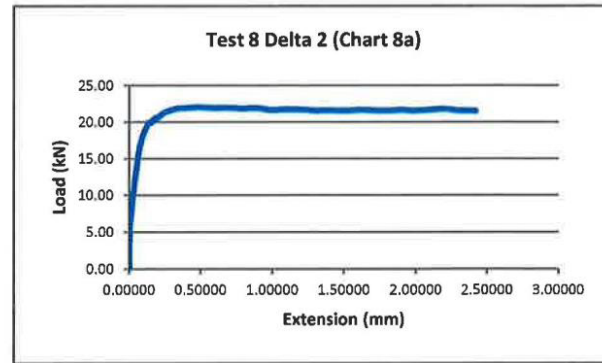
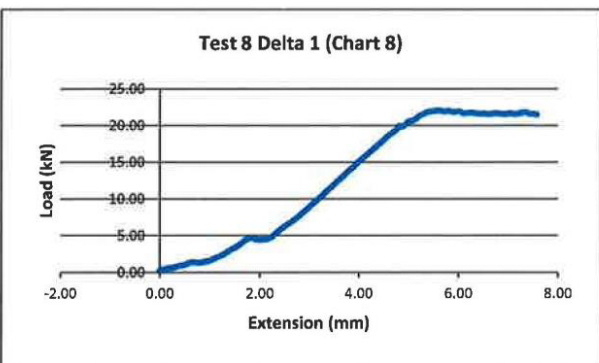
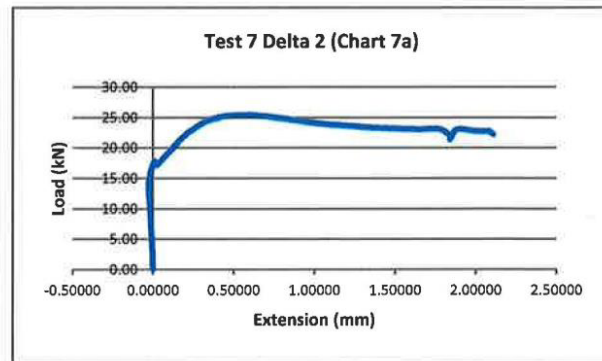
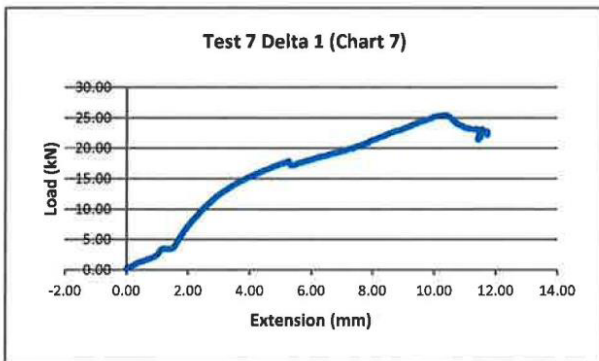
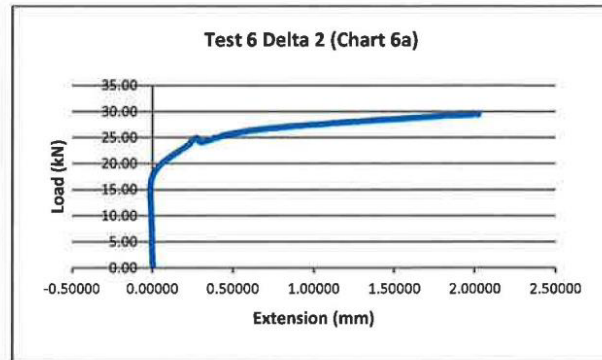
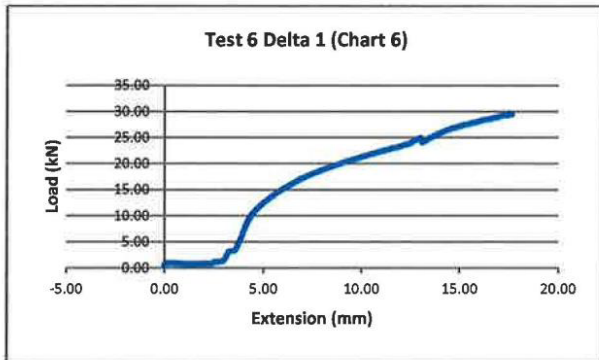
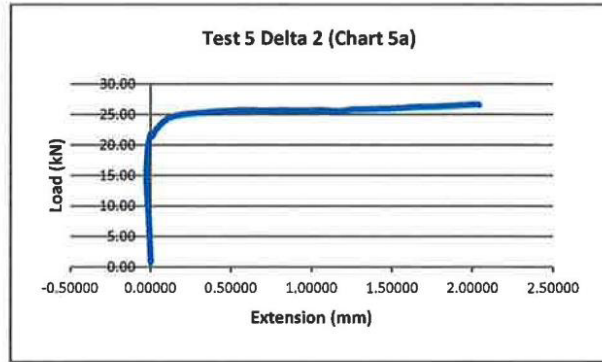
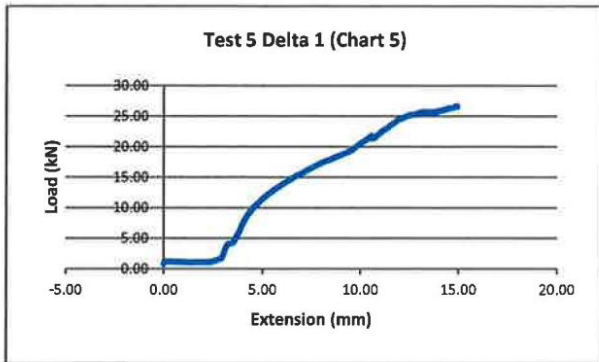


## Appendix A

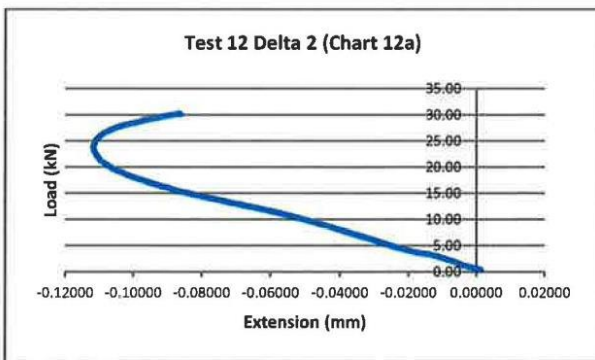
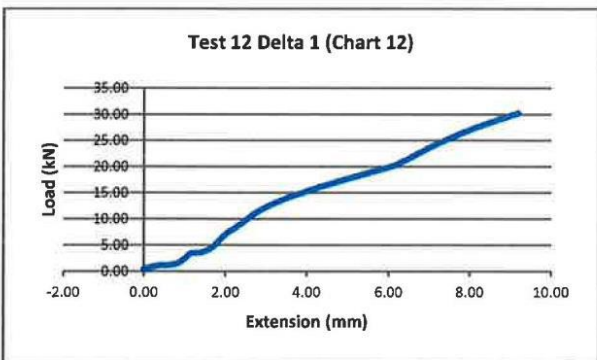
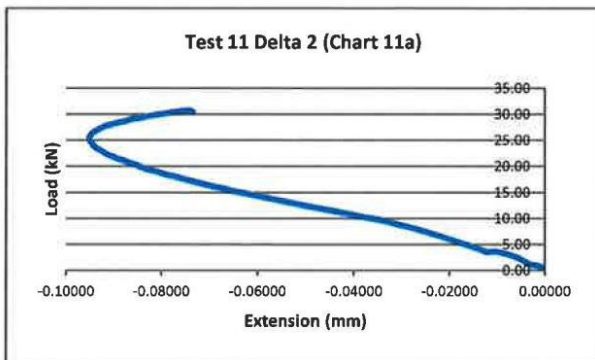
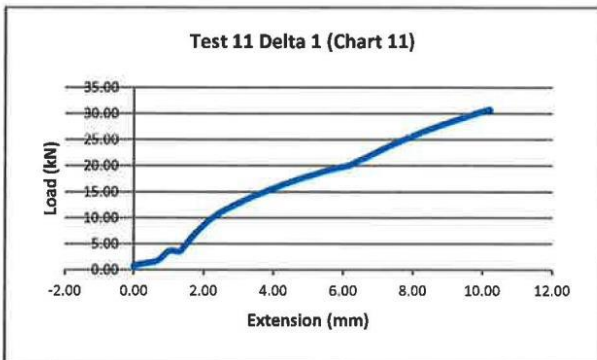
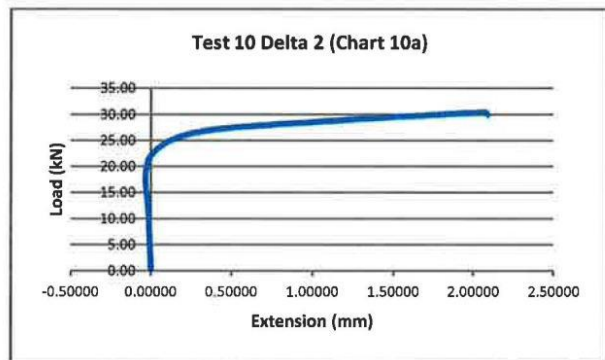
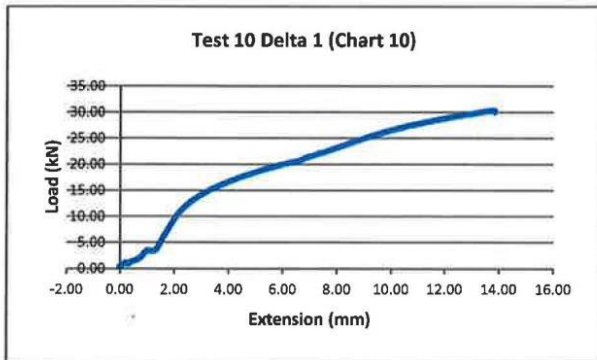
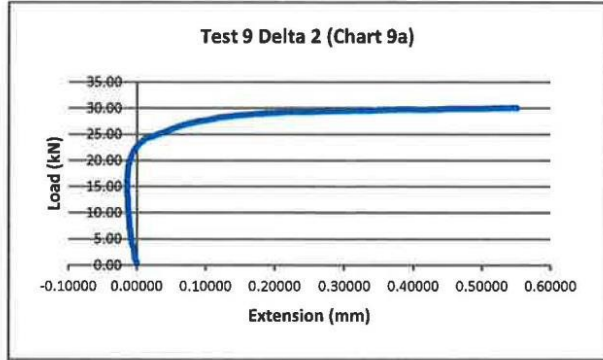
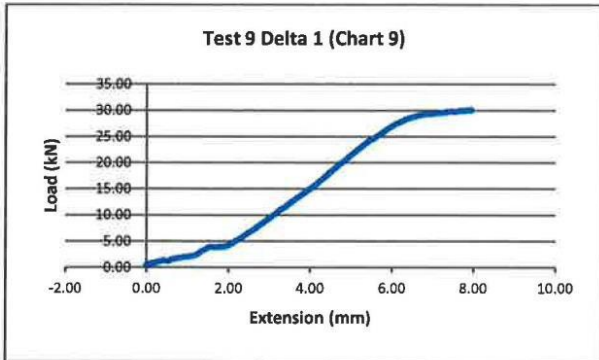




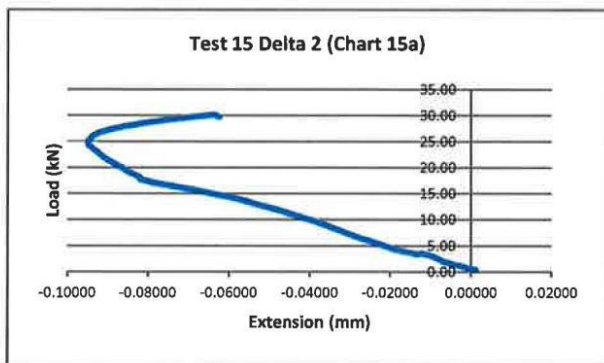
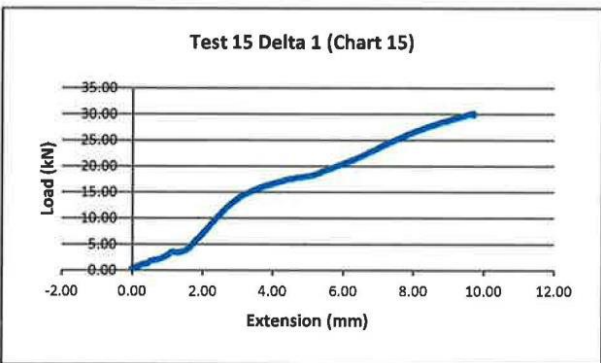
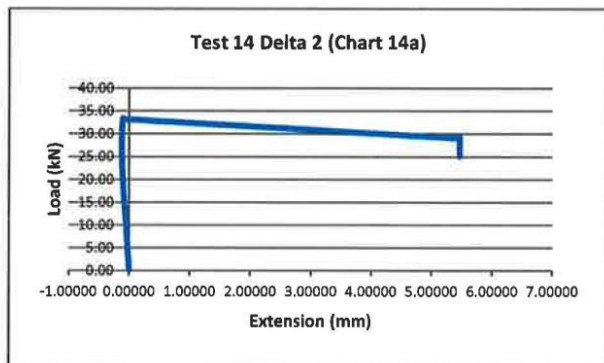
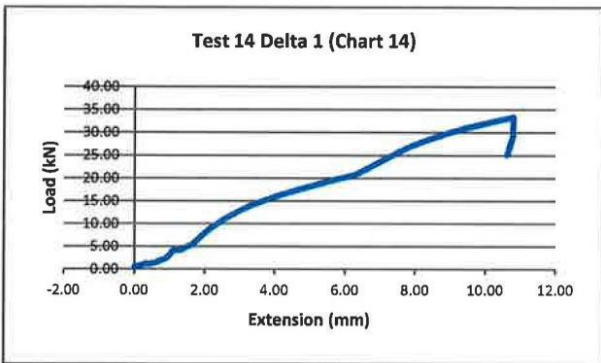
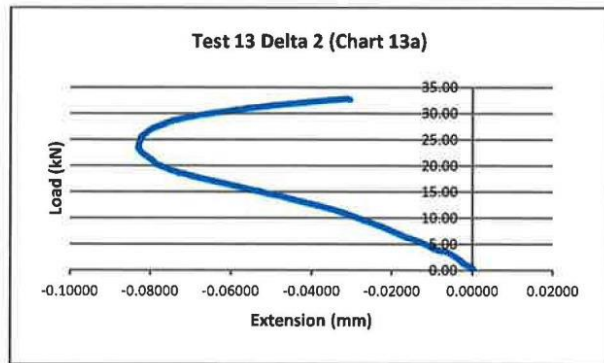
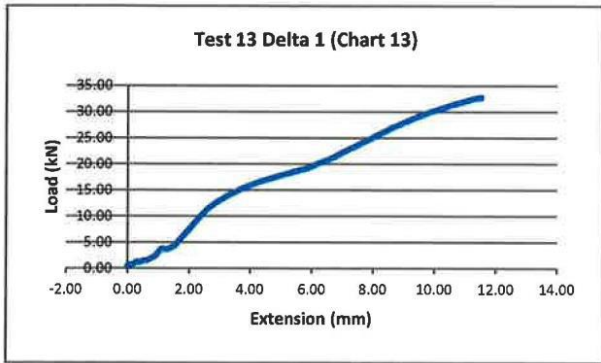
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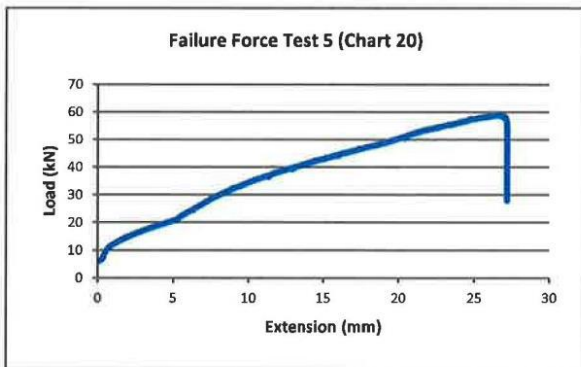
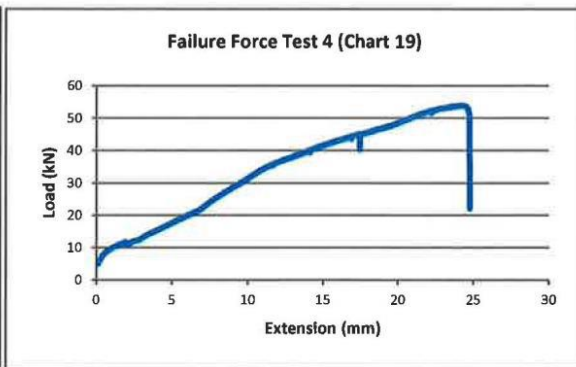
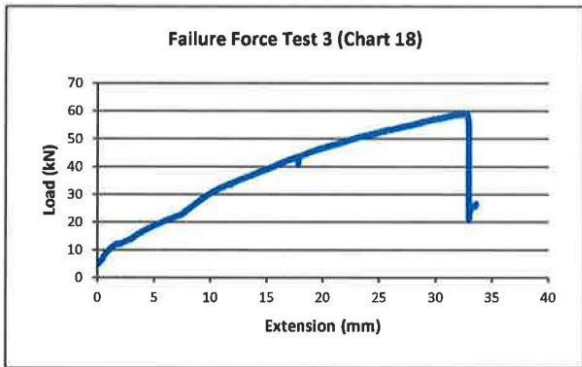
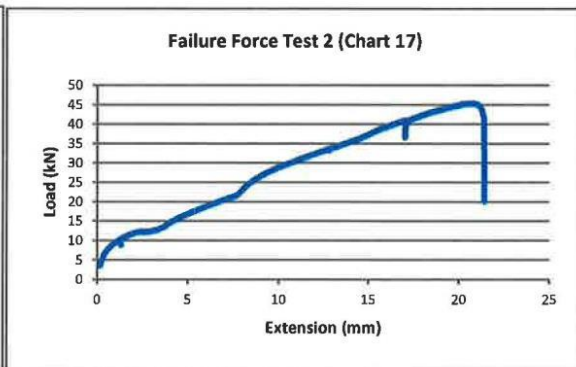
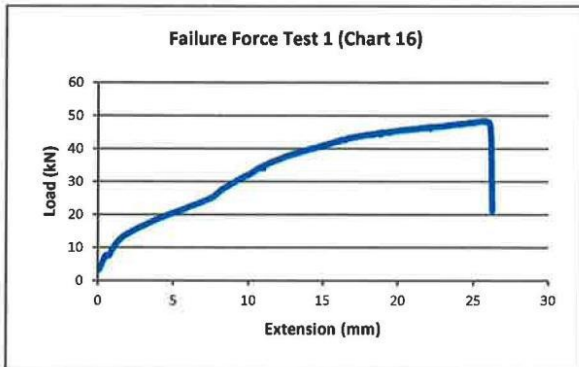
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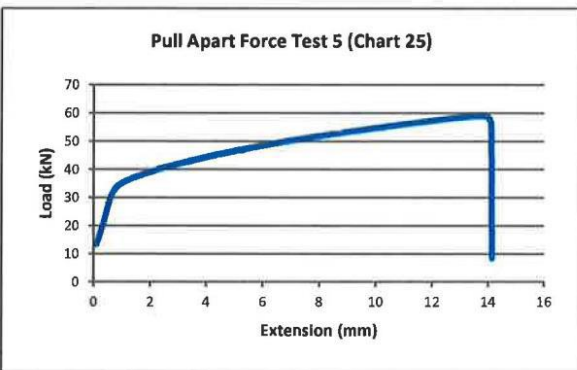
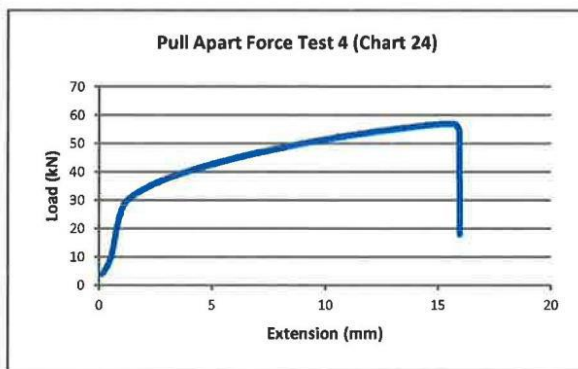
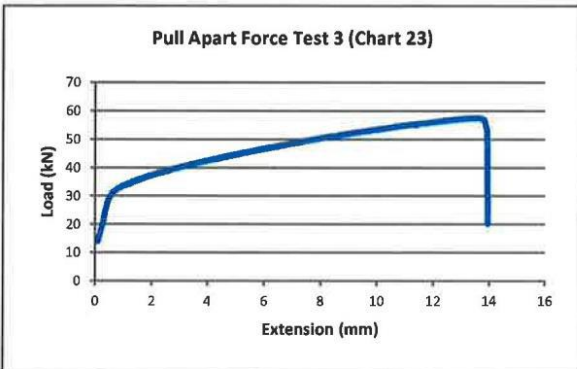
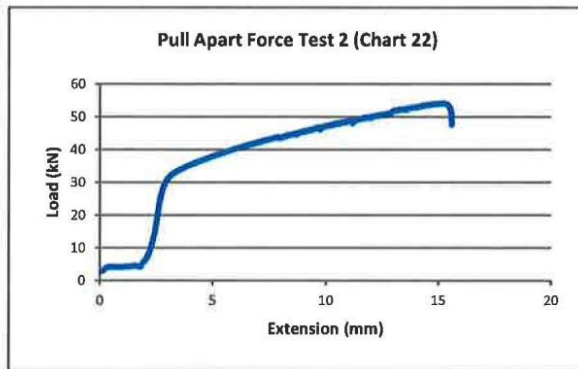
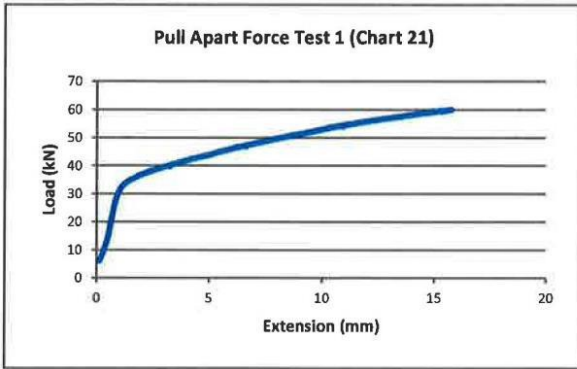
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## Appendix B



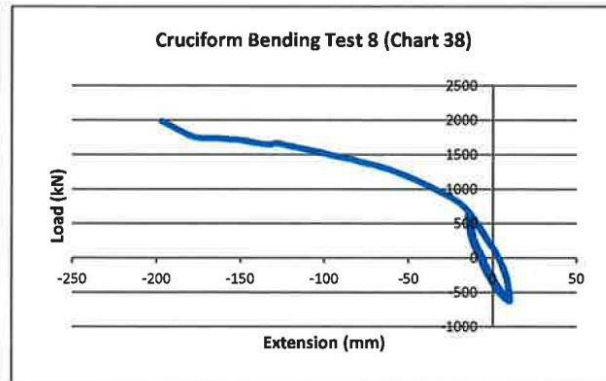
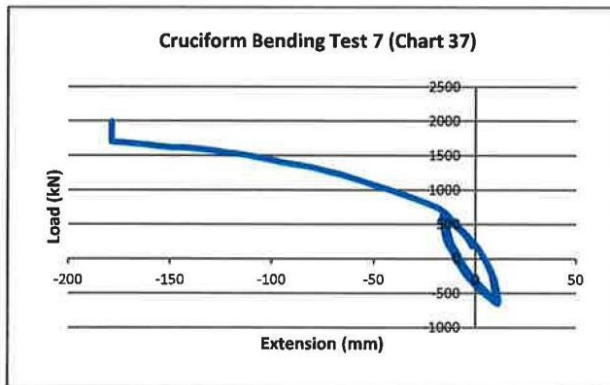
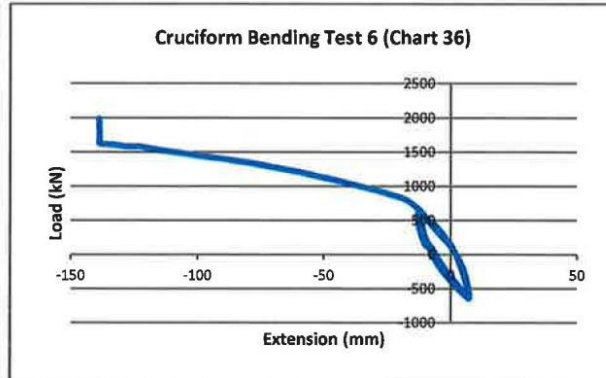
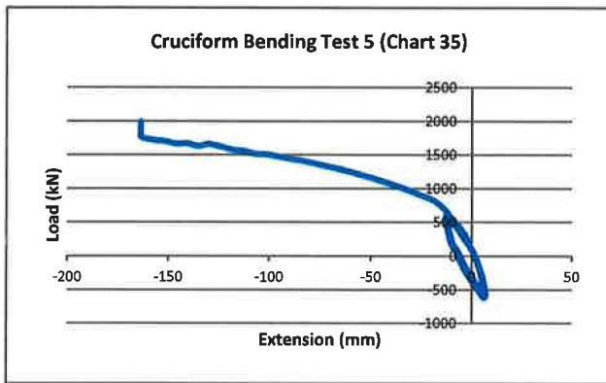
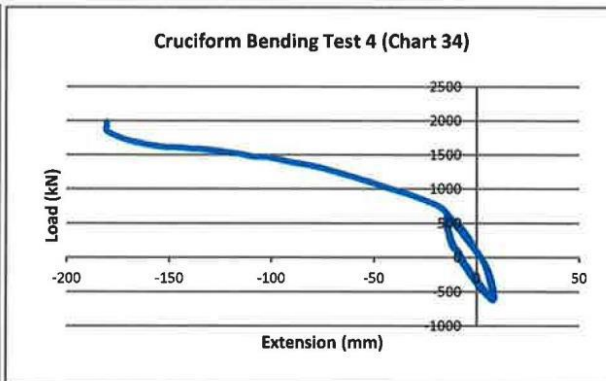
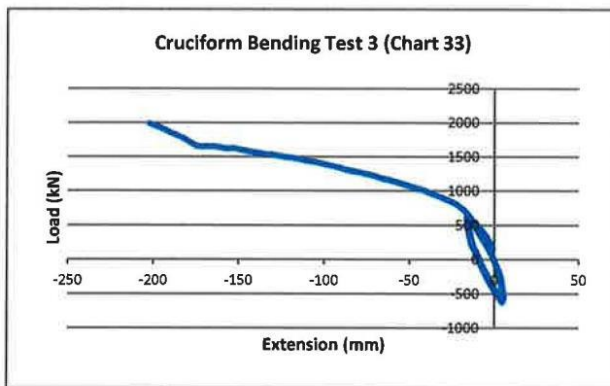
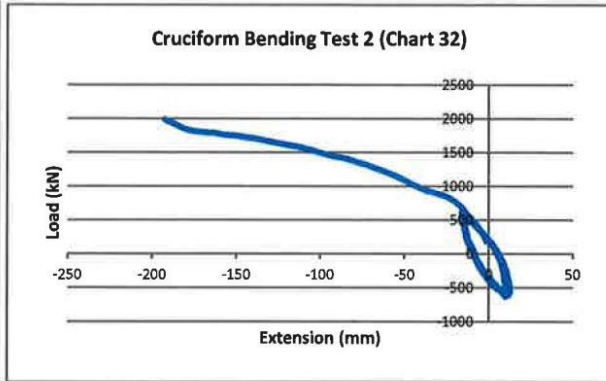
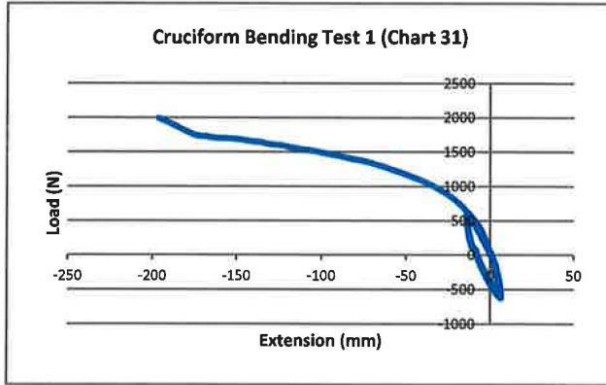
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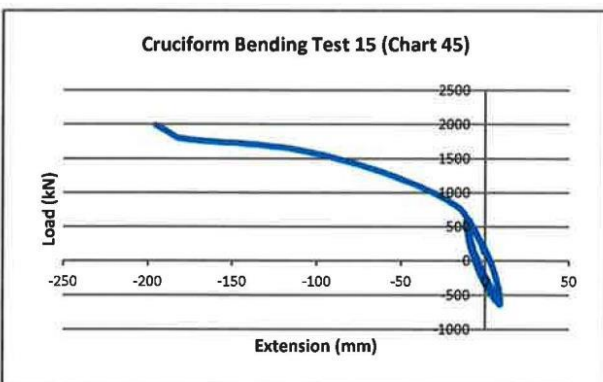
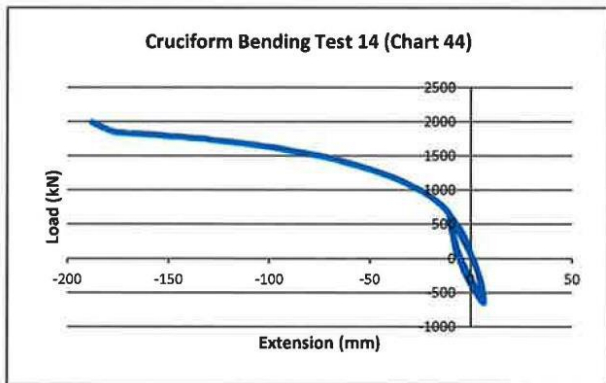
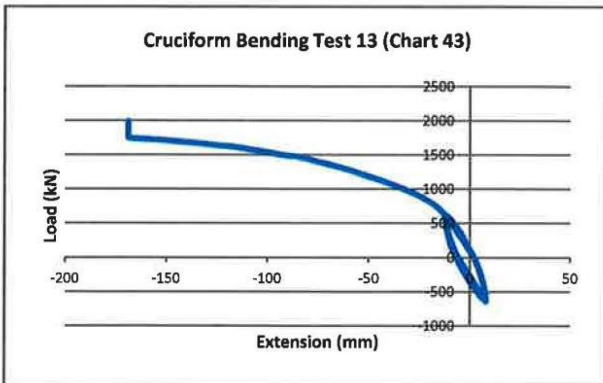
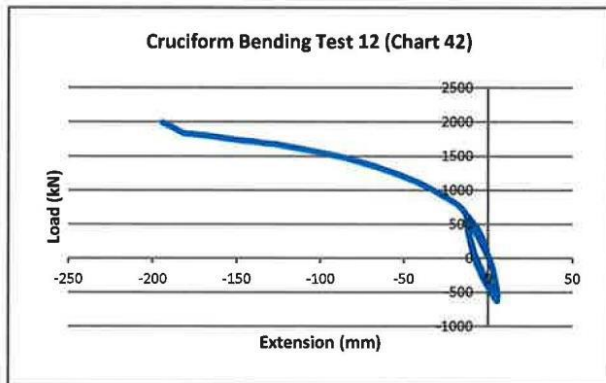
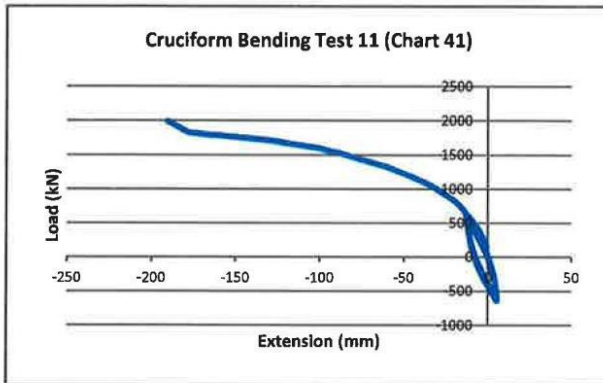
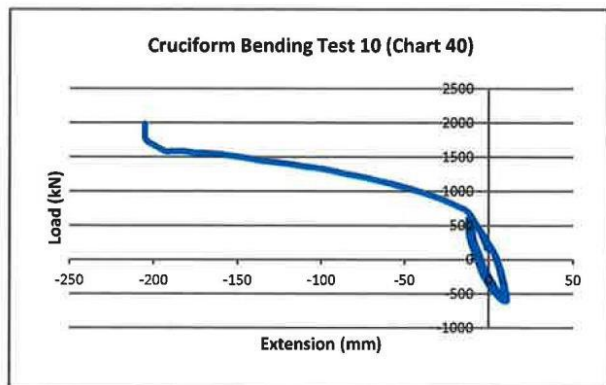
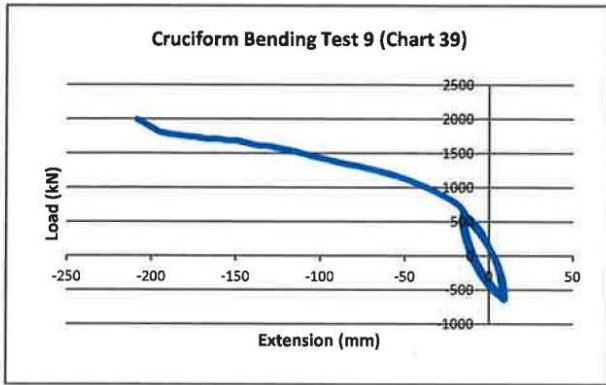
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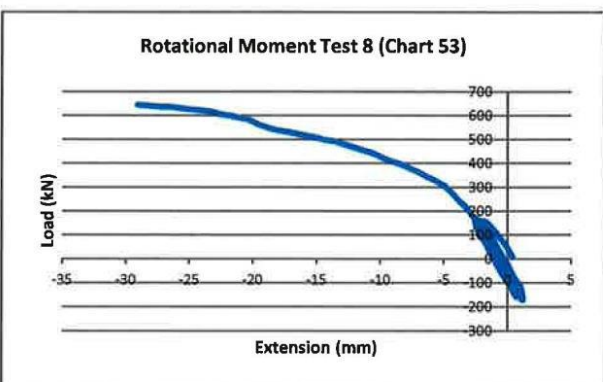
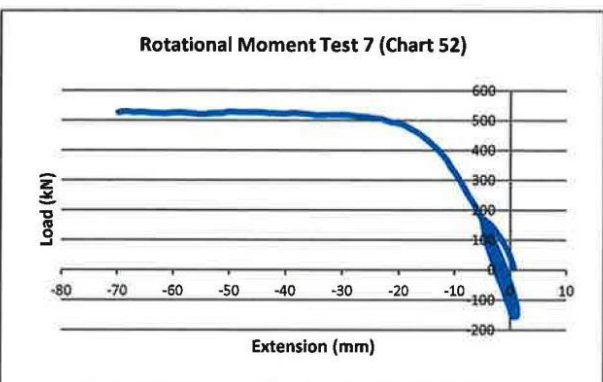
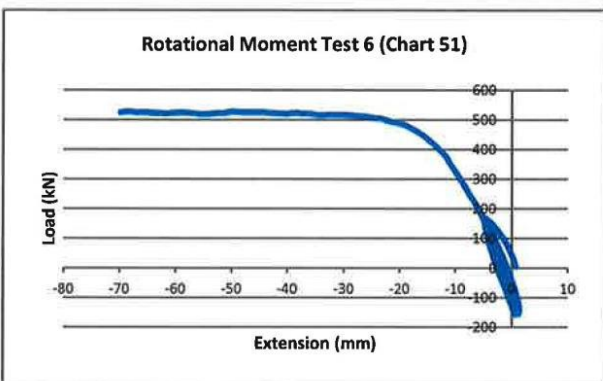
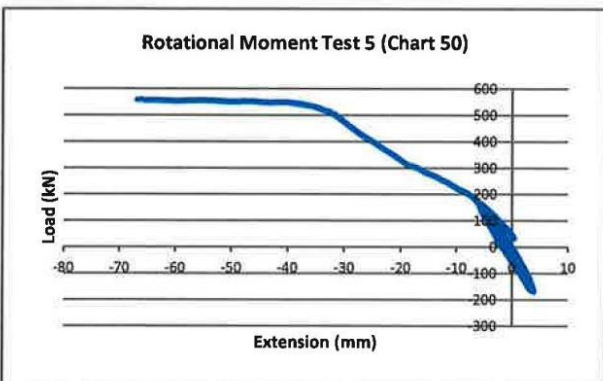
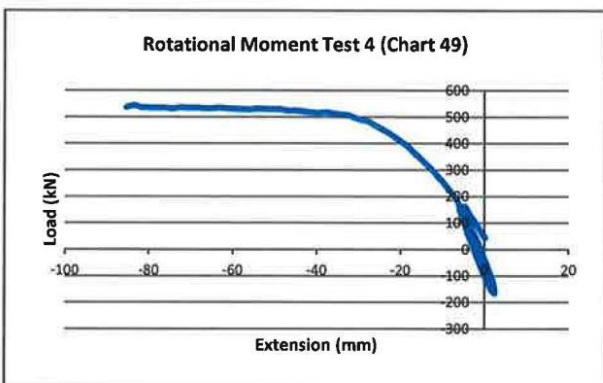
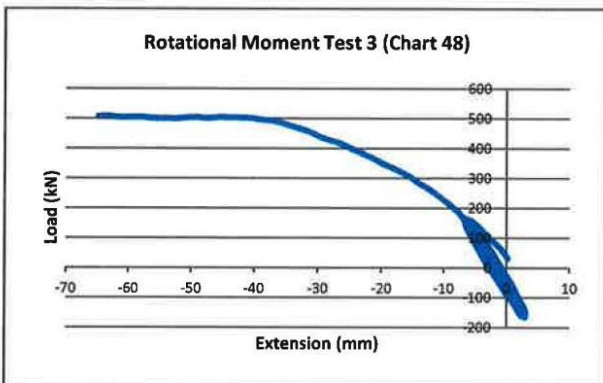
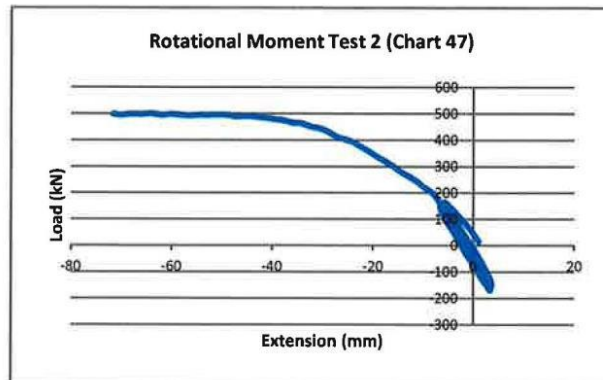
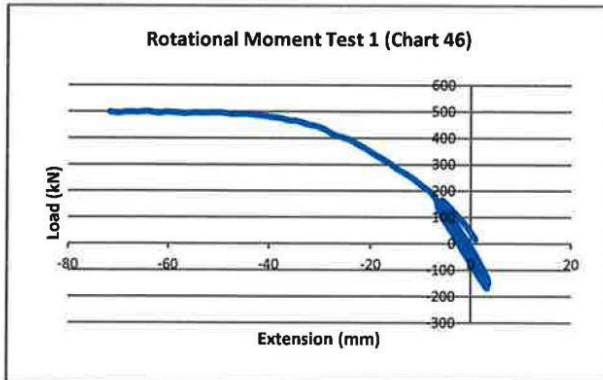
## Appendix C



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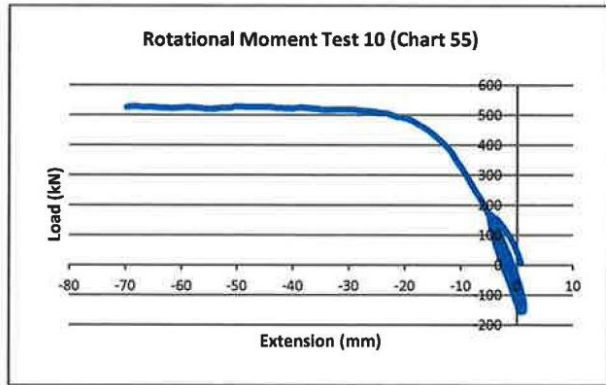
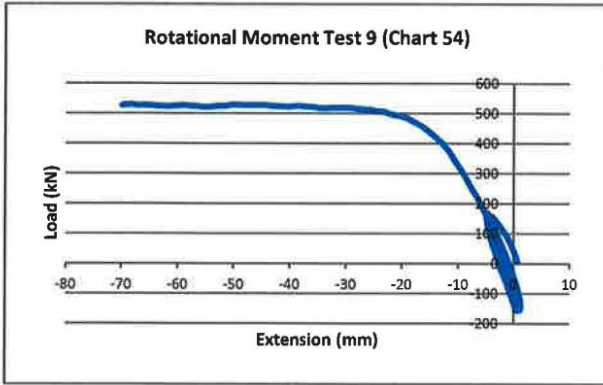


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A handwritten signature in blue ink, appearing to be 'L. M.', is located in the bottom right corner of the page.