



Customer: Nanjing Guhua MetalWork Co Ltd    Order Number : GH001  
Xiongzhou Industrial Park  
Luhe District  
Nanjing, China

Date of Issue: 11/01/2012

Test Date : 04/01/2012  
to  
10/01/2012

This report details the results of prototype tests carried out on Steel Swivel Coupler Drop Forged Zinc Plated 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**

Steel Swivel Coupler Drop Forged Zinc Plated

Marks :    Class A L EN74-1 GH1111G

**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**

Manufactured by:    Nanjing Guhua MetalWork Co Ltd  
Shape:    To drawing GH-64  
Dimensions:    To drawing GH-64, GH-64-01, GH-64-02, GH-03-VO, GH-30-VO, GH-23-VO, GH-51-VO, GH-40-VO  
Mass:    1100 ± 50g  
Material Characteristics:    As stated on drawing No. GH-64  
Surface Protection:    Zinc Plated

**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 marking satisfy the requirements laid out in EN74-1. (A photograph is shown at the end of this report).

**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 and Appendix B.**

Authorised Signatory  
L Mangham  
Mechanical Testing Manager

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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	10.28	20
2	10.61	20
3	9.09	20
4	11.41	20
5	10.19	20
6	10.44	20
7	10.52	20
8	9.99	20
9	8.97	20
10	10.1	20

F <sub>95%</sub>	8.73	20.00
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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	11	20
12	10.29	20
13	9.27	20
14	11.6	20
15	11.42	20

F <sub>95%</sub>	8.52	20.00
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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>95%</sub> figures must be equal to or greater than the requirements stated below.

Requirements from EN 74-1 table 8:

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

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

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

*Signature*





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	29.55
17	29.6
18	33.42
19	30.26
20	28.60
$F_{1.5\%}$	20.91

The  $F_{1.5\%}$  figures must be equal to or greater than the requirements stated below.

Requirements from EN 74-1 table 8:-  
 $P_{f,ult}$  = 20.0kN minimum Right Angle couplers & 14.0kN 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 A 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

Not required for Swivel Copplers

Tested using solid steel bar (RB)	
Test Number	Maximum Load $F_{p,c}$ (kN)
21	N/A
22	N/A
23	N/A
24	N/A
25	N/A
$F_{p,5\%}$	#NUM!

Requirements from EN 74-1 table 8:-

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.

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**Indentation Check**, tested in accordance with clause 7.5

Tested using 2.7mm wall steel tube (RT <sub>82</sub> )	
Test Number	Maximum Indentation $\Delta_{10}$ (mm)
26	0.4
27	0.41
28	0.45
29	0.38
30	0.47

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 A 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**Not required for Swivel Copplers**

Tested using 3.2mm steel tube (RT <sub>81</sub> )			
Test Number	C <sub>q1,MB,C</sub> (kNm/rad)	C <sub>q2,MB,C</sub> (kNm/rad)	M <sub>ult,c</sub> kNm
31	#DIV/0!	#DIV/0!	N/A
32	#DIV/0!	#DIV/0!	N/A
33	#DIV/0!	#DIV/0!	N/A
34	#DIV/0!	#DIV/0!	N/A
35	#DIV/0!	#DIV/0!	N/A
36	#DIV/0!	#DIV/0!	N/A
37	#DIV/0!	#DIV/0!	N/A
38	#DIV/0!	#DIV/0!	N/A
39	#DIV/0!	#DIV/0!	N/A
40	#DIV/0!	#DIV/0!	N/A

M <sub>B,5%</sub>	#DIV/0!	#DIV/0!	#NUM!
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Tested using 4.0mm aluminium tube (RT <sub>A</sub> )			
Test Number	C <sub>q1,MB,C</sub> (kNm/rad)	C <sub>q2,MB,C</sub> (kNm/rad)	M <sub>ult,c</sub> kNm
41	#DIV/0!	#DIV/0!	N/A
42	#DIV/0!	#DIV/0!	N/A
43	#DIV/0!	#DIV/0!	N/A
44	#DIV/0!	#DIV/0!	N/A
45	#DIV/0!	#DIV/0!	N/A

M <sub>B,5%</sub>	#DIV/0!	#DIV/0!	#NUM!
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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>q1,MB,C</sub>	= 15.0 kNm/rad
C <sub>q2,MB,C</sub>	= 6.0 kNm/rad
M <sub>ult,c</sub>	= 1.6 kNm
Aluminium Tube	
C <sub>q1,MB,C</sub>	= 13.0 kNm/rad
C <sub>q2,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

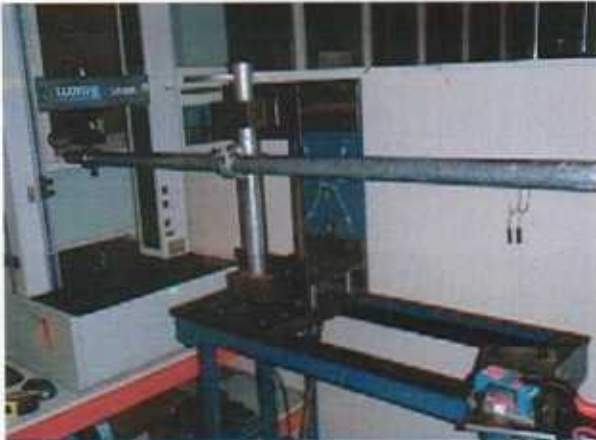
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Cruciform bending is outside our scope of UKAS accreditation





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 **Not required for Swivel Copuplers**

Tested using 4.0mm aluminium tube (RT <sub>A</sub> )		
Test Number	C <sub>q,MT,d</sub> kNm/rad	M <sub>T,d</sub> kNm
46	#DIV/0!	N/A
47	#DIV/0!	N/A
48	#DIV/0!	N/A
49	#DIV/0!	N/A
50	#DIV/0!	N/A

M <sub>T5%</sub>	#DIV/0!	#NUM!
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Tested using 4.0mm aluminium tube (RT <sub>A</sub> )		
Test Number	C <sub>q,MT,c</sub> kNm/rad	M <sub>T,c</sub> kNm
51	#DIV/0!	N/A
52	#DIV/0!	N/A
53	#DIV/0!	N/A
54	#DIV/0!	N/A
55	#DIV/0!	N/A

M <sub>T5%</sub>	#DIV/0!	#NUM!
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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.

The F<sub>5%</sub> figures must be equal to or greater than the requirements stated below.

Requirements from EN 74-1 table 8:

Steel and Aluminium Tube	
C <sub>q,MT,c</sub>	= 7.5 kNm/rad
M <sub>T,c</sub>	= 0.13 kNm

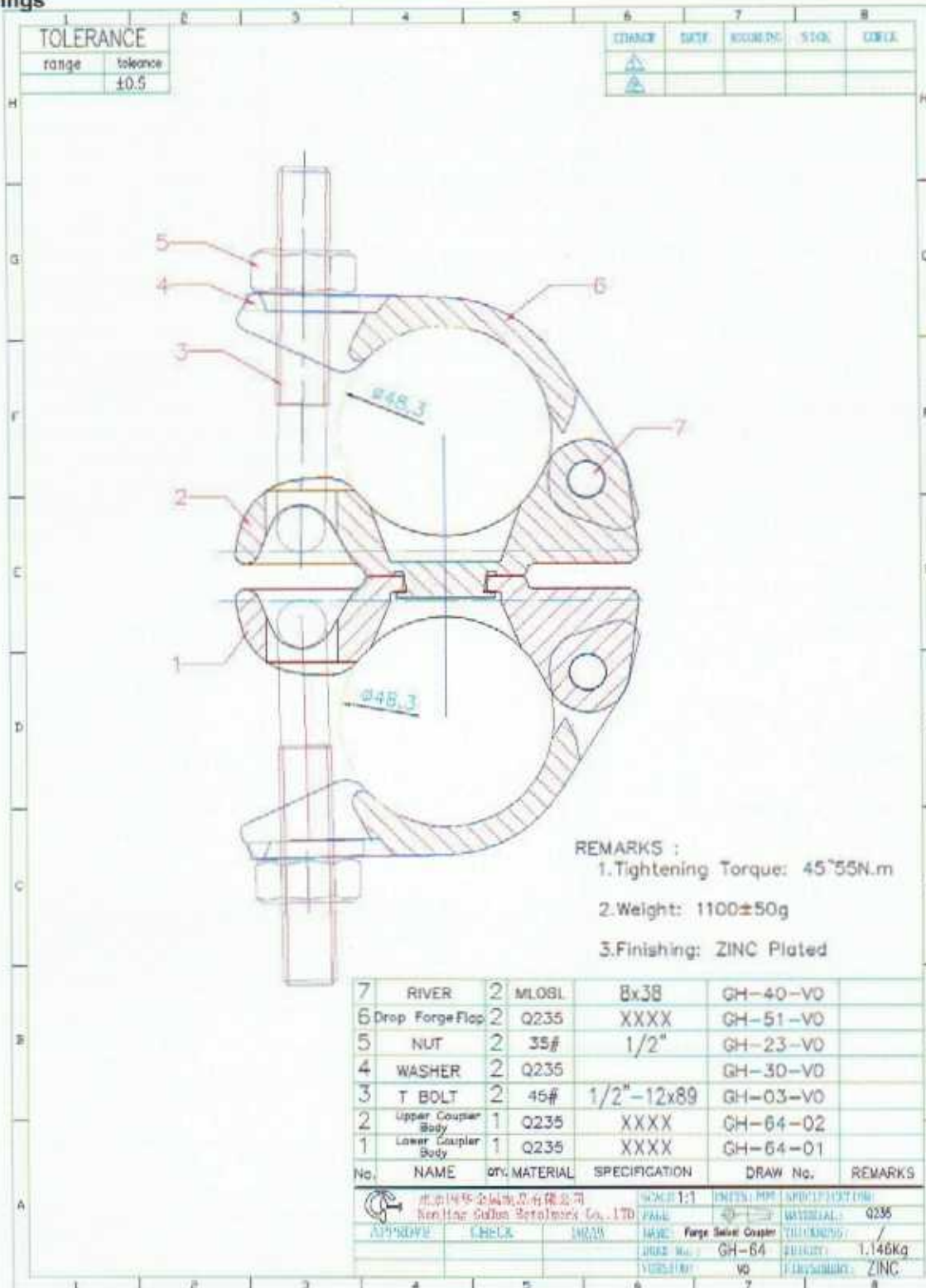
Rotation Stiffness and Moment is outside our scope of UKAS accreditation

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

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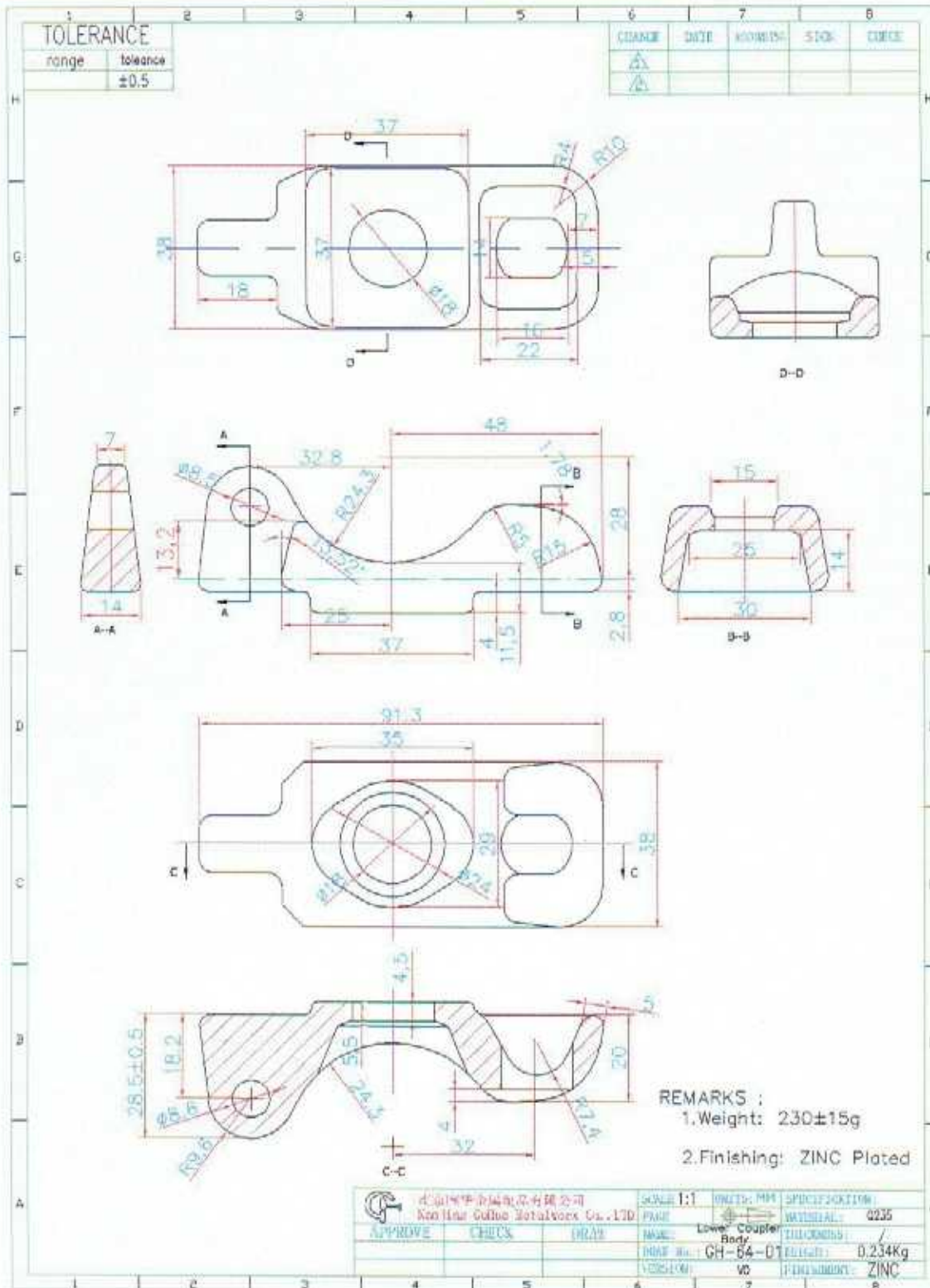


Drawings



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TOLERANCE		CHANGE	DATE	RECORDING	STOCK	CHECK
range	tolerance					
	±0.5					

REMARKS :

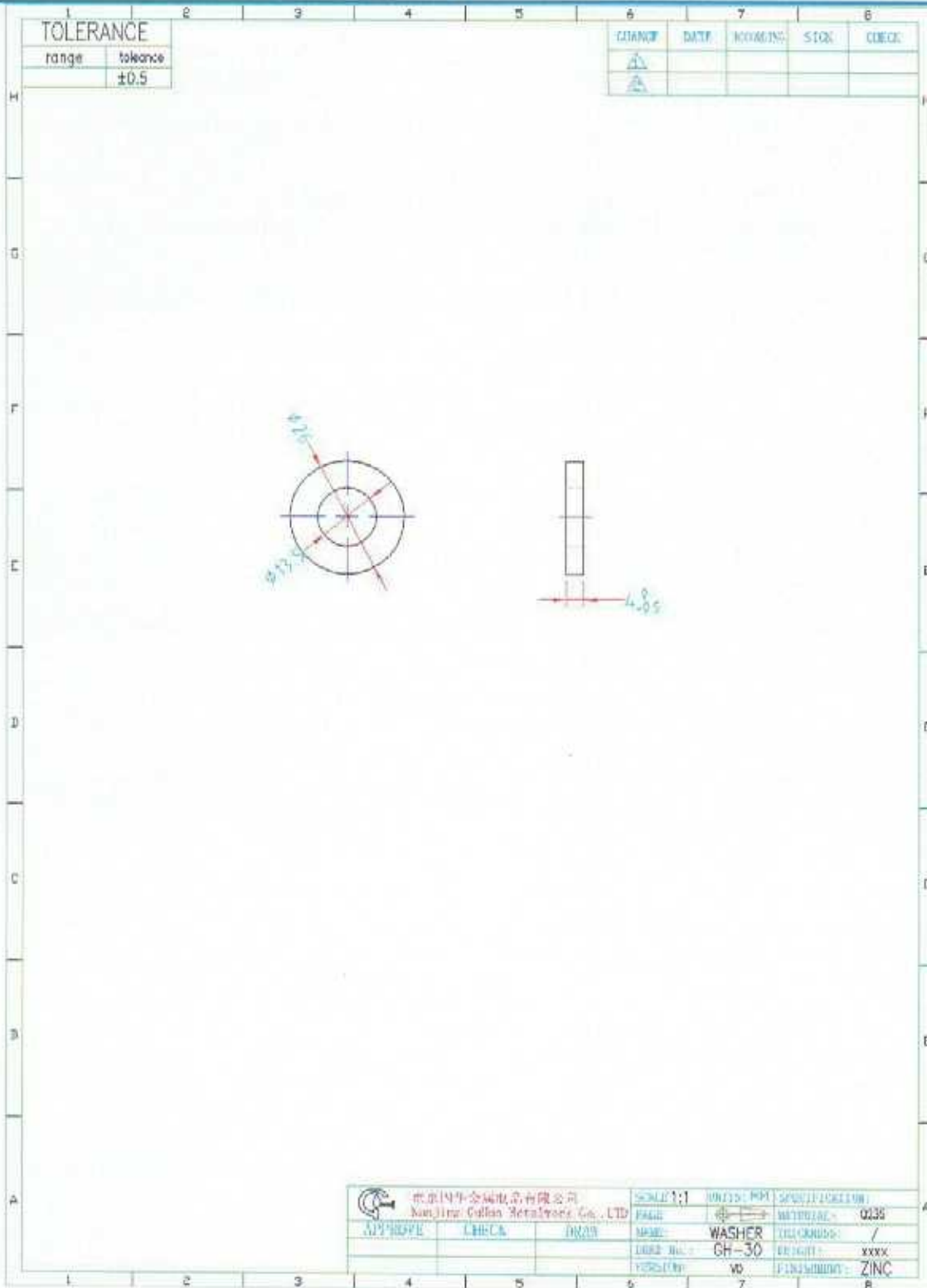
1. Not allowed any quench crack and rusty on the surface
2. Dimension of forge crack must less than 0.36mm
3. Bolt grade: 8.8
4. Rotation moment must over 134N.m
5. Quantity: 2

			SCALE: 1:1	UNITS: MM	SPECIFICATION
Kanlian-Gulha Bolts&Nuts Co., Ltd			FILE:		MATERIAL: 45#
APPROVE	CHECK	DRAW	NAME:	T BOLT	ADDRESS: /
			DRAW NO.:	GH-03	PHONE: xxxx
			VERSION:	V0	FINISHING: ZINC

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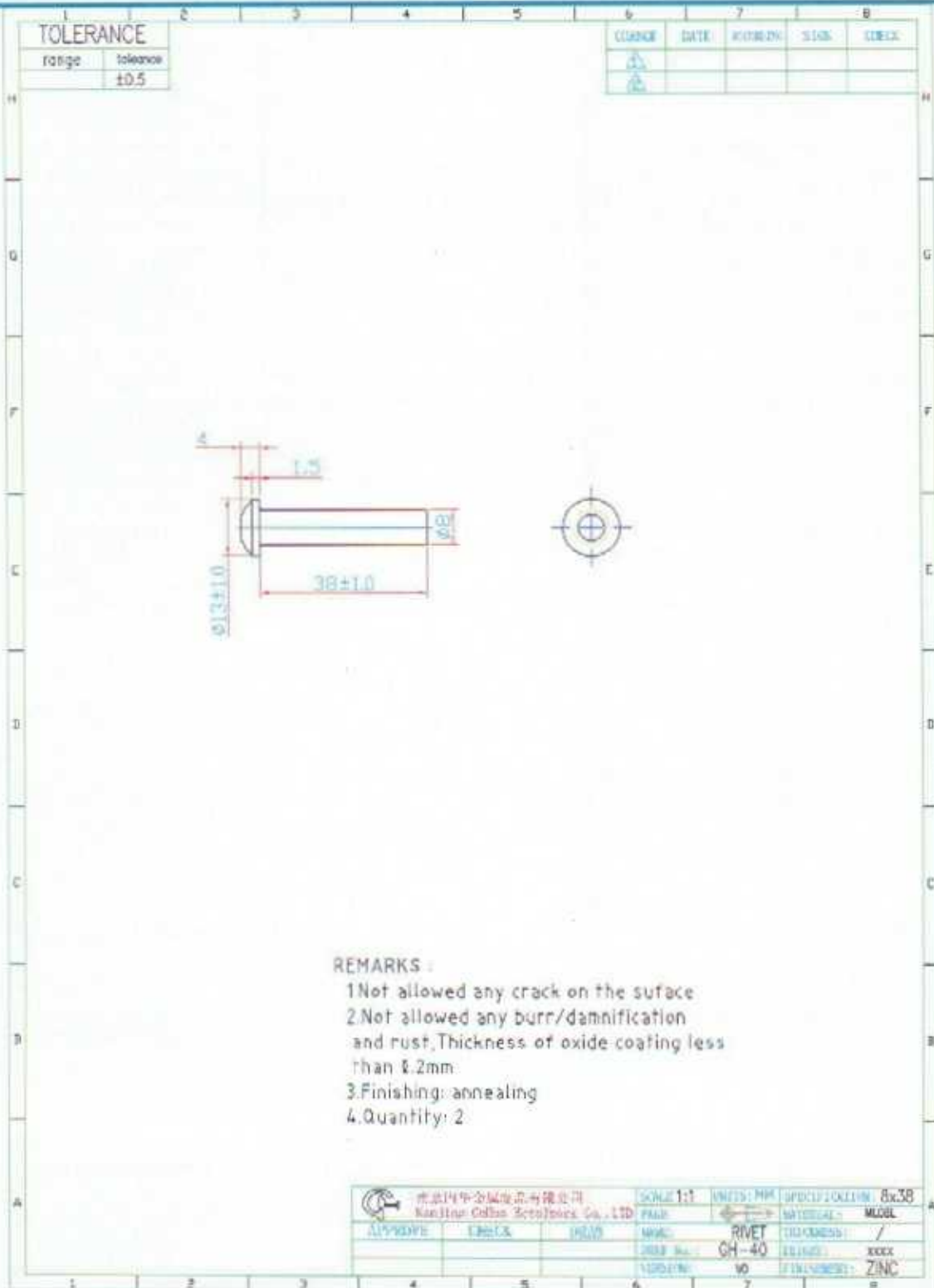




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Photograph of markings on the coupler



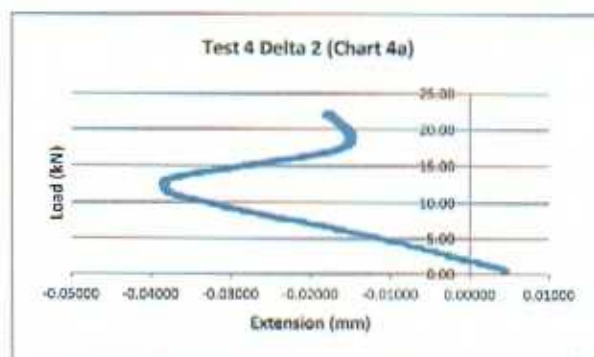
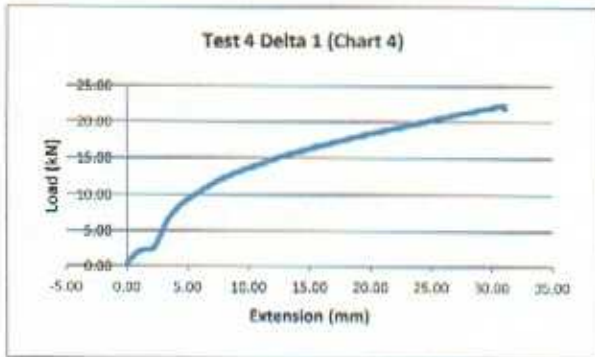
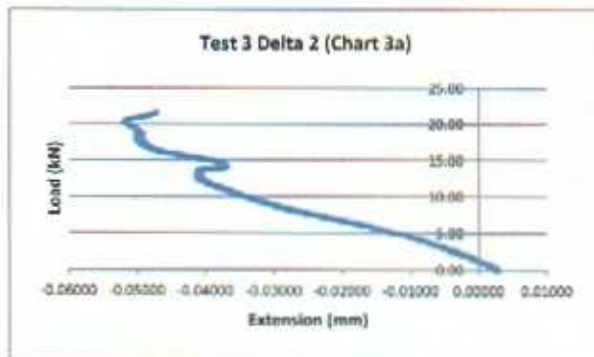
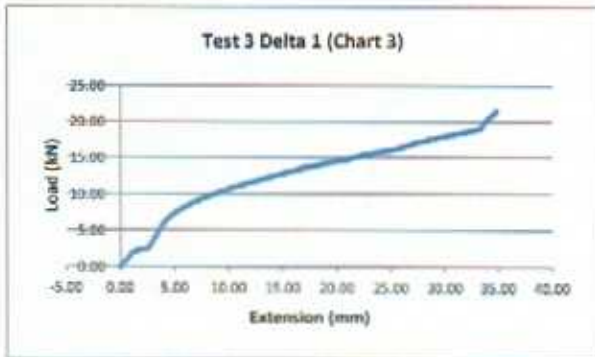
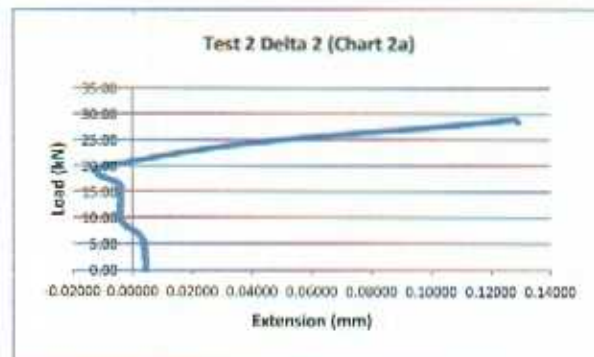
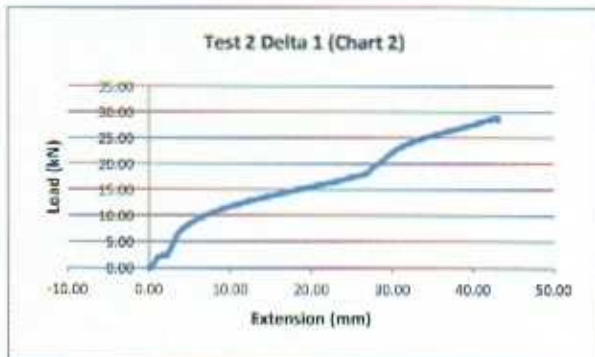
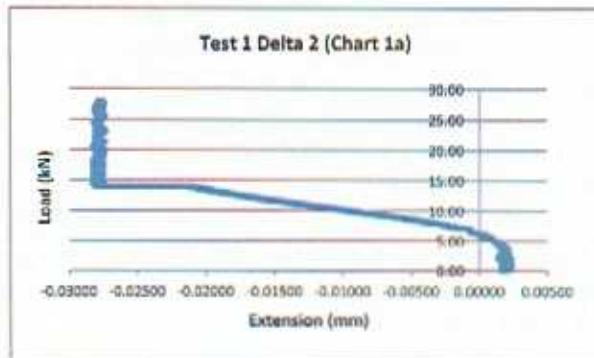
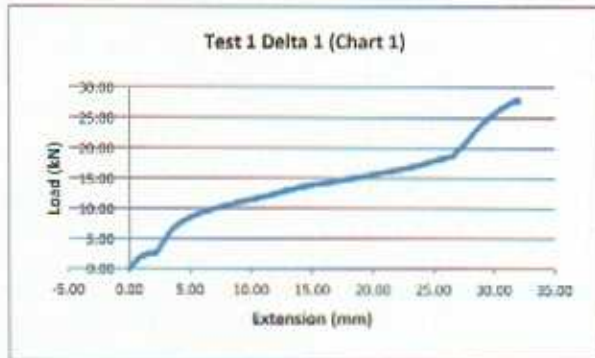
End of Report

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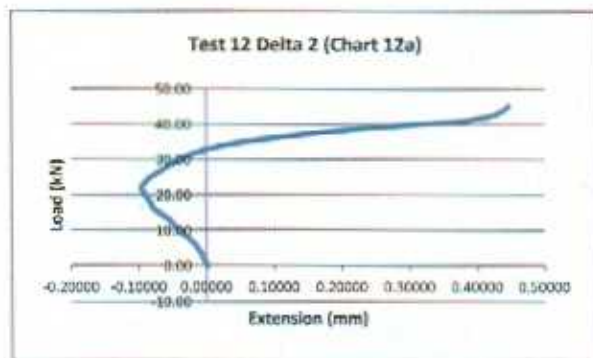
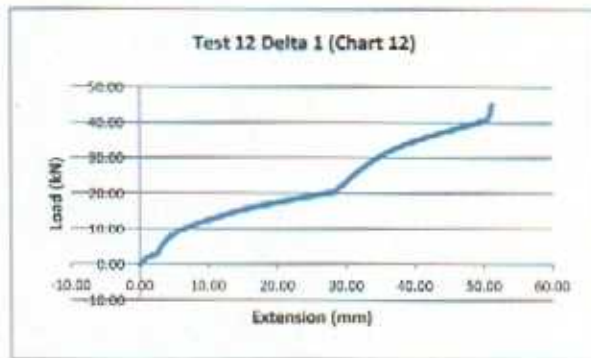
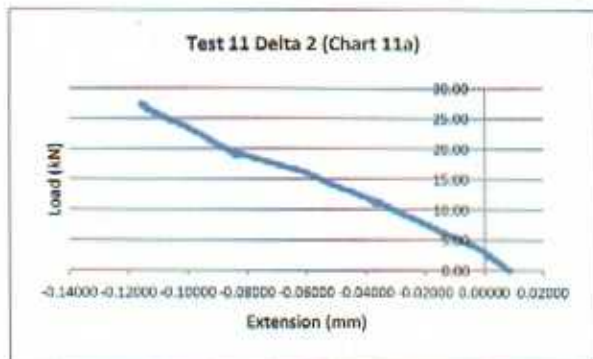
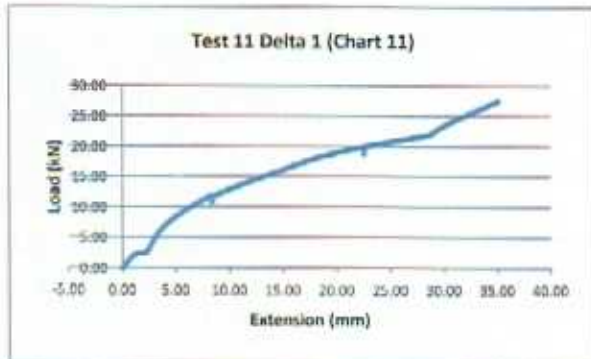
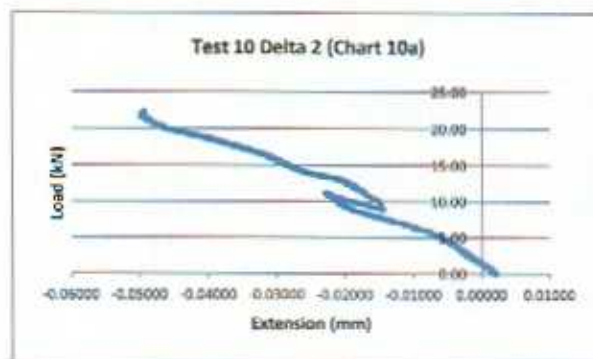
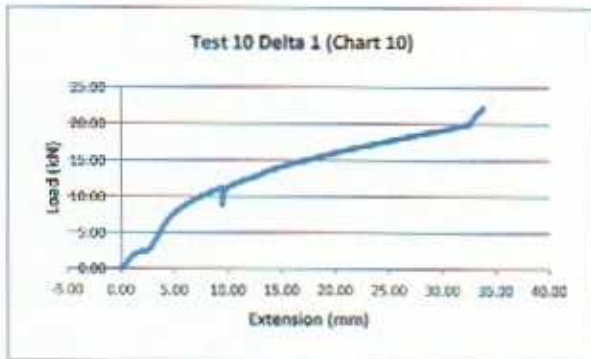
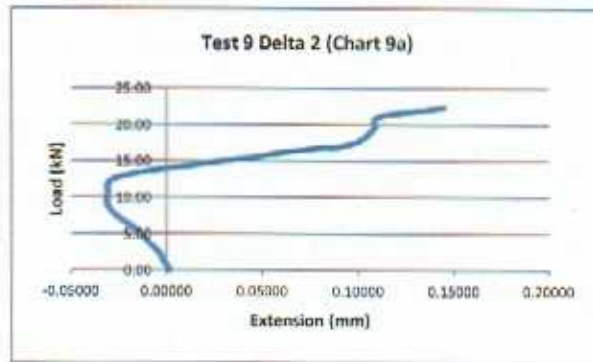
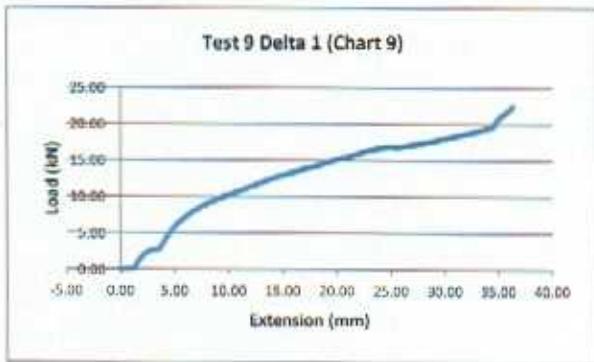
Appendix A



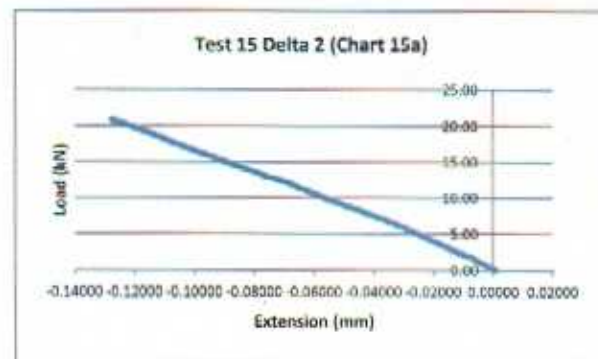
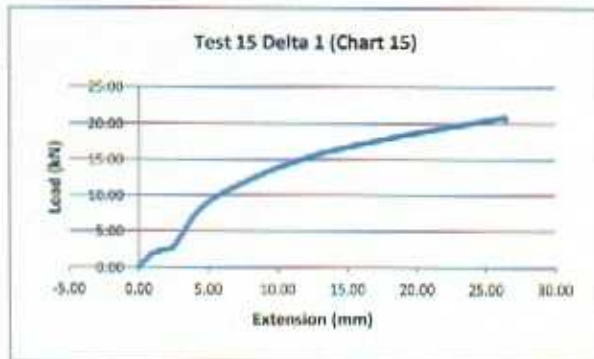
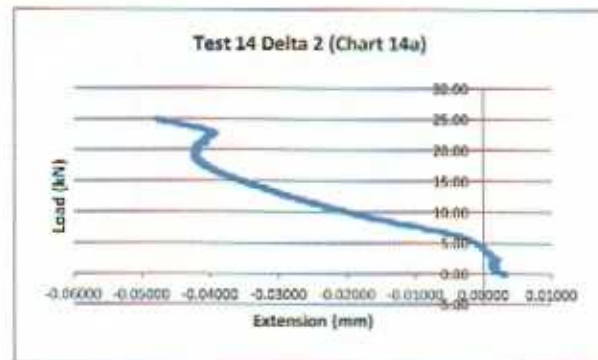
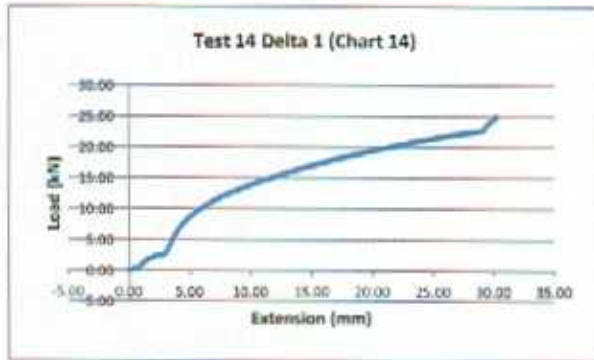
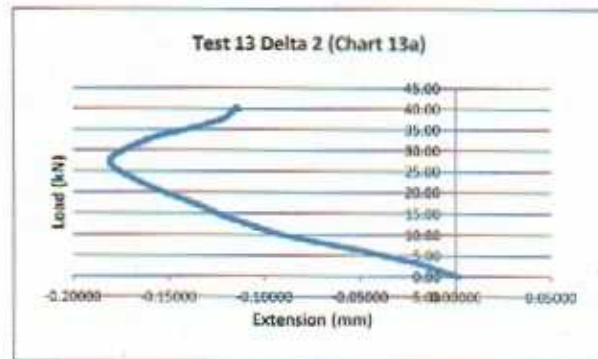
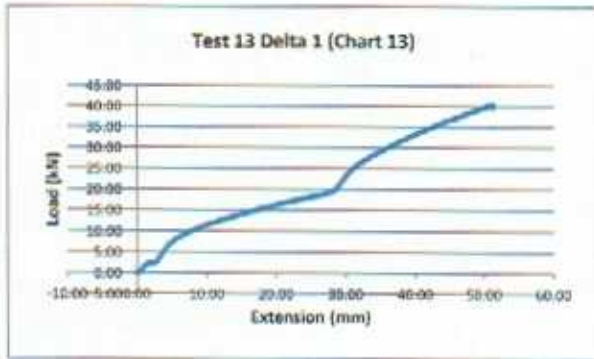
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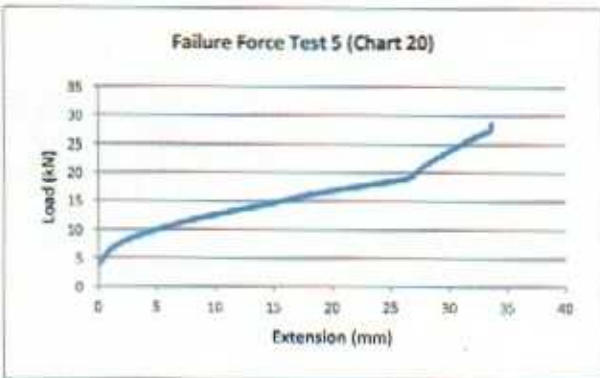
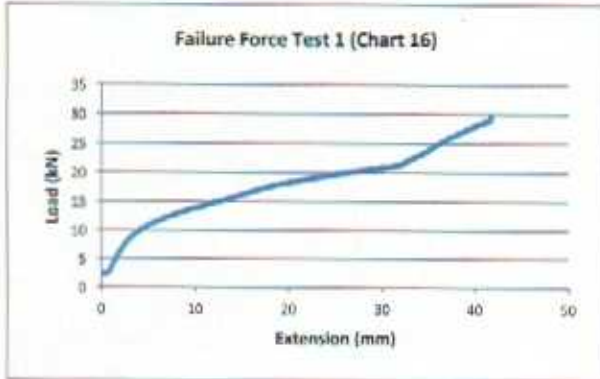
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Appendix B



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