



SHEAR TEST

CLIENT: CJ O'Shea

SITE ADDRESS: 42-45 Belsize
Park, London,
NW3 4EE

REPORT NUMBER: SC-550-ST-001

JOB NUMBER: SC-0550

Test Procedure Requirements:

BS 8539:2012 Code of practice for the selection and installation of post-installed anchors in concrete and masonry

BS 8580-2:1986 Code of practice for the selection and installation of post-installed anchors in concrete and masonry.

CFA Procedure for Site Testing Construction Fixings 2012

TEST DETAILS:

- There are 10no. Shear tests in total
- These tests were carried out on 12mm diameter Hilti V-R anchors.
- The bar had been resin fixed into the internal of the retained brick wall elevation using Hilti Hit HY-70 max.
- These bolts were being tested to failure.

FAILURE CRITERIA:

These tests are being carried out to the point of failure.

The failure load will be recorded as:

- The point at which either the base material will fail (Brick crushing) this is taken at a point of > 12mm movement.
- The point at which the anchor fails in shear (steel failure)
- The point at which there is bond failure withere between the bolt and the resin or the resin and the brick (Pry out).
- In all of the tests the failure was noted by hearing the masonry crack and crush under load. The test was then stopped and a visual inspection carried out which showed the base material failure

REPORT BY: Theodoros Isokratous

CHECKED

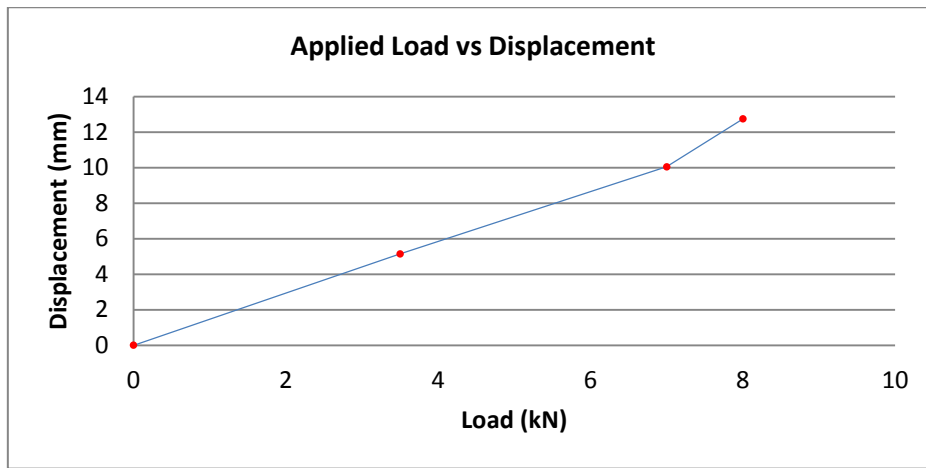
BY: Conor McHugh

DATE: 9th August 2013

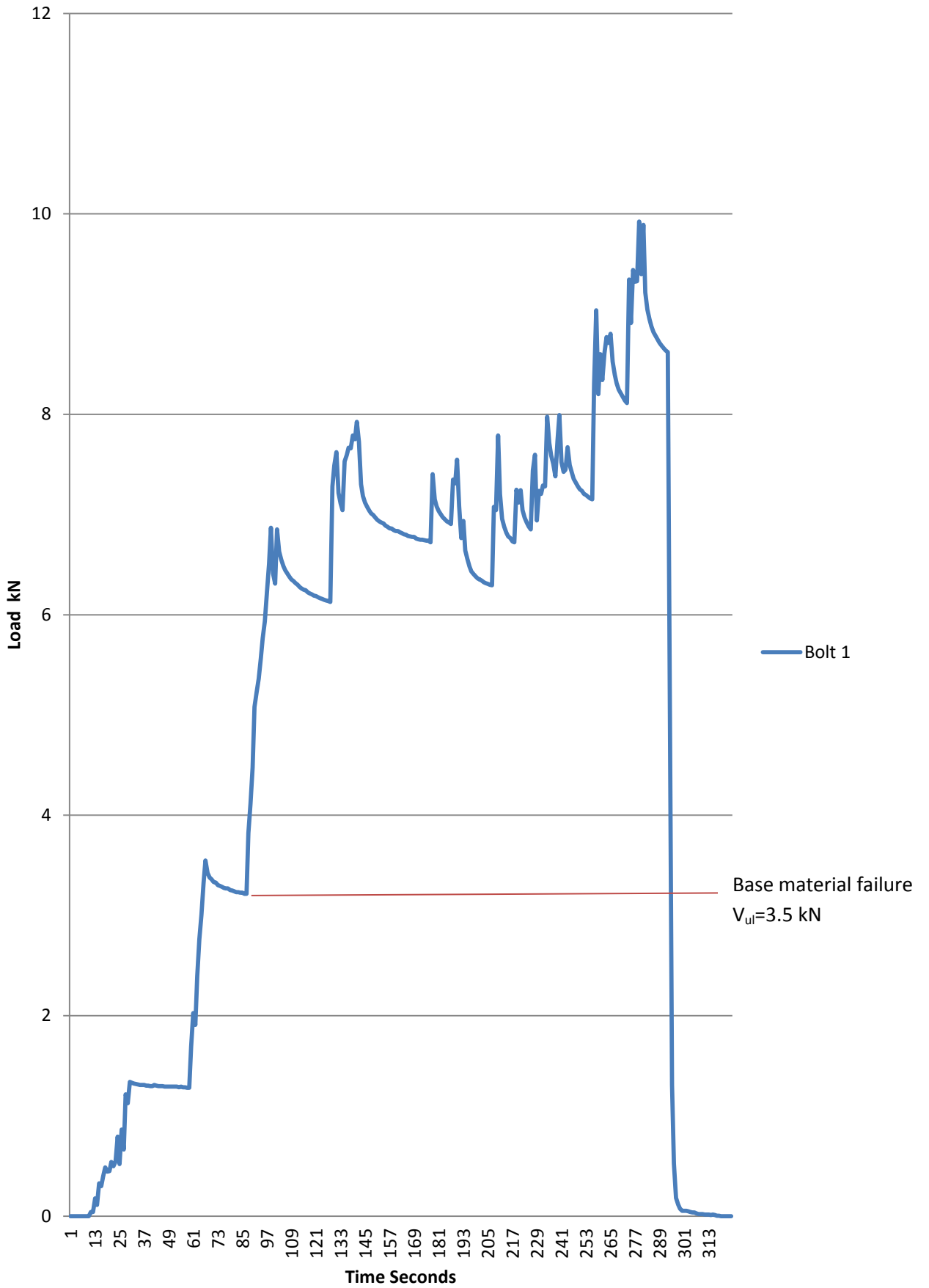
GENERAL INFORMATION	
Test Carried Out By	Conor McHugh - Theodoros Isokratous
Date of Test	7th August 2013
Purpose of Test	Calculate allowable resistance
Test Requested By	Niall O'Shea
Report Number	SC-0550-PT-01
Clients Contact	Niall O'Shea
Anchors Installed By	Mr P Singh (C J O'Shea)
ANCHOR DETAILS	
Anchor manufacturer	Hilti
Anchor Type, Size and Finish	Hilti HIT-V M12
Purpose of Anchor	Façade retention
Characteristic Resistance	
Design Resistance	
TEST DETAILS	
Type of Loading	Shear Load - Incremental
Proof or Allowable Resistance	Allowable resistance
Required Proof Load	Test to failure
TEST LOCATION	
Location	Façade
Anchor reference	1-10
Edge Distance	n/a
Centre Spacing	n/a
BASE MATERIAL	
Material type and Strength	Solid Bricks
Thickness	Unknow
INSTALLATION DETAILS	
Hole Diameter	
Drill Bit Cutting Diameter	
Hole Depth	
Resin Type	Hilt HIT-HY max
Embedment Depth	
Hole Cleaning Method	
Temperature When Installed	
Manufacturer Curing Time	
Actual Curing Time Allowed	
TEST EQUIPMENT	
Hydraulic Jack	HSS256 Hi Force :BB6677
Hydraulic Pump	HP110 Hi Force: DL2217
Pressure Gauge	DL2217
Measurement Gauge	Dti01

BOLT #1 - Ground Floor		
LOAD APPLIED	GAUGE READING	DISPLACEMENT
kN	mm	mm
0	18.75	0
3.5	13.6	5.15
7	8.7	10.05
8	6	12.75

Base material Fail

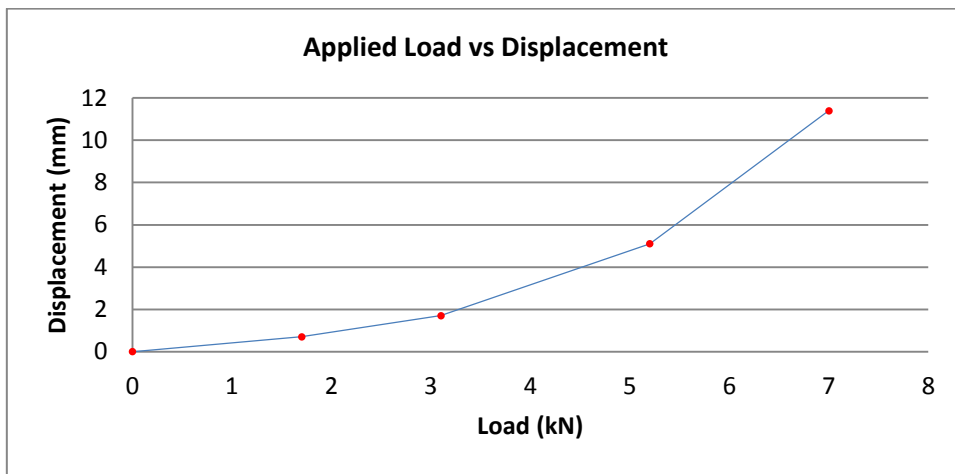


Bolt 1

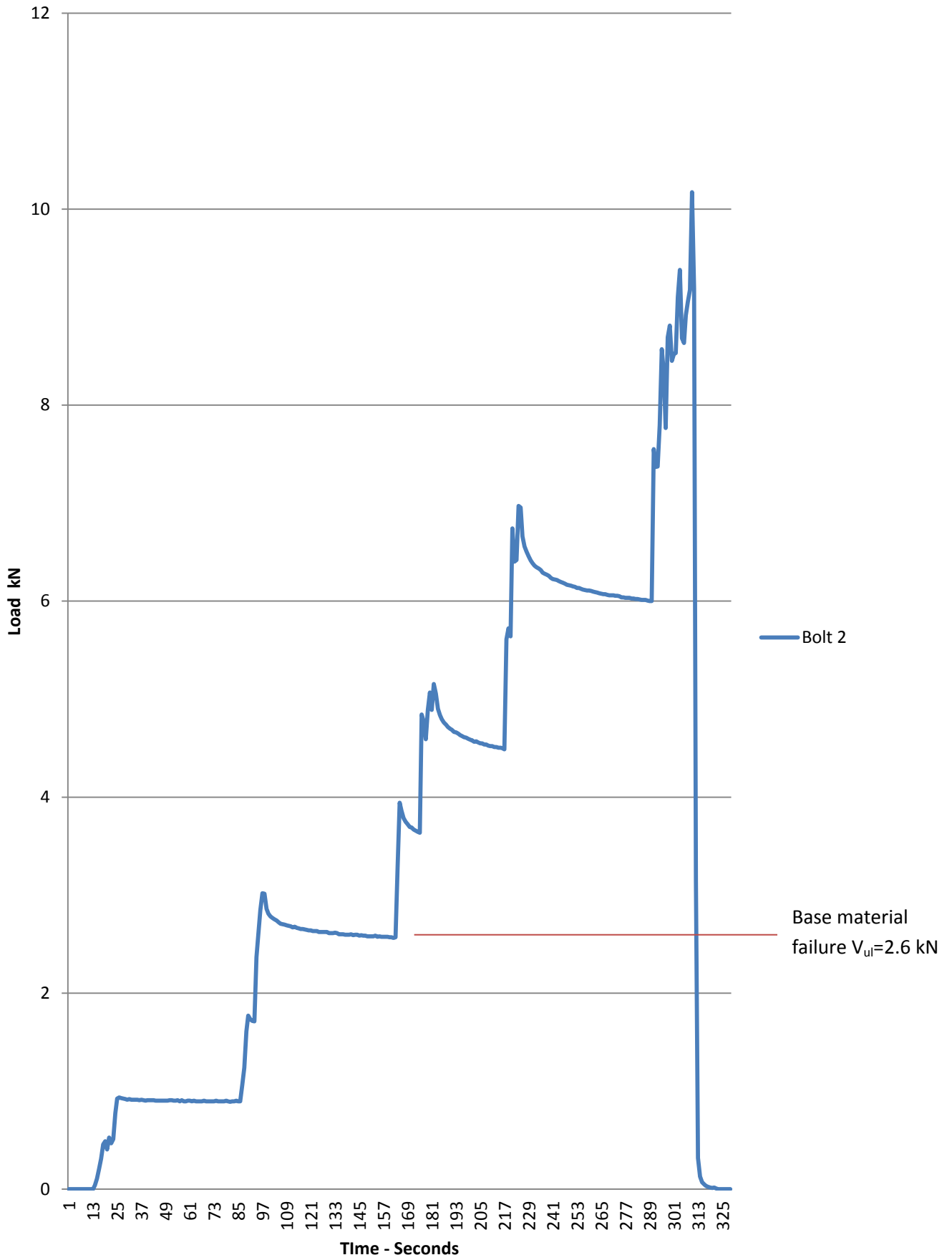


BOLT #2 - Ground Floor		
LOAD APPLIED	GAUGE READING	DISPLACEMENT
kN	mm	mm
0	19.4	0
1.7	18.7	0.70
2.6	17.7	1.70
5.2	14.3	5.10
7	8	11.40

Base material Fail

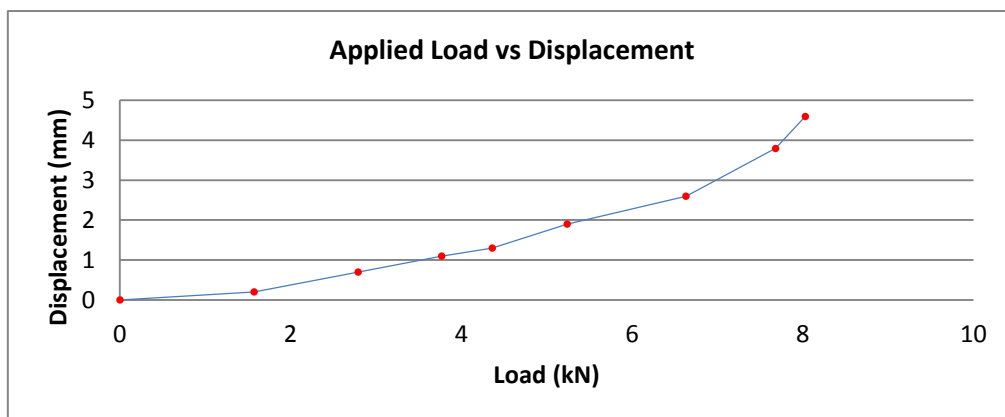


Bolt 2



BOLT #3 - Ground Floor		
LOAD APPLIED	GAUGE READING	DISPLACEMENT
kN	mm	mm
0	20.6	0
1.52	20.4	0.20
2.79	19.9	0.70
3.77	19.5	1.10
4.36	19.3	1.30
5.24	18.7	1.90
6.63	18	2.60
7.68	16.8	3.80
8.03	16	4.60

Base material Fail

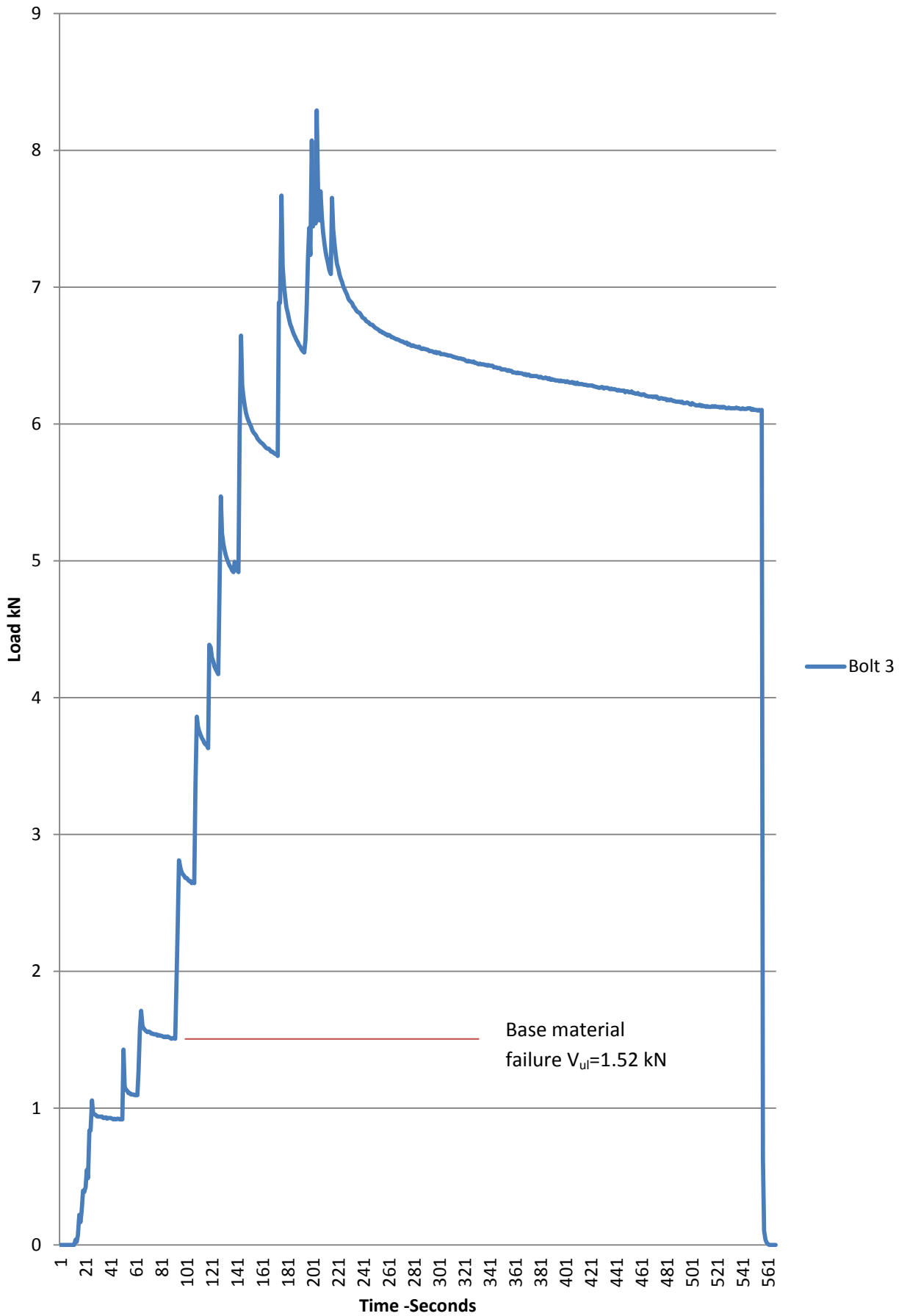


Before Testing



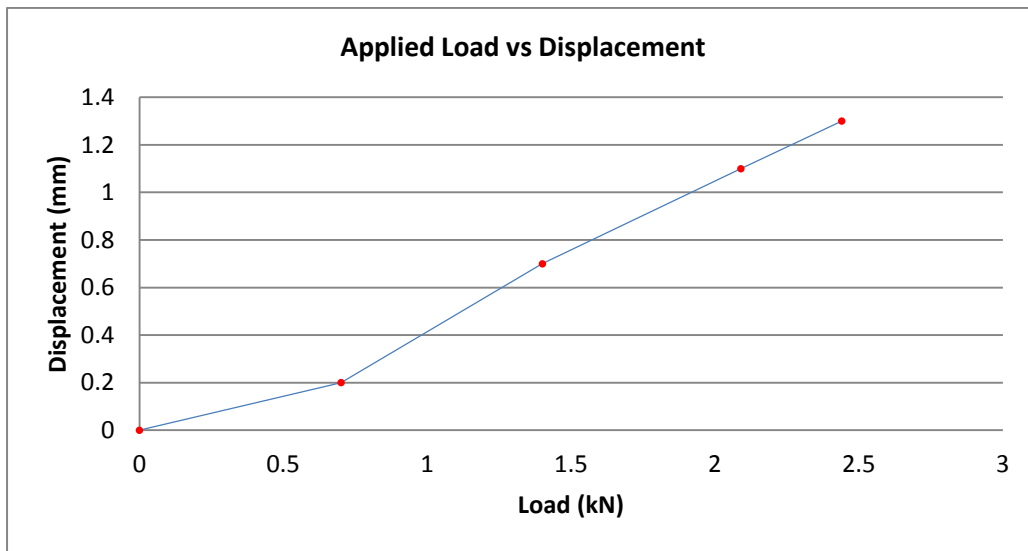
After Testing

Bolt 3

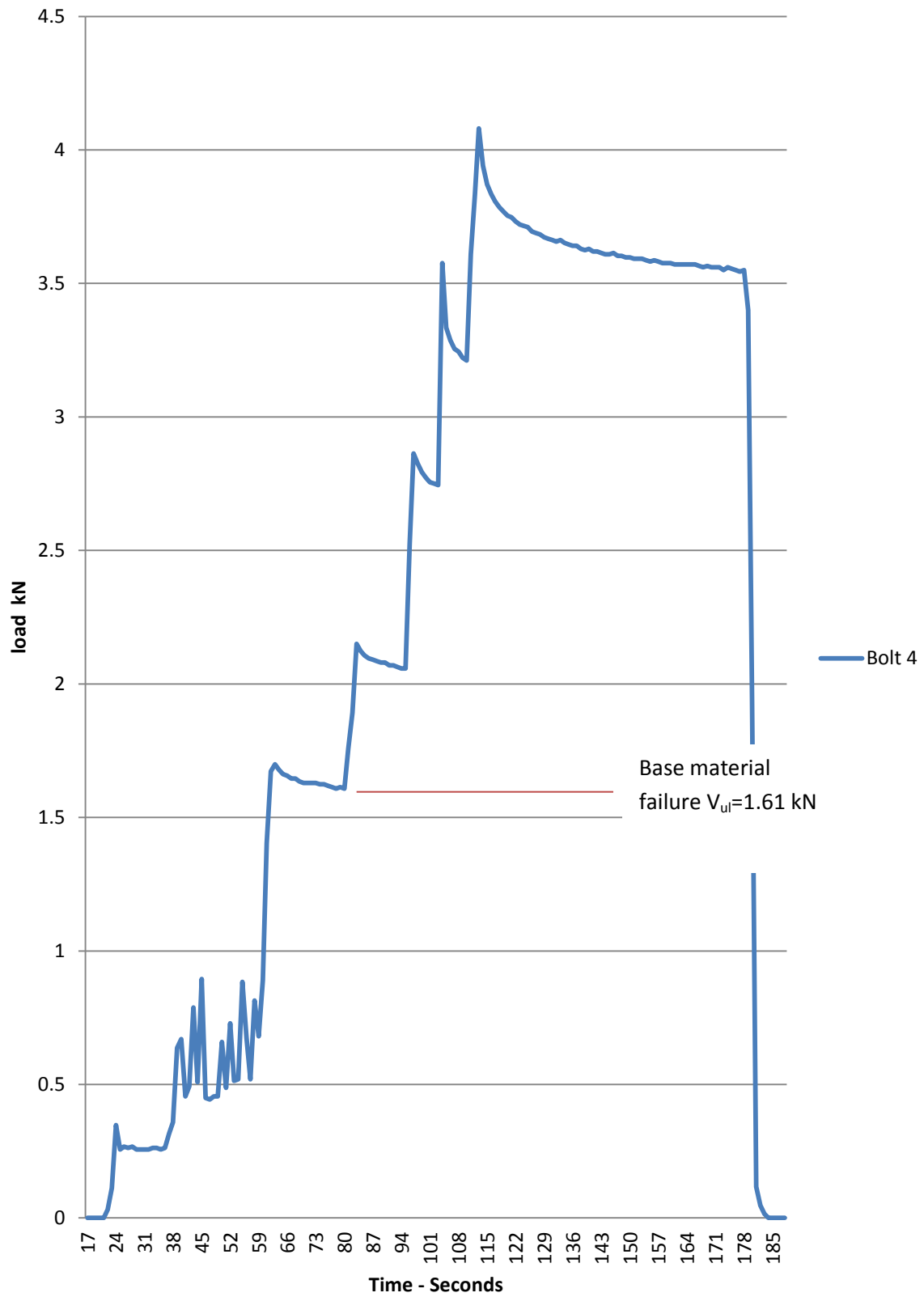


BOLT #4 - Ground Floor		
LOAD APPLIED	GAUGE READING	DISPLACEMENT
kN	mm	mm
0	20.6	0
0.7	20.4	0.20
1.61	19.9	0.70
2.09	19.5	1.10
2.44	19.3	1.30

Base material Fail

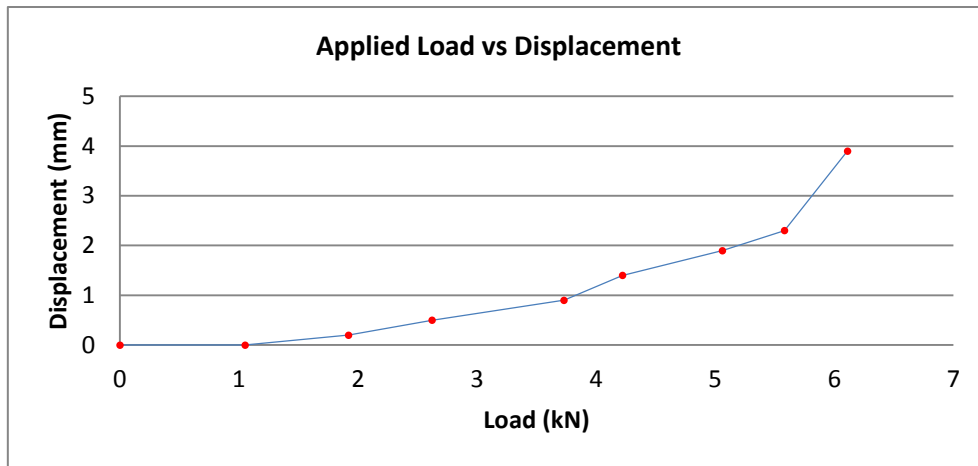


Bolt 4

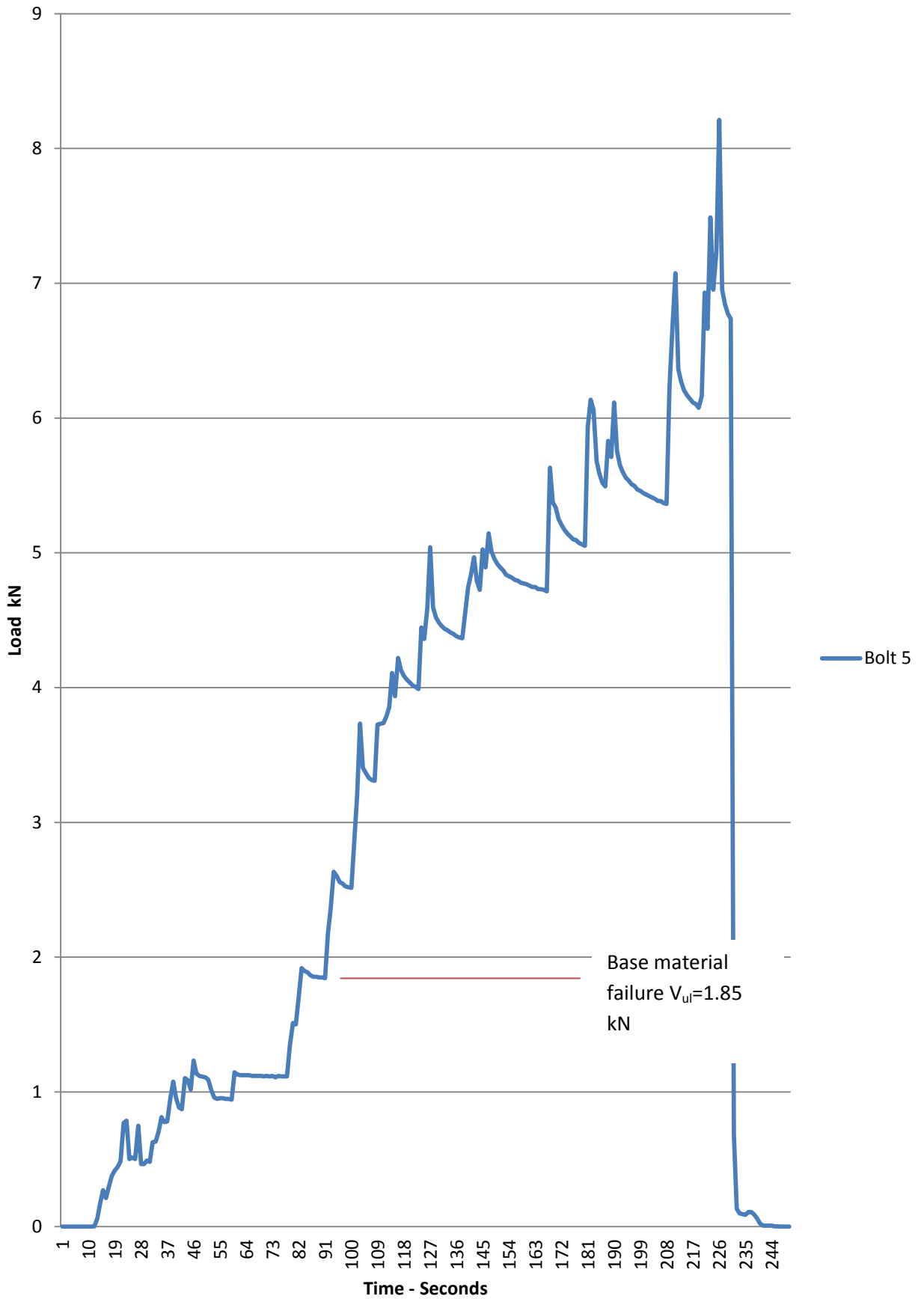


BOLT #5 - Second Floor		
LOAD APPLIED	GAUGE READING	DISPLACEMENT
kN	mm	mm
0	20.9	0
1.05	20.9	0.00
1.85	20.7	0.20
2.62	20.4	0.50
3.73	20	0.90
4.22	19.5	1.40
5.06	19	1.90
5.58	18.6	2.30
6.11	17	3.90

Base material Fail

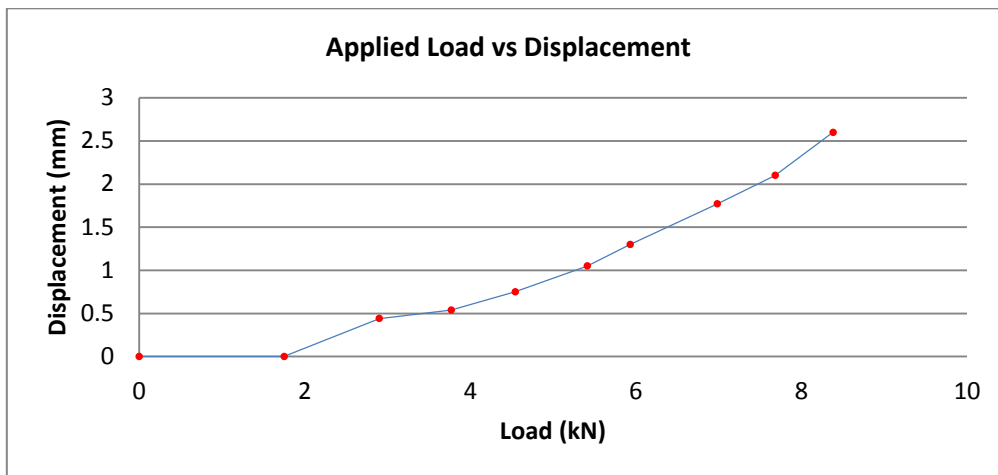


Bolt 5



BOLT #6 - Second Floor		
LOAD APPLIED	GAUGE READING	DISPLACEMENT
kN	mm	mm
0	14.9	0
1.75	14.9	0
2.9	15.34	0.44
3.33	15.44	0.54
4.54	15.65	0.75
5.41	15.95	1.05
5.93	16.2	1.3
6.98	16.67	1.77
7.68	17	2.1
8.38	17.5	2.6

Base material Fail

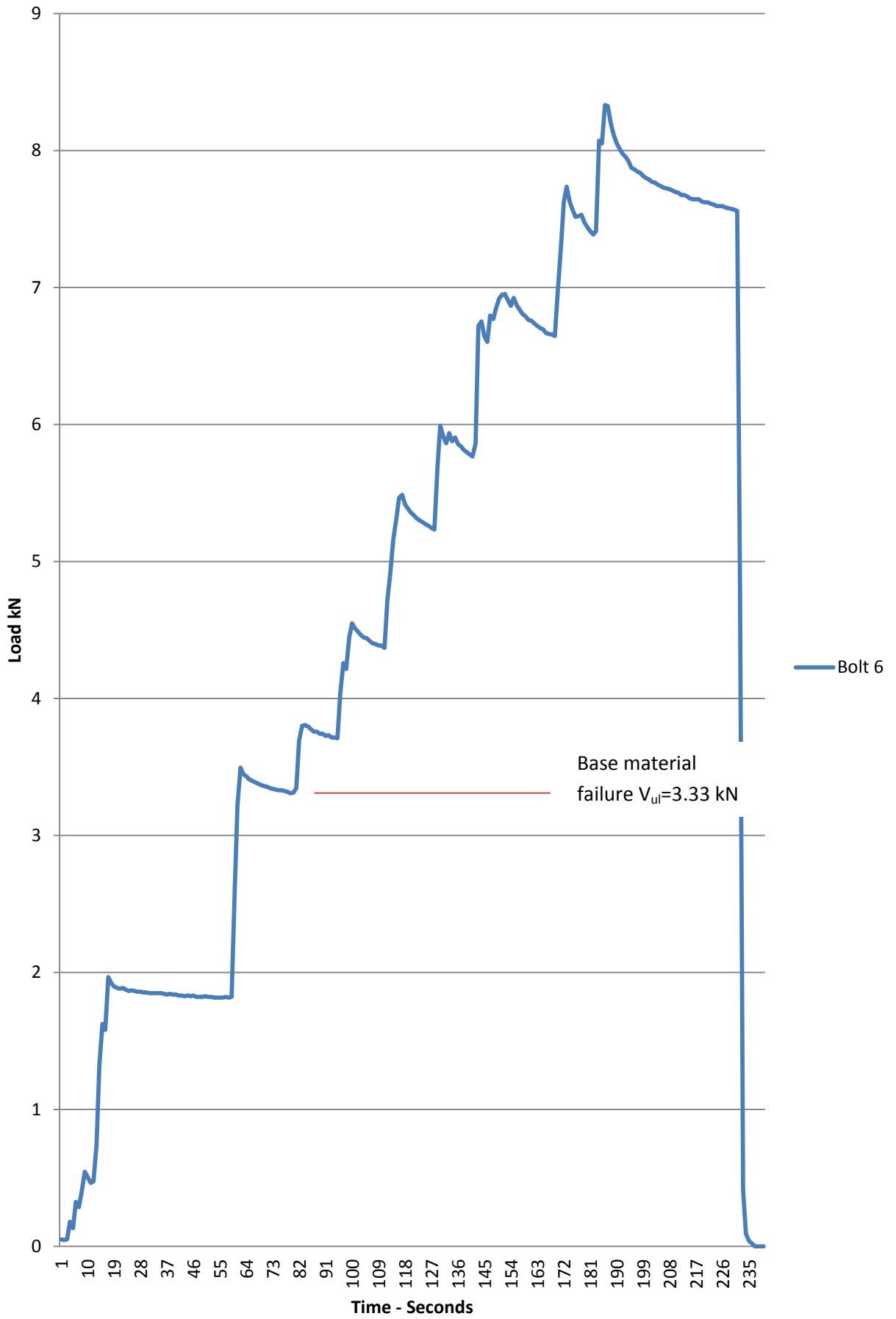


Before Testing



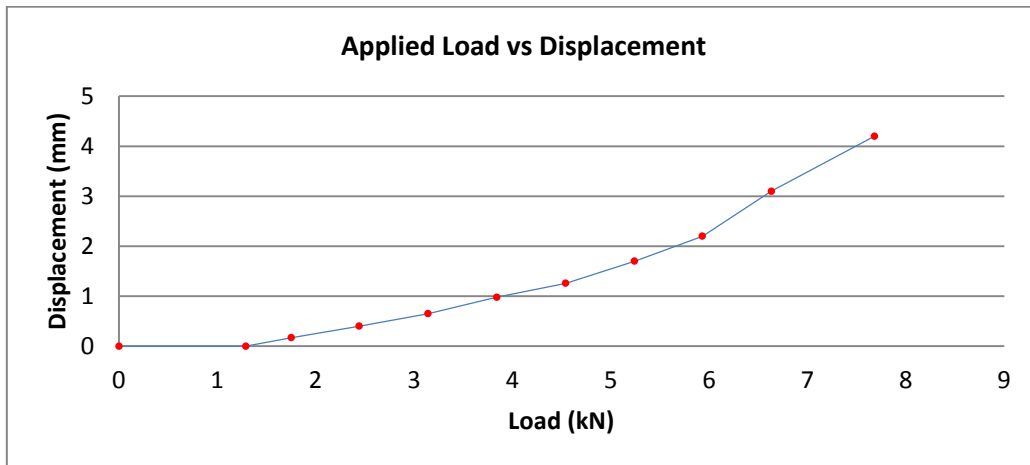
After Testing

Bolt 6

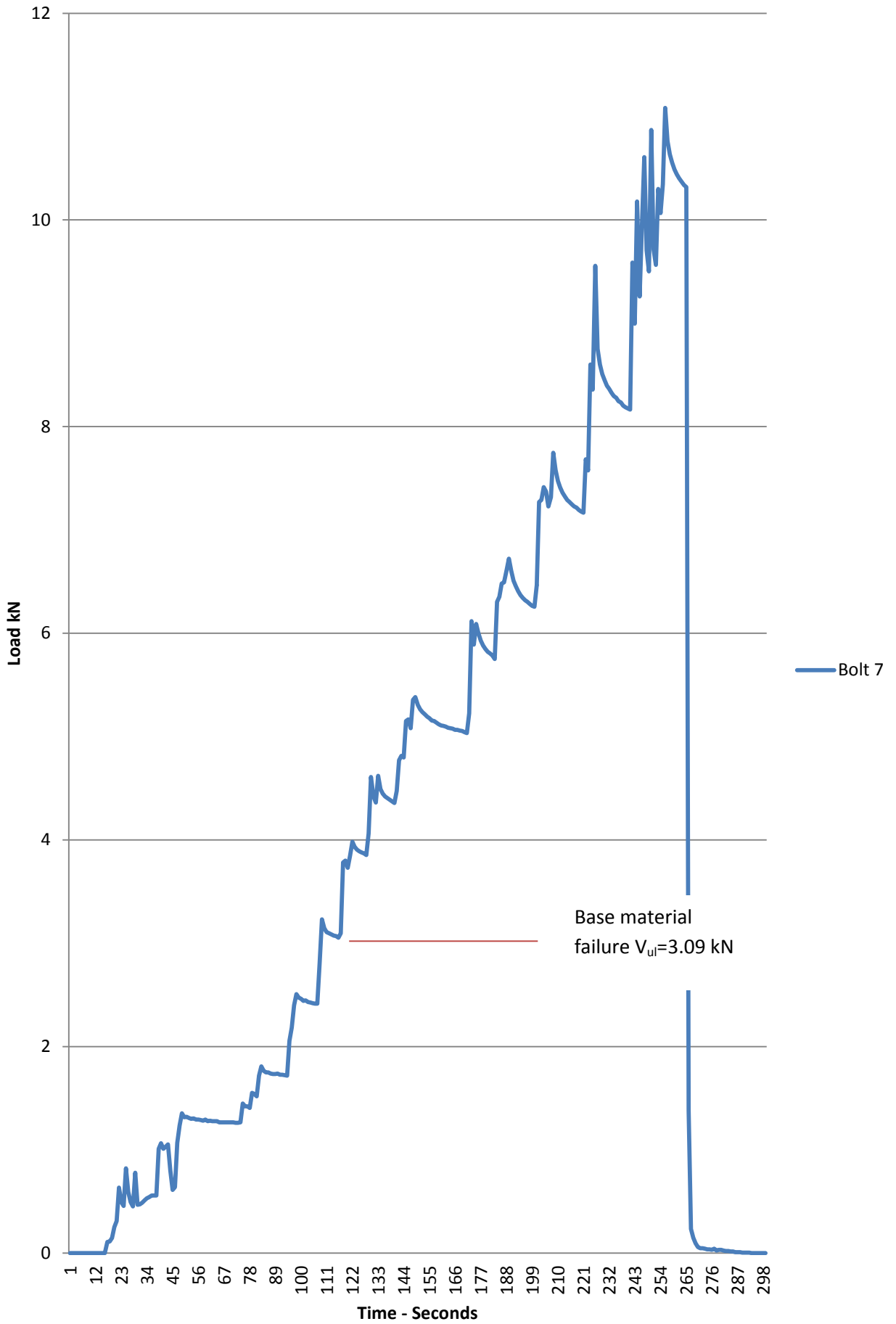


BOLT #7 - First Floor		
LOAD APPLIED	GAUGE READING	DISPLACEMENT
kN	mm	mm
0	25.8	0
1.29	25.8	0
1.75	25.63	0.17
2.44	25.4	0.4
3.09	25.15	0.65
3.84	24.82	0.98
4.54	24.54	1.26
5.24	24.1	1.7
5.93	23.6	2.2
6.63	22.7	3.1
7.68	21.6	4.2

Base material Fail

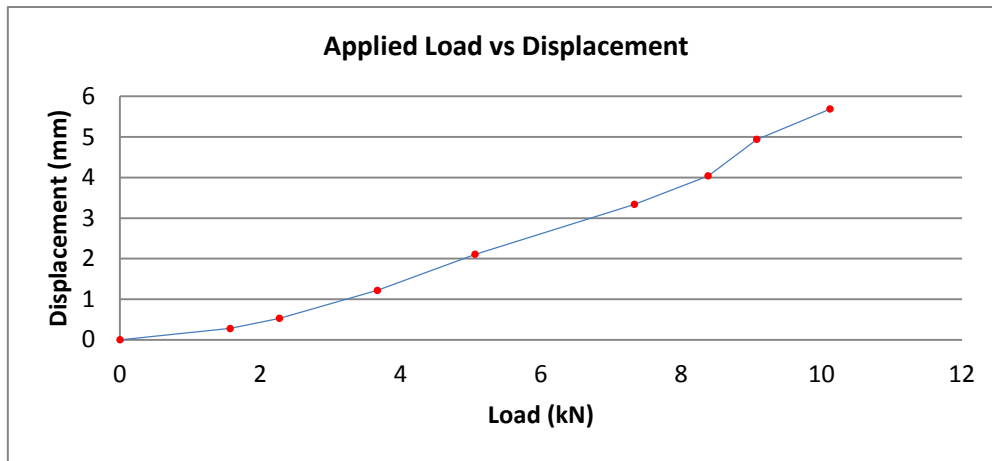


Bolt 7

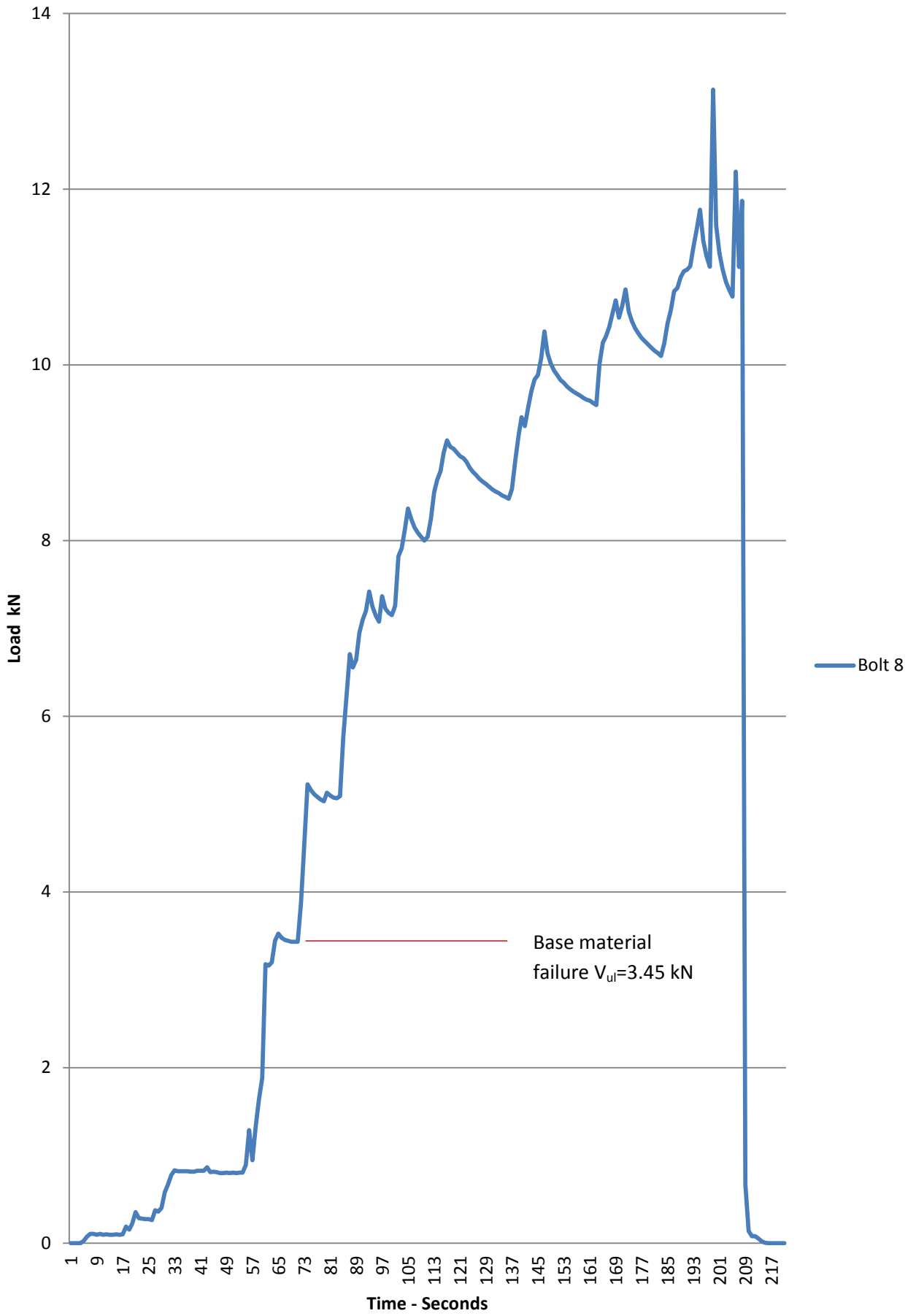


BOLT #8 - First Floor		
LOAD APPLIED	GAUGE READING	DISPLACEMENT
kN	mm	mm
0	25.41	0
1.57	25.13	0.28
2.27	24.88	0.53
3.45	24.19	1.22
5.06	23.3	2.11
7.33	22.07	3.34
8.38	21.37	4.04
9.074	20.47	4.94
10.12	19.72	5.69

Base material Fail

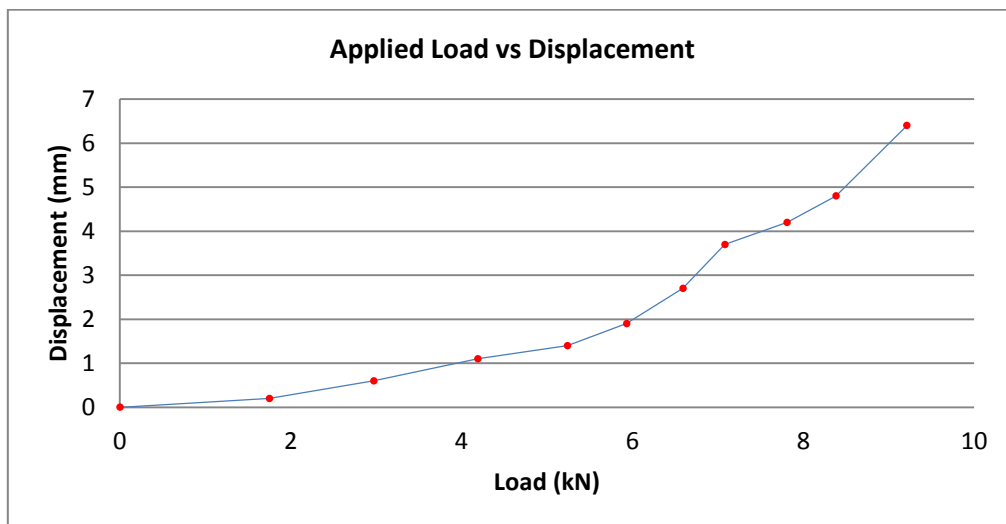


Bolt 8

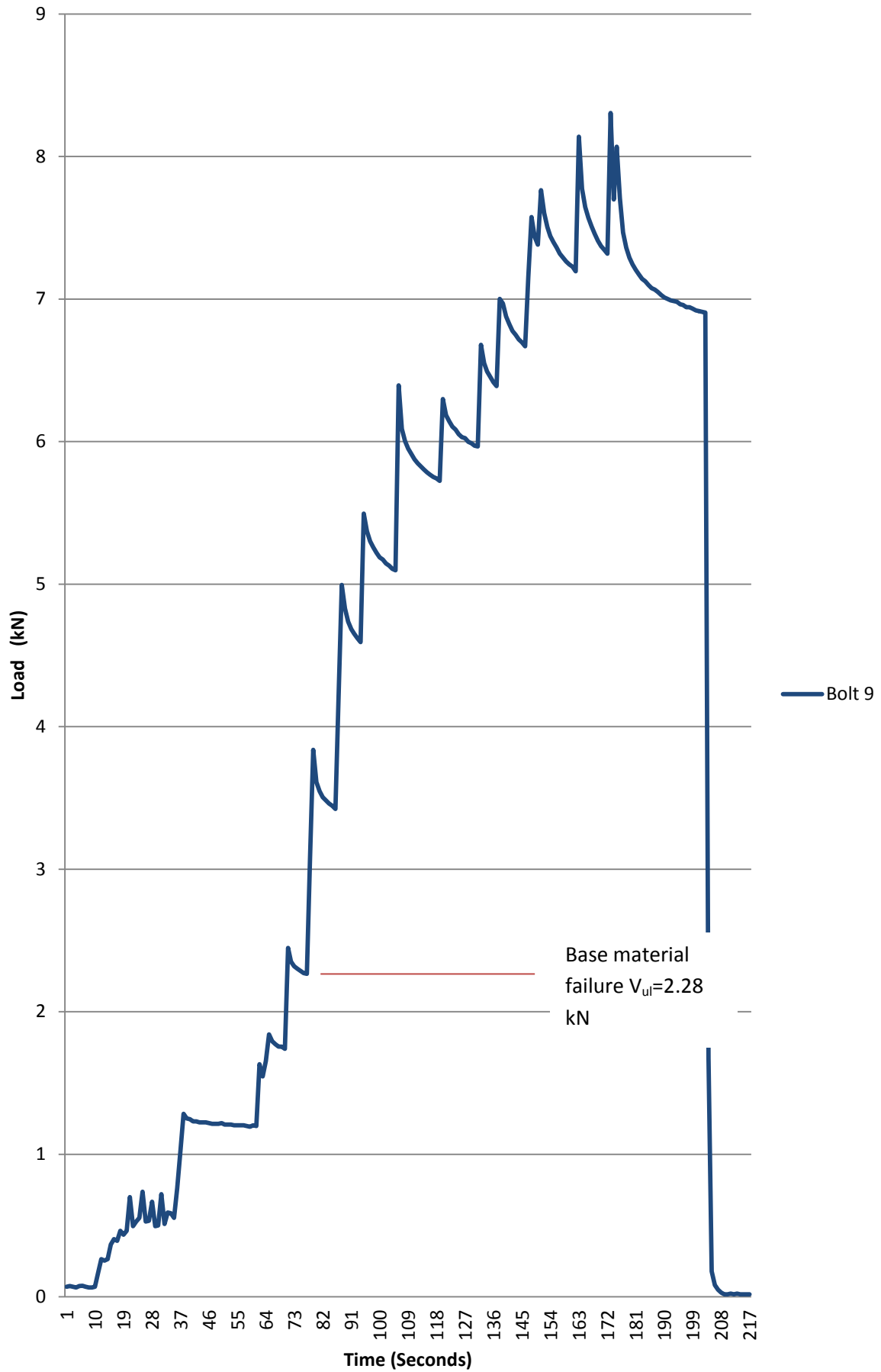


BOLT #9 - First Floor		
LOAD APPLIED	GAUGE READING	DISPLACEMENT
kN	mm	mm
0	15.4	0
1.75	15.4	0.2
2.28	15.3	0.6
4.19	15.1	1.1
5.24	14.7	1.4
5.93	14.2	1.9
6.59	13.9	2.7
7.08	13.4	3.7
7.81	12.8	4.2
8.38	11	4.8
9.21	10	6.4

Base material Fail

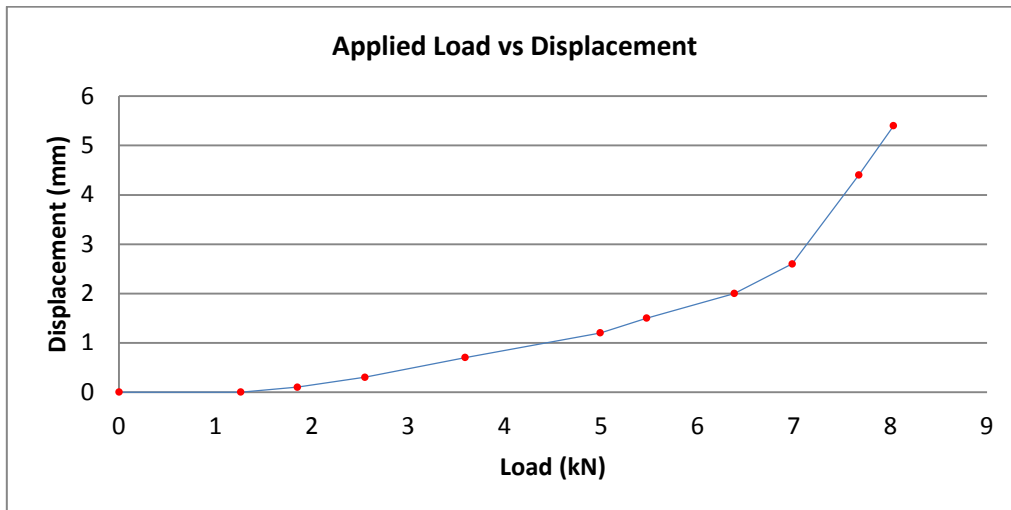


Bolt 9

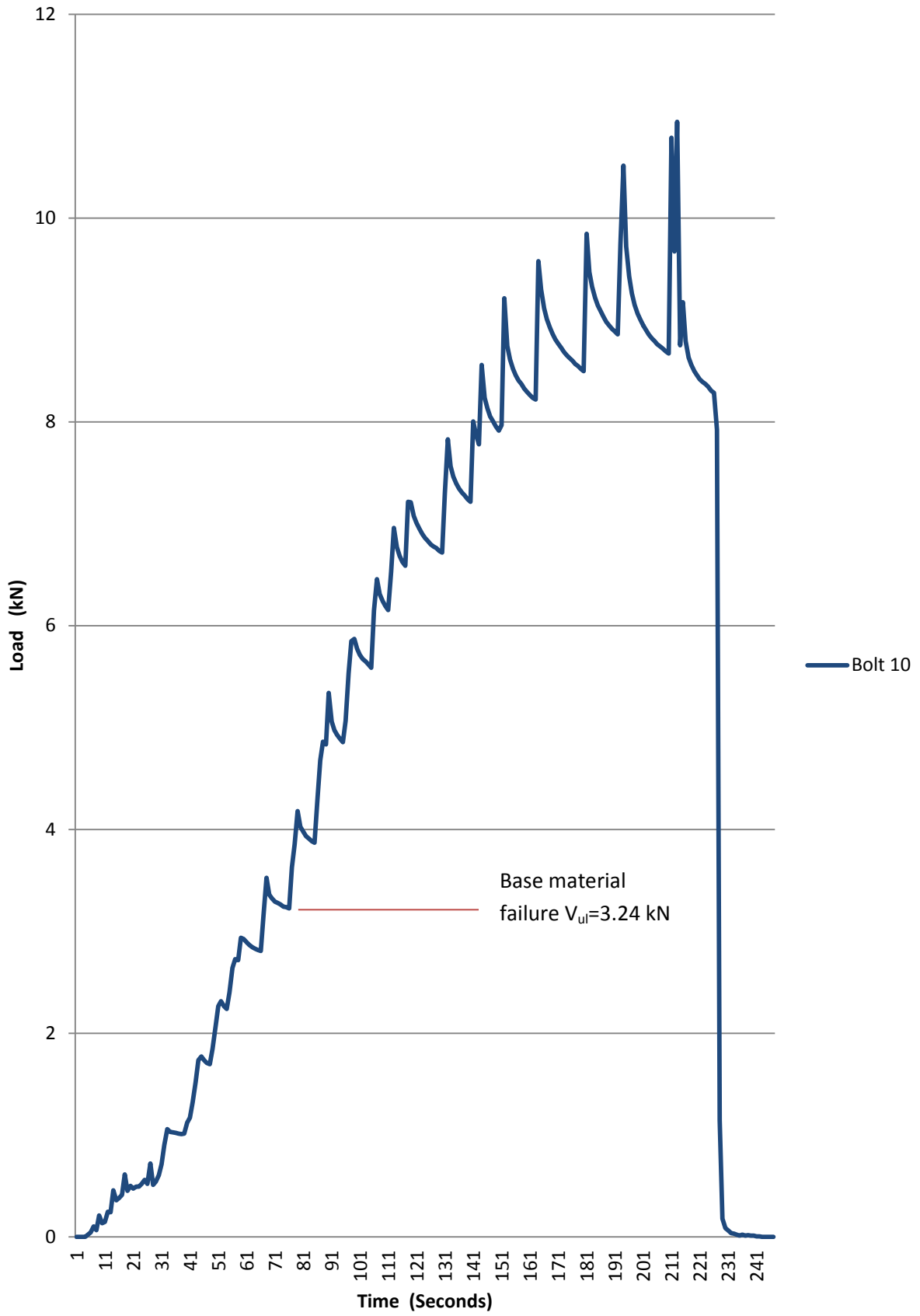


BOLT #10 - First Floor		
LOAD APPLIED	GAUGE READING	DISPLACEMENT
kN	mm	mm
0	18.7	0
1.26	18.5	0
1.85	18.1	0.1
2.55	17.6	0.3
3.24	17.3	0.7
4.99	16.8	1.2
5.47	16	1.5
6.38	15	2
6.98	14.5	2.6
7.67	13.9	4.4
8.03	12.3	5.4

Base material Fail



Bolt 10



Results

Based on equation B.2.3.2.2 of BS 8539:2012

$$V_{RK1} = V_{Ru,m}(1 - K \cdot v) \cdot \Omega$$

Bolt Number	Fail Load (kN)
1	3.5
2	2.6
3	1.52
4	1.61
5	1.85
6	3.33
7	3.09
8	3.45
9	2.28
10	3.24

$$V_{Ru,m} = 2.61 \text{ kN}$$

$$v = 0.32, K = 2.57, \Omega = 0.9$$

Characteristic Resistance V_{RK1}

$$V_{RK1} = 2.61(1 - 2.57 \cdot 0.32) \cdot 0.9 = \mathbf{0.42 \text{ kN}}$$

$$V_{R,all} = V_{RK1} / \nu$$

(Equation B.10)

$$\nu = 2.5 \text{ Global safety factor}$$

Allowable Resistance $V_{R,all}$

$$= \mathbf{0.22 \text{ kN}}$$

Conclusions

- All of the tests resulted in a base material failure. In all of the tests the failure was noted by hearing the masonry crack and crush under load. The test was then stopped and a visual inspection carried out which showed base material failure.
- The results varied which lead to a higher deviation and a lower overall resistance value.
- The masonry was noted as being in a very poor condition and this could be seen as were fixing the test rig to the wall. The percussion from drilling was even causing some bricks to crack.