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STRENGTH AND STIFFNESS CHARACTERISTICS OF MASONRY WALL TIES

AUCKLAND UNISERVICES LIMITED

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THE UNIVERSITY OF AUCKLAND

Prepared for:

Eagle Wire Products Ltd
PO Box 58096
Greenmount
AUCKLAND

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Prepared by:

Mark Byrami
Department of Civil & Environmental Engineering
University of Auckland



Auckland UniServices Limited

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Objective

In December 1997, a series of tests on type B wall ties supplied by Eagle Wire Products Limited was conducted in the Civil Materials Lab.

These tests were conducted in accordance with the **Draft Australian/New Zealand Standard DR97300: Part 1 Wall Ties.**

The results of these tests are presented in UniServices Report 7240.00

In December 2003, a further series of tests was conducted on wall ties similar to the ones referred to as 1.6M in the abovementioned report but containing some modifications intended to increase their performance.

Method of Testing

These tests were conducted as per **AS/NZ 2699.1** appendix A, which specifies the same method of specimen construction, preparation and test procedure as **DR97300**. This procedure is also described in UniServices Report 7240.00, chapter 2, and will not be repeated here.

Results

The performance of the wall ties under test are presented in **Table 1**, which contains the **Stiffness** of each tie, being the average of the forces resisted at the 2mm deflection limits in tension and compression, the **Strength** of each tie, being the peak tension load resisted during the fourth cycle of displacement at ± 10 mm, and the **Residual Strength** of each tie, being the peak tension load resisted during the 15mm cycle.

Table 2 contains the **Characteristic Stiffness**, being the average of the values for all of the specimens, the **Characteristic Strength** and the **Characteristic Residual Strength** of the lot calculated as per paragraph A10.2 of **AS/NZ 2699.1**

The load deflection graphs are included as an appendix.

Table 1.

| Specimen I.D | Stiffness (kN/mm) | Strength (kN) | Residual Strength (kN) | Initial Loading Direction |
|--------------|-------------------|---------------|------------------------|---------------------------|
| 1 | 0.49 | 1.46 | 1.26 | Compression |
| 2 | 0.41 | 1.84 | 2.26 | Compression |
| 3 | 0.54 | 1.60 | 1.81 | Compression |
| 4 | 0.63 | 1.80 | 2.05 | Tension |
| 5 | 0.61 | 1.61 | 1.90 | Tension |
| 6 | 0.55 | 1.88 | 2.02 | Tension |

Table 2.

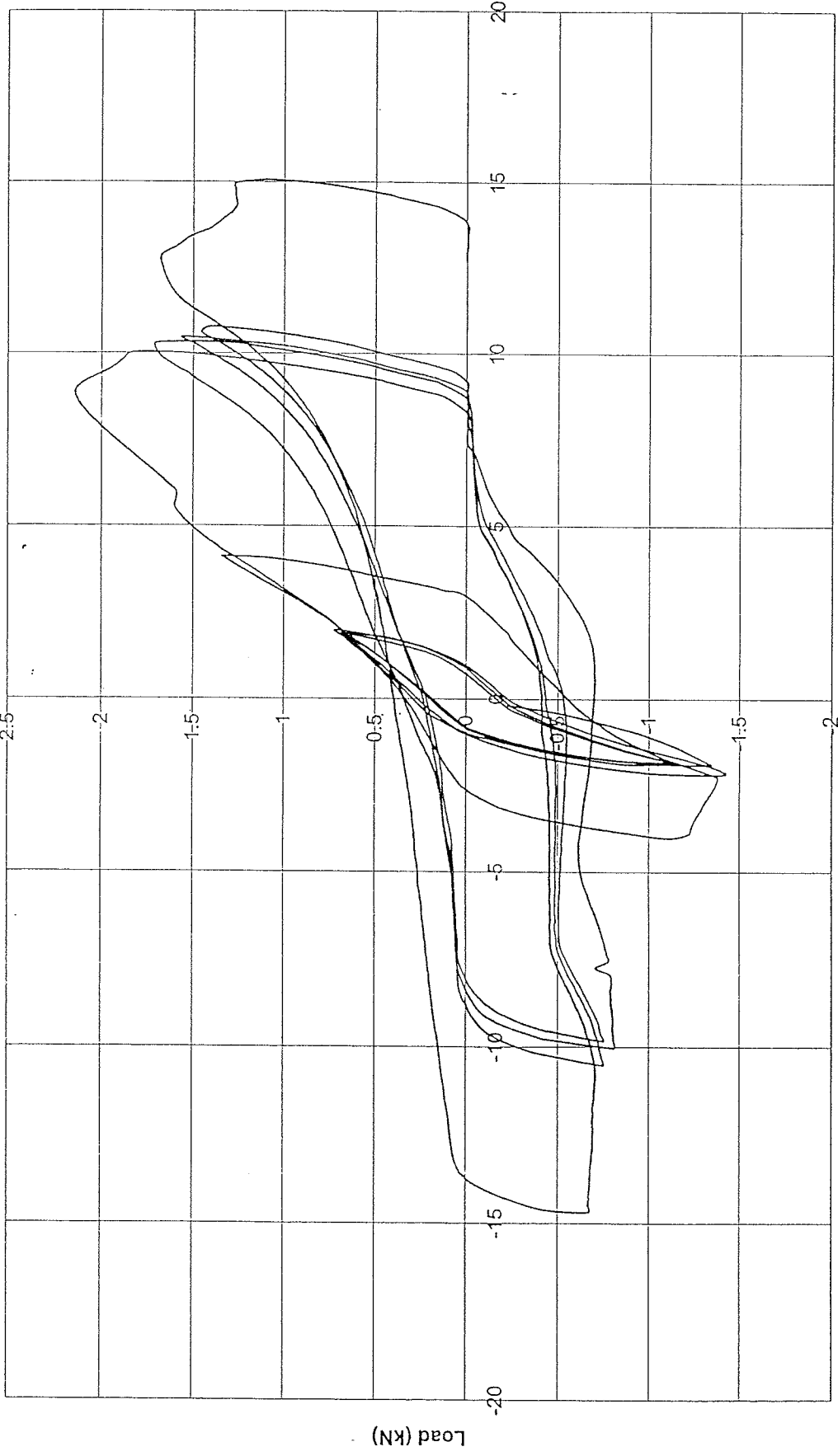
| Lot | Axial Stiffness (kN/mm) | Axial Strength (kN/mm) | Residual Strength (kN) | Classification |
|-----|-------------------------|------------------------|------------------------|----------------|
| 1-6 | 0.54 | 1.51 | 1.61 | EH |

Observations

With reference to paragraph 2.7.3 and table 2 of AS/NZ2699.1, the results show that, as tested, these type B non-flexible ties conform to the Heavy Duty (EH) classification.

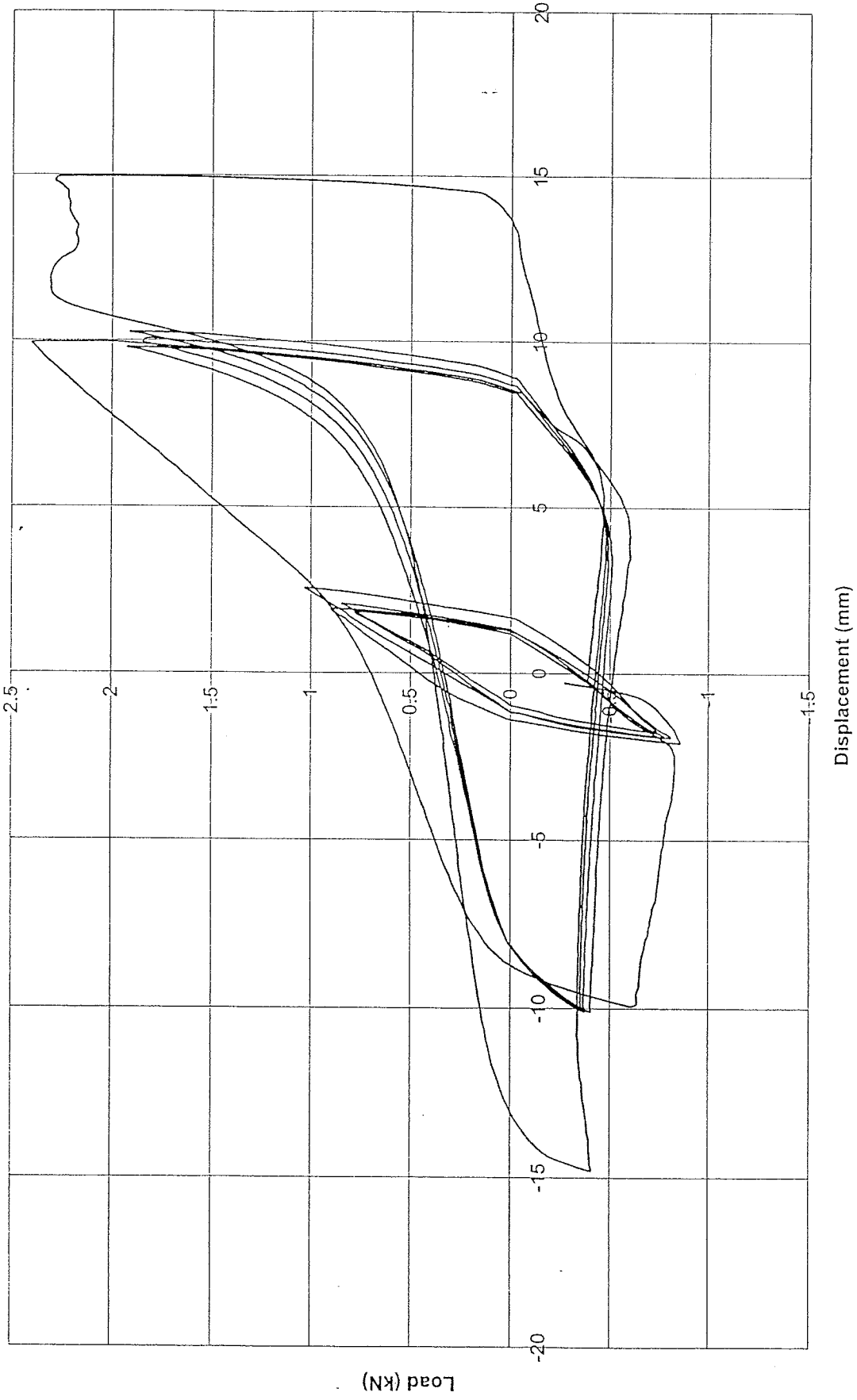
It was observed during testing, that these “modified” ties rely for their increase in axial strength by placing a greater burden on the fastener causing it to withdraw from the framing to a greater extent than previously. It seems that the properties of the timber used will now have a greater influence on consistent performance.

Specimen 1

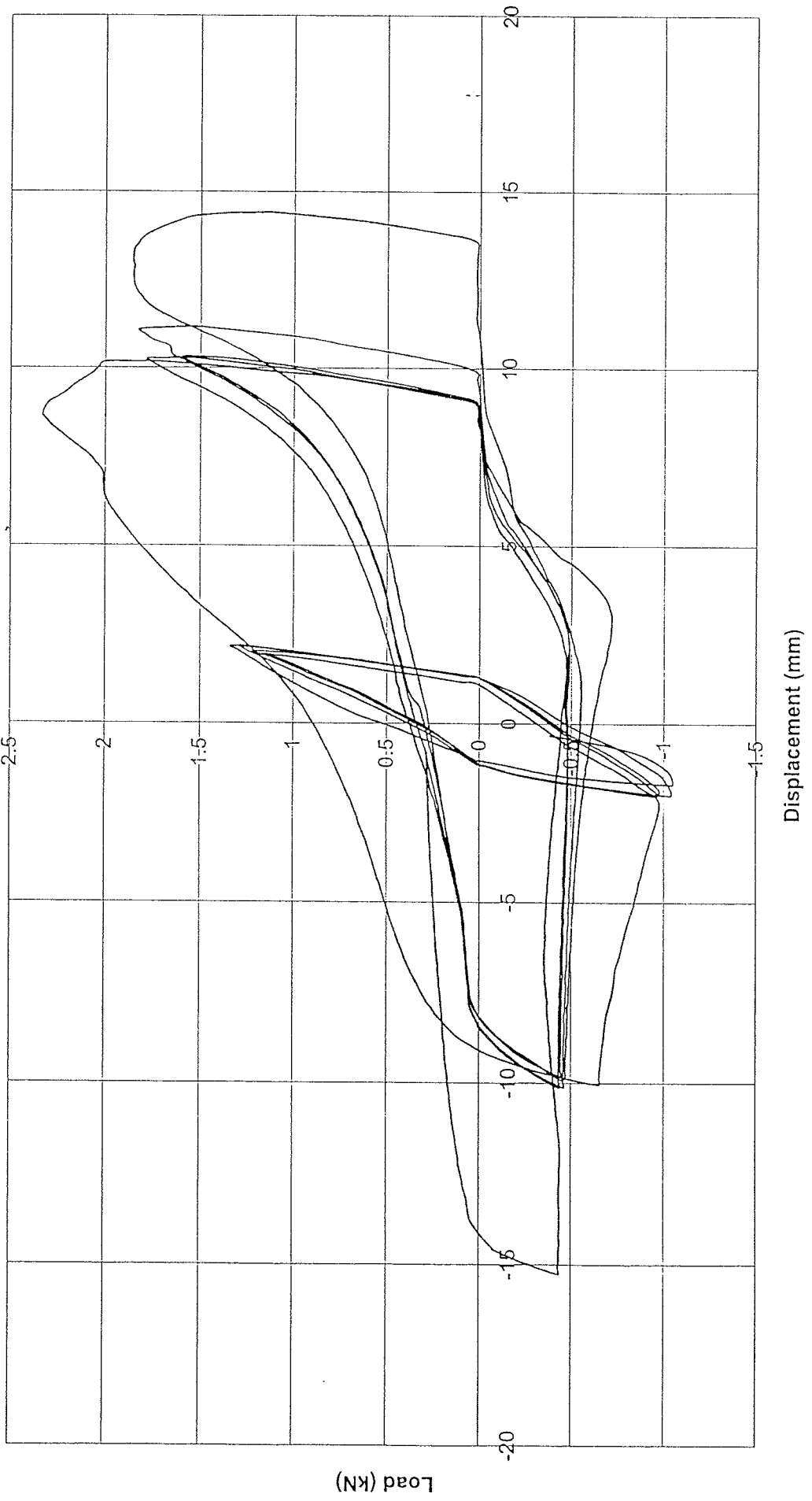


Displacement (mm)

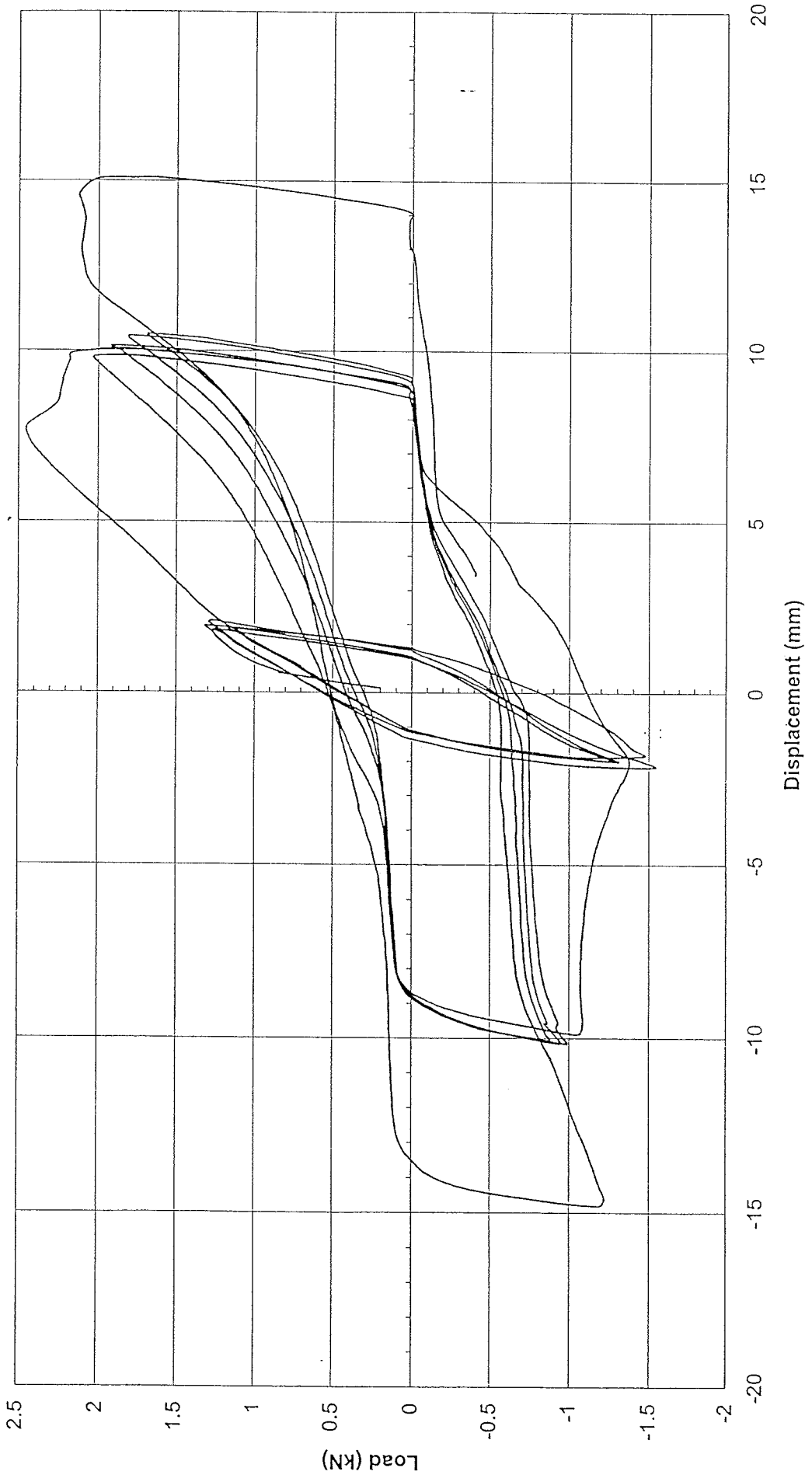
Specimen 2



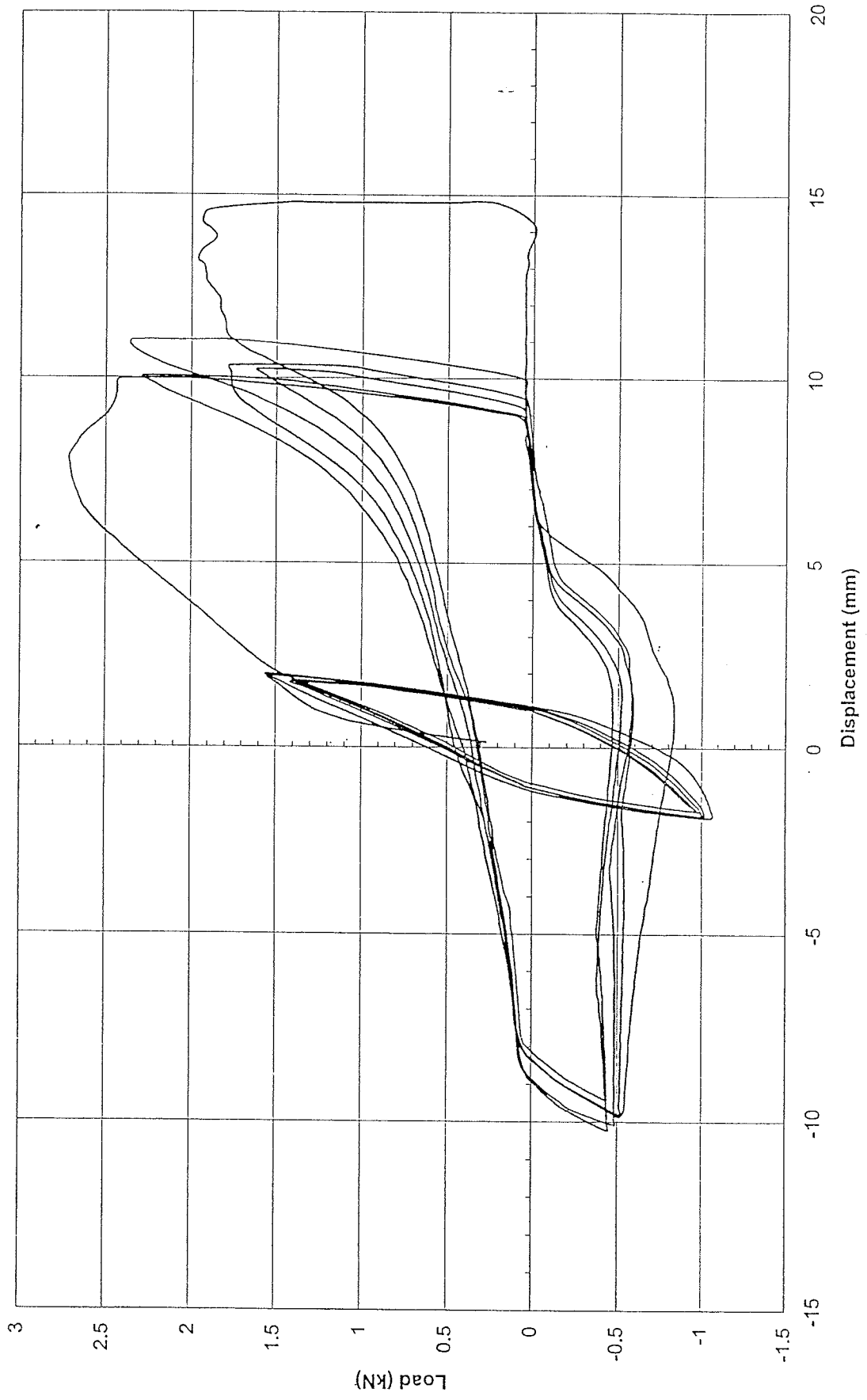
Specimen 3



Specimen 4



Specimen 5



Specimen 6

