

# Tensile Behavior of Newly Developed Undercut Anchor in Cracked and Uncracked Concrete

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# 1. Introduction

## ----- Background -----

An anchor that exhibits stable performance even under harsh conditions is necessary for the wide-range and long-term usage of anchors.



The authors have designed undercut post-installed anchors.

## ----- Purpose of the paper -----

The objectives of the present report are to show the tensile loading test results obtained on post-installed anchors designed by the authors, and to confirm the fundamental characteristics of the proposed anchor based on these results.

# 2. Outline of the Anchor

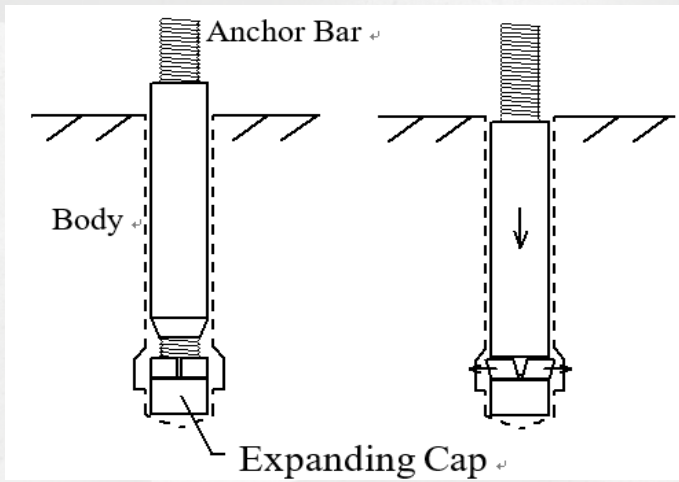


Fig. Scheme of the anchor

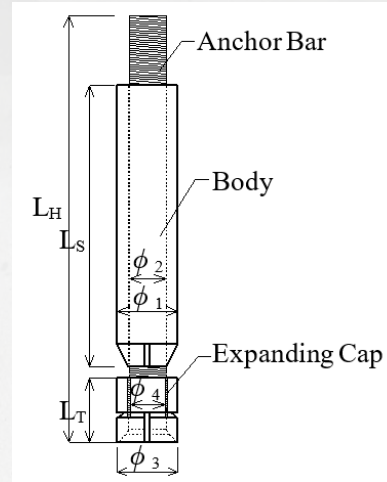


Fig. Detail of the anchor



## Features of the anchor

1. The anchor is composed of a main body, an expanding cap and an anchor bar.
2. The anchor is placed in a hole with an expanded base.
3. The expanding cap which is fixed at the anchor bar tip, has four slits; by driving the main body into it, the wedge-shaped tip of the main body cuts into the expanding cap, forcing it to expand radially upwards and fix itself into the concrete slab.



# 3. Experimental Investigation

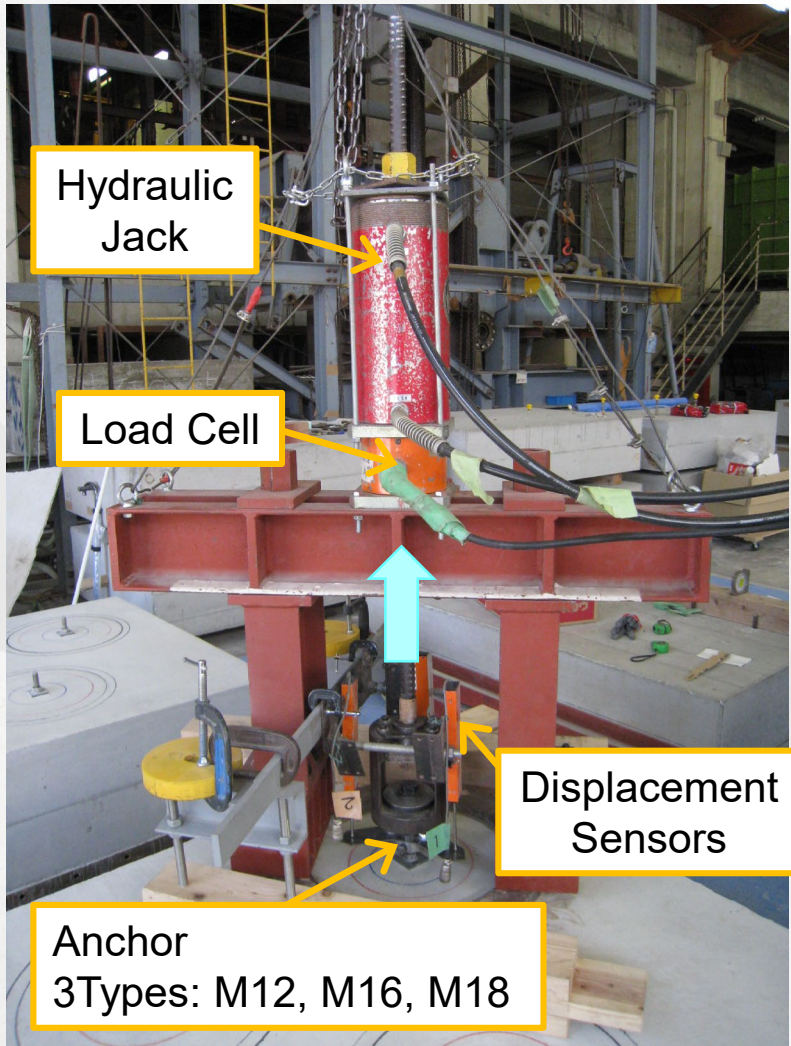


Fig. Overall View of the test setup

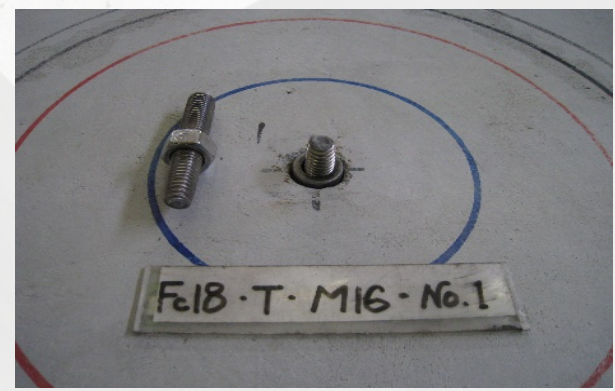
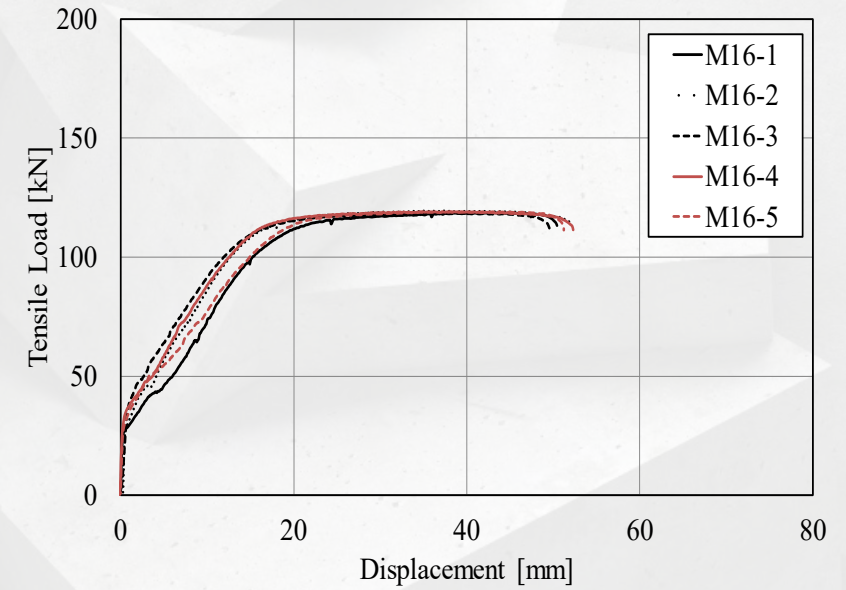
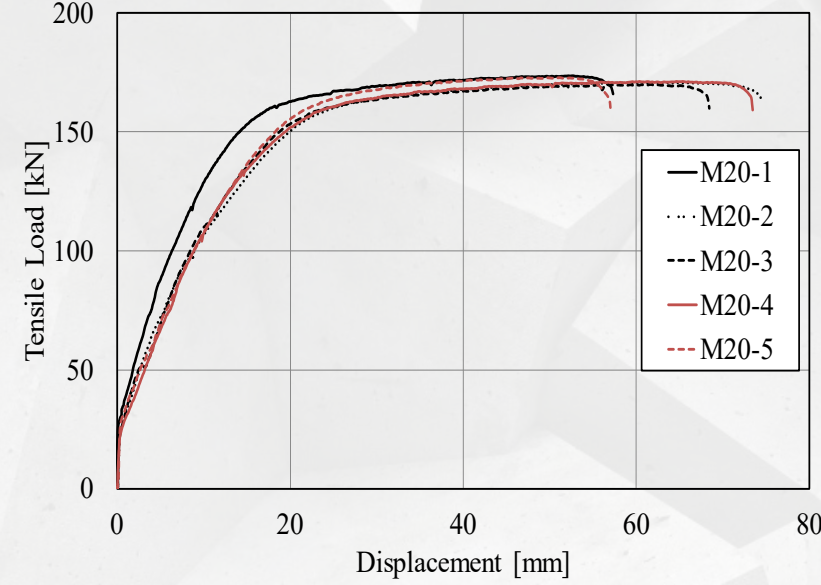
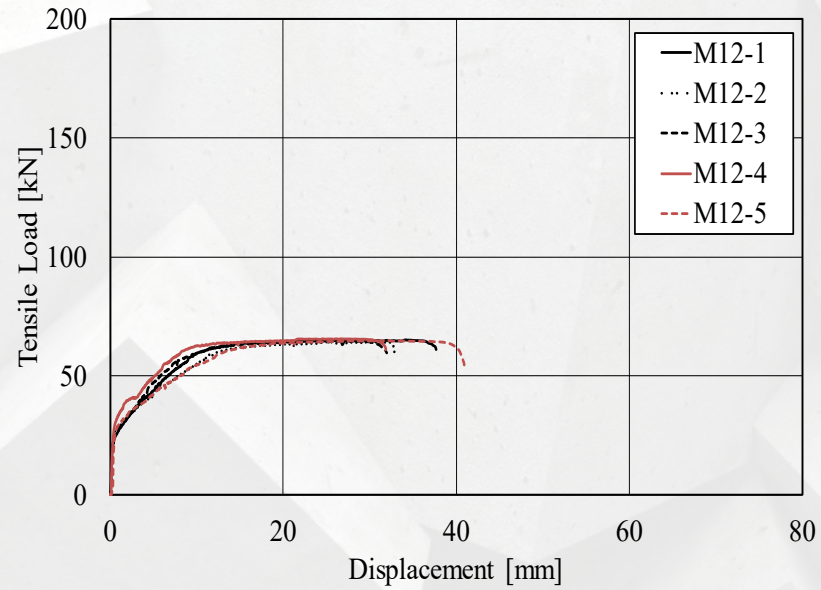


Fig. Load-bearing behavior during monotonic tension loading and failure mechanism



# 4. Tensile Loading Tests in Cracked Concrete

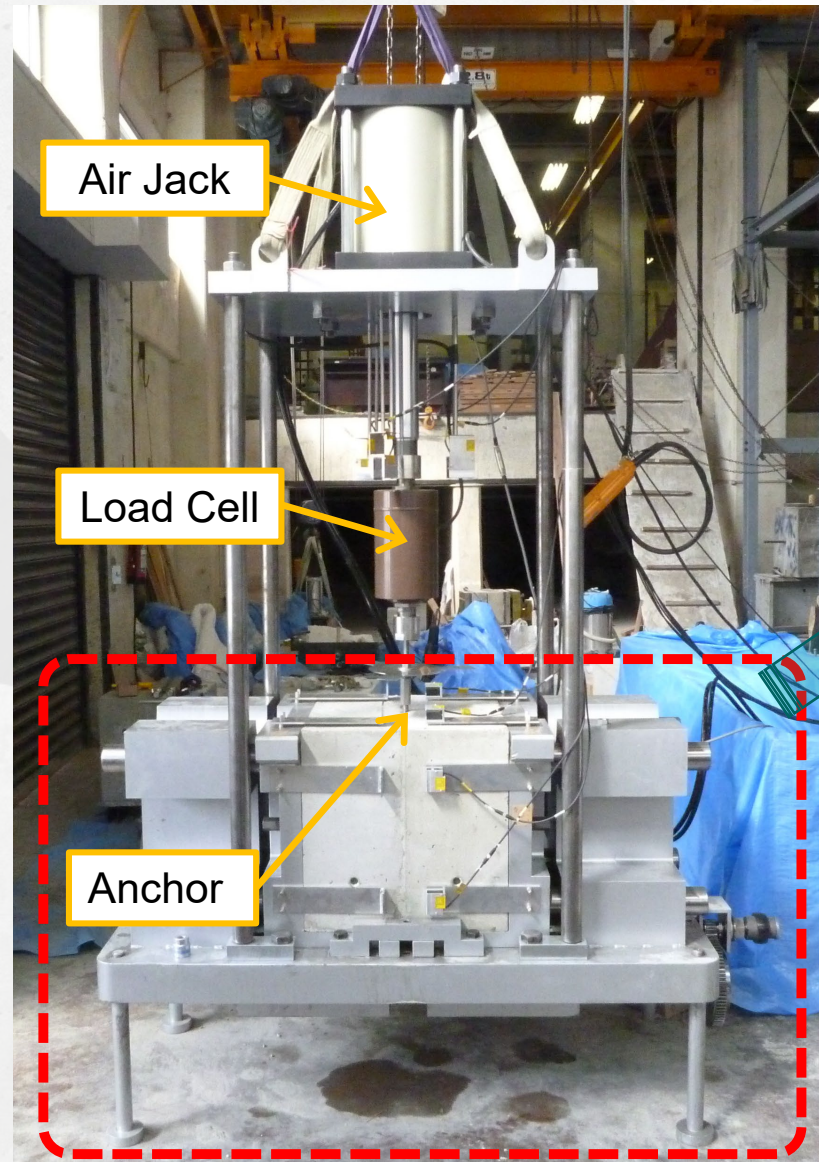


Fig. Overall View of the test setup

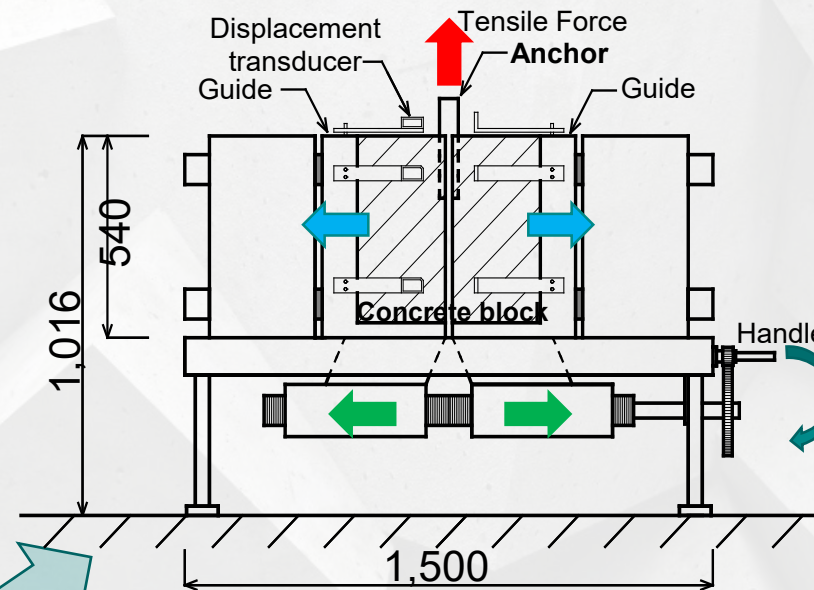


Fig. Detail of the test setup

## Feature of the test setup

1. Small size
2. Easy controllable crack width

## Procedure of the test

We conducted tests where forces corresponding to the long-term loading in cases where the anchor bar yields were applied at a fixed rate while the crack width of the test specimen was gradually increased.

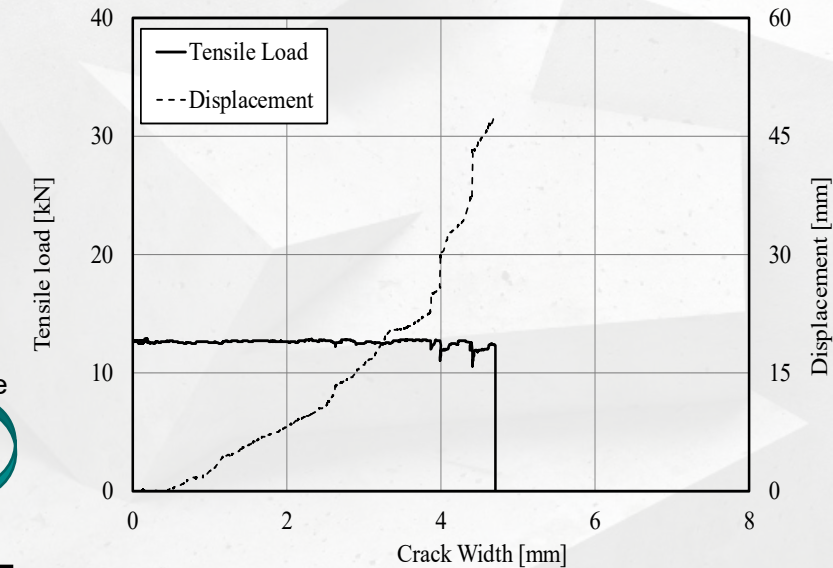


Fig. Typical Result of the Test



## 5. Conclusion

Tensile load tests were conducted on an undercut post-installed anchor designed by the authors; fundamental yield strength characteristics of this anchor were analyzed based on the obtained results, and the following findings were obtained:

1. The extent of fixation with the concrete base material increased as a result of making the undercut section of the anchor expand in the upward direction, and the anchor exhibited a stable yield strength.
2. The extent of yield strength decreased even in the presence of relatively large cracks. It was lower in the proposed anchor than in standard metal anchors, and its superior performance was confirmed.

**Thank you for your attention!**

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