LDM 1201

LABORATORY DEVELOPED METHOD 1201

TESTING OF EMBEDDED ANCHORS IN GLASSFIBRE REINFORCED CONCRETE – AXILE TENSILE LOAD

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SECTION 1: SCOPE

This laboratory developed method prescribes a process for determining the ability of a fixing insert or anchor to withstand tensile applied loads when embedded in Glassfibre Reinforced Concrete (GRC) material.

It is not intended to test the tensile force required to detach a rib, pad or other formed section which may contain the embedded insert or anchor from a thinner section of GRC. Such forces must be calculated by a suitably qualified engineer using the known characteristics of the material determined by other test results.

SECTION 2: APPARATUS

2.1.: A suitable mechanical or hydraulic ram which is capable of progressively applying a pull-out force to the insert.

2.2.: An attached electronic or analogue hydraulic gauge capable of measuring an applied force up to 25 kN.

The gauge is to be accurate to within 0.5% of the applied load and have been calibrated within the previous twelve months with full metrological traceability to ISO 17025:2017.

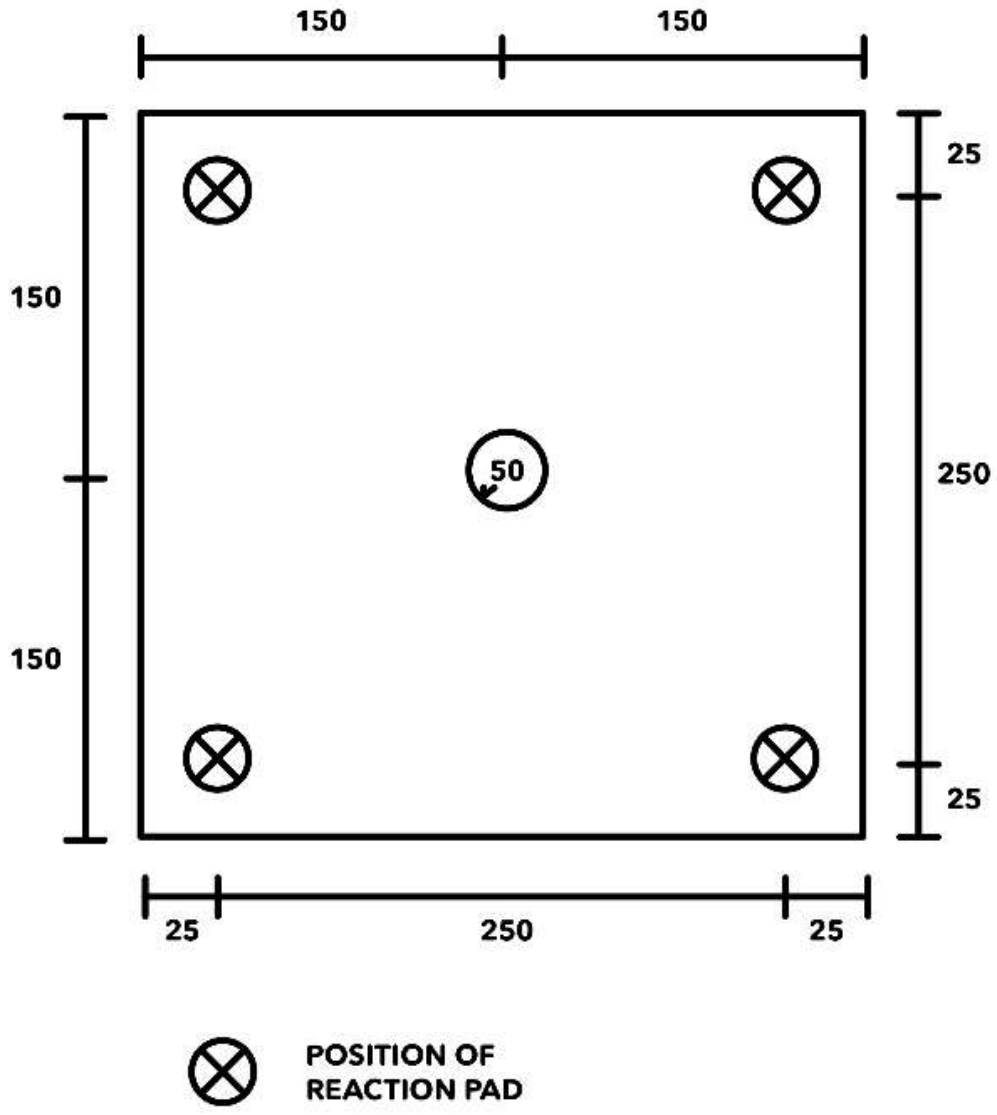
2.3.: A suitable device to measure first movement of the anchor or fixing accurate to 0.02 mm.

2.4.: A load spreader plate fabricated from 12 mm thick mild or stainless steel and fitted with 4 nr adjustable reaction pads positioned in each corner as per Figure 1 and a centrally located access hole with a diameter of 50 mm.

The size of the plate is to be the same as that of the test specimen.

2.5.: A bolt of the required size and thread to attach the insert to the device and manufactured in A2 stainless steel.

FIGURE 1



SECTION 3: TEST SPECIMEN

The test specimen shall be manufactured to be representative of the quality and characteristic properties of the finished product.

3.1.: The length and width of the sample shall normally be 300 mm x 300 mm.

Other sizes may be tested however these will need input from a qualified structural engineer to assess suitability based on the diameter of the fixing and embedment depth.

3.2.: The minimum size of specimen is to be 170 mm x 75 mm to accommodate commercially available pulling bridges.

3.3.: The maximum size of the specimen must be such that the applied load will not cause a failure of the GRC before the failure of the fixing.

3.4.: The thickness of the specimen must represent that to be used in the actual production and should be uniform across the specimen.

3.5.: The fixing must be located centrally along both x and y axis.

SECTION 4: NUMBER OF TEST SPECIMENS

A minimum of 4 specimens shall be tested.

SECTION 5: PROCEEDURE

5.1.: The specimen is to be placed horizontally on a suitable flat surface such as a steel engineer’s bench or similar.

5.2.: The stainless-steel bolt is to be fully inserted into the fixing.

5.3.: The spreader plate is to be positioned with the hole directly over the fixing and with each restraint in contact with the corner of the specimen. The stainless-steel bolt will then protrude allowing attachment to the puller.

5.4.: The reaction pads are to be adjusted so the plate is level using a suitable spirit level.

5.5.: The mechanical puller is to be placed directly over the hole and attached according to the manufacturer's instructions to the bolt.

5.6.: The hydraulic gauge is to be attached to the puller and if necessary, set to zero.

5.7.: Load is to be progressively applied incrementally with the applied load being recorded at each increment.

5.8.: Continue applying load incrementally until the gauge records first movement of the fixing.

5.9.: Record the applied load at first movement.

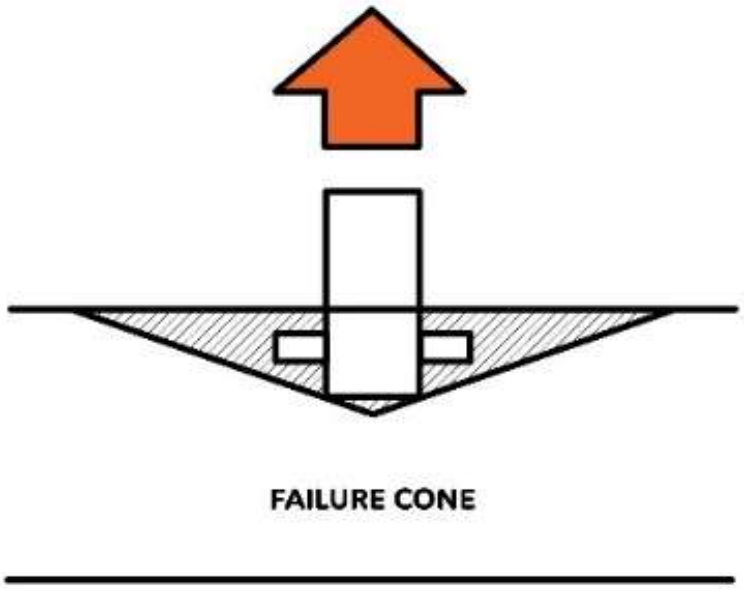
5.10.: Remove the puller and spreader plate.

5.11.: Measure the displacement of the fixing.

5.12.: Re-attached the puller and apply load until fixing pulls out of specimen allowing measurement of failure cone.

5.13.: Record the diameter of the failure cone.

FIGURE 2



SECTION 6: VALIDITY OF TEST

The test can only be considered valid if the fixing has become displaced and created a failure cone.

If the GRC has cracked in a line emanating from one reaction pad to the other, then the flexural capacity of the GRC has been exceeded and the test must be considered invalid.

In the event there is no failure at maximum load this should be noted in notes section

SECTION 7: TEST REPORT

The test report should detail the following:

7.1.: Name of manufacturer.

7.2.: Manufacturing process used (Spray or Premix).

7.3.: Age of specimen.

7.4.: Type of fixing including thread, depth, and material.

7.5.: Applied load at each increment.

7.6.: Failure load of each specimen at first movement.

7.7.: Displacement of anchor or fixing at first movement.

7.8.: Diameter of failure cone for each specimen.

7.9.: Arithmetical mean of failure load and cone diameter.