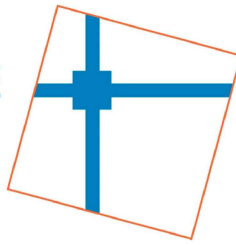


REPORT 3244-03:

**MAGOXX[®] - BOARD, EMBEDMENT TESTS WITH DYNA PLUS[®]-
SCREWS**

Project number: 3244
Author: drs. H. Schinkel
Date: August 31, 2020

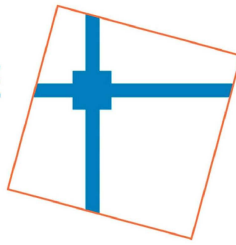
Number of pages: 5



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1. PROJECT DATA

Commissioner : SINH Building Solutions B.V.

Address : Saturnusstraat 60, unit 67
NL - 2216 AH Den Haag

Contact person : Mr. J. Engels

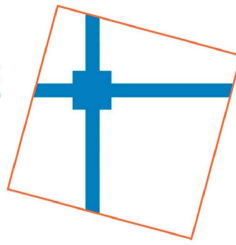
Project : Embedment of screws in MAGOXX[®]-Board

Project number : 3244

Project manager : drs. H. Schinkel

Date of examination: June - August 2020

Date of report : August 31, 2020



2. INTRODUCTION

BouwTechnologie RDA B.V. was commissioned by SINH Building Solutions BV to test MAGOXX[®]-board as commercialized by SINH Building Solutions at Den Haag (NL). The maximum expected force of screws in the board shall be determined in accordance with EN 383 on five specimens, cut with it longest size parallel to the longest dimension of the board and specimens, perpendicular to the longest dimension of the board.

The 29th of May 2020 SINH Building Solutions B.V. supplied five boards with a thickness of 9 mm. The width of all boards was 1200 mm and the length of the boards was 3000 mm. The sheets were marked on their surface:

MAGOXX-CE-ETA 15/0634 NLY01-9mm-09/03/20

BouwTechnologie cut the test pieces for the tests in accordance with EN 383, dimensions 35 x 140 mm.

3. ANCILLARY MATERIALS

Apart from the sheet specimens screws were used:

Universal screw, panhead, outdoor

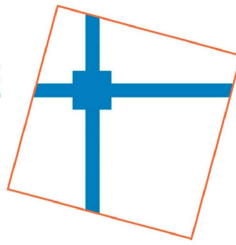
3,5 x 40 mm

Anti-Rust-Coating C4

Brand: DynAplus[®]

Manufacturer: Hoenderdaal Fasteners

DoP nr: DP.0282.08.02



4. DESCRIPTION

The samples were sawn by BouwTechnologie RDA following the cutting plan, at random over the board surface. The samples were coded as follows:

Sheet number (1 through 5)

Direction of cutting (P = parallel, L = perpendicular)

Parallel: the longest edge of the sample (140 mm) is parallel to the longest dimension of the sheet. Thus L means that the 140 mm side has been cut perpendicular to the longest dimension of the sheet.

Boards are to be fixed to a substrate by screws located at the edges. By standard the 10 cm edges of boards are cut off and rejected. In this investigation also specimens were cut from the edges, so that the sample set is representative for all over the board.

From each board two P and two L specimens were taken.

Specimens from the edges were marked with an additional "r".

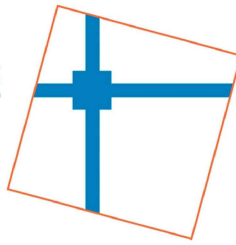
The load equipment for the test methods A, B en D is Zwick 1484, latest calibration on July 23, 2020 with report numbers 119840 and 119839.

4.1 Maximum expected force

The specimen to be tested was mounted in the steel testframe. A panhead universal screw 3,5 x 40 mm, was perpendicularly led into the frame, holes 3,6 mm and through the sheet. After bringing in the screw it was tested by hand that the sheet remained free from the frame. Rotating the sheet around the screw remained possible by slight touching with the fingertip, between the frame and the sheet a gap of about 0,2 mm protected the specimen from friction against the frame.

At both top sides of the specimens measuring gauges (0,01 mm) were mounted, resting on a plate at the level of the screw.

Load was applied to the screws through the frame, displacement was measured from the gauges. During loading the displacement rate was kept constant at 0,1 mm/min. Test was stopped when the displacement no longer was linked to increase of load. The maximum expected force was identified as the end of the horizontal level of force in the load-displacement curve.



5. RESULTS

In total 20 tests were done.

Fourteen out of these gave a force-displacement curve like expected: at first a slow increase, followed by a straight line, then bending to a horizontal level being the maximum force of 1000 to 1400 N approximately.

In six of the tests the curve did not become straight and reached values of over 1500 N, where curving of the screw occurred. This is not allowed by the standard and the test result was rejected. Upon dismantling the specimen, on its back side it was observed that the screw had penetrated the board just above the level of a reinforcement thread. This justified the rejection of the test result. On the front side, where also a reinforcement net is present, this was visually not possible to detect.

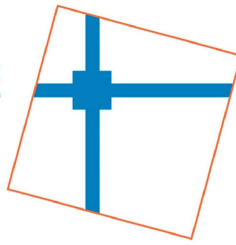
The individual test results of the different tests are given in the tables. The average values are the arithmetic means by calculation, as are the standard deviations.

Table 1. Specimens and test results, parallel cut specimens

Specimen code	Maximum load [N]	Remark
1P1	1792	rejected, net
1P2	1664	rejected, net
2P1	1178	
2P2r	1200	
3P1	1514	rejected, net
3P2r	1250	
4P1	1278	
4P2	1024	
5P1	1328	
5P2r	1275	

Table 2. Specimens and test results, perpendicular cuts

Specimen code	Maximum load [N]	Remark
1L1r	1274	
1L2	1504	rejected, net
2L1	1018	
2L2	1630	rejected, net
3L1r	1328	
3L2	1364	
4L1	1068	
4L2r	1260	
5L1	1528	rejected, net
5L2	1270	



As an average maximum force of the parallel specimens has been found 1219 N, standard deviation 100 N.

As an average maximum force of the perpendicularly cut specimens has been found 1226 N, standard deviation 131 N.

The overall average value is 1223 N, standard deviation 112 N.

The displacement at maximum force, also called the slip of the screw in the matrix, varied between 0,5 and 0,8 mm.

The results indicate that the embedment of the screws in the matrix of the boards is independent on the direction of the force. Also the edges of the boards show a similar performance as those at random locations.

Moisture content: after test five specimens from each board were heated for 24 hours at 105 °C.

The moisture content of the boards at test was 9,2 % by weight.

The density of the boards was on average 1081 kg/m³.

The thickness of the test pieces varied between 9,00 and 9,42 mm. The nominal thickness of the screws was 3,5 mm. The average compressive strength can be calculated as the quotient of 1223 N and (9,21 x 3,5) mm² = 38 N/mm².

6. CONCLUSION

The maximum expected force 3,5 mm diameter screws can carry in 9 mm thick MAGOXX[®]-board 1080 kg/m³ is:

$$F_{\text{max,est}} = 1220 \text{ N}$$