



## **ASSESSMENT REPORT**

The performance of Hilti X-FB and X-DFB metal clips and fixings if tested in accordance with AS3013-2005 Appendix C- Supports & Fixings

### **EWFA Report No:**

54533500-01

### **Report Sponsor:**

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## 1 INTRODUCTION

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This report presents an assessment of the performance of Hilti X-FB and X-DFB metal clips and fixings if tested in accordance with AS3013-2005 Appendix C- Supports & Fixings .

The tested prototypes described in Section 2 of this report, when subject to the proposed variations described in Section 3 and tested in accordance with the referenced test method described in Section 4. The conclusions of the report are summarised in Section 5.

The validity of this assessment is conditional on compliance with Sections 6, 7, 8 and 9 of this report.

Summaries of the test data on which this assessment is based are provided in Appendix A together with a summary of the critical issues leading to the assessment conclusions including the main points of argument.

## 2 TESTED PROTOTYPES

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This assessment is based on reference tests M-767/2010 & FIRES-FR-178-11-AUNE, being tests on Hilti X-FB & X-FDB clips installed on the soffit (exposed face) of a 180mm thick reinforced concrete slab and 150mm thick concrete slab respectively. Both tests were carried out in accordance with EN1363-1:2000. Tests were sponsored by Hilti Pty Ltd and was conducted by EMI Special Laboratory for fire safety in Budapest, Hungary and FIRES Laboratory in Batizovce, Slovak republic respectively.

Refer to Appendix A for a full summary of the tests data.

## 3 VARIATION TO TESTED PROTOTYPES

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The proposed construction shall be as tested in EMI Test Report M-767/2010 & FIRES Test Report FIRES-FR-178-11-AUNE with consideration of following variations:

Type of Fixings	Proposed Type & Size
B3 Nails	X-P 17/20/24 B3 MX, X-S 14 B3 MX
G3 Nails	X-P 17/20/24 G3 MX and X-S 14 G3 MX
X-P Nails	X-P 22 P8, X-P 22 MX, X-P 27 P8, X-P 27 MX
X-GHP	X-GHP 18 MX & X-GHP 20 MX

Table 1 Proposed fixing nails in lieu of the ones used in Tested Prototypes.

## 4 REFERENCED TEST PROCEDURES

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This report is prepared with reference to the requirements of AS3013-2005 Appendix C, Fire Test Method- Supports and Fixings.

## 5 FORMAL ASSESSMENT SUMMARY

On the basis of the discussion presented in this report, it is the opinion of this testing authority that the following Hilti X-FB & X-DFB clips used in conjunction with the fixings listed in Table 1 would satisfy the requirements of AS3013-2005-Appendix C Supports and Fixings, Clause 3.2.1 for a wiring systems that have been classified by others for WS5X, where 5 indicates the test was conducted for 120 minutes.

Clip Type/ Size	Weight per clip ( kg)	Weight per double clip ( Kg)	Clip Centres (mm)**
X-(D)FB 5,6,7,8	0.056	0.112	300
X-(D) FB 11	0.077	0.154	300
X-(D) FB 16	0.207	0.413	300
X-(D) FB 20	0.368	0.735	300
X-(D) FB 25	0.546	1.092	300
X-(D) FB 28	0.662	1.323	300
X-(D) FB 32	0.872	N/A	300
X-(D) FB 40	1.061	N/A	300

\*\* The spacing of the clip centres can be altered according to the cable manufacturer's recommendation provided a service load of 1.00 kg per clip is not exceeded.

Table 2 Maximum loads and spacing for Hilti Clips and Fasteners

## 6 DIRECT FIELD OF APPLICATION

The application of the results for this assessment is for cables fixed to concrete slabs using Hilti X-FB & X-DFB in which are required to maintain a circuit integrity under fire conditions. Refer to AS3013-2005, Appendix C.

The results of the assessment report are based on actual test data and the scope is necessarily limited to the specifications indicated in Section 3 and discussed in the Appendices of the assessment.

## 7 REQUIREMENTS

This report details the methods of construction, test conditions and assessed results that would have been expected had the specific elements of construction described herein been tested in accordance with AS/NZS 3013 Appendix C

All services shall be supported in the manner in which they are assessed as described in Section 3. Any further variations with respect to size, constructional details, loads, stresses, edge or end conditions, other than those identified in this report, may invalidate the conclusions drawn in this report.

## 8 VALIDITY

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This assessment report does not provide an endorsement by Exova Warringtonfire Aus Pty Ltd of the actual products supplied.

The conclusions of this assessment may be used to directly assess fire hazard, but it should be recognised that a single test method will not provide a full assessment of fire hazard under all conditions.

Because of the nature of fire testing, and the consequent difficulty in quantifying the uncertainty of measurement, it is not possible to provide a stated degree of accuracy. The inherent variability in test procedures, materials and methods of construction, and installation may lead to variations in performance between elements of similar construction.

The assessment can therefore only relate only to the actual prototype test specimens, testing conditions, and methodology described in the supporting data, and does not imply any performance abilities of constructions of subsequent manufacture.

This assessment is based on information and experience available at the time of preparation. The published procedures for the conduct of tests and the assessment of test results are the subject of constant review and improvement and it is recommended that this report be reviewed on or, before, the stated expiry date.

The information contained in this report shall not be used for the assessment of variations other than those stated in the conclusions above. The assessment is valid provided no modifications are made to the systems detailed in this report. All details of construction should be consistent with the requirements stated in the relevant test reports and all referenced documents.

## 9 AUTHORITY

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### 9.1 APPLICANT UNDERTAKINGS AND CONDITIONS OF USE

By using this report as evidence of compliance or performance, the applicant(s) confirms that:

- to their knowledge the component or element of structure, which is the subject of this assessment, has not been subjected to a fire test to the Standard against which this assessment is being made, and
- they agree to withdraw this assessment from circulation should the component or element of structure be the subject of a fire test by a test authority in accordance with the Standard against which this assessment is being made and the results are not in agreement with this assessment, and
- they are not aware of any information that could adversely affect the conclusions of this assessment and if they subsequently become aware of any such information, agree to ask the assessing authority to withdraw the assessment.

### 9.2 GENERAL CONDITIONS OF USE

This report may only be reproduced in full without modifications by the report sponsor. Copies, extracts or abridgments of this report in any form shall not be published by other organisations or individuals without the permission of Exova Warringtonfire Aus Pty Ltd.

### 9.3 AUTHORISATION ON BEHALF OF EXOVA WARRINGTONFIRE AUS PTY LTD

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Reviewed by:



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### 9.4 DATE OF ISSUE

10 May 2018

### 9.5 EXPIRY DATE

31 May 2023

## APPENDIX A. SUMMARY OF SUPPORTING DATA

### A.1 TEST REPORT – EMI TEST REPORT M-767/2010

#### A.1.1 Report Sponsor

A.1.1.1 Hilti (Hungaria) Szolgaltato Kft, 1037 Budapest III, Bojtar u. 58-60

#### A.1.2 Test Laboratory

A.1.2.1 EMI Special Laboratory for Fire Safety, Budapest, Hungary

#### A.1.3 Test Date

A.1.3.1 The fire resistance test was conducted on 29/11/2010

#### A.1.4 Test Standards

A.1.4.1 The test was conducted in accordance with MSZ EN-1363-1:2000

#### A.1.5 Variations to Test Method

A.1.5.1 None

#### A.1.6 General Description of Tested Specimen

A.1.6.1 A total of 46 test specimens were installed on the soffit (exposed face) of a 180-mm thick reinforced concrete slab and exposed to the heating conditions described in the test standards.

#### A.1.7 Instrumentation

A.1.7.1 The test report states that the instrumentation was in accordance with EN 1363-1:2000

#### A.1.8 Test results

A.1.8.1 The performance of Hilti metal conduit clips X-FB fixed to the soffit of a concrete slab are summarised in Table 1 below:

Specimen (Report reference no.)	Base Material	Load ( N)	Fastener details	Fire rating (mins) EN-1363-1:2000
33	Concrete Slab	20	X-GN 20 MX	120
38	Concrete Slab	50	X-GHP 18 MX	120
43	Concrete Slab	10	X-GHP 20 MX	120

Table 3: EMI test result summary

### A.2 TEST REPORT- FIRES TEST REPORT FIRES-FR-178-11-AUNE

#### A.2.1 Report Sponsor

A.2.1.1 Hilti CR spol.s r.o, Uhrineveska 734, 252 43 Pruhonice, Praha-zapad, Czech Republic

#### A.2.2 Test Laboratory

A.2.2.1 FIRES, s.r.o in Batizovce

#### A.2.3 Test Date

A.2.3.1 The fire resistance test was conducted on 25/08/2011

#### A.2.4 Test Standard

A.2.4.1 The test was conducted in accordance with DIN 4102-12:1998-11 which corresponds to EN 1363:1-2000

#### A.2.5 Variations to Method

A.2.5.1 None



**A.2.6 General Description of tested specimen**

A.2.6.1 The test comprised Hilti X-FB single clips models X-FB MX, X-FB 16 MX, X-FB 22 MX, X-FB 40 MX as well as X-DFB double clips models X-DFB 16 MX, X-DFB 22 MX and X-DFB 28 MX installed on the soffit of a 150mm thick concrete slab using type X-GHP 18 nails using a gas gun nominally 300mm centres. The clips were used to support 3.1m lengths of cable exposed to the furnace chamber with each cable run incorporating ten clips and fixings. Loading on the clips has been calculated from the cable mass (kg/km) provided by the cable manufacturers specifications.

**A.2.7 Instrumentation**

A.2.7.1 The test report states that the instrumentation was done in accordance with DIM 4102-12:1998:11 which corresponds to EN 1363:1-2000.

**A.2.8 Test Results**

A.2.8.1 The performance of the specimens fixed to the soffit of the slabs (FIRES report specimens 13 through to 58) are summarised in Table 4 below:

Cable maximum outside diameter	Cable mass KG/100mm	Clip Centres	Single Clip Type	KG	Double Clip Type	KG
5mm	16	300	X-FB 5	0.056	X-DFB 5	0.112
6mm	16	300	X-FB 6	0.056	X-DFB 6	0.112
7mm	16	300	X-FB 7	0.056	X-DFB 7	0.112
8mm	16	300	X-FB 8	0.056	X-DFB 8	0.112
11mm	22	300	X-FB 11	0.077	X-DFB 11	0.154
16mm	59	300	X-FB 16	0.207	X-DFB 16	0.413
20mm	105	300	X-FB 20	0.368	X-DFB 20	0.735
25mm	156	300	X-FB 25	0.546	X-DFB 25	1.092
28mm	189	300	X-FB 28	0.662	X-DFB 28	1.323
32mm	249	300	X-FB 32	0.872	-	N/A
40mm	303	300	X-FB 40	1.061	-	N/A

Table 4: FIRES test result summary

**A.3 APPLICATION OF TESTS DATA TO AS3013-2005**

**A.3.1 General**

A.3.1.1 The classification system used for the performance of the wiring system elements under fire conditions is contained in Australian Standard 3013 Electrical Installations-Classification of fire and mechanical performance of wiring system elements-2005. This classification is used to indicate the suitability of elements of a wiring system under fire conditions, with the fire test method for supports and fixings contained in Appendix C.

A.3.1.2 The wiring system standard AS3013 separates the testing of cables (Appendix A- Fire test method- Cables and Busways) from the testing of supports and fixings (Appendix C Fire test method- Supports and fixings).

A.3.1.3 The Australian test method detailed in AS3013 Appendix C requires a minimum of ten specimen fixings to be mechanically loaded and placed within the furnace assembly which is operated in accordance with the test procedures outlined in Australian Standard AS 1530.4-2014 with regards to the standard heating conditions, furnace control and furnace pressure conditions during the test. Despite the fact that fire exposure conditions for AS1530.4-2014 and EN1363 are identical, EN1363 requires the use of plate thermometers to measure furnace temperature. This variation is not considered to adversely affecting the fire severity of the test when compared to the heating requirements of AS1530.4-2014.

A.3.1.4 AS3013-2005 criteria of performance consider that a support of fixing has failed the test if:

- Any Specimen fails to support its load
- Any part of the support is vertically deflected by more than 100mm from its position at the start of the test, and
- If any fixings dislodge from the specimen mounting slab

A.3.2 **Applicability of FIRES-FR-178-11-AUNE to AS 3013-2005**

A.3.2.1 The methodology reported in FIRES report FIRES-FR-178-11-AUNE differs from the methodology followed by AS3013-2005 stated in A.3.1.2 which requires circuit continuity to be maintained whilst testing the cables and supports/fixings. As AS3013 test cables and support/fixings separately this assessment has considered the supports and fixings contained in the FIRES report. Thus, reference to circuit continuity has not been considered in this assessment.

A.3.2.2 In FIRES test report FIRES-FR-178-11-AUNE, Hilti X-FB and Hilti X-DFB clips fixed with X-GHP 18 nails was able to support the cable loads while remaining fixed to the mounting slab for the whole duration of the test (122 minutes)

A.3.3 **Applicability of EMI Test Report M-767/2010**

A.3.3.1 The specimen in EMI Test Report M-767/2010 were tested in accordance with EN1363:1, where the heating conditions, furnace pressure and time temperature curve used is identical to the ones required in AS1530.4-2014.

A.3.3.2 However, EMI test was based on single support/fixing, hence, not complying with the requirement of Clause of C4.2, Appendix C of AS3013. Nevertheless, the outcomes of this test report were used to assess the performance of the fixings under different loads.

## APPENDIX B. ASSESSMENT OF SPECIFIC VARIATIONS

### B.1 VARIATION TO TYPE OF NAILS

#### B.1.1 Proposed Construction

B.1.1.1 It is proposed that the X-FB and X-DFB clips are fastened using the following fastening nails:

- B3 Nails: X-P 17/20/24 B3 MX, X-S 14 B3
- G3 Nails: X-P 17/20/24 G3 MX and X-S 14 G3 MX
- X-P Nails: X-P 22 P8, X-P 22 MX, X-P 27 P8, X-P 27 MX

#### B.1.2 Discussion

B.1.2.1 It is proposed that the fixation of simple and double clips X-FB and X-DFB by means of fastening nails to be varied to include the following nails, X-P 17/20/24 B3 MX, X-S 14 B3, X-P 17/20/24 G3 MX, X-S 14 G3 MX, X-P 22 P8, X-P 22 MX, X-P 27 P8, X-P 27 MX.

B.1.2.2 Nail X-S 14 B3 is designed to steel and very hard concrete. It is made of steel HRC 57,5, thickness of zinc coat 2-8 µm, diameter of head nail 6,8 mm diameter and diameter of nail 3 mm.

B.1.2.3 Nails X-P 17/20/24 B3 MX are high performance collated nails designed to concrete, aerated concrete and brick. It is made of steel HRC 57,5, thickness of zinc coat 2-8 µm, diameter of head nail 6,8mm and diameter of nail 3mm used for BX3 cordless electric nailer.

B.1.2.4 Nails X-P 17/20/24 G3 MX are high performance collated nail for concrete, used for GX3 gas actuated fastening tool.

B.1.2.5 X-P 22 P8 & X-P 27 P8 nails are a high performance single nail for use with powder actuated tools on concrete and other materials. They are made of steel HRC 59, thickness of zinc coat 5 µm.

B.1.2.6 X-P 22 MX & X-P 27 MX nails are high performance collated nail for use with powder actuated tools on concrete and other base materials. They are made of Carbon Steel HRC 59, thickness of zinc coat 5 µm

B.1.2.7 Upon the survey of the above proposed nails, it was concluded that all proposed nails are made of steel, the design of the new proposed fastening nails is same as the tested nails and the only noticeable change is in the plastic cartridge on nails to facilitate the use of another fastening tool. Further, after the nail is embedded in the slab, this plastic cartridge or collation will not have any contribution to the holding performance of the nail. Therefore, the change of these fastening nails doesn't affect the performance the clips in fire performance as prescribed in AS3031-2005, hence can be positively assessed.

B.1.2.8 In the light of the above, it can be considered that replacing X-GHP nails with the above proposed nails to fix X-FB and X-DFB metal clips in concrete slabs will not detrimentally affect the performance of the Hilti clips.

### B.2 VARIATION TO THE SPACING OF THE CLIP CENTRES

#### B.2.1 Proposed Construction

B.2.1.1 It is proposed that the spacing of the of the clips centres can be altered accordingly to the cable manufacturer's recommendation provided a service load of 1 kg per clip is not exceeded.

#### B.2.2 Discussion

B.2.2.1 It is proposed that the clip centres can be varied according to the cable manufacturer's recommendation provided that the service load of 1 kg per clip is not exceeded.

B.2.2.2 In both tests Fire Test Report M-767-2010 & FIRES-FR-178-11-AUNE, the clip centres spacing was limited to 300mm to facilitate fitting 10 fixings inside the furnace.

B.2.2.3 Theoretically, it is expected that increasing the spacing between the clips centres will increase the load on the individual clip as it will be holding higher cable weight, causing it to either fail to support its load or dislodge from the specimen mounting slab before 120 minutes.

B.2.2.4 Reference to Fire Test Report M-767-2010, the loading of the test specimen was provided using suspended weight applied not less than 30 minutes prior to the commencement of the test. The loads applied were 10 N, 20 N & 50 N on X-FB 11 clips fastened by X-GHP 20 MX and X-GHP

18 MX respectively. The clips were able to support the cable loads whilst remaining fixed to the specimen mounting slab for the full 120 minutes duration of the test.

B.2.2.5 In the light of the above discussion , it can be concluded that altering the clip centres spacing and limiting the service load of each clip to 1kg will not detrimentally affect the holding performance and the likely fire resistance performance for 120 minutes, hence can be positively assessed.