

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

Assessment Report

Author: Brett Roddy

Report number: FCO-3062

Date: 2 June 2014

Client: Hilti (Australia) Pty Limited

Commercial-in-confidence

Inquiries should be address to:

Fire Testing and Assessments	Author	The Client
Infrastructure Technologies 14 Julius Avenue North Ryde, NSW 2113 Telephone +61 2 94905444	Infrastructure Technologies 14 Julius Avenue North Ryde, NSW 2113 Telephone +61 2 94905500	Hilti (Australia) Pty Limited Level 5, 10 Homebush Bay Drive Rhodes, NSW 2138 Telephone +61 2 878 1042

Report Details:

Report CSIRO Reference number: FCO-3062.

Report Status and Revision History:

VERSION	STATUS	DATE	DISTRIBUTION
A	Draft for review	08/05/2014	CSIRO/Hilti
B	Final	05/06/2014	Hilti

Report Authorization:

AUTHOR	REVIEWED BY	AUTHORISED BY
Brett Roddy	Chris Wojcik	Brett Roddy
		
5 June 2014	5 June 2014	5 June 2014

Copyright and disclaimer

© 2014 CSIRO To the extent permitted by law, all rights are reserved and no part of this publication covered by copyright may be reproduced or copied in any form or by any means except with the written permission of CSIRO.

Important disclaimer

This assessment report will lapse on 30 June 2019. Should you wish us to re-examine this report with a view to the possible extension of its term of validity, would you please apply to us three to four months before the date of expiry. This Division reserves the right at any time to amend or withdraw this assessment in the light of new knowledge.

CSIRO advises that the information contained in this publication comprises general statements based on scientific research. The reader is advised and needs to be aware that such information may be incomplete or unable to be used in any specific situation. No reliance or actions must therefore be made on that information without seeking prior expert professional, scientific and technical advice. To the extent permitted by law, CSIRO (including its employees and consultants) excludes all liability to any person for any consequences, including but not limited to all losses, damages, costs, expenses and any other compensation, arising directly or indirectly from using this publication (in part or in whole) and any information or material contained in it.

Contents

Executive summary.....	4
1 Introduction	5
2 Proposal.....	5
3 Analysis.....	5
4 Conclusion.....	6
5 Term of validity	6
Appendix A	7
References.....	9

Executive summary

This report provides the assessment of this Division on the likely performance of a range of Hilti X-FB metal clips and fixings if tested in accordance to AS3013-2005 Appendix C, Fire Test Method - Supports and Fixings.

Based on the established fire performance under test and the factors detailed in this report, it is the opinion of this Division that the following Hilti X-FB clips used in conjunction with Hilti X-GHP 18 fixings would satisfy the requirements of AS3013-2005 – Appendix C Supports and Fixings., Clause 3.2.1 for a wiring system classification of WS 5X, where the 5 indicates the test was conducted for 120 minutes.

Table 1 below nominates the maximum loads the clip systems achieved.

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	0.16	300
X-(D)FB 16	0.207	0.42	300
X-(D)FB 20	0.368	0.74	300
X-(D)FB 25	0.546	1.1	300
X-(D)FB 28	0.662	1.33	300
X-(D)FB 32	0.872	N/A	300
X-(D)FB 40	1.061	N/A	300

Table 1: Maximum loads and spacing for Hilti clips and fasteners

Performance of a Hilti X-FB metal clips and fixings if tested in accordance with AS3013-2005 Appendix C – Supports & Fixings

1 Introduction

This report provides the assessment of this Division on the likely performance of Hilti X-FB (single) and X-DFB (double) metal clips and fasteners, if tested in accordance with AS3013-2005. The AS3013 classification system is used to indicate the suitability of the elements of a wiring system under fire conditions with the fire test method for supports and fixings contained in Appendix C of the standard.

2 Proposal

You have proposed to use the results of fire tests conducted at European laboratories on Hilti X-FB and X-DFB conduit clips and fixings to support the assessment of these clips and fixings in terms of the requirements of test standard AS3013 Electrical Installations – Classification of the fire and mechanical performance of wiring system elements: 2005. Fire test reports on cable supports and fixings from EMI Special Laboratory for Fire Safety in Budapest and the FIRES Laboratory in Slovakia are contained in Appendix A, and have been used to support the assessment of the Hilti clips and fixings.

3 Analysis

The classification system used for the performance of 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 system is used to indicate the suitability of the elements of a wiring system under fire conditions, with the fire test method for supports and fixings contained in Appendix C.

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). This differs from the methodology reported in FIRES Report FIRES-FR-178-11-AUNE which requires circuit continuity to be maintained whilst testing the cables and supports/fixings. As AS3013 tests cables and support/fixings separately, this assessment has only considered the supports and fixings contained in the FIRES report and therefore reference to circuit continuity has not been considered.

The Australian test method detailed in AS3013 Appendix C requires a minimum of ten specimen fixings to be mechanically loaded and placed within a furnace assembly which is operated in accordance with the test procedures outlined in Australian Standard 1530.4 with regard to the standard heating conditions, furnace control and furnace pressure conditions during the test. Whilst the fire exposure conditions of AS1530.4 and EN 1363 are identical; EN 1363 requires the use of plate thermometers to measure furnace temperature. This variation is not considered to adversely affect the fire severity of the test when compared to the heating requirements of AS1530.4.

The AS3013 criterion of performance considers that a support or fixing has failed the test if:

- any specimen fails to support its load;
- any part of the support is vertically deflected by more than 100-mm from its position at the start of the test, and
- if any fixing dislodges from the specimen mounting slab.

The FIRES test report FIRES-FR-178-11-AUNE demonstrates that the Hilti X-FB and X-DFB clips and X-GHP 18 fixings continued to support the cable loads whilst remaining fixed to the specimen mounting slab for the full 122 minute duration of the test.

Whilst the EMI Test Report has also demonstrated that the Hilti X-FB clips and fasteners continued to support the applied load during the fire test, this test is based on a single support/fixing and therefore does not meet the requires of AS3013 Appendix C, Clause C4.2.

4 Conclusion

Based on the established fire performance under test and the factors detailed in this report, it is the opinion of this Division that the following Hilti X-FB clips used in conjunction with Hilti X-GHP 18 fixings would satisfy the requirements of AS3013-2005 – Appendix C Supports and Fixings for the following wiring systems classifications for up to the maximum loads nominated in the table below:

Based on the established fire performance under test and the factors detailed in this report, it is the opinion of this Division that the following Hilti X-FB clips used in conjunction with Hilti X-GHP 18 fixings would satisfy the requirements of AS3013-2005 – Appendix C Supports and Fixings., Clause 3.2.1 for a wiring system classification of WS 5X, where the 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	0.16	300
X-(D)FB 16	0.207	0.42	300
X-(D)FB 20	0.368	0.74	300
X-(D)FB 25	0.546	1.1	300
X-(D)FB 28	0.662	1.33	300
X-(D)FB 32	0.872	N/A	300
X-(D)FB 40	1.061	N/A	300

Table 1: Maximum loads and spacing for Hilti clips and fasteners

5 Term of validity

This assessment report will lapse on 30 June 2019. Should you wish us to re-examine this report with a view to the possible extension of its term of validity, would you please apply to us three to four months before the date of expiry. This Division reserves the right at any time to amend or withdraw this assessment in the light of new knowledge.

Appendix A

A.1 EMI Test Report M-767/2010

On 29 November 2010, EMI Special Laboratory for Fire Safety in Budapest conducted a fire test on various Hilti fire-resistant fastening products in accordance with the requirements of test standard MSZ EN-1363-1: 2000.

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 standard. The furnace pressure and time temperature curve used in the EN 1363-1 test is the same as that used ISO 834-1 which in turn is the same as that required by AS1530.4-2005.

Loading of the test specimens was provided using suspended weights applied not less than 30 minutes prior to the commencement of the test.

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

Table 1: EMI test result summary.

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

A.2 FIRES Test Report FIRES-FR-178-11-AUNE

On 25 August 2011, FIRES Laboratory in Batizovce, Slovak republic conducted a fire test on Hilti X-FB single conduit clips and X-DFB double conduit clips in accordance with DIN 4102-12:1998-11. The test was terminated after 122 minutes at the request of the sponsor. The purpose of this test was to classify an electrical wiring system required to maintain circuit integrity for a specific length of time in the event of a fire. This test comprised the cables in conjunction with the cable supports and fixings.

The test comprised the following Hilti X-FB single clips models X-FB 8 MX, X-FB 16 MX, X-FB 22MX and 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 150-mm thick concrete slab using type X-GHP 18 nails fixed using a gas gun a nominally 300-mm 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.

The performance of the specimens fixed to the soffit of the slab (FIRES report specimens 13 through to 58) are summarised in Table 2 below:

Table 2: FIRES test result summary.

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

References

The following informative documents are referred to in this Report:

AS

3013-2005 Electrical installations – Classification of the fire and mechanical performance of wiring system elements.

1530.4-2005 Methods for fire tests on building materials, components and structures Part 4: Fire-resistance tests of elements of building construction.

EMI

M-767/2010 Test report regarding the fire rating of Hilti fire resistant products.

FIRES

FR-178-11-
AUNE Fire test report on Hilti single and double clips type X-FB and X-DFB.

CONTACT US

t 1300 363 400
+61 3 9545 2176
e enquiries@csiro.au
w www.csiro.au

YOUR CSIRO

Australia is founding its future on science and innovation. Its national science agency, CSIRO, is a powerhouse of ideas, technologies and skills for building prosperity, growth, health and sustainability. It serves governments, industries, business and communities across the nation.

FOR FURTHER INFORMATION

Infrastructure Technologies

Mario Lara
Senior Fire Resistance and Assessments Engineer
t +61 2 94905500
e mario.lara@csiro.au

w www.csiro.au/Organisation-Structure/Divisions/CMSE/Infrastructure-Technologies/Fire-safety.aspx

Infrastructure Technologies

Brett Roddy
Manager, Fire Testing and Assessments
t +61 2 94905449
e brett.rodny@csiro.au

w www.csiro.au/Organisation-Structure/Divisions/CMSE/Infrastructure-Technologies/Fire-safety.aspx