

# The classification of Hilti X-MCT-MX cable supports with Hilti X-P and X-GHP fixings in accordance with AS/NZS 3013 -2005 Appendix C

## Assessment Report

**Author:** Keith Nicholls

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### Inquiries should be addressed to:

Fire Testing and Assessments  
NATA Registered Laboratory  
14 Julius Avenue  
North Ryde, NSW 2113  
Telephone +61 2 94905444

Author  
Infrastructure Technologies  
14 Julius Avenue  
North Ryde, NSW 2113  
Telephone +61 2 94905500

The Client(s)  
Hilti (Aust.) Pty Ltd  
1G Homebush Bay Drive  
Rhodes NSW 2138  
Australia  
Telephone +61 428 194 658




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Keith Nicholls	Jing Xu	Brett Roddy
		
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# 1 Introduction

This report confirms the classification of Hilti X-MCT-MX cable supports with Hilti X-P and X-GHP fixings in accordance with AS/NZS 3013 -2005 Appendix C.

This report is prepared for the purpose of meeting the evidence of suitability requirements of the NCC clause A5.2 1 d) as appropriate for a report from an Accredited Testing Laboratory.

This report reviews and confirms the extent to which the reference tests listed in Section 2 meet the requirements of the test standards listed in Section 4 of the report. The proposed variations to the tested construction presented in Section 3 are subject to an analysis in Appendix B, and the conclusions are presented in Section 5 of this report.

The field of applicability of the results of this assessment report is presented in Section 6 and subject to the requirements, validity and limitations of Section 7, 8 and 9.

# 2 Supporting Data

This assessment report refers to various test reports to support the analysis and conclusions of this report. They are listed below;

Report Reference	Test Standard	Outline of Test Specimen
SGS Report # AJFS2005004130FF	EN 1363-1:2012	Fire resistance test of a concrete slab incorporating 40 steel cable tie holders

The test SGS Report # AJFS2005004130FF was undertaken by SGS-CSTC Co., Ltd. Anji Branch and sponsored by HILTI (Shanghai) Ltd. Permission has been given for the use of these reports for this assessment.

# 3 Proposed Variations

The proposed construction comprises pipes tested in #AJFS2005004130FF and subjected to the following variationL:

- Confirm the duration, without dislodgement of Hilti X-MCT-MX Steel Cable Tie Holders fixed with various Hilti X-P or X-GHP nails listed in Table 1 based on test report SGS Report # AJFS2005004130FF

**Table 1: Proposed nails in concrete slabs and variation from tested nail**

Type of Fixing	Name of the fixing/nail	Detail
B3 Nails	X-P 17 B3 MX	Nail included in the original test
	X-P 20 B3 MX	Same as X-P 17 B3 MX, only 3mm longer
	X-P 24 B3 MX	Same as X-P 17 B3 MX, only 7mm longer
	X-S 14 B3 MX	Same as X-P 17 B3 MX, only 3mm shorter
G3 Nails	X-P 17 G3 MX	Same as X-P 17 B3 MX
	X-P 20 G3 MX	Same as X-P 17 B3 MX, only 3mm longer
	X-P 24 G3 MX	Same as X-P 17 B3 MX, only 7mm longer
	X-S 14 G3 MX	Same as X-P 17 B3 MX, only 3mm shorter

Type of Fixing	Name of the fixing/nail	Detail
X-P Nails	X-P 22 P8	Higher hardness and bigger nail diameter than X-P 17 B3 MX, plus 5mm longer, single nail
	X-P 22 MX	Higher hardness and bigger nail diameter than X-P 17 B3 MX, plus 5mm longer, magazine nail
	X-P 27 P8	Higher hardness and bigger nail diameter than X-P 17 B3 MX, plus 10mm longer, single nail
	X-P 27 MX	Higher hardness and bigger nail diameter than X-P 17 B3 MX, plus 10mm longer, magazine nail
X-GHP Nails	X-GHP 18 MX	Same as X-P 17 B3 MX, only 1mm longer
	X-GHP 20 MX	Same as X-P 17 B3 MX, only 3mm longer


## 4 Referenced Standards

### Standards:

AS 1530.4-2014	Methods for fire tests on building materials, components and structures Part 4: Fire resistance tests of elements of building construction
AS/NZS 3013-2005	Electrical installations - Classification of the fire and mechanical performance of wiring system elements, as appropriate for fixings

## 5 Conclusion

On the basis of the analysis presented in this report, it is the opinion of this Accredited Testing Laboratory that the tested prototypes described in Section 2 when varied as described in Section 3 will achieve the performance below when submitted to a test in accordance with the test methods referenced in Section 4, and subject to the requirements of Section 7, the validity of Section 8 and limitation of Section 9.

Support and fixing system description		Maximum load on fixing and clip	Classification in accordance with AS/NZS 3013-2005 Appendix C
Cable support clip	Fixing		
Hilti X-MCT-MX 	X-P 17 B3 MX	<b>20N</b>	<b>WS5X</b>
	X-P 20 B3 MX		
	X-P 24 B3 MX		
	X-S 14 B3 MX		
	X-P 17 G3 MX		
	X-P 20 G3 MX		
	X-P 24 G3 MX		
	X-S 14 G3 MX		
	X-P 22 P8		
	X-P 22 MX		
	X-P 27 P8		
	X-P 27 MX		
	X-GHP 18 MX		
	X-GHP 20 MX		

## 6 Direct Field of Application of Results

The results of this assessment apply to fixing and support systems exposed to fire from below.

## 7 Requirements

It is required the systems described above be fitted to a concrete slab construction that has been tested, assessed or designed to achieve the required classification.

Any variations concerning size, constructional details, loads, stresses, edge or end conditions that are other than those identified in this report, may invalidate the conclusions drawn in this report.

## 8 Term of Validity

This assessment report will lapse on 31<sup>st</sup> March 2026. 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.

## 9 Limitations

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

Because of the nature of fire resistance 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.

This assessment report does not provide an endorsement by CSIRO of the actual products supplied to the industry. The referenced assessment can therefore only relate 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 is reviewed on or, before, the stated expiry date.

The information contained in this assessment 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.

# Appendix A Supporting Test Data

## A.1 SGS Report # AJFS2005004130FF

On 16 June 2020, this SGS-CSTC Co., Ltd. Anji Branch conducted a full-scale fire-resistance test in accordance with EN 1363-1:2012 on a concrete slab assembly incorporating 40 steel cable tie holders.

The concrete slab with a compressive strength of 31.7 MPa had overall nominal dimensions of 2400 mm (L) × 1400 mm (W) × 180 mm (T), incorporating 40 steel cable tie holders 40 steel cable tie holders on the exposed surface of the concrete block.

Five models of Hilti cable tie holders were tested, however models C and D are applicable for this assessment:

Sample No.	Model	Description
C	Hilti X-MCT-MX	10 x Cable tie holder (Hilti X-MCT-MX) with nail (Hilti X-P 17 MX B3) fixings were installed on to the mounting system and loaded each with 20 N each on the exposed side
D	Hilti X-MCT-MX	10 x Cable tie holder (Hilti X-MCT-MX) with nail (Hilti X-P 17 MX B3) fixings were installed on to the mounting system and loaded each with 40 N each on the exposed side

The side of concrete block assembly incorporating steel cable tie holder was exposed to the furnace. The test duration was 120 minutes.

Sample No.	Result
C	No failure before 120 minutes
D	1 failure before 120 minutes due to nail pull out

NCC schedule 3 defines Accredited Testing Laboratory as

- (a) an organisation accredited by the National Association of Testing Authorities (NATA) to undertake the relevant tests; or
- (b) an organisation outside Australia accredited to undertake the relevant tests by an authority recognised by NATA through a mutual recognition agreement; or
- (c) an organisation recognised as being an Accredited Testing Laboratory under legislation at the time the test was undertaken.

It is confirmed that the organisation ilac which certified # AJFS2005004130FF, is recognised by NATA through a mutual recognition agreement for testing and calibration.

Therefore # AJFS2005004130FF can be used for meeting the requirements of NCC Volume 1 Schedule 5 Clause 2(c) as appropriate for FRL.

## A.2 Applicability of EN 1363-1:2012 test data to AS 1530.4 -2014 and AS/NZS 3013-2005

### **General**

The fire resistance test # AJFS2005004130FF was conducted in accordance with EN 1363-1: 2012. This standard differs from the testing called up by AS/NZS 3013-2005 Appendix C as appropriate for fixings and the NCC which is AS 1530.4-2014. The significance of these differences are discussed below.

### **Temperature Regime**

The furnace temperature regime for fire resistance tests conducted in accordance with AS 1530.4-2014 follows the same trend as EN 1363-1: 2012.

The parameters outlining the accuracy of control of the furnace temperature in AS 1530.4- 2014 and EN 1363-1: 2012 are not appreciably different.

### **Furnace Thermocouples**

The furnace thermocouples specified in AS 1530.4-2014 are type K, mineral insulated metal sheathed (MIMS) with a stainless steel sheath having a wire of a diameter of less than 1.0mm and an overall diameter of 3mm. The measuring junction protrudes at least 25mm from the supporting heat resistant tube.

The furnace thermocouples specified in EN 1363.1: 2012 are made from folded steel plate that faces the furnace chamber. A thermocouple is fixed to the side of the plate facing the specimen with the thermocouple hot junction protected by a pad of insulating material. The plate part is to be constructed from 150 ±1 mm long by 100 ±1 mm wide by 0.7 ±0.1 mm thick nickel alloy sheet strips.

The measuring junction is to consist of nickel chromium/nickel aluminium (Type K) wire as defined in IEC 60584-1, contained within mineral insulation in a heat-resisting steel alloy sheath of nominal diameter 1 mm, the hot junctions being electrically insulated from the sheath.

The thermocouple hot junction is to be fixed to the geometric centre of the plate, by a small steel strip made from the same material as the plate. The steel strip can be welded to the plate or may be screwed to it to facilitate the replacement of the thermocouple. The strip should be approximately 18 mm by 6 mm if it is spot-welded to the plate, and nominally 25 mm by 6 mm if it is to be screwed to the plate. The screw is to be 2 mm in diameter.

The assembly of plate and thermocouple should be fitted with a pad of inorganic insulation material 97 ±1 mm by 97 ±1 mm by 10 ±1 mm thick with a density of 280 ±30 kg/m<sup>3</sup>.

The relative location of the furnace thermocouples for the exposed face of the specimen, for AS 1530.4-2014 and EN 1363.1: 2012, is 100mm ±10mm and 100mm ±50mm respectively.

The furnace control thermocouples required by EN 1363.1: 2012 are less responsive than those specified by AS 1530.4-2014. This variation in sensitivity can produce a potentially more onerous heating condition for specimen tested to EN 1363.1: 2012, particularly when the furnace temperature is changing quickly in the early stages of a test.

### **Furnace Pressure**

It is a requirement of AS 1530.4-2014 and for EN 1363-1: 2012 that for vertical elements, a furnace gauge pressure of zero (0) Pa is established at a height 500mm above the national floor level or for wall penetrations. For AS 1530.4-2014 the furnace gauge pressure shall be 15Pa at the location of the lowest penetration while for EN 1363-1: 2012 it is 10Pa.

For horizontal elements, AS 1530.4-2014 dictates that the furnace pressure on the underside of the test specimen shall not exceed 20 Pa at 100 mm below the underside of the separating element.



It is confirmed that # AJFS2005004130FF only had  $15\pm 3$  Pa pressure differential relative to the laboratory atmosphere at a position 100 mm below the underside of the assembly

The parameters outlining the accuracy of control of the furnace pressure in AS 1530.4-2014 and EN 1363-1: 2012 are also not appreciably different.

#### ***Performance Criteria***

The performance criteria in EN 1363-1: 2012 and AS 1530.4-2014 are not applicable to this specimen type. The observation which made on whether the fixing dislodged from the slab will be discussed below for compliance to AS/NZS 3013-2005 Appendix C.

#### ***Application of Test Data to AS 1530.4-2014***

The variations in furnace heating regimes, furnace thermocouples and the responses of the different thermocouple types to the furnace conditions are likely to be more onerous or not expected to have a significant effect on the outcome of the referenced fire resistance test.

The variation in pressure would not affect the behaviour of the specimen as there were no gap formed for up to 120 minutes.

Based on the above discussion, it is considered that the results of the referenced test can be used as a basis to assess the performance of the specimen if tested in accordance with AS 1530.4-2014.

#### ***Application of Test Data to AS/NZS 3013-2005 Appendix C***

With reference to AS/NZS 3013-2005 Section 2, in order to achieve a classification, the fixing must be tested in accordance with Appendix C.

It is confirmed that # AJFS2005004130FF is a test for determining the suitability of supports and fixings for supporting elements of wiring systems under fire conditions, and thereby satisfied AS/NZS 3013-2005 Appendix C clause C1.

Since the results of # AJFS2005004130FF is applicable to with AS 1530.4-2014, it also satisfies AS/NZS 3013-2005 Appendix C clause C3.

It is confirmed that a minimum of 10 specimens for Cable tie holder (Hilti X-MCT-MX) with nail (Hilti X-P 17 MX B3) fixings were tested in # AJFS2005004130FF and thereby satisfied AS/NZS 3013-2005 Appendix C clause C4.2 (a)

AS/NZS 3013-2005 Appendix C clause C4.2 (b) requires separate qualification for any variation to the fixing's material and method of construction as defined below:

- (i) Change in material used in construction of the fixing, e.g. mild steel or stainless steel.
- (ii) Change in the design of the fixing.

The proposed variation requires a change in material used in construction of the fixing, which will be addressed in Appendix B of this report.

It is confirmed the test procedures in # AJFS2005004130FF satisfied AS/NZS 3013-2005 Appendix C clause C6 and C7.

The performance criteria AS/NZS 3013-2005 Appendix C is whether the fixings dislodges from the concrete slab. This was recorded in # AJFS2005004130FF through observation.

Based on the above, the results of # AJFS2005004130FF is deemed to have satisfied the requirements of AS/NZS 3013-2005 Appendix C as appropriate for fixings.

Based on the result of # AJFS2005004130FF, specimen No. C would achieve a classification of WS5X in accordance with AS/NZS 3013-2005 section 3 as appropriate for fixings.

# Appendix B Analysis of Variations

## B.1 Variation to fixing size and length

The proposed construction comprises Hilti X-MCT-MX Steel Cable Tie Holders and -P 17 B3 MX nail tested in #AJFS2005004130FF (specimen C and D) when subject to the following variations

- Confirm the duration, without dislodgement of Hilti X-MCT-MX Steel Cable Tie Holders fixed with various Hilti X-P or X-GHP nails listed in Table 1 based on test report SGS Report # AJFS2005004130FF

With reference to #AJFS2005004130FF (specimen C), 10 x Hilti X-MCT-MX Steel Cable Tie Holders were fixed to a concrete slab with X-P 17 B3 MX nail. Each specimen were loaded with 20N of point load. The fixings did not dislodge when exposure fire on the underside of the slab for up to 120 minutes.

In general, it is expected that fixings which are longer or larger diameter or of higher hardness are expected to have similar or greater capacity to hold onto the the concrete substrate when exposed to fire.

It is observed that aside from the X-S 14 B3 MX and X-S 14 G3 MX nail types, the other proposed nail types are all either longer or larger diameter or of higher hardness than the X-P 17 B3 MX tested in #AJFS2005004130FF.

The proposed X-S 14 B3 MX and X-S 14 G3 MX nail types are 3mm shorter than the tested X-P 17 B3 MX nail, which may reduce the load carrying capacity of these nails.

With reference to #AJFS2005004130FF(specimen D), 10 x Hilti X-MCT-MX Steel Cable Tie Holders were fixed to a concrete slab with X-P 17 B3 MX nail and were loaded with 40N of point load. There was one fixing which was observed to have dislodge when exposure fire on the underside of the slab during the 120 minutes exposure.

It is observed that some of the tested X-P 17 B3 MX nail was able to carry 40N of point load. Therefore it is expected that even when reduced by 3mm in length, the large margin in weight would allow the shorter X-S 14 B3 MX and X-S 14 G3 MX nail to be able to carry the proposed 20N of point load for up to 120 minutes.

Based on the above, it is expected that the proposed construction will carry a load of 20N for up to 120 minutes while meeting the criteria of AS/NZS 3013-2005 clause C7 when tested in accordance with AS 1530.4 – 2014. In accordance with AS/NZS 3013-2005 Clause 3, the proposed construction can be assigned a classification of WS5X as appropriate for supports and fixings.

#### CONTACT US

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

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#### FOR FURTHER INFORMATION

##### **Infrastructure Technologies**

Keith Nicholls

Team Leader - Fire Assessments

**t** +61 2 94905450

**e** keith.nicholls@csiro.au

**w** <https://research.csiro.au/infratech/fire-safety/fire-testing/>

Brett Roddy

Group Leader | Infrastructure Technologies North Ryde

**t** +61 2 94905449

**e** brett.rodny@csiro.au

**w** <https://research.csiro.au/infratech/fire-safety/fire-testing/>