



Determination 2018/055

Regarding the compliance of a warehouse fitout, comprising of a storage racking system and a mezzanine floor, with the fire safety requirements of the Building Code at 49 Stoneleigh Drive, Rolleston



Summary

This determination considers the compliance of a warehouse fitout, comprising a storage racking system and a mezzanine floor, with the fire safety requirements of the Building Code. The determination considers whether the fitout was part of the original building as it was intended to be built, or whether it can be considered an alteration to an existing building.

1. The matter to be determined

- 1.1 This is a determination under Part 3 Subpart 1 of the Building Act 2004¹ ("the Act") made under due authorisation by me, Katie Gordon, Manager Determinations, Ministry of Business, Innovation and Employment ("the Ministry"), for and on behalf of the Chief Executive of the Ministry.
- 1.2 The parties to this determination are:
 - M Gray of Forbes and Davies Ltd, the warehouse owner who applied for the determination ("the applicant")
 - Selwyn District Council, carrying out its duties as a territorial authority or building consent authority ("the authority")

¹ The Building Act, Building Code, compliance documents, past determinations and guidance documents issued by the Ministry are all available at www.building.govt.nz or by contacting the Ministry on 0800 242 243.

- Fire and Emergency New Zealand (FENZ) as a party under Section 176(g)² of the Act.
- 1.3 The determination arises from the applicant's installation of racking in a new warehouse before appreciating this was building work requiring a building consent. In his view the racking and mezzanine floor, which came from his previous warehouse, only needed minor modifications for installation in this building. However, the authority considered the warehouse with the racking system and mezzanine floor installed did not comply with various Building Code³ requirements and issued a notice to fix requiring him to seek building consent for remedial work.
- 1.4 The applicant has proposed a fire safety proposal to achieve compliance but FENZ, which was asked to comment by the authority under section 46 of the Act, still has outstanding concerns about this proposal.
- 1.5 Accordingly, the matter to be determined⁴ is whether the racking system and mezzanine floor fit-out as described in the fire safety proposal complies with the Building Code with respect to Clause C Protection from Fire.
- 1.6 In making this determination I have confined it to the matter described in paragraph 1.5 and have not have not considered any other aspects of compliance with the Building Code. The compliance of the racking system with respect to B1 Structure, and stairs to the mezzanine level with respect to F4 Safety from falling, have been addressed by the applicant and is not considered further in this determination.
- 1.7 In making my decision, I have considered the submissions of the parties, the report of the independent experts engaged by the Ministry ("the experts") who are Chartered Professional Engineers (CPEng) with specialist qualifications and expertise in fire engineering, and the other evidence in this matter.
- 1.8 Refer to Appendix A for the relevant sections of the Act referred to in this determination.

2. The building

- 2.1 The applicant's warehouse was built in 2015 at 49 Stoneleigh Drive, Rolleston. It is used for the wholesale importing and distribution of automotive parts and is not open to the public. The warehouse is usually staffed by three warehouse workers, while a sales representative is onsite one day a week.
- 2.2 The floor area for the warehouse storage area is $928m^2$. Associated office space adds a further $110m^2$ and includes a self-contained sleeping area. There are a number of direct escape points to the outside, including from the sleeping area. The floor plan as consented is shown in Figure 1.

² Unless otherwise identified in this determination, references to sections are to sections of the Building Act and references to clauses are to clauses of the Building Code.

³ Schedule 1 to the Building Regulations 1992

⁴ Under section 177(1)(a) of the Act



Figure 1: The consented floor plan (not to scale)

- 2.3 The consented base-build fire safety design for the warehouse included a Type 3 automatic heat detection system⁵ throughout all areas with manual call points complying with New Zealand Standard NZS 4512:2010⁶, a Type 1 smoke alarm within the sleeping area, and shutdown of the air handling system on smoke detection (Type 9).
- 2.4 The building itself is mostly constructed from steel portal frames supporting precast concrete tilt panels. The panels are topped with profiled steel sheet cladding up to the level of the roof, which has an apex height of 7.9m.



Figure 2: Floor plan of racking system and mezzanine level (not to scale)

⁵ Refer www.building.govt.nz/building-code-compliance for descriptions of system types

⁶ NZS 4512:2010 Fire Detection and Alarm Systems in Buildings

2.5 The warehouse racking system includes a platform, or mezzanine, about 2.2m above the ground floor. This mezzanine is made from 100×50 mm one-way span timber joists topped with particleboard flooring and is structurally supported by the modular racking system below. It has a floor area of 452m^2 (i.e. just over half the warehouse's floor area) and is accessed via stairs at each end. The racking system (including mezzanine) is shown in Figure 2 and Figure 3.



Figure 3: The racking system and mezzanine level (not to scale)

3. Background

- 3.1 After the Canterbury earthquake sequence⁷ damaged his Hornby warehouse the applicant decided to build a new facility in the Izone Rolleston business precinct. The authority issued a building consent for this on 1 May 2015 (BC150389), conducted its final site inspection on 20 August 2015, and issued a code compliance certificate on 20 November 2015. I have not seen a copy of the code compliance certificate.
- 3.2 The applicant relocated the existing racking system and mezzanine from the Hornby warehouse as it had not been damaged. After installing this in August 2015 the applicant sought a building warrant of fitness and was advised that the racking and mezzanine installation was building work that should have had a building consent. He then approached the authority to seek a certificate of acceptance to cover the code-compliant aspects of the installation (knowing that a building consent would be required for any remedial work).
- 3.3 At the authority's request, on 8 August 2016 a representative of FENZ visited the warehouse. In an email to the authority and the applicant on 15 August 2016 the representative:
 - recommended the fire alarm system be upgraded to include smoke detectors under the mezzanine floor
 - said the doors linking the warehouse to the office/sleeping area could be upgraded to provide self-closing mechanisms to provide longer escape time from the sleeping area, and

⁷ The Canterbury Earthquake Sequence includes the 'Darfield Earthquake' of 4 September 2010 with a moment magnitude of 7.1, followed by a series of aftershocks that included a 6.3 magnitude event on 22 February 2011.

- said that providing the housekeeping was kept to a high standard i.e. good separation of oils, aerosols, paints etc, together with combustible waste being kept tidy and to a minimum, and staff were made aware of the evacuation procedures " [FENZ] would be happy that the life risk has been looked after".
- 3.4 On 5 September 2016 the applicant applied for a certificate of acceptance. The authority subsequently issued a certificate (CA 161864) on 8 November 2016 covering compliance with Clause G8 Artificial light only. The authority listed a number of other clauses it was unable to verify compliance with and issued a notice to fix (No. NF0481) in respect of these.
- 3.5 To help demonstrate the as built racking system and mezzanine floor's compliance with the Building Code's fire safety requirements, the applicant commissioned a fire engineering consultancy ("the applicant's fire engineer") to develop a proposal and identify remedial works required. On 10 October 2016 the applicant's fire engineer presented a Fire Engineering Brief (FEB) to the authority, which detailed a fire safety proposal ("the fire safety proposal") to assess the compliance of the racking system and mezzanine floor in order to identify what remedial work is required. The FEB proposed a performance-based design approach as an alternative solution proposal⁸ for code compliance. This FEB was based on the premise that the installation of the racking system and mezzanine was a building alteration so that section 112 applied; that is, code compliance for means of escape from fire was only required to be provided "as nearly as is reasonably practicable".
- 3.6 The authority submitted this proposed FEB to FENZ for comment. FENZ responded on 31 October 2016, and again in 29 November 2016 and 19 May 2017 following an onsite meeting and further details from the applicant's fire engineer.
- 3.7 In its initial response to the FEB dated 29 November 2016, FENZ said the application for a certificate of acceptance did not allow for compliance as near as is reasonably practicable with the requirements of the Building Code under section 112. While the authority might grant a certificate of acceptance or building consent for the remedial works nevertheless, FENZ considered it was obliged to offer its comments on the proposal "regardless of any pre-determined agreement or limitations".
- 3.8 In its 29 November 2016 letter, FENZ also identified issues with the proposed fire design relating to:
 - what it considered a selective use of the Verification Method for fire safety, C/VM2 which 'may not result in a proposal that achieves the level of safety indicated by the compliance documents'
 - assumptions in the FEB relating to ventilation of the fire and smoke production given the size of the mezzanine and its boundary edge length
 - the sufficiency of some of the fire modelling calculations, particularly with the proposal's selective combination of parts of the Verification Method C/VM2 requirements with parts of the Acceptable Solution C/AS5 requirements
 - the fire rating of the mezzanine floor, which the applicant's fire engineer argued could be assessed on an "as near as is reasonably practicable" basis under section 112, but which FENZ believed had to be considered as new work

⁸ A means of demonstrating compliance with the relevant requirements of the Building Code. For information about alternative solutions, Acceptable Solutions and Verification methods go to www.building.govt.nz.

- the "disapplication" of some Building Code clauses by the applicant under section 112, which FENZ considered inappropriate.
- 3.9 In its 19 May 2017 letter, FENZ said a number of these issues had been addressed at the onsite meeting but re-stated outstanding concerns it had relating to:
 - the calculations of period of structural adequacy in the event of a fire for the mezzanine's unprotected steel supports, and
 - the fire rating of the intermediate floor in relation to the operational firefighting response time. Although the FEB suggested no applied fire protection was required as the structure inherently provided 20 minutes fire resistance, FENZ said the total time required was likely to be "significantly greater" than this, and noted that the Acceptable Solutions and Verification Method C/VM2 required a fire rating of intermediate floors of at least 30 minutes.
- 3.10 On 12 January 2018 the authority issued the applicant with a further notice to fix for non-compliant building work (NTF0570 to replace NTF0481). A cover letter identifying areas of non-compliance included:

Contrary to clauses C4-C6, the FEB process demonstrating compliance in regard to movement to a place of safety, access and safety for firefighting operations, and structural stability, has not yet been agreed to.

- 3.11 On 12 January 2018 the authority also issued the applicant with an additional notice to fix (NTF0572) for the failure to supply the annual Building Warrant of Fitness under section 108(1) of the Act.
- 3.12 The applicant applied to the Ministry for a determination on 26 February 2018.

4. Submissions

4.1 The applicant

- 4.1.1 With his application for determination the applicant included a submission, summary of events and copies of:
 - the fire design report for the warehouse dated 26 January 2015 (and included in the building consent application for the warehouse) and PS1 Producer Statement (design) dated 13 February 2015
 - the FEB regarding the racking system and mezzanine dated 10 October 2016 as prepared by the applicant's fire engineer
 - correspondence August 2016 May 2017 with FENZ and between the applicant's fire engineer and the authority.
- 4.1.2 In response to my request for additional information, on 7-8 March 2018 the applicant sent me copies of:
 - further building consent documentation for the warehouse
 - a chartered professional engineer's PS4 (Producer Statement Construction review) and associated inspection report for the racking system as installed at the Rolleston warehouse dated 15 August 2016 regarding compliance with Clause B1 Structure
 - an application for a certificate of acceptance for the racking system and an associated compliance schedule

- drawings for the racking and mezzanine
- correspondence between the applicant's fire engineer, FENZ and the authority October 2016 January 2018.
- 4.1.3 In his submission the applicant said he hoped there was some room for "practical suggestions, logic and common sense to prevail (as has been demonstrated by [FENZ] Canterbury) to enable this business to continue economically trading with its existing, proven, safe warehouse fitout/racking system".
- 4.1.4 The applicant said he was seeking a determination to allow the existing racking to continue in its current configuration and for the authority to issue a certificate of acceptance (for the compliant work) and building consent to carry out the additional safety upgrades that had been identified as being required, which he said included:
 - installation of a Type 4 smoke alarm system throughout the warehouse and underneath the mezzanine, with direct connection to FENZ (plus associated signage)
 - self-closing doors to the office/sleeping area
 - various structural and safety improvements including handrails on both stairways to the mezzanine, support stays around the mezzanine railing, and additional hold-down bolts
 - the warehouse to continue to be closed to the public and to have the current occupancy (i.e. three staff plus a travelling sales representative).
- 4.1.5 The applicant also said (in summary):
 - The raised storage platform (mezzanine) meant there was no potential for products to fall from any shelves over 2 m high and he did not believe portable picking trolleys were as safe, especially in an active seismic area.
 - The FEB was prepared as an alternative solution proposal as agreed with the authority at the time. This process did not transpire and it was sent to FENZ in Wellington for review. However, the conclusion of this review effectively discounted the summary of FENZ's Canterbury safety officer, who had actually inspected the building (see paragraph 3.3 of this determination).
 - Regarding occupancy, he said this warehouse working model had operated for the last 17 years with three warehouse staff and one sales representative who was out of the warehouse four days a week. The sleeping room was only ever occupied at night and in that case, there would only be one person on site.
 - The FEB had demonstrated that the potential egress on a compliant 35m² mezzanine floor could be 39m, but as installed the mezzanine had two means of escape provided and in this case was 37.3m.

4.2 The authority

- 4.2.1 On 14 March 2018 the authority supplied a summary of key events and copies of:
 - warehouse floor plans and elevations from building consent BC150389
 - photos of the racking system and a layout and shelving plan
 - the certificate of acceptance application for the racking and mezzanine (work carried out in August 2015), and a PS1 Producer Statement Design and

associated specifications (re compliance with Clause B1 structure) dated 11 August 2016

- correspondence relating to the racking system including an email of 3 August 2016 regarding a search for relevant consents relating to its previous use at two warehouse facilities (none were found)
- the authority's inspection notice 13 October 2016 for the certificate of acceptance, the certificate of acceptance issued 8 November 2016 (for compliance with Clause G8 only), and a project information memorandum issued 21 September 2016
- correspondence from FENZ re the FEB on 19 May 2017
- notices to fix NTF0572 and NTF0570 issued 12 January 2018 regarding the applicant's failure to supply a compliant building warrant of fitness and the non-compliant building work, plus a covering letter.

4.3 The draft determination and submissions received in response

- 4.3.1 The draft determination was issued to the parties for comment on 23 August 2018.
- 4.3.2 The authority responded on 31 August 2018 accepting the draft with non-contentious comments and noting two typographical errors. The authority noted there was "no guarantee that the number of staff will not increase, the [code compliance certificate] states the number of occupants as 16, and there is no guarantee that a future owner will not open the building to the public".
- 4.3.3 FENZ responded on 10 September 2018 accepting the draft without further comment.
- 4.3.4 The applicant responded 24 September 2018 accepting the draft. The applicant expressed his disappointment that the draft determination did not offer any 'compromises or practical suggestions for a solution'.
- 4.3.5 In response to the authority's comment in paragraph 4.3.2, while I note that this is not central to the matter to be determined, if the owner wishes to continue with the fire safety proposal to demonstrate code compliance, I suggest the applicant work through this item with relevant stakeholders.
- 4.3.6 In response to the applicant's submission in paragraph 4.3.4, I note that the Building Code is a performance-based document and it is an owner's choice what route is taken to achieve compliance in any given case. In paragraph 3.9 this determination notes there are two key matters outstanding, and paragraphs 5.6 and 5.7 identify areas of the proposal which require additional analysis and information to support the demonstration of compliance with the Building Code. I suggest the applicant work with relevant stakeholders through the items identified by the expert, as a starting point for revising the fire safety proposal (which is an alternative solution⁹) and identifying remedial building work required.

5. The experts' report

5.1 On 11 May 2018 I engaged the experts (refer paragraph 1.7) to provide their opinion on the fire safety proposal proposed by the applicant's fire engineer, taking into account any relevant technical comment made by FENZ.

⁹ The proposal is an alternative solution, but utilizes parts of the Fire Engineering Brief (FEB) process detailed in Verification Method C/VM2

- 5.2 I also advised the experts that it appeared the installation of the racking system was a first use fit-out in the building rather than an alteration to an existing building to which section 112 applied. Accordingly, I advised that their expert opinion should be in relation to the fire safety of the building as a whole treated as for a new installation.
- 5.3 The experts received copies of the information supplied by parties and made a site visit on 18 May 2018. On 28 May 2018 the experts requested further analysis or details available to show how compliance would be achieved, given the FEB indicated that modelling was proposed to demonstrate compliance, but did not provide the results of this modelling.
- 5.4 On 29 June 2018, as I received no further information from the applicant, I asked the experts to finalise their report. I received this report on 19 July 2018, and sent copies to the parties on the same day.
- 5.5 In the experts' opinion:
 - the building as currently constructed with the internal racking fit-out installed does not comply with Clauses C1-C6 Protection from fire
 - the alternative solution approach detailed in the fire safety proposal and FEB will not result in compliance with these clauses being demonstrated, and
 - additional quantitative fire engineering analysis will be required to support the demonstration of compliance of the fire safety proposal.
- 5.6 The experts note that the fire safety proposal and FEB's proposal for an alternative solution only outlines the intended approach and does not provide all documentation and assessments necessary to determine Building Code compliance (including, but not limited, to modelling results noted in paragraph 5.3). In their view (in summary):
 - the proposed use of an equivalency method with Acceptable Solution C/AS5¹⁰ for the mezzanine (regarding means of escape) is not sufficient to show compliance with Clauses C4.3 and C5.6
 - the inherent fire resistance of the mezzanine flooring and supporting system using AS 1720.4¹¹ is not considered adequate to comply with Clauses C4.3 and C5.6 (the experts noted this standard is applicable to timber, and a number of timber products, but not to particle board, which the mezzanine floor is constructed of)
 - there is a lack of information demonstrating compliance for smoke control within the warehouse as a consequence of the extended mezzanine floor
 - there is a lack of information demonstrating compliance with the requirements for firefighting access and operations.
- 5.7 The experts also reviewed the alternative solution proposal against the relevant Acceptable Solutions C/AS5 and C/AS2¹². They considered there were the following departures:

¹⁰ C/AS5 (buildings used for business, commercial and low level storage) dated November 2017

¹¹ Australian Standard AS 1720.4-2006 Timber structures Fire resistance for structural adequacy of timber members

¹² C/AS2 (buildings used for sleeping) dated November 2017

- the mezzanine floor area, at $452m^2$, is well above the maximum for intermediate floors of $35m^2$ (considering the building as a warehouse with storage higher than $3m^{13}$)
- the mezzanine's construction and supports (i.e. particle board flooring on a light steel frame system) do not achieve the minimum required fire resistance rating of 30/30/30 and 30/-/- respectively, and
- more exit signs are needed throughout the building to indicate escape routes through the racking system.

6. Discussion

- 6.1 The matter to be determined is whether the racking system and mezzanine floor fitout as described in the fire safety proposal complies with the Building Code with respect to Clause C Protection from Fire.
- 6.2 As noted earlier (paragraph 5.2), I consider the installation of the racking and mezzanine floor to be the first use fit-out for the warehouse rather than an alteration to an existing building. In doing so, I appreciate that a code compliance certificate was issued for the warehouse in 2015. However, the building consent documentation I have seen does not include any racking fitout or similar; yet the installation of this which is building work would clearly have been required in a subsequent construction stage given the building's intended use as a warehouse.
- 6.3 I refer here to previous Determination 2004/5¹⁴ in which the former Building Industry Authority (a predecessor to the Ministry) considered the argument that a first use fit-out within a new building could be treated as an alteration to that building. In its determination the Building Industry Authority said:

... In the view of the [Building Industry Authority], the fit-out of a particular area in the shell of a building to suit the needs of the first tenant is part of the construction of the building and cannot be treated as an alteration of an existing building. The various building consents were all for stages of construction, not for alterations. In other words, the [Building Industry Authority] takes the view that a building is to be treated as a new building under construction until all of it is actually completed and ready for use.

- 6.4 I agree with that view, and consider it is relevant in this case. It is my view that the fire safety proposal and the building as a whole including any proposed building work, should comply fully with the Building Code under section 17.
- 6.5 As outlined in section 5 of this determination, the experts consider that the building as currently constructed with the racking and mezzanine fit-out does not comply with Clause C Protection from Fire. The experts also consider that the fire safety proposal as presented by the applicant's fire safety engineer is insufficiently detailed to demonstrate compliance because the fire safety proposal lacked quantitative fire engineering analysis (for example modelling results) and additional supporting information.
- 6.6 Further, despite whether this information was provided, the experts are of the view that the proposal would not result in compliance with the Building Code for the reasons stated in paragraphs 5.6 and 5.7. In particular the experts noted the equivalency method with Acceptable Solution is not appropriate given the significantly larger size of the mezzanine compared with the benchmark of the

¹³ Being a parameter of the Acceptable Solution C/AS5

¹⁴ Determination 2004/05: Fire safety provisions in a medical centre building (31 March 2004)

Acceptable Solution, and the method for establishing the inherent fire resistance of the mezzanine flooring given the flooring is particle board.

- 6.7 I also note, that there appear some valid concerns raised both by FENZ and the experts that need addressing; the large size of the mezzanine and the fire rating of its flooring (particle board) and support frame. There is increased risk associated with the significant departure in size of the mezzanine in comparison with the Acceptable Solution. While the building code is performance based and the proposed mezzanine size is not specifically prohibited, I would expect to see design features that address or mitigate this increased risk.
- 6.8 I also note, the travel distance measurement that is provided by the applicant to determine the total open path available commences at the mid-point of the mezzanine. In my view, this does not provide a worst case travel distance that would occur for an occupant at one end of the mezzanine yet unable to use the closest exit.

6.9 Conclusion

- 6.9.1 I acknowledge the applicant's frustrations in endeavouring to demonstrate compliance for fire safety. However, I have considered the experts' report and agree with its key findings and I conclude the warehouse with the racking and mezzanine as installed does not currently comply with Clause C.
- 6.9.2 Paragraph 3.9 narrows the matters of dispute to two outstanding matters; the period of structural adequacy of the mezzanine's steel support in the event of a fire, and the fire rating of the mezzanine floor. Accordingly, having considered the experts' report, submissions from parties and other evidence in this matter, I also conclude that the fire safety proposal does not comply with the Building Code with respect to Clause C Protection from Fire, specifically:
 - the period of structural adequacy of the mezzanine's steel support in the event of a fire does not comply with Clauses C4.3, C5.6 and C6.3, and
 - the fire rating of the mezzanine floor does not comply with Clauses C4.3, C5.6 and C6.3.
- 6.9.3 Paragraphs 5.6 and 5.7 identify areas of the fire safety proposal which the experts identify require additional analysis and information to support the demonstration of compliance with the Building Code. In addition to the matters outlined in paragraph 6.9.2, the applicant may wish to use this start point for revising the fire safety proposal (which is an alternative solution) and identifying remedial building work required, but I leave these matters to the parties to resolve to make the installation compliant.
- 6.9.4 In the application for determination the applicant also sought a decision in respect of the issue of a certificate of acceptance for the racking system and mezzanine floor. However, a certificate of acceptance can only be issued in respect of work considered to be code compliant. Once the parties have agreed on the work required to bring the racking system and mezzanine floor into compliance with Clause C, a certificate of acceptance can be issued for the existing components of these elements considered to be compliant, with a building consent sought for the remedial building work required to achieve compliance.

7. The decision

7.1 In accordance with section 188 of the Building Act 2004, I hereby determine that the racking system and mezzanine floor fit-out as described in the fire safety proposal does not comply with the Building Code with respect to Clause C Protection from Fire.

Signed for and on behalf of the Chief Executive of the Ministry of Business, Innovation and Employment on 9 November 2018.

Katie Gordon Manager Determinations

Appendix A

A.1 The relevant sections of the Act include:

17 All building work must comply with building code

All building work must comply with the building code to the extent required by this Act, whether or not a building consent is required in respect of that building work.

112 Alterations to existing buildings

- (1) A building consent authority must not grant a building consent for the alteration of an existing building, or part of an existing building, unless the building consent authority is satisfied that, after the alteration,—
 - (a) the building will comply, as nearly as is reasonably practicable, with the provisions of the building code that relate to—
 - (i) means of escape from fire; and
 - (ii) access and facilities for persons with disabilities (if this is a requirement in terms of section 118): and
 - (b) the building will,-
 - (i) if it complied with the other provisions of the building code immediately before the building work began, continue to comply with those provisions; or
 - (ii) if it did not comply with the other provisions of the building code immediately before the building work began, continue to comply at least to the same extent as it did then comply.