FPA NEW ZEALAND

Industry Update

FEBRUARY 2023

WELCOME

Scott Lawson

Welcome to February's newsletter

Much has happened since our last newsletter in December 2022, and – unfortunately – it has been a rough start to the year, with general bad weather and then Cyclone Gabrielle badly affecting many communities around the country. It goes without saying that our team, including the board and councils, are all thinking of those affected by these significant events.

I would like to acknowledge those who have lost their lives and loved ones as well as those finding themselves without homes, incomes and possessions; we offer our condolences. Given our close bond and working relationship with Fire and Emergency New Zealand, I make special mention of the two volunteer firefighters, Dave van Zwanenberg and Craig Stevens, who tragically lost their lives in the line of duty while helping their community. We are working with Fire and Emergency New Zealand on how best to offer some support to the families of these two men. If any of you would like to donate to this cause, please contact us directly.

We have held our first board, council and special interest group (SIG) meetings for the year, and there is plenty going on in each of these groups. Read on to see what will be happening over the coming year in your respective sector.

HOFFE SIG

The past couple of years have seen the passive SIG busy with several projects, and this year will be no different however the HOFFE SIG will have a lot on too in 2023. Given the substantial workload with the HOFFE projects, we are moving to a dual chair role for the group this year. Lance Hunt will join Steve Smith to co-chair the group and split tasks between them to ensure the projects have enough support and direction. Without going into all the detail, as I am sure Steve and Lance will do so in their updates over the coming months, some of the projects we are focusing on include:

- creation of a fire fighting foam position statement on handhelds in response to the letter from the Environmental Protection Authority in late December 2022
- a submission for the revision of NZS 4503 in 2023
- waste reduction and strategies for disposal of powder, foam and remaining small quantities of Halon 1211 ▶

IN THIS ISSUE...

REGULAR FEATURES

- a review and update of the HOFFE position statement to also include recommendations on hose reels.

There is plenty of work to do in this area, so we are seeking input from our HOFFE service members to assist and ensure our work on these projects includes representation of all members' interests. The old saying applies here: if you're given the chance for input and don't participate, then don't complain after the work is done. This will be an exciting year for HOFFE members, as several of these key areas will be receiving resources and support.

Industry training

I am pleased to announce that we are in final stages of several proposals and business models that will see the association expand into hands-on training for our members. These plans will likely include the formation of a new training facility that will grow with time and cover the main industry sectors that FPANZ represents. While our support and focus is for members to continue to obtain formal NZQA fire qualifications, there is a clear opportunity for us to develop some practical training to supplement current theoretical and on-the-job training. We will be surveying our members about training in the coming weeks to appropriately focus our efforts as we start this exciting new initiative.

Website updates

Our website continues to grow, and we are adding useful content and resources all the time. We encourage you to check it often to see what has been added. We are often contacted for information that is readily available on the website, and if it isn't, we add it to our development list if it's not already planned. One of the most useful sections for our members and their field staff is the resources section. Here, you and your staff can find links to useful information such as:

- Aon technical notes
- codes of practice
- formal standards interpretations
- all back editions of newsletters
- position statements
- product registers.

The site is also mobile friendly to make it easier for field staff to access content while out and about.

FireNZ

We recently released the FireNZ 2023 call for papers, so if you have an interesting topic you want to share with the industry, download the call for papers document from the website and submit it ASAP. We are now finalising the floor plans for the exhibition space, and this will be released in the next couple of weeks. This will be followed by details of this year's industry awards and nomination forms.

Industry learning

We continue to see solid numbers of learners in each sector of our industry. We are now getting really high-quality data about our learners from Competenz, a copy of which is available on page 3. As you will see, the data shows us various trends and completion rates for each course, which in turn will enable us to adjust our training, careers and recruitment projects to fill gaps and ensure resources are going into the areas we need to improve on. This will help drive our objectives in this area for 2023. While our enrolments have been better than those for many sectors, as an industry we need to focus on supporting learners more to raise our completion rates.

Membership update

I would like to congratulate Metspray (NZ) 2013 Ltd for completing their provisional period and migrating to full gold membership status. I also extend a warm welcome to the following new Provisional Bronze members:

- Pulse Fire Ltd
- Southbrook Fire Research Ltd.

Thanks for taking the time to read this month's newsletter. Do let us know if you want to add any of your staff to our mailing lists so they receive the newsletter. The content is increasingly relevant to both management and field staff, who will benefit from being aware of what's happening in the industry, hearing about key topics that may affect them and knowing where to locate information and the like. To ensure your staff are getting the newsletter, you can email us at info@fpanz.org with their details or click here to add them and select the appropriate communication options.

Until next month,

Scott Lawson
Chief Executive Officer, FPANZ

Industry Learner Data 2022

	2022
Distinct Learners in Training	997
Active Learners	502
Enrolments	407
Completions	172
Terminations	375
Net Enrolment Movement	*-140*
Number of Employers	193
Credit Achievement %	71%
Programme Completion %	40%

Distinct Learners in Training GENDER	2022
Female	78
Male	919
Total	**997**

Distinct Learners in Training ETHNICITY	2022
Maori	113
Pasifika	75
Other	809
Total	**997**

Qualification	Total learners	Active learners	New enrolments	Completions	Terminations	Net Enrolment Movement
NZC Fire Detection and Alarm Systems (Level 3)	88	34	50	29	25	*-4*
Active Learners 502 NZC Fire Detection and Alarm Systems (Level 4)	229	128	88	26	75	*-13*
NZC Fire Detection and Alarm Systems (Level 4) Special Hazards Strand	16	10	9	1	5	3
NZC Fixed Fire Protection Systems (Level 3)	50	30	27	7	15	5
NZC Fixed Fire Protection Systems (Level 4)	115	69	26	5	40	*-19*
NZC Fixed Fire Protection Systems (Level 4) Special Hazards Fixed Fire Protection Systems Strand	3	3	1	-	-	1
NZC in Fire Protection Systems Technology (Inspections) (Level 4) Fire Detection and Alarm Systems Strand	87	47	28	6	32	*-10*
NZC in Fire Protection Systems Technology (Inspections) (Level 4) Fixed Fire Protection Systems Strand	11	7	5	-	4	1
NZC in Fire Protection Systems Technology Testing (Level 3)	125	54	44	20	50	*-26*
NZC in Hand Operated Fire Fighting Equipment (Level 3)	47	18	15	14	15	*-14*
NZC Passive Fire Installation (Level 3)	169	59	74	44	61	*-31*
NZC Passive Fire Protection Systems (Level 4)	107	39	27	10	49	*-32*
NZC SCP in Routine Compliance Inspections (Passive) L4	18	4	13	10	4	-1
Total	**1,065**	**502**	**407**	**172**	**375**	***-140***

FPA NEW ZEALAND

The Institution of Fire Engineers New Zealand Branch

SFPE New Zealand

fire NZ 2023

CONFERENCE & EXHIBITION

WWW.FIRENZ.ORG

3-5 OCTOBER 2023

SHED 10, QUEENS WHARF, AUCKLAND

BUILDING PERFORMANCE

Building Emergency Management response to Cyclone Gabrielle

Tēnā tātou

The impacts of tropical Cyclone Gabrielle are now affecting many areas in the North Island of Aotearoa New Zealand and may cause significant flooding and damage to infrastructure and buildings.

The MBIE Building Emergency Management response team are working to support those Territorial Authorities and communities in the North Island that are affected by this event.

This email provides an update of the work that the team are doing to support the response, along with some supporting resources.

MBIE and territorial authorities are working together to support impacted communities
In the event of a damage-causing emergency, territorial authorities carry out a range of building emergency management activities, such as leading rapid building assessments of damaged buildings, taking steps to manage the safety of people around buildings, and working with building owners to manage buildings following significant event.

MBIE has several roles and responsibilities in a national state of emergency, including monitoring the event and response, reporting to Minister of Building and Construction, providing liaison officers to the NCC and coordinating the deployment of rapid building assessors where required.

To read more about the Building Management in Emergencies (BMIE) framework, see Managing buildings in an emergency | Building Performance.

For further information for territorial authorities and decision makers, please see Guidance for decision-makers and territorial authorities | Building Performance

MBIE are coordinating the national response of Rapid Building Assessors (RBAs)
We are preparing for the deployment of RBAs to the affected areas to conduct post-event assessments. MBIE is coordinating the national level of deployment of RBA resource. Once deployed to a region RBAs will be managed by the territorial authorities' local response teams who have responsibility for leading RBA operations in their area.

Rapid Building Assessor programme | Building Performance

Buildings across Aotearoa New Zealand are being assessed and assigned placards
After a rapid building assessment is conducted, a building is given either a red, yellow, or white placard. These placards identify how the building is allowed to be used: ▶

- **Red placards** mean entry is prohibited.
- **Yellow placards** mean access to the building is either restricted and cannot be used or that you cannot enter except under supervision for a limited time or on essential business.
- **White placards** mean that your building can be occupied - but it does not mean the building is not damaged.

For more information about what the placards mean for you, and for more information on MBIE's building response to the current weather events, please see North Island severe weather events 2023 | Building Performance.

Region-specific event information is available via your local CDEM or Council websites.

Additional Resources

A range of additional information is available on our website, using the links below.

- Building owners have a responsibility to ensure their buildings remain structurally sound following an event, and must allow authorised officials to carry out their assessment. Read more at Information for building owners | Building Performance
- Together with Construction Sector Accord, Mates in Construction and industry, CHASNZ has written this simple high-level guide to assist those businesses involved in remediating flood damaged buildings and property - Risk Guide To Working On Flood Damaged Property
- The Construction Sector Accord has put together a contractual guidance for those have been impacted by the recent weather events - Contractual guidance document and background
- This BRANZ bulletin covers health and safety considerations, tips for cleaning up inside and outside, drying out the house and repairs following a flood - Restoring a home after flood damage
- Business.govt.nz has information available for businesses to help with things like looking after your employees, safely operating, and building and landlord responsibility - Extreme weather information for businesses.

Noho mai rā i roto i ngā manaakitanga katoa (Stay well, take care)
The Building Performance team

HOFFE SIG Update

Authors **Steve Smith & Lance Hunt** – HOFFE SIG Chairs

What a crazy start to the year we have all had, our thoughts are with those who have been affected by the crazy weather we have been experiencing. There's a lot of sympathy within the group for those who are being badly affected by the recent spate of bad weather. As summer draws to an end (officially) and we reflect back on the few days of summer that we had, we can only wonder what winter will bring?

We have just had our first HOFFE group meeting of the year, with a lot going on, it was also the first meeting where we introduced our co-chair approach to the group.

This is a brief overview of the topics we discussed:

- **A court case was brought against Mr and Mrs Singh (of Aerofire)** under section 46B of the Fair Trading Act by the Commerce Commission in January 2023 to enforce undertakings they had provided in response to a previous prosecution. The Singhs were legally represented and selected not to oppose the application but consented to the order.
- **NZS4503** – progress here with the scoping document done, discussions are to be held at additional meetings for the NZS4503 group before the next scheduled HOFFE group meeting in order to continue to progress this project.
- **Foam** – A position statement is underway with a twofold aim, a less detailed handout that can be distributed to clients and a more in depth technical document for the fire equipment technician.
- **Training** – initiatives being followed up with VR fire training. Rino Lovreglio of Massey University addressed the group introducing their training project.
- **Dry powder fire extinguisher recycling** – this is an ongoing project involving all components of the fire extinguishers as well as the extinguishing agent. It was suggested that an approach may be made to get funding for the project - in order to do so we would first need to quantify the amount of dry powder fire extinguishers that would be processed annually and costings involved for processing.
- **Fire hose reels** – a healthy discussion was held on the pros and cons of having these installed in a commercial premises. A variety of stances were discussed - some common points included their instinctive use, ongoing supply of extinguishing agent and challenges that servicing them can present.
- **Lithium battery fires** – some bold claims are being made about fire extinguishers being able to successfully extinguish these fires. The evidence available suggests that while some smaller fires may be able to be successfully extinguished larger fires are harder to control and generally reignite. Work to create a AS/NZS standard for this class of fire is still in its early stages.

Have a great month, our next HOFFE Group meeting will be on the 24th March at 1pm, you can access this meeting on line as it is on the event calendar.

Kind regards,

Steve Smith & Lance Hunt,
HOFFE SIG Chair 2022/2023

Inspectorate SIG Update

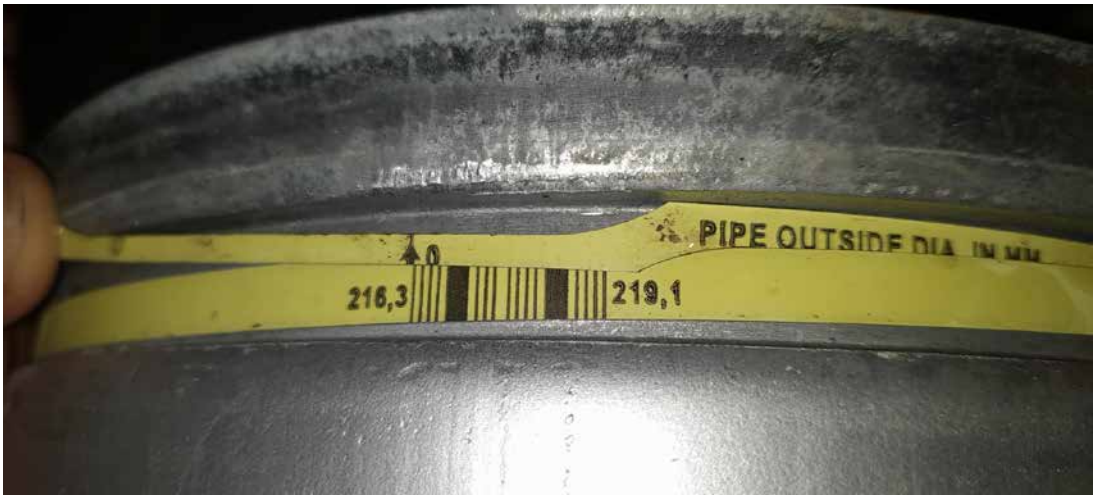
Author **Stephen Ridder** – Inspectorate SIG Chair

Happy new year!

In the fire sector the need for ongoing vigilance to quality never ends. Recently there have been several instances of pipe joint failures. Two of these had the potential to result in serious outcomes. In the first case during fire pump commissioning a 150mm coupling on the discharge of the fire pump nearly let go while the pump was passing 6000 L/min at a pressure of 1000 kPa, when the pump was shut down the entire groove on one side could be seen. In the other case after final discharge and valve set testing was completed two couplings on the discharge check valve of a fire pump (13,000 L/min @ 1000 kPa) were noticed to be sitting at a funny angle and neither coupling was holding the groove about the full circumference.

When forming and assembling a roll groove joint there are two key aspects to making a successful connection. Firstly, the groove needs to be correctly formed, not too deep and not too shallow. Also, the ends of the pipe need to remain square and not flare out. Anyone forming grooves needs to have a Pi tape and be using it regularly to check. Additionally, the need to prepare the piece of pipe for grooving cannot be overlooked: cut the pipe end square, grind off the weld seam, and deburr. Secondly the coupling needs to be assembled and tightened correctly so it sits in the groove true, the bolt pads are even to each other and the gaps on both sides are identical. This is normally completed by tightening down each bolt part of the way at a time; not overtightening one side while the other side is loose.

In my experience the two most common fabrication faults are overly aggressive grooving and overtightening one bolt. There are full details in the guild books available from the coupling manufactures on how to form a groove and how to assemble a coupling.



Example photo of over grooved pipe.

Kind Regards,

Stephen Ridder
Inspectorate SIG Chair 2022/2023

Evacuation Consultants SIG Update

Author **Phil Jackson** – Evacuation Consultants SIG Chair

Welcome to 2023, I hope that you had an enjoyable break. Our revised certified evacuation consultant recertification program was rolled out late last year, I am pleased to see that our members are taking the opportunity to complete this. If you would like to become a certified evacuation consultant, please get in touch. Once qualified your details are published on the FPA website, if asked for a list of consultants, agencies often refer people to this list.

As many of you will be aware FENZ were intending to have their new evacuation scheme platform up and running mid-February, unfortunately this has been delayed. Please keep an eye on their website and your inbox for updates around how this is progressing.

The SIG meetings provide an ideal forum to discuss matters such as the new evacuation scheme platform, we are often asked for feedback and advice around how these interfaces can be improved. If you have any items for our agenda or would like to see a particular topic addressed, please get in touch. All of the meetings can be found on the FPA calendar via the website.

Regards,

Phil Jackson
Evacuation Consultants SIG Chair 2022/2023

FIRE EMERGENCY NEW ZEALAND
WHAKARATONGA IWI

Fire Information Unit is now called **Regulatory Compliance Group**

Fire Information Unit is now called **Regulatory Compliance Group** to better reflect our team's role within Fire and Emergency, which includes:

- Receiving and processing Evacuation Scheme Applications, trial evacuations and training reports
- Providing advice and guidance around the Fire Permitting process
- Receiving and processing Fire Hazard complaints
- Receiving and processing Emergency Response Plans
- Receiving and processing Pyrotechnic permit applications
- Receiving and processing sprinkler shutdown notifications
- Receiving Ahikura information and forwarding to District for processing

If you usually use **fireinfounit@fireandemergency.nz** or **fireinfo@fireandemergency.nz** to communicate with the Fire Information Unit, please delete them from your email address book and use the new email address **rcg@fireandemergency.nz**

Please note, the below email addresses will not be affected by the name change, so you can continue to use them for specific advice or requests relating to the following:

- **evacuation@fireandemergency.nz**
- **firepermit.enquiries@fireandemergency.nz**
- **firehazards@fireandemergency.nz**

0800 FIRE INFO has also been replaced by **0800 REG COMP (0800 734 2667)**

Passive Fire Protection SIG Update

Author **Justin McEntyre** – Passive Fire Protection SIG Chair

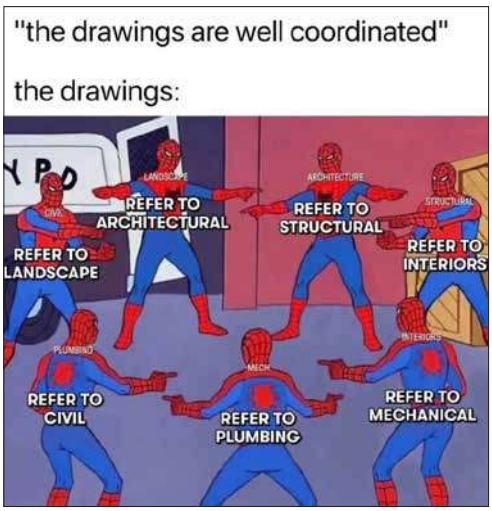
Grenfell – Reflecting on where we are now:

14th June marks the anniversary of the Grenfell Tower Tragedy in London. This event made the world take notice of a number of issues in Fire design, construction & regulation around the world. Over 5 years since the tragedy I reflect on where we are at in NZ as a Fire Safety industry with regard to Passive Fire Protection.

In May 2018 the Hackitt report was issued that specifically looked at the Building Regulation industry with regard to this tragedy. Specific recommendations were made to the industry including those that 'Procure, Design, Construct & Maintain buildings'. The key findings from the report were as below.

- **Existing Regulation and guidance was unclear & complex causing confusion & misinterpretation**
  - One would argue that Fire Safety regulation & compliance is never going to be straight forward. However, we shouldn't settle that we can't make it clearer & continually improve.
  - The industry has come together to work toward issuing guidance documentation, training events, reviews & the like. As well as high aspirations for where to take the industry.
- **Unclear roles, responsibilities over the life of the building & Fragmentation within the industry**
  - I feel that this is an Achilles heel of the industry. See attached meme that I received recently.
  - At an "industry" level we are more connected than ever before. However, at regional & project levels there is disconnect.
    - Different expectations by different BCA's
    - Different expectations by different Fire Engineers
    - Different accountability by different Fire Engineers
    - Different level of service provided by Contractors
    - Different levels of knowledge
    - Different levels of competency
  - One of the key frustrations I see & hear is accountability & liability passing – passing on liability for an inspection, caveats on inspection reports, caveats on producer statements, reliance on a producer statement. There is a growing trend on participants getting themselves involved more & more but providing less & less or passing the buck more & more.
  - Clear decision making & instruction – similarly there is a growing trend in either a lack of providing any clarity or instruction at all or providing vague instructions without clear decisions made.
  - Everyone is running scared of taking accountability & liability – which means the outcome is going to be either confusion, frustration or completely missed.
  - We need to have mature conversations about roles, responsibilities & accountability & liability – because passing the buck & being clever with wording to avoid liability is not a mature outcome for the fire safety industry. ▶

Passive Fire Protection SIG Update *cont.*



- **Weak compliance enforcements & sanctions. Regulations oversight & enforcement lacking**
  - This is a tightrope between too tight vs too loose.
  - To date I'm not aware of any enforcement or sanctions against manufacturers, contractors, designers or inspectors – yet we know there are stories daily of poorly delivered passive fireworks, or questionable products readily available.
- **Lack of competence working on design & construction & maintenance**
  - Installation
    - We now have qualifications in Passive Fire with NZQA Level 3 Passive Installer, Level 4 Inspector as well as Diploma in Fire Engineering
    - However, Manufacturers accreditation training is optional & not enforced. Anecdotally good contracting companies regularly put their staff through training with suppliers/ manufacturers. However, anyone can still buy fire collars, mastics, products from any distributor or manufacturer in NZ. There is no gate keeping on product distribution. Whereas Intumescent Coatings have really ratcheted this up & mostly all Manufacturers/ Distributors will only sell Intumescent paint to accredited contractors. I believe Manufacturers/ Distributors can do more in this space to control who is installing products.
    - We could also be more diligent in the procurement phase with who is being selected to install products – if thorough due diligence is done at the start & only competent proven contractors engaged then surely 99% of issues will be removed at the built phase.
  - Designers
    - What makes a Passive Fire Designer? There is a growing number of participants entering this space, but what is their training, experience & skills?
    - What is their insurance cover?
    - What are their motivations?
    - Where does their role & responsibility start/ stop – is it just Fire stopping of services selection or are they responsible for considering the entire Fire separation? (or are we in the spider man scenario)
  - Maintenance
    - IQP's have a tough job. They aren't even the ambulance at the bottom of the cliff, they are the clean up crew after the car accident.
    - There is a lot of training & work being done in the IQP space in most areas of NZ.
    - I feel there is further ground by making the realisation that Passive Fire inspections & maintenance is a specialist field & should no longer be treated as an add on Specified System inspection to other disciplines.
    - There has been a growing trend of respect for IQP's where buildings need failed. No longer should they live in fear of losing their livelihood if they fail a building. ▶

Passive Fire Protection SIG Update *cont.*

  - I still see inconsistency across the regions on the level of respect given to a Fire & Smoke separation inspection.
  - Building owners & their maintenance teams obviously hold a massive responsibility in this space as well & it's a hard market to reach out to as they really only rely on their annual IQP inspection for the most part.
- Certification of participants in the Passive Fire Industry is the next step.

Inadequate product quality

- Product quality not such an issue that I see. But product testing or system testing.
- One of the key findings after Grenfell was that Assessments can't be relied upon. Yet in NZ we are still significantly dominated by Assessments or even still EJ's.
- We have had significant gains in NZ in that there are now 4 test labs in NZ (plus the Australian labs) which is a massive benefit to the market & is making great gains.
- Yet time and time again we are still seeing the proliferation of assessments. Assessments when completed within the parameters of AS4072.1 are perfectly compliant. But there is greyness around some assessments & the use of the interpretation & use of these assessments.
- We also have been tough on penetrations yet floaty when it comes to facades, doors, dampers & other Passive Fire elements.
- In December 2023 there will be more onus & importantly liability on Building Manufacturers, importers & distributors to ensure their products are compliant for sale in NZ as well as communicated in specific ways. There is punishment for breaches. I am hopeful that this will reward good supply chains & ratchet up responsibility by those that play in the grey fringes.

Ignorance

- Naivety is bliss they say. Well unfortunately as an Industry we can't accept this.
- We still come across poorly constructed partitions, foams, non compliant fire doors & the like. But for the most part Commercial construction is well aware of the importance & requirements of good Passive Fire design & build.
- The gate keepers are Councils & Fire Engineers in ensuring that the build teams have capable & competency on the job as well as great understanding of the Fire requirements.

Indifference – people motivated by low cost, not better.

- This is a systemic issue for all of the construction industry sadly.
- Passive Fire has gained a lot of respect in terms of Project design attention & Budgets
- We are never going to remove all the bottom dwellers, but we can all collectively hold our industry in great respect & avoid letting this creep in.

In summary I score our industry a 4/ 7 on where we are. We've done a lot, but we can always do more.

Kind Regards,

Justin McEntyre
Passive Fire Protection SIG Chair 2022/2023

Post-installed fasteners for non-structural connections in concrete*

Author **Dorian Borosnyoi-Crawley, Hilti (New Zealand) Ltd**

Editor's note: This article is a shorter version of an article published here:* **LINK. *The review provided by Mr. Stephen Ridder is greatly appreciated.*

Post-installed fasteners are used for various structural and non-structural connections when a steel member is connected to concrete. The installation method of the fasteners depends on the fastener system (e.g., mechanical or chemical fasteners), Fig. 1. Both the concrete and the fasteners react differently to different types of loads; therefore, the selection and design of post-installed fasteners need the existence of 1) fastener selection and acceptance criteria, and 2) fastener design methods for different load types (Fig. 2).

It is important to clarify that non-structural application does not mean it is not safety-critical (Fig. 3). The New Zealand Building Code (NZBC) extends its objective, functional, and performance requirements to building elements. In this context, building elements include any structural and non-structural component or assembly incorporated into or associated with a building. Safeguarding people from *injury* or *loss of amenity* and *protecting other property* from physical damage is the broad understanding of the objectives of safety-critical applications in the NZBC. The level of chosen safety is always related to the consequences of failure and lies within the responsibility of the designer. NZBC and the Standards referenced in it set a framework for the minimum level of safety. Non-structural connection design and installation are included in the cluster of building elements and as such, regulated by NZBC Clause B1 Structure. Using the example of automatic fire sprinkler systems, ▶

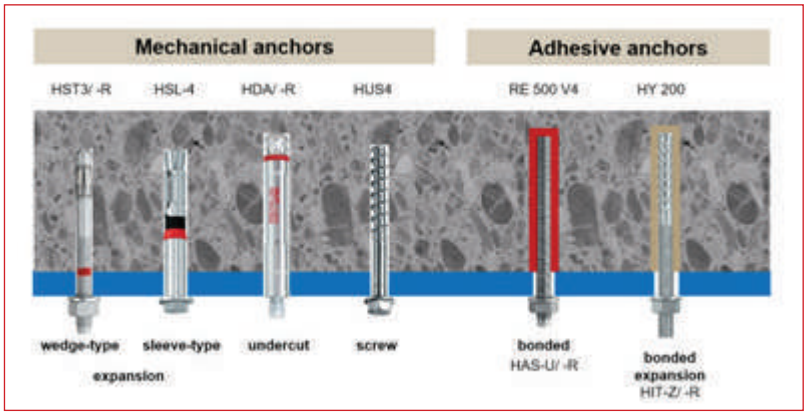


Figure 1: The installation method of the fasteners depend on the fastener system

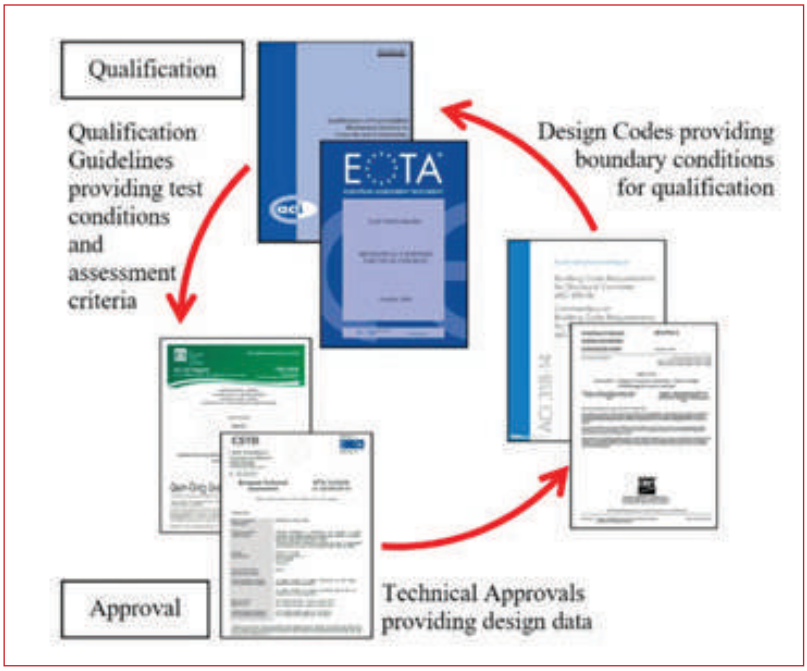


Figure 2: Fastener design methods for different load types

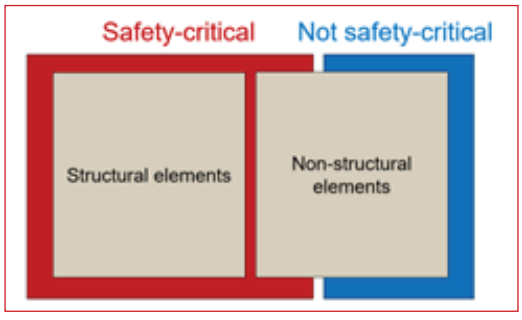


Figure 3: It is important to clarify that non-structural application does not mean it is not safety-critical

Post-installed fasteners for non-structural connections in concrete *cont.*

it can be agreed that these are "stand-alone" systems, with no interaction with other systems/utilities and their operation must be ensured before, during, and after an earthquake. NZS 4541 delegates the seismic demand to NZS 1170.5 but allows the use of more conservative approaches too and cites NZS 4219 in the calculation of the design horizontal seismic acceleration demand on a component.

Earthquake motions are characterized at the ground level by the time histories of acceleration, velocity and displacement of the movement, however, the demand on connections is different from these due to the amplification of earthquake motions by buildings and their connected elements. Fig. 4 indicates a schematic representation for the amplification of the earthquake motions for non-structural building elements. Such amplifications may be calculated by simplified assumptions given in the Standards or with specific design and analysis. It should be noted that the fundamental vibration period of non-structural elements is usually product-specific, and designers can find this information in the manufacturer's technical data. Product-specific design software are also available. Provided by the framework of the NZBC and the Standards referenced in it, the designers have three levels of consideration in the selection process and seismic design of fastenings:

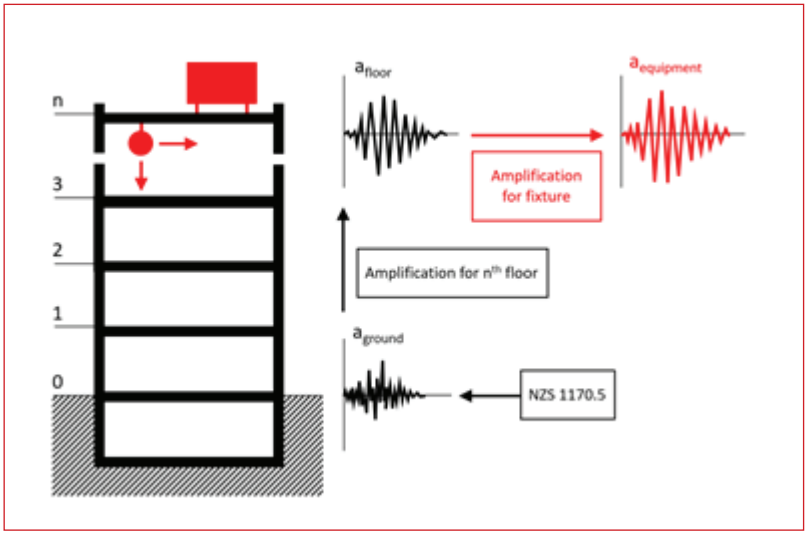


Figure 4: A schematic representation for the amplification of the earthquake motions for non-structural building elements

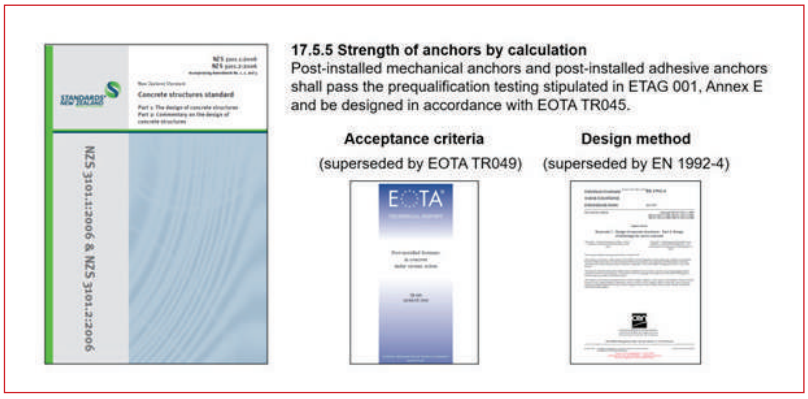


Figure 5: Clear guidance on the prequalification testing requirements and seismic design of post-installed fasteners in New Zealand

1. When to perform seismic design; *demand* (refer to loading Standards, e.g., NZS 1170.5)
2. How to perform seismic design; *capacity* (refer to material Standards, e.g., NZS 3101)
3. What product to use; *suitability* (qualifications, assessments, certifications, listings, etc.)

In New Zealand, similarly to many other countries around the globe, the selection and design of post-installed fasteners in concrete is addressed in the relevant material Standard, NZS 3101 *Concrete structures standard*. Clause 17.5.5 of NZS 3101 gives clear guidance on the prequalification testing requirements and seismic design of post-installed fasteners in New Zealand (Fig. 5). Clause 17.5.5 of NZS 3101 states that post-installed mechanical anchors and post-installed adhesive anchors shall be designed in accordance with EOTA TR 045 by using anchor products that passed the prequalification testing stipulated in ETAG 001, Annex E. The attention of the readers is called here to a hierarchical relationship between material Standards (e.g., concrete design, steel design, timber design, etc.) and application Standards (e.g., engineering systems, automatic fire sprinkler systems, fire hydrant systems, etc.) that is not always communicated formally, however, is an underlying basic assumption in the objectives of the NZBC and the related engineering design (Fig. 6). As a golden rule, if an application Standard gives recommendation ▶

Post-installed fasteners for non-structural connections in concrete *cont.*

or commentary in the scope of a material Standard, then it must be equally or more conservative than the provisions given in the material Standard. It is generally accepted that application Standards should not set a lower level of safety than that is set in the relevant material Standard for a safety-critical application. In case of doubt, users shall seek for guidance from the design engineer. It has utmost importance for, e.g., automatic fire sprinkler systems, where currently NZS 4541:2020 does not directly cite NZS 3101, and in this way leaves the sprinkler system certifier (SSC) and the end users of the Standard in doubt for the correct interpretation. Such confusion has led to Standards NZ issuing a formal interpretation to clarify what NZS 4541:2020 intended. Seismic design of fasteners in accordance with NZS 3101 requires the fasteners to be qualified for cracked concrete and seismic applications. The complexity of non-structural fastener behaviour under earthquake loading is shown schematically in Fig. 7.

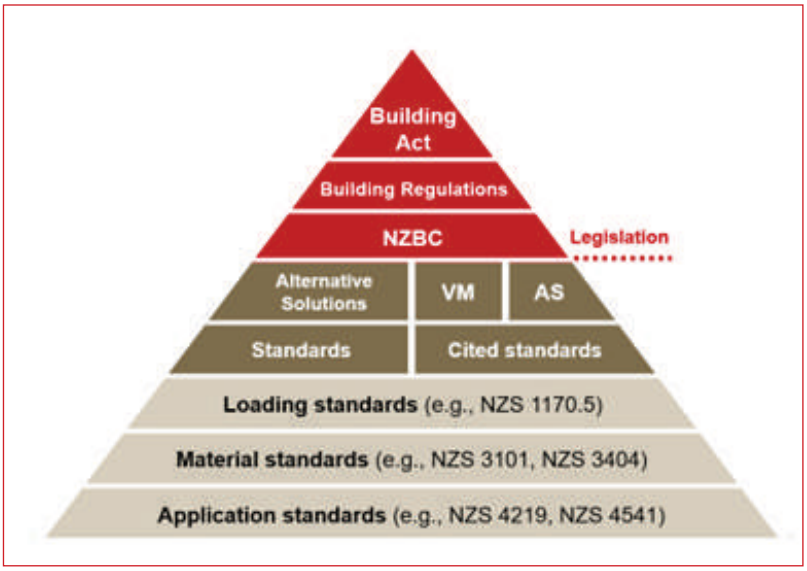


Figure 6: NZBC and the related engineering design

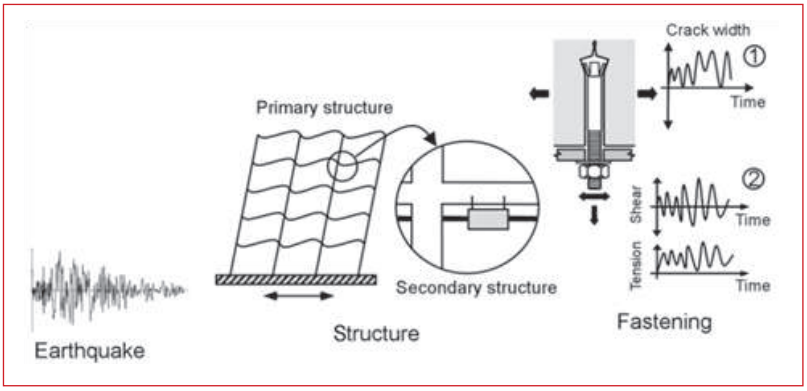


Figure 7: The complexity of non-structural fastener behaviour under earthquake loading is shown schematically

Post-installed fasteners became very popular in the 1970s–1980s, but in the lack of Standards, the design was mainly done based on fastener manufacturers' handbooks and earthquake load was not considered during the selection and design. The fastener research in seismic applications gained considerable momentum in the 2000s. To assist readers understanding the context, Fig. 8 indicates a timeline with the key dates and events in the development and implementation of seismic testing protocols worldwide. Fastener selection in New Zealand, utilizing EN 1992-4:2018 acknowledges the two EOTA seismic performance categories C1/C2 and provides guidelines to designers for the category selection (Table 1). It should be noted that the European Standards (EN) delegate certain topics to the EU member countries to be addressed in their own National Annex Documents (NAD), and the C1/C2 selection criteria is ▶

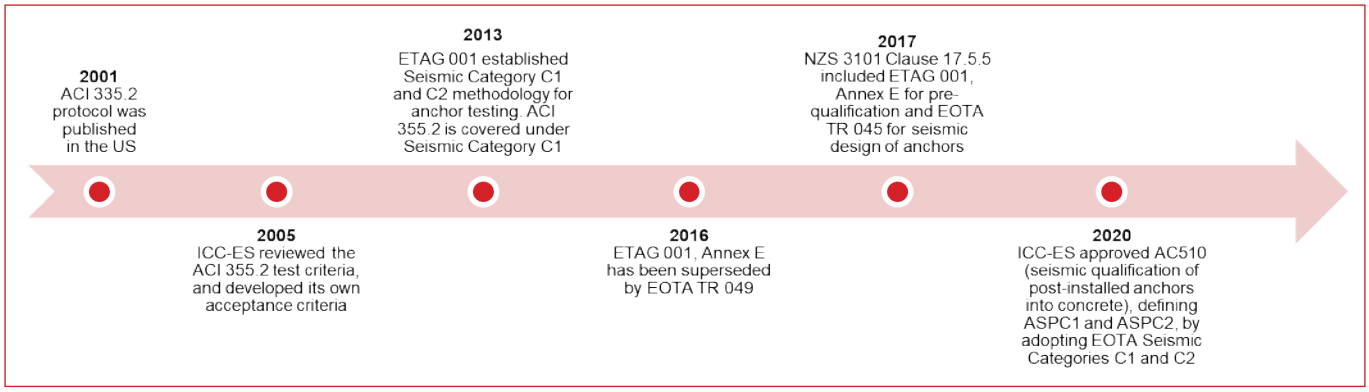


Figure 8: timeline with the key dates and events in the development and implementation of seismic testing protocols worldwide

Post-installed fasteners for non-structural connections in concrete *cont.*

in this category. Therefore, besides the EN 1992-4:2018 guideline is normative, it can still be subject to changes in EU member countries. Since New Zealand is not an EU member country it is not regulated on how to address this situation, and Standards NZ does not provide guideline for the use of EN 1992-4:2018 in New Zealand, however, it is cited in Clause 17.5.5 of NZS 3101. If we agree to follow the EN 1992-4:2018 method in interim, as normative/obligatory to be used for NZBC compliance then it can be demonstrated that the decisive parameter for the C1/C2 category selection in New Zealand is the *elastic site hazard spectrum C(T)* at T=0 period (see Clause 3 of NZS 1170.5). The limiting value for C2 seismic performance category is *C(T=0)* > 0.1g horizontal acceleration for class A & B rocks. As the absolute minimum C(T=0) for New Zealand is higher than the threshold of 0.1g, it implies that C2 seismic performance category may dictate in most cases in every IL2 to IL4 Importance Level building (see Table 2). The specific category for each case would have to be determined by the Engineer, taking all applicable standards into account. It is noted that Standards NZ has issued a Formal Interpretation (FI-143) that relates to the fire sprinkler industry only. This FI-143 allows for C1.

	Seismicity level[a]		Importance Class acc. to EN 1998-1:2004, 4.2.5			
1	Class	$a_g \cdot S^c$	I	II	III	IV
2	Very Low[b]	$a_g \cdot S \le 0{,}05\ g$	No seismic performance category required			
3	Low[b]	$0{,}05\ g < a_g \cdot S \le 0{,}1\ g$	C1	C1[d] or C2[e]		C2
4	> low	$a_g \cdot S > 0{,}1\ g$	C1	C2		

[a] The values defining the seismicity levels are subject to a National Annex. The recommended values are given here.
[b] Definition according to EN 1998-1:2004, 3.2.1.
[c] a_g = design ground acceleration on type A ground (see EN 1998-1:2004, 3.2.1), S = soil factor (see EN 1998-1:2004, 3.2.2).
[d] C1 for fixing non-structural elements to structures (Type 'B' connections)
[e] C2 for fixing structural elements to structures (Type 'A' connections)

Table 1: Guidelines to designers for the category selection

	Seismicity level[a]		Importance Level acc. to AS/NZS 1170.0:2002			
	Class	$C_h(T=0) \cdot Z \cdot R$		2	3	4
				R=1.0	R=1.3	R=1.8
	> low	$C_h(T=0) \cdot Z \cdot R > 0.1\ g$		C2		
[a] for class A & B rocks acc. to NZS 1170.5:2004			(Northland)	(0.189 g)	(0.246 g)	(0.34 g)
			NZ	0.246 g	0.319 g	0.442 g
			(for 50 years Design working life and $N(T,D)$=1.0)			

Table 2: C2 seismic performance category may dictate in most cases in every IL2 to IL4 Importance Level building

Conclusions

In this article, some key aspects of the fastener selection and acceptance criteria, and the seismic fastener design for non-structural connections were addressed. Based on these findings the following conclusions can be drawn:

- Non-structural connection design and installation can be safety-critical application that is regulated by NZBC Clause B1 Structure.
- Seismic demand on non-structural connections is determined by NZS 1170.5.
- NZS 3101 in clause 17.5.5 follows the international best practice, clearly stating the criteria required for the seismic assessment (EOTA TR 049; the superseding document of ETAG 001, Annex E) and design of post-installed fasteners in concrete (EN 1992-4; the superseding document of EOTA TR 045).
- EOTA TR 049 provides two performance classes for seismic qualification, C1 and C2. Taking assumptions for locations around New Zealand, anchors in concrete should be designed using C2 seismic performance category, for both structural and non-structural applications, barring any other application specific recommendation in relevant standards.
- Users of Standards follow the logic of the hierarchy of Standards: it is generally accepted that application Standards should not set lower level of safety than that is set in the relevant material Standard for a safety critical application. In case of doubt, users shall seek for guidance from the design engineer. ■

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Full Page	$1050.00	$1000.00/issue	$945.00/issue	25cm x 18cm
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	Bryce Donaldson
	Justin McEntyre
	Samantha McNaughton
	Nicky Marshall
	David Prosser

Attendance Record

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BOARD			14/7/22	6/10/22	1/12/22	16/2/23
Chris Mak	President	CHAIRPERSON	✓	✓	✓	✓
Paul Ryan	Vice President		✓	✓	✓	A
Keith Blind	Past President		✓	✓	A	A
Bryce Donaldson	Elected Member Director		✓	✓	✓	✓
Justin McEntyre	Elected Member Director		✓	✓	✓	✓
Samantha McNaughton	Independent Director		A	✓	✓	✓
Nicky Marshall	Elected Member Director		✓	✓	✓	✓
David Prosser	Elected Member Director		✓	✓	✓	✓
Elaine Christy	FPANZ	NOTETAKER	✓	✓	✓	✓
Scott Lawson	FPANZ		✓	✓	✓	✓

COUNCIL			6/10/22	1/12/22	16/2/23
Scott Lawson	FPANZ	CHAIRPERSON	✓	✓	✓
Elaine Christy	FPANZ	NOTETAKER	✓	✓	✓
Bryce Donaldson	Argus Fire		✓	✓	A
Chris Mak	Aon Fire Protection		✓	✓	✓
Carol Caldwell	SFPE		✓	✓	✓
David Prosser	Lifetime member		✓	✓	✓
Ed Claridge	Auckland City Council		A	A	A
Justin McEntyre	Passive SIG Chair		✓	A	✓
Nicky Marshall	Protech Design		✓	✓	✓
Paul Ryan	Ryanfire		A	✓	A
Phil Jackson	EVAC SIG Chair		✓	A	A
Rob Scott	NZFEMA President		✓	✓	✓
Todd O'Donoghue	FENZ		S	S	✓
Steven Smith	HOFFE SIG Chair		✓	✓	✓
Stephen Ridder	INSP SIG Chair		A	A	✓
Glenn Thompson	Ice Fire		✓	A	A
Garth Moran	Altex		✓	A	A
Phil Lacey	GHD		✓	✓	✓
Hanga-Aro-Rau			✓	A	✓
Jason Hill	Institution of Fire Engineers NZ Branch		A	A	A
Lance Hunt	HOFFE SIG Chair				✓
Kevin Withell	Competenz				✓

Key	
Present	✓
Stand in sent	S
Apologies	A
Resigned	R

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M	T	W	T	F
2	3	4	5	6
9	10	11	12	13
16	17	18	19	20
23	24	25	26	27
30	31			

FEBRUARY				
M	T	W	T	F
		1	2	3
6	7	8	9	10
13	14	15	16	17
20	21	22	23	24
27	28			

MARCH				
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6	7	8	9	10
13	14	15	16	17
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27	28	29	30	31

APRIL				
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24	25	26	27	29

MAY				
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29	30	31		

JUNE				
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JULY				
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31				
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AUGUST				
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SEPTEMBER				
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OCTOBER				
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23	24	25	26	27
30	31			

NOVEMBER				
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27	28	29	30	

DECEMBER				
M	T	W	T	F
				1
4	5	6	7	8
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18	19	20	21	22
25	26	27	28	29

KEY	
OFFICE REOPENS	FPANZ office reopens after the Christmas/New Years break
SIG MEETINGS*	8am - Passive AKL 10am - EVAC AKL 1pm - HOFFE SIG
BOARD/COUNCIL MEETINGS	Venue TBA
FireNZ Conference	Venue TBA
FireAustralia Conference	Sydney, 3-5 May 2023
MEMBERSHIP	FPA Membership Year 2022/2023 Finishes 30 June
AGM	Board/Council Meetings and AGM Venue TBA, 30 November 2023

*SIG MEETING VENUE TBA

Fire Protection Association New Zealand
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