23 November 2020

Intumescent Paint for Plasterboard Part 1 of 3: Introduction

The industry is facing a massive hidden Passive Fire Protection problem which has surfaced with the investigation around leaky buildings. Across New Zealand standard plasterboard has been installed non-compliantly, which now leaves these buildings facing life safety compliance issues under the NZBC. In the first part of our series, we take a closer look at identifying the problem.

Identifying the Problem is Key to Offering the Right Solution

Question: "Shane, can you fire rate plasterboard?"
Answer: "Why would I need to fire rate plasterboard?"

In a world where we need to act fast and tend to merely react to requirements that are set out by regulations and codes, we often skip the step where we sit back and identify what the actual challenge is that we are facing.

Only when we understand the why, we can offer real solutions.

Background

We are facing a massive hidden Passive Fire Protection problem that has surfaced with the investigation around the leaky buildings from circa 1995 – 2010.

Plasterboard has been used successfully for some time as a passive fire protection system — but only if the correct type of plasterboard is installed in exact accordance with the manufacturer's instructions.

If instructions are not followed accurately it means that the fire separating elements in question do not have the Fire Resistance Rating (FRR) required under the NZBC.

The resulting Passive Fire Problem is vast and complex and involves a multitude of different passive fire protective systems:

- Deficient passive fire stopping
- Structural steel being un-protected against the effects of heat
- Fire separating elements being installed using the wrong fire-resistant insulative material

The legal ramifications of this problem are huge, and in fact, some industry insiders believe that it has the potential to be much larger than the well documented leaky building saga, and in fact might become the largest lawsuit in the southern hemisphere, ever!

The Challenge

It became clear from the outset that a resource-efficient, tested and compliant solution to the Passive Fire Problem we are facing was never going to be easy to find.

All non-compliant fire separating elements must be upgraded to the minimum life safety fire standards of today. This situation is very unfortunate, as apart from being deficient in its FRR, the plasterboard is still fit for purpose.

The situation is aggravated by the complexity of the fire separating elements inside the building core, being riser shafts, elevator shafts, emergency stairwells and corridors.

Not to forget that any building work involves numerous teams including architects, designers and construction trades, as well as various other stakeholders. Approaching a solution in isolation leaves the project open to potentially further areas of non-compliance, additional costs, and possibly the need for more partial fixes.

In complex situations like this we tend to look for the seemingly best solution: The most cost-effective or even the most ideal solution for life safety. But if we step back, we understand that time delays are the costliest aspect, so that in fact the best solutions are compliant as well as the quickest to design, get approved and install.

I am sure you all will agree that today it is more important than ever that we look at the underlying problem in more depth, instead of simply offering to put on a band-aid.

In the next part of our series, we will be defining the problem for different scenarios in more detail.

Contact: info@techcoatings.co.nz
www.techcoatings.co.nz

22 February 2021

Intumescent Paint for Plasterboard Part 2 of 3: Defining the Problem in More Depth

In this part we want to show that the issue we are facing is multi-levelled and encompasses much more than the structural problem that presents on the surface.

In last month's blog post, we identified that the reason for a non-compliant fire-separating element often lies with the plasterboard in the system not being installed in accordance with the manufacturer's instructions. We also elaborated on the fact that there is an added complexity due to the structural makeup of these elements and where they are located within a building. In this month's blog post, we want to investigate the problem in more depth and show that the issue we are facing is multi-levelled and encompasses much more than the structural problem that presents on the surface.

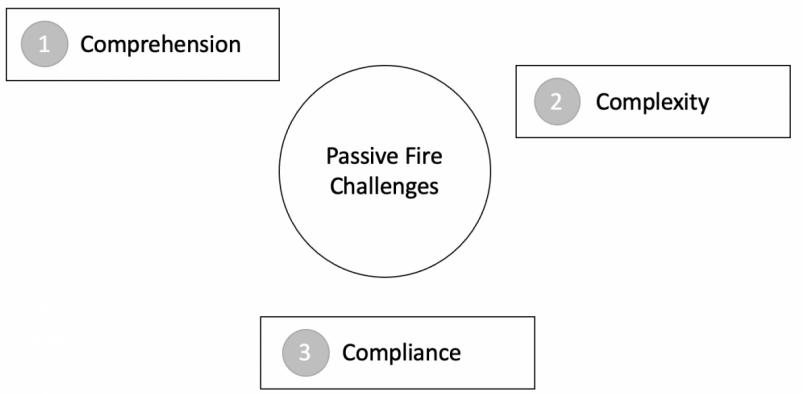
Exploring the Challenge

When faced with the question "Can you fire rate plasterboard?" we must firstly acknowledge that plasterboard already has an inherent fire rating. Therefore, the actual question that needs to be answered is "Can you increase the fire rating of an existing fire-separating element that uses plasterboard?"

Our focus accordingly extends to the fire-separating element in its entirety.

It is important to note that the reasons why people ask us to upgrade fire-separating elements are not restricted to issues caused by inadequate installation. The need for an upgrade is often brought about by general changes to buildings. These can result in the need for an upgrade or a change due to outdated compliance or even in the addition of new fire-separating elements.

When looking at upgrading fire-separating elements we are normally faced with the following three challenges.



1) Comprehension: Understanding the existing system

Understanding the existing system is the foundation to all satisfactory solutions. So, the essential question for any solution we offer is: What is the existing system comprised of?

Often this question is not an easy one to answer in detail as the building has been constructed during a different time to a different standard and would require the person on site to have in-depth knowledge of the inspection of these fire-separating elements.

The issue presents as follows:

1. Due to an insufficient understanding of its construction the fire-separating element is not compliantly constructed,
2. The person responsible for inspection is faced with a scene that is difficult to decode and the problem is not identified in its entirety — inexact questions are asked,
3. The answers given do not solve the underlying problem,
4. The rectification is insufficient.

A comprehensive solution to compliantly upgrade fire-separating elements will ensure an adequately detailed decoding of the existing system, an in-depth understanding of the requirements of a compliant system and offer a tested and endorsed solution that will rectify even the worst-case scenario.

2) Complexity: Upgrading elaborate structures

A key factor when looking at upgrading fire-separating elements is their inherent complexity within multi-tenancy buildings.

For us to create an understanding for the challenges that are associated with upgrading complex elements, we will use riser shafts as an example as they are the most elaborate structures and model all aspects of other fire-separating elements.

Riser shafts are the main thoroughfare for services in a tall building. As such their integrity is critical to the functioning of the whole entity. It is therefore most important to ensure as little impact as possible during remediation work.

But riser shafts are very restricted in space and with the multitude of utilities running through them creating a challenge in terms of access. This makes moving around difficult to nearly impossible and requires workers to use harnesses.

The complexity is elevated by multiple service penetrations which need to be taken into consideration during any remediation work.

Due to the above, a timely and cost-efficient remediation cannot be achieved by removing, replacing, or even adding sheets of plasterboard.

Evidently, a timely and cost-effective compliant solution needs to consider the restricted space, the costs involved in disconnecting utilities and the need to incorporate multiple penetrations.

3) Compliance: Non-compliant installation

Only a plasterboard fire-separating element that is constructed in accordance with a tested and endorsed system can form part of a fire cell. But we have found that often the plasterboard fire-separating elements were not constructed in accordance with a tested and endorsed system.

Even though specific processes may vary between projects, in all cases the appropriate product must be used and installed in accordance with the manufacturer's specifications.

Here are some common examples of non-compliant use and installation:

- Usage of incorrect lining (plasterboard) — wrong type or thickness
- Usage of incorrect screws — wrong gauge and/or length
- Screws fixed in the wrong pattern or with incorrect screw centres

The lack of understanding and the non-compliant installation are inherently linked and are tell-tale signs of a fundamental flaw in the system around passive fire.

Only a certified and endorsed passive fire solution embedded in a robust quality assurance system and guided by a code of practice will be able to rectify the situation.

Conclusion

As shown, miscellaneous degrees of difficulties arise from varying structures within a building. But the true passive fire problem we are facing is an underlying, multilevel insufficiency stretching from fire safety design all the way to its execution.

Passive fire protection is an important part of the fire safety features of a building and should ideally be subjected to the same rigorous installation documentation, inspection and sign-off as active fire protection.

In the last part of our series, we want to explore what a compliant solution to the passive fire problem we are facing can look like.

Contact: info@techcoatings.co.nz – www.techcoatings.co.nz

22 March 2021

Intumescent Paint for Plasterboard Part 3 of 3: Offering a Sound Solution to Our Passive Fire Problem

We want to finish this series off by demonstrating how a tested and endorsed intumescent coating system embedded in an integrated approach is able to deliver a compliant, cost-effective, minimal waste solution.

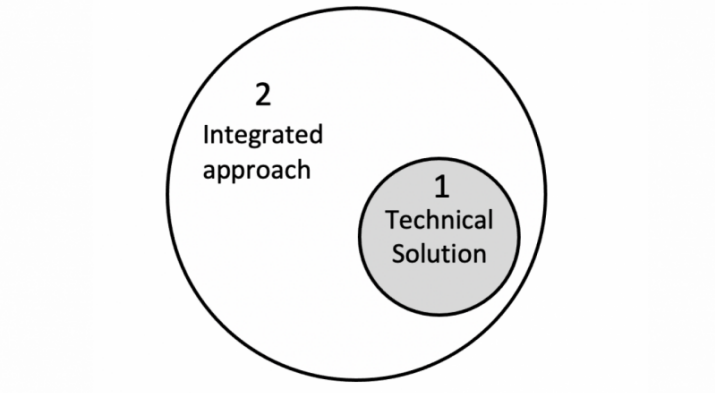
In last month's blog post, we thoroughly investigated the three challenges the industry is facing in regard to upgrading fire-separating elements: Comprehension, Complexity and Compliance.

In the third and final part of our series we want to demonstrate how a tested and endorsed intumescent coating system embedded in an integrated approach is able to deliver a compliant, cost-effective, minimal waste solution.

Offering more than a technical solution

It goes without saying that with the multitude of challenges arising around upgrading fire-separating elements an all-encompassing solution can only be achieved by approaching the situation with fresh eyes. Over the past three years, we have been meticulously looking at these challenges, which made us realise that a resolution was never going to entail a technical solution alone.

While there is definitely a need for passive fire protection to move into the future, there most certainly is also the requirement for a more integrated way of thinking when designing, specifying and installing fire-separating elements.



In the following paragraphs, we want to discuss the technical as well as the non-technical facet of a reliable solution to the passive fire problem we are facing.

The technical side of the solution: intumescent coatings

While adding or replacing plasterboard is still a heavily employed solution in the industry, it does not match the requirements of our time — namely being compliant as well as being timely, cost effective and environmentally friendly.

However, the current generation of intumescent coatings tick all the boxes and have an established performance, when correctly specified, installed and quality controlled. Hence, instead of replacing a system, which is otherwise fit for purpose, why not simply increase the FRR of an existing fire-separating element with each coat of intumescent coating applied?

This presents a huge advantage, as it allows remediation work to be done in a fraction of the time and significantly reduces building waste and costs. It requires fewer trades to be involved on site which also reduces potential delays and issues caused by handovers.

Only intumescent coatings make it possible to carry out remediation work in very restricted spaces like riser shafts, with their multitude of service penetrations and minimal impact requirements, as none of the utilities need to be disconnected. Additionally, emergency corridors and stairwells, which are means of escape or safe refuge, can be upgraded in a live building.

With properties like low-VOC and low-odour, as well as a very limited amount of noise during application, the impact on occupants is minimal and the building can continue to be used while remediation work is carried out or very shortly after.

Testing for compliance

None of the before however is of any relevance if the intumescent coating is not a compliant, endorsed system, tested in accordance with the requirements of the Australasian market.

One of the cornerstones to producing a tested and endorsed solution is to test on specimens made from locally sourced materials, manufactured in Australasia, constructed in accordance with local construction standards and carefully following the local linings manufacturer's instructions. The other is ensuring a test regime fulfils the requirements of AS1530.4:2014, the current version of the testing standard stated in the NZBC and NCC.

It is often overlooked however that a comprehensive understanding of compliance is only half of the picture, a detailed decoding of the existing system is of equal importance.

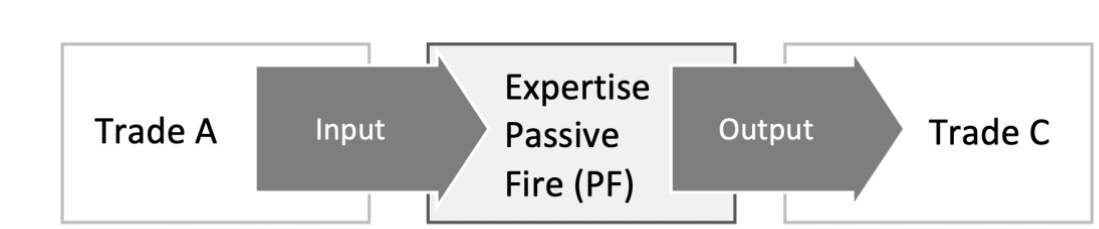
We believe that diligent decoding of existing systems is only possible by partnering with experts from adjacent disciplines and applying inspection best practices.

Integrated approach: understanding inputs and outputs is key to a sound solution

Most likely, upgrading the fire-separating element will be one of many aspects of a comprehensive remediation project and consequently, it needs to be aligned within its bigger framework.

We have encountered first-hand how the independent work of different trades — within passive fire and outside, in general construction — often conflicts with each other and that even the best solution will not be able to remedy the challenges we are facing, if it is stand-alone. Only an integrated approach across disciplines will lead to success.

To paint a clearer picture, we want to utilise an approach used in Quality Management: Every process is guided by its inputs and outputs, or to put it in simple words, no process is ever independent.



Understanding how inputs will affect the performance of your product and how your outputs might affect the following trade is essential. High quality results can only be achieved when consideration is given to the interactions with other trades. We need to step up and look outside the box.

We strongly believe that as a supplier your job starts well before you even sell a bucket of paint and extends way beyond it — this means correctly decoding the existing system as well as realising how any follow up work will be affected by or affects your outputs.

That is why we believe that running research tests on common crossover challenges is important. Only thereby one can answer questions e.g. whether passive fire stopping needs to be done before or after upgrading or if overlays such as banister brackets, dado rails, plywood and commercial linoleum, that might be fixed or glued to an emergency corridor after applying a coating, have an impact on the performance of the passive fire system.

Outlook

Often, we are brought in when things need fixing, when fire-separating elements have NOT been dealt with according to specifications or manufacturer's instructions. And even though our system and approach has proven to remedy the most complex scenarios, shouldn't it be our goal to not even let it come to this point?

If Passive Fire Protection, with a focus on fire-separating elements, wants to become a respectable discipline within Fire Design, it needs to step up its game.

We have set our goal nothing lower than creating a best practice for the specification, application, and quality control of intumescent coating systems for non-ferrous substrates.

Aligned with other disciplines we suggest the following:

Passive Fire Solutions for non-ferrous substrates need to:

- Be tested and endorsed according to test standards required by the NZ Building Code
- Guided by a Code of Practice
- Embedded in a robust Quality Assurance system at all stages
- Allow for an interdisciplinary approach and include trainings

Conclusion

We truly believe that only a high-quality, tested and endorsed intumescent coating solution embedded in an integrated approach will be able to remedy the current passive fire problem and lead to long-term success.

We hope we were able to demonstrate what a sustainable, minimal waste, cost effective and minimally disruptive solution can look like and that intumescent coatings are the future of upgrading fire-separating elements.

Why settle for less if you can have it all?

Special thanks

None of our insights would have come about without opening our questions to more than just Passive Fire. We want to thank the numerous people, who have taken the time to listen to our questions and provide us with valuable feedback, for their support.

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