

Escape of water in buildings due to plastic pipe plumbing failures

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According to the Association of British Insurers (ABI), escape of water (EOW) claims cost UK insurers £2.5 million a day - nearly £1 billion a year. ⁱ Whilst leading insurer Aviva suggests 65% of construction sites suffer water damage at some stage of the build. ⁱⁱ

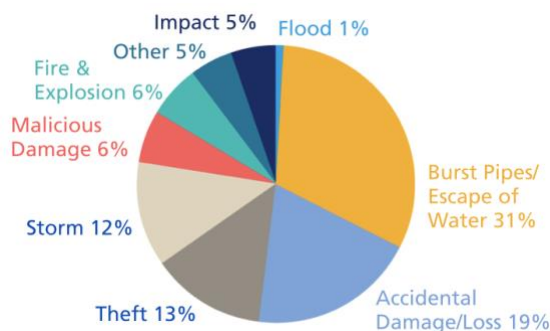
Awareness of the negative environmental impacts of plastics has increased but the construction sector's use of plastics for plumbing materials continues to grow, primarily due to lower costs and speed of installation. However, there is increasing evidence from the insurance industry that suggests poor workmanship, particularly in relation to 'push-fit' plastic pipework, is the most common cause for escape of water claims. ⁱⁱⁱ

The aim of this research was to further investigate the issue of escape of water in buildings due to plastic pipe plumbing failures, via a literature review and interviews with key stakeholders within the insurance industry, including brokers, insurers, loss adjuster and forensic scientists.

It is hoped the findings will help make the case for the adoption of more robust plumbing solutions with lower environmental impacts across their whole life cycle, with the ultimate aim of reducing the volume and value of escape of water claims.

Escape of water – a growing issue

Escape of water in buildings is a major issue for both the construction and insurance industries. In 2018, nearly 1 in 3 of Zurich's total claims were for water damage caused by burst pipes and escape of water. ^{iv}



Causes of claims in buildings – Zurich, 2018

On construction sites, losses often occur in the final weeks of projects once fit-out elements have already been installed, resulting in increased damage and higher rectification costs. This can cause significant

delays to the project programme and consequential financial losses to the building owner.

Like the current insurance industry, insurers' approach to escape of water risks is hardening, resulting in higher premiums and increased excesses. There is also a push from the industry for more education and guidance, notably the Construction Insurance Risk Engineers Group (CIREG)'s best practice guide - 'Managing Escape of Water Risk on Construction Sites'. ^v

“Tackling the rising costs of escape of water claims must be a key priority for the industry.” ^{vi}

James Dalton, former Director of General Insurance Policy, Association of British Insurers

New technologies such as automatic flow detection shut-off systems are becoming

more widely available, but uptake is low and they are rarely considered at the design and construction stages.

All types of buildings are affected by EOW – new and old, residential and commercial. The volume of domestic claims is often higher, but the value of industrial and commercial claims can be considerable. In the commercial sector, losses of over £1 million have been seen, compared to the average cost of domestic homes which is just under £3,000. ^{vii}

What are the causes of EOW?

Escape of water (EOW) in buildings can occur for a variety of reasons – inadequate installation of fittings, component design or material choice, pressure or temperature fluctuations, corrosion and incompatible compounds, amongst others.



Lockton, the world's largest privately held insurance brokerage firm, notes that the most common cause for EOW claims from construction firms is due to “poor workmanship, particularly in relation to push-fit pipework.” ^{viii}

Poor workmanship is a recurring theme and cited as a common cause by IFIC Forensics, part of Jensen Hughes who offer forensic investigation services across the globe – “The most common cause of escape of water claims is poor workmanship. This trend can be seen across all types of pipework fitting including push fit, compression and soldered joints, with the failure of push fit and compression fittings being the most frequent.” ^{ix}

The Association of British Insurers, “the voice of the UK's world-leading insurance industry”, were interviewed as part of this research, and in 2017/18 worked closely with its members to understand the factors

causing the significant increase in EOW claims. One of the main issues identified, which has led to an increase in the volume of claims in particular, was the ‘increased use of plastic push-fit pipe work in renovation and new build projects.’

Ian Hollingworth, claims manager for specialist insurer EC Insurance Co. (ECIC), now part of Markel International, is without doubt that the increased use of push-fit pipes has led to a rise in EOW claims:

“We have seen an upsurge in escape of water claims in recent years, and the increasing use of push-fit pipes has, without a doubt, contributed to this rise.” ^x

There are other factors at play, including a desire for integrated appliances and ‘hidden’ pipework, increased ‘DIY’ plumbing installations, and Modern Methods of Construction (MMC) providing new challenges for industry.

“The growing presence of plumbed appliances, accommodation containing multiple showers and toilets, the use of modern methods of construction, incorrectly installed push-fit plumbing fittings, and DIY are adding to increased escape of water events, particularly in the social housing sector,” states Kevin Wellman, CEO of the Chartered Institute for Plumbing and Heating Engineering. ^{xi}

Data from ABI states that the number of escape of water claims has steadily risen over the last 15 years, whereas other commercial property claims trends have trended downwards. ^{xii} In the past 8 years alone the total cost of escape of water claims has nearly doubled. ^{xiii} It can be noted that this trend has coincided with the increased uptake of plastic pipe plumbing materials in buildings, which are now known to be the most commonly used material type within industry.

Industry engagement

As part of the research, interviews with a range of stakeholders in the insurance

industry were conducted, including brokers, risk management consultancies, insurance companies, loss adjusters, forensic scientists and representative bodies.

This engagement built upon relationships established via the Timber Accelerator Hub ^{xiv} project, which sought to identify and overcome fire, risk and insurance related barriers for mass timber construction.

Interviews with experts at major insurance firms such as Aviva, Gallagher, Marsh, and Zurich further reiterated the severity of escape of water claims. However, it was noted that there is a lack of hard insurance data which drills-down into the precise cause of many water escapes. Marsh, the world's largest broker, noted that there is a "huge amount of data that exists, it just needs to be unlocked and made sure to be consistent."

This was further highlighted following a discussion with the recently departed Executive Director at the Chartered Institute of Loss Adjusters' (CILA), who suggested that loss adjusters and, in particular, forensic scientists are more likely to record the causes of failures to a greater level of detail.

This led to engagement with the CILA Property Specialist Interest Group, with a poll of their members finding that burst pipes were the major cause of water damage claims but did not have sufficient data to indicate this was caused by a specific material type.

Material incompatibility

Plastic pipes can be subject to failure and associated escape of water if they come into contact with incompatible materials, some very common. These include caulks and fire stopping materials, leak detection fluids, pipe tapes, sealants and paints. ^{xv}

Paul Redington, a Regional Major Loss Manager at Zurich confirms that they have seen a number of these losses with some claims running into six figures.

In recent years, leading forensic scientist Hawkins has increasingly investigated escapes of water from chlorinated polyvinyl chloride (CPVC) pipework, a type of thermoplastic used for potable plumbing

and in fire suppression sprinkler systems. When used in conjunction with incompatible fire-stopping compounds, this caused pipework to become more flexible, whilst in some instances pipework became brittle and cracked. ^{xvi}

This 'environmental stress cracking', is a growing concern and a number of CPVC pipe manufacturers now produce guidance documents listing products that are incompatible with their pipework.



Cracking of a CPVC pipe due to incompatible fire-stopping compound – Hawkins, 2019

An interview with Dr Christabel Evans, a Materials Engineer at Hawkins who specialises in material failures further highlighted the material incompatibility issue.

“One emerging area is escapes of water from sprinkler systems. CPVC plastic pipes used in conjunction with incompatible fire stopping compounds can cause environmental cracking of the pipework itself, and not at the fittings where failures more commonly occur.”

Dr Christabel Evans, Materials Engineer, Hawkins

The 'plastics problem'

Mainstream awareness of the negative environmental impacts of plastics has increased due to popular documentaries such as the BBC's Blue Planet II.

The focus of this has largely been on single-use plastics from consumer products and packaging, with less attention on the use of plastics in construction materials, both from a short and long-life perspective.

For the past three years, ASBP has been exploring this topic further via a cross-sector working group ^{xvii}, which includes major contractors Mace and Morgan Sindall.

Plastics are made from fossil fuels and account for 4-8% of global oil consumption. By 2050, growing demand for plastics could push this figure as high as 20%. ^{xviii} The sector's use of plastics continues to grow and polymers such as PVC, PEX and HDPE are some of the most commonly used materials for pipework in buildings due to their lower up-front costs and speed of installation.

It is recognised that plastics have useful applications within the construction industry, and in some cases may be the most appropriate material choice (i.e. for underground pipework). A reduction in the unnecessary use of plastics is to be encouraged and suitable alternative materials adopted where appropriate, such as copper and aluminium in the case of pipework, ductwork and guttering.

The CHARM 'virtually plastic-free' homes project^{xix} led by Green Square Accord has transformed the site of a former factory carpark into one-bedroom apartments for local people. The landmark project sought to eliminate plastic in building materials wherever possible with plastic pipes substituted for copper, clay and cast iron, which has notably led to a significant reduction in defects.

"It's an open secret in the industry that plastic piping leaks everywhere. It's a constant issue around

quality and has a very high maintenance cost."

Carl Taylor, Assistant Director of New Business and Growth, Green Square Accord

Conclusions

The findings of this study show that escape of water is a huge problem facing both the insurance and construction industries.

- There is not one single cause that can be attributed, but a number of factors which have led to the rise in EOW claims, including poor workmanship and increased use of plastic push-fit pipework.
- The number and cost of escape of water claims continues to rise. It can be noted that this trend has coincided with the increased uptake of plastic pipework.
- Improvements in workmanship can be fostered via further training and guidance from organisations such as ABI, CILA and CIREG.
- More appropriate material choices can help to minimise pipe failures and reduce our usage of fossil fuel derived products, in turn mitigating environmental impacts.
- Whilst failures most commonly occur with pipe fittings, stress cracking of pipework and material compatibility and is an emerging area of concern.

Next steps

It was noticeable from this research that stakeholders, including some of the largest insurance companies in the UK, were very open to engagement and discussion on the escape of water issue. This willingness to engage, despite being welcomed, further emphasises the severity of the EOW problem facing the insurance and construction industries.

Further research and work on this topic could include continued engagement with stakeholders within the insurance industry to help foster improved and consistent recording, and sharing, of data on the causes of escape of water claims, to the granularity of material type.

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