

Safer choices for Hot Work: flame free construction



Capturing work practices and innovations that:

1. Eliminate or reduce the need for hot works, or;
2. Significantly increase the safe undertaking of hot works

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Disclaimer:

This guidance, Safer choices for Hot Work: flame free construction, has been produced by a working group of the Construction Industry Advisory Committee (CONIAC) which comprises industry experts from varied backgrounds, trade associations and the Health and Safety Executive (HSE). It provides the construction industry with advice, information, and guidance to help meet legal requirements and reflects what the industry considers current good practice. HSE supports this industry-led approach.

About CONIAC

The Construction Industry Advisory Committee (CONIAC) was established in 2003, to advise the HSE on the protection of people from hazards to health and safety within the building, civil engineering, and engineering construction industries. Its membership comes from the HSE and key industry stakeholders.

To address specific issues in greater depth, CONIAC establishes topic-specific working groups made up of subject-matter experts drawn from across the industry. One such group is the CONIAC Fire Safety Working Group, which focuses on improving the management of fire risk during the construction phase and supporting the wider cultural shift towards better fire safety practices.

The Fire Safety Working Group operates as a cross-industry collaboration platform, bringing together representatives from contractors, specialist trades, insurers, fire engineers, regulators, and industry bodies.

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Chair's Foreword

Fire remains one of the most serious and persistent risks in construction, and our industry has long relied on procedural controls to manage it. In recent years, however, we have seen a decisive shift in how organisations approach ignition risks. The increasing adoption of flame-free methods—across roofing, mechanical systems, prefabrication and cutting—demonstrates that eliminating the cause of fires is not only possible, but achievable at scale.

A more mature, design-led culture should be the goal, where hot work is no longer treated as a routine activity, but as an exception that requires clear justification. Designers, contractors and clients can move risk upstream, challenging assumptions that have been embedded for decades. Designing out risk before it ever reaches our sites represents a profound change, and mirrors the direction set by CDM, the Joint Code of Practice on the Protection from Fire of Construction Sites and Buildings Undergoing Renovation, and the Building Safety Act: earlier thinking and safer outcomes.

This document supports that shift by giving industry the clarity and confidence it needs to make better choices. It highlights practical alternatives that are already being successfully implemented on major projects, supported by insurers and increasingly expected by clients.

Our opportunity now is to embed this mindset consistently. Every project should start with a simple question: can we remove the ignition source entirely? Where the answer is yes, we unlock safer, simpler and more resilient methods of delivery. Where it is not, the need for disciplined controls and clear justification becomes even more important.

I would like to extend my sincere thanks to Sabrina Goodall of Balfour Beatty, who led this project on behalf of the CONIAC Fire Safety Working Group, and whose leadership and commitment have been instrumental in bringing this guidance together. I would also like to thank the many industry contributors who have generously given their time and expertise to support its development.

Through this collaboration, the sector continues to move beyond compliance towards genuine excellence in fire prevention.

Gary Walpole
Chair, CONIAC Fire Safety Working Group

Part 1: Introduction

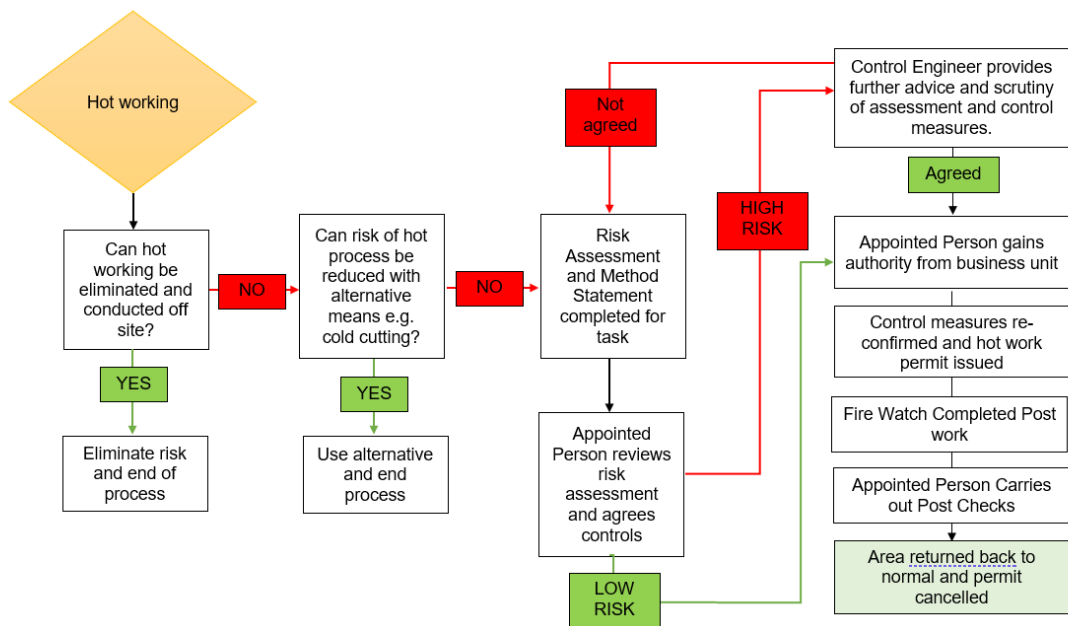
Purpose

There is a growing range of practical alternatives to traditional Hot Work, and clearer guidance can help organisations to confidently consider and adopt these options. The aim of this guide is to provide an overview of common Hot Work activities typically encountered across UK construction, refurbishment and maintenance projects, while highlighting opportunities to improve existing methods, introduce safer practices that are already available, and explore new technologies that can reduce—or in some cases eliminate—fire risk.

Hot Work is a recognised high-risk activity. It requires a permit-to-work system and competent staff with the right knowledge, skills and experience to execute a task effectively and manage the risks involved. When properly controlled, the risk from Hot Work can be kept within acceptable levels. However, in some scenarios, there is a benefit from simplifying process activities on site. This approach not only supports safer workplaces but also helps meet our legal obligations.

Other important drivers behind reducing the use of Hot Work include:

1. Clients increasingly requiring “flame-free” methods on their premises
2. Construction companies moving away from using LPG on sites to support carbon reduction goals
3. Major infrastructure clients committing to, and incentivising, low carbon construction methods
4. The adoption of modern working practices which count towards attracting new talent into industry



Example Hot Work Assessment process

Competence

From a fire compliance perspective, many early decisions regarding processes that involve hot work are made by designers, architects, and surveyors who may lack specialist fire expertise. It is essential that decision-makers have a thorough understanding of fire safety management during construction, rather than relying solely on guidance from contractors or specialists who may not adhere to current best practice or may be influenced by commercial interests.

The Building Safety Act (and Regulator) adds further challenges, with decision-makers facing pressure to deliver cost-effective solutions while also ensuring compliance. To make sound choices, they must weigh short and long-term benefits, recognise when a solution introduces new risks, and be able to make informed decisions around the latest safe methodologies.

Installer competence is also critical: even where safer alternatives are chosen, the effectiveness often depends on trained and competent application.

To support better decision-making, this guide has been developed to provide impartial, practical information for all parties in the supply chain, so that safer processes can be embedded consistently across industry. This guide can assist users to meet performance requirements in relation to design for safety (in the spirit of CDM).

Insurance

The main insurance benefit is the reduction in the risk of major claims collectively arising from hot works in the future which would help to keep insurance costs more stable in the medium to long term. Specific cost savings are not possible to quantify due to many other factors, including health and safety, that are considered when determining insurance costs.

Legal requirements

The Regulatory Reform (Fire Safety) Order 2005 is the main legislation governing fire safety in non-domestic premises*. For construction sites, the two key guidance documents are:

1. HSG 168 Fire Safety in Construction, 3rd Edition (2022)
This HSE guidance places a duty on Dutyholders to identify, eliminate, and control fire risk, including challenging design decisions. It also advises adopting safer alternatives to hot cutting and welding, such as cold-cutting techniques, where reasonably practicable.
2. Joint Code of Practice: Fire Prevention on Construction Sites (JCOP) (10th Edition - 2022 with Amendments 1/2023 & 2/2025)
The JCOP requires designers and contractors, during the concept and design phases, to work together to eliminate hazards where possible, assess fire risks, and minimise potential damage. It also states that alternative methods to Hot Work should be used wherever practicable.

Additional CDM duties:

- **Regulation 9 (Designers):** Eliminate or reduce foreseeable fire risks through design and provide information on residual risks.
- **Regulation 11 (Principal Designers):** Plan and coordinate pre-construction health and safety, ensuring fire risks are addressed and information shared.
- **Regulation 29 (Contractors):** Manage and supervise construction work to control fire risks, implement safe systems, and maintain site security.

Both documents and CDM regulations provide limited guidance for the active construction phase before the building is compartmented and fire protection is in place, where any lack of passive measures significantly increases risk and can compromise escape routes in the event of fire.

*In Scotland the Fire (Scotland) Act 2005 and Fire Safety (Scotland) Regulations 2006 apply.

Suppliers

Any reference to product suppliers in this guide is for informational purposes only and does not imply preference or endorsement over other suppliers or methodologies. Listings are based on user experience, submitted case studies, and direct feedback regarding good practice. Readers should not interpret the mention of any supplier or method as a direct recommendation. It remains the responsibility of the user to exercise their own judgement and due diligence when selecting products, methods, or suppliers, considering the specific requirements and context of their project.

PART 2: Roofing

Further to a request under the Freedom of Information Act 2000, London Fire Brigade Headquarters provided the following table with the number of hot work fires where the location of the fire started was 'roof' for the last 10 years - 2014-2023:

Count of Call ID	Calendar years										
Location fire started	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	Grand Total
Green or living roof								1			1
Roof	15	15	9	13	18	16	21	7	10	16	140
Roof space	8	10	10	9	12	6	5	8	8	9	85
Grand Total	23	25	19	22	30	22	26	16	18	25	226

Earlier fire incident data: 2003-2013

In 2015 BRE Global [12] investigated fire incidents reported to the Department for Communities and Local Government (DCLG) involving roof voids and identified issues related to compartmentation over a ten-year period. Their findings were:

Out of 106 fire investigations, 34 had aspects relevant to concealed fire spread:

- 11 were solely related to compartmentation in roof voids
- 10 were solely related to issues with cavity barriers
- 6 were combined issues with compartmentation in roof voids and cavity barriers
- Four fires were related to fires in or issues with ducting
- One fire involved both ducting and compartmentation in roof voids

Hot work is one of the greatest safety risks when installing a roofing system. Although some of the waterproofing systems mentioned in this guide do not require hot work during the installation process, all waterproofing systems require the substrate to be completely dry before the new waterproofing can be applied; gas torches are therefore commonly utilised for drying the substrate, which may present a fire risk on some surfaces.

However, all flat roofs are suitable for flame-free preparation and installation. Roofs with a combustible support structure and/or other combustible building elements in close proximity are high-risk candidates warranting flame-free solutions. Every project will have its own specific requirements, which may require bespoke solutions from the manufacturer. Historically, hot-melt has been considered the most robust roof solution, particularly for roofs that will be covered or built over (for example, landscaped areas, roof terraces, or roofs providing access for servicing plant and equipment). There is notable hesitance to move away from bitumen works due to increased remedial works arising from other methods, and contractors will need assurance from manufacturers that any flame free solution is equally robust in its intended environment.

Roofing fires in the news

Suspected spark from a weld cause of Rouen Cathedral fire on 11 July 2024

The spire had been in renovation for years and was surrounded by scaffolding enclosed with protective sheeting when the fire began about 120 metres above ground level. Workers on the premises raised the alarm. The contributing combustibles were plastic elements from the worksite. It is believed that a spark from a weld could have fallen onto a plastic cabin interior at the work site. No injuries reported.



[Suspected spark from a weld cause of Rouen Cathedral fire on 11 July 2024](#)

Staines Tower block fire caused by welding work – developer: Jun 2024

The developer stated there was a fire on the roof of one of the blocks at the Staines construction site, resulting from welding works being undertaken on the roof. The 14-storey building was unoccupied at the time. It is also believed that gas canisters exploded during the incident. Some smoke inhalation but no other personal harm reported.



[Staines: Tower block fire caused by welding work - BBC News, Jun 2024](#)

Reading fire: Crane rescues worker next to burning high rise: November 2023 [15]

This was a high-profile incident all over the news and social media as it was unfolding with the incredibly dramatic rescue of an operative who was trapped on the roof and was rescued just in time by a crane operator. The cause of the fire is not yet confirmed and is still under investigation, but Hot Work was taking place on the roof at the time. The fire (pictured) was blocking the operative's evacuation route.



[Reading fire: Crane rescues worker next to burning high rise: November 2023](#)

Both fires are still under investigation, but initial reports for Staines and Reading have indicated that combustible insulation in the vicinity contributed to the rapid fire spread.

Waterproofing systems for Flat roofs, Terraces and Balconies

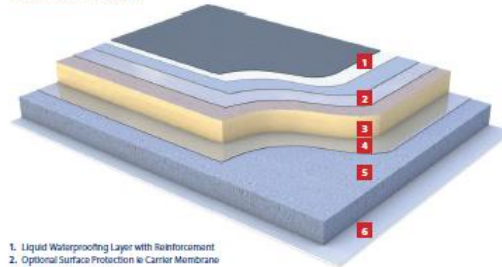
BS6229 Flat roofs with continuously supported flexible waterproof coverings-Code of practice defines a flat roof as: “roofs with a flat or curved surface, at a pitch not greater than 10 degrees to the horizontal”.

When selecting waterproofing systems for flat roofs and balconies it is important to firstly understand the four main types of roof waterproofing systems that can be installed on a flat roof or balcony, these are:

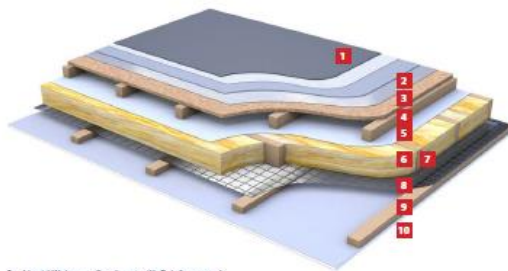
Warm roof system.

This is where the principle thermal insulation is installed above the slab/deck and underneath the waterproofing layer resulting in the temperature of the slab/deck being close to that of the building interior.

Warm Roof Build-up



1. Liquid Waterproofing Layer with Reinforcement
2. Optional Surface Protection ie Carrier Membrane
3. Rigid Thermal Insulation
4. Air and Vapour Control Layer (AVCL)
5. Structural Slab/Deck
6. Internal Finish



1. Liquid Waterproofing Layer with Reinforcement
2. Optional Surface Protection ie Carrier Membrane
3. Supporting Structure/Deck
4. Fittings to Provide Ventilated Void (Min 50mm Deep)
5. Breather Membrane
6. Thermal Insulation
7. Structural Frame
8. Air and Vapour Control Layer (AVCL)
9. Furrings to Provide Service Void (min 25mm deep)
10. Internal Finish

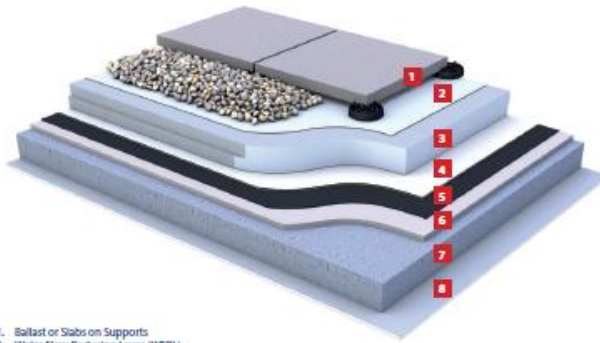
Cold Roof System

This is where the principle thermal insulation is installed below the slab/deck resulting in the temperature of the slab/deck and waterproofing layer being close to that of the external climate.

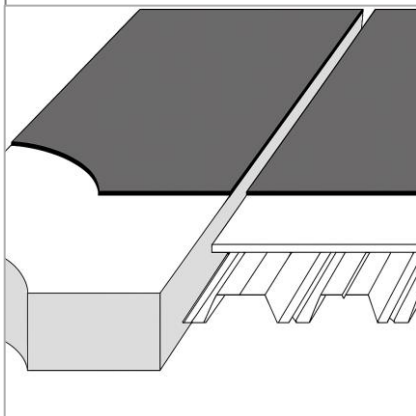
Inverted Warm Roof System

This is where the principle thermal insulation is placed above the waterproofing layer, resulting in the temperature of the slab/deck and the waterproofing layer being close to that of the building interior.

Inverted Roof Build-up



1. Ballast or Slabs on Supports
2. Water Flow Reducing Layer (WFR)
3. Rigid Thermal Insulation
4. Drainage Layer (Optional)
5. Liquid Waterproofing Layer
6. Screed to Falls
7. Structural slab/deck
8. Internal Finish



Uninsulated Roof System

In an uninsulated roof system, the waterproofing layer is installed directly onto the slab/deck without any thermal insulation.

Materials:

There are numerous different types of flat roof waterproofing products/systems that are available in the UK market, which can be generally split into five categories:

1. Reinforced Bitumen Membrane (RBM) Systems
2. Hot applied liquid waterproofing
3. Cold applied liquid waterproofing
4. Mastic asphalt
5. Single ply membranes

We will look at each of these systems in turn in the following pages and then consider flame free alternatives that are available.

1: Reinforced Bitumen Membrane (RBM) Systems

These systems are installed using a few different methods; traditional pour and roll, torch-on, self-Adhesive involving heat-activated technology, hot air welding techniques or adhesive bonding. A key advantage of RBM systems is their long lifespan. They require little upkeep although annual maintenance is recommended to extend its lifespan. These systems can sustain heavy foot traffic as well as loads associated with installation and maintenance and permanently sited rooftop plant.



The reinforcement fleece within bitumen membranes is provided to ensure a high tensile strength. Bitumen is the primary raw material used in the production of RBM. It is a by-product of oil refining and is essentially the waste material of this petrochemical process and therefore has little additional detrimental effect on the environment.

2: Hot Applied Liquid Waterproofing (hot-melt)

Hot Melt Structural Waterproofing Systems are ideally suited as a waterproofing system for terraces, podiums, plazas, green roofs, car parks, and substructures.

Systems are fully bonded to a primed substrate and achieve adhesion across a wide range of temperatures and are typically finished with a wide variety of decorative or amenity surface coverings, including paving, decking, ballast, green, blue and BioSolar roof systems.

Pros consist of:

- Monolithic when installed (no laps)
- Self-healing (please consult manufacturers literature)
- Longevity

Hot Melt waterproofing systems are expected to have a service life equivalent to “the structure in which it is incorporated”, accredited by third-party assessment. This provides clients with durability security, reduced roofing maintenance needs and whole life cost benefits.

The hot melt compound is melted in an agitating boiler, powered by electricity and LPG, although there are more modern boilers powered by electricity alone.



3: Cold Applied Liquid Waterproofing

Cold applied liquid systems usually comprise of multiple layers of liquid compound and reinforcement, that come together to form a fully adhered and seamless finish.

The systems are flame free and offer a highly durable and safe waterproofing solution for terraces, balconies, walkways, car parks as well as a practical option for commercial and residential flat roofs.

Although the systems are cold applied the substrate must be clean and completely dry before application of the liquid waterproofing system therefore careful application is required when drying combustible surfaces, such as use of heat instead of flame.



4: Mastic Asphalt

Mastic Asphalt is one of the oldest waterproofing membrane systems and has an extremely long-life span. The life span of the product and its long pedigree mean it is commonly used to waterproof listed buildings and churches. It consists of a limestone aggregate, bound together with bitumen which is heated in a boiler and applied with a wooden float. The craft skills of a mastic asphalt spreader make use of the flowing characteristics of the material to guide it around penetrations and along upstands. Mastic Asphalt, like Hot Melt, does need to be heated in a boiler



5: Single Ply

Single ply is a synthetic polymer-based roofing membrane that, as the name suggests, provides a waterproofing layer in a single sheet. Welded at the joints with hot air, solvent or adhesive, it can be adhered, mechanically fixed or ballasted onto a flat or pitched roof. Single ply roofing systems are particularly advantageous if the project has weight and load bearing considerations. The membranes are durable and resistant to climate conditions, yet incredibly lightweight, typically 2-3kg per square metre. The speed of installation can make it a cost-effective method of waterproofing for a roof.



Torch Applied RBM (flame free alternative)

The Etorch 3 won the Construction News awards in 2023 for Best Product Innovation. It is safe to use on roofs as a replacement for the gas flame torch for some RBM systems (manufacturers can advise). Also suitable for drying up at approximately one meter per minute.



The Etorch produces hot air capable of replacing the conventional LPG gas used for drying/ activating bituminous membranes on the flat, up-stands, pitch pockets etc and completes the drying process on a variety of decks where torch is unsuitable. Further alternatives are available in the LRWA drying up of substrate guidance in Appendix A.

Benefits

- Flame free solution
- Zero CO2 emissions
- Reduced hot work risk and associated processes
- Eliminates need for LPG

Considerations

- Requires power supply: can be considerable for larger roofs
- Substantial initial outlay (lease or purchase)
- Does not bond all RBM products, check with manufacturer guidelines
- trailing cables

A cost analysis of LPG vs electricity is under way.



Hot-Air Welders (Manual Lap Welding)

If an automatic hot air welder is not available, then the laps will need to be sealed manually, using handheld hot air tooling and pressure roller.

Hot-Air Welders (Detail Work)

The formation of details to abutments, edge details, upstands, roof lights and other penetrations will need to be carried out using a handheld hot air welder.

These details potentially offer pathways into the building so great care must be taken when completing such detailed work. Utilise the [NFRC Safe2Torch](#) pictorial checklist to identify areas where it is not safe to use an open flame gas torch.



Torch Applied RBM (flame free alternative)

Self-Adhesive Membranes



Most manufacturers of Reinforced Bitumen Membranes (RBM) will have roof systems that remove the need for gas torch application.

Many of these systems are self-adhesive and require specialist primers and bonding accelerators. These products often contain Isocyanates and Dichloromethane (DCM). Therefore, Workplace Exposure Limits (WEL) will need to be assessed under COSHH*, with control measures for applying these accelerators to protect the worker's health.

**Control of Substances Hazardous to Health Regulations 2002*

Hot-Air Welders (Automatic Lap Welding)



All self-adhesive membranes will need to be bonded at the laps with hot air tooling to achieve a bonded joint (lap).

Automatic hot air welders are the most efficient method of achieving a continuous lap bond, providing a consistent heat and pressure source directly to the lap.

An operative is required to operate this machine, to ensure quality of lap bound throughout the welding process.

This equipment only uses hot air. Whilst the fire risk is significantly reduced, it does not remove it entirely and will therefore need to be risk assessed.

Images depicting how flames can travel - front and rear views



(courtesy Zurich**)

**For research only: gas torches and naked flames are not recommended for this type of application. For more information refer to National Federation of Roofing Contractors Safe2Torch guidance: <https://www.nfrc.co.uk/knowledge/safe2torch.html>

Roofing: electric hot melt boilers

Epot: series 8



The epot is designed as a replacement for the gas bitumen boiler, melting and heating modern bituminised rubber compounds (hot-melt) used in structural roofing & waterproofing installations.

Three sizes available:
100, 300 and 500L capacities.

3-Phase Electric Melter



Developed by WJ Horrods Ltd to provide an alternative to gas-fired hot air rubber melters. These machines combine all the features required to be used to heat hot melt blocks but without the need for naked flames.

These boilers come in two sizes and are powered by a three-phase electrical supply.

Benefits

- Fast to heat up and melting times reduced
- Avoids safety and quality control issues arising from the use of gas fired pots
- The risk of 'flash' and vapour ignition fires caused by overheating is eliminated (operates at manufacturer's recommended temperature)
- No naked flame

Considerations

- Requires access to power supply and is a sizeable piece of equipment (powered by 3-phase electricity)
- Substantial initial outlay
- Suitable for larger areas (case study available in appendix)
- Potential for slips, trips and falls with the introduction of wires
- Initial learning curve for correct installation

Note:

Flame-Free Flat Roof Installation Methods: Pros and Cons

System Type	Pros	Considerations
Cold Applied Liquid Membranes	<ul style="list-style-type: none"> - Fully flame-free application - Ideal for complex detailing - Fast cure options - Suitable for refurb & new build - Low VOC options available 	<ul style="list-style-type: none"> - Weather sensitive (rain, humidity) - Surface prep critical - Cure time may vary - Substrate needs to be dry
Hot Melt	<ul style="list-style-type: none"> - Seamless monolithic finish - Long service life - Robust and durable - Good for inverted roofs 	<ul style="list-style-type: none"> - Requires heated application (burn risk) - Not fully flame-free if using LPG boiler
Reinforced Bitumen Membranes (RBM)	<ul style="list-style-type: none"> - Tried and tested system - Durable multi-layer build-up - Torch-free (e.g. self-adhesive or mechanically fixed) options exist 	<ul style="list-style-type: none"> - Traditional methods involve hot works - Flame-free RBM can still be labour-intensive
Single Ply Membranes	<ul style="list-style-type: none"> - Flame-free hot air welding - Lightweight and fast to install - Wide range of colours/ finishes 	<ul style="list-style-type: none"> - Poor seam welding can lead to leaks or early failure - Performance heavily depends on skilled installation - Site QA and approved installers are essential
Mastic Asphalt	<ul style="list-style-type: none"> - Extremely durable and robust - Long lifespan - Recyclable material 	<ul style="list-style-type: none"> - Requires heat application (not flame-free) - Skilled labour needed

Notes on Safer Choices & Flame-Free Practices:

- **Self-adhesive, Cold-applied** and **mechanically fixed** systems offer the most fire-safe installation processes.
- **Hot works** should be avoided where possible; if unavoidable, rigorous hot work permits and controls are essential.
- Many RBM manufacturers now offer **torch-free detailing solutions** and **self-adhesive options** to reduce fire risk.
- Consider **insurance-backed flame-free systems**, with third-party certification when specifying roof work in sensitive or occupied buildings.

BOSSING AND LEAD WELDING

Lead Bossing (Traditional)



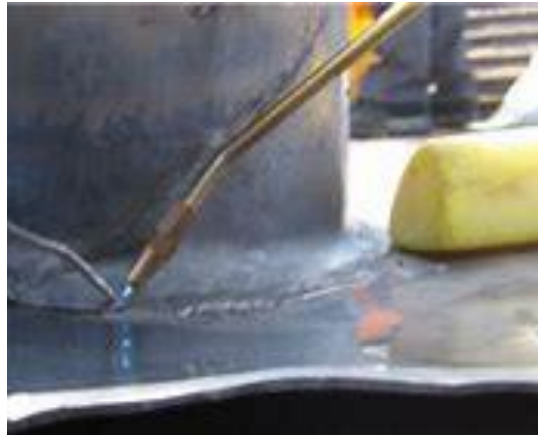
Benefits

- Flame free solution
- When undertaken correctly, it maintains the integrity of the lead sheet, reducing potential leak issues.
- **Aesthetic finish:** smooth and seamless finish is ideal for decorative or visible areas.
- Often the preferred installation technique for listed or heritage buildings.
- Bossing can be undertaken off site

Considerations

- **Skill-intensive:** Requires significant experience to avoid tearing or thinning the lead.
- **Time-consuming:** Complex shapes will take far longer to form via bossing
- No hot works permit required therefore no fire risk
- Less equipment required, so set up costs are lower; however, bossing takes longer than welding in the majority of circumstances

Lead Welding



Benefits

- Simplified installation techniques over bossing. Less skill required
- Quicker technique than bossing in majority of circumstances
- Welding can be used to carry out repairs
- Welding can be conducted off site
- Quieter process than bossing

Considerations

- More equipment required: high set up costs
- Higher risk: Improper technique can cause pinholes or weak joints.
- Fire hazard: Involves open flame, so safety precautions are critical. Hot works permit required
- Exposure to Lead fumes
- Often uses oxyacetylene* which is higher risk and banned on some construction sites due to its volatility.

* Where used, acetylene must be carefully managed in line with life safety, business continuity, and impacts on others in the event of an explosive event (see [RC49: Recommendations for the storage, handling and use of acetylene cylinders](#))

Lead bossing without the use of naked flame is the traditional method for forming and shaping lead detailing.

Lead welding (burning). This process uses naked flame from an oxy-acetylene torch to fuse the lead sheets together to form a weathertight seal. (Other gases are available)



Image 1: lead bossing finish



Image 2: lead welding finish

Part 3: M&E

M&E Suspension

See full case study available in Appendix A.
Fast track suspension system for electrics and HVAC services, eliminates need to cut, file and hot dip components. Cost saving summary included.



Unistrut has a similar offering and has been used on many projects, including Crossrail.

M&E cutting shear

By [Milwaukee](#): claimed as one of the cleanest and safest ways to cut strut profiles. Battery operated. In use details not known.

Various Shear types are available from suppliers including [Makita](#) and [Hilti](#) to suit a variety of metal cutting activities.



Modularized E&M units



Gammon HK supply built to order Electrical and Mechanical (E&M) units for plant rooms and multi-service corridor modules, benefiting from 90% reduction in hot work hours. The work is conducted in a factory with machinery or welding robots. (since 2016)

Uk Modularized E&M unit suppliers include:

[Wernick](#): Offers FMflex (welfare/offices) and PSflex (energy/infrastructure)

[view case studies](#)

[Modulek](#): Specializes in bespoke, rapid-build solutions

[video case study](#)

[Balfour Beatty Kilpatrick](#): Design and offsite manufacturing of M&E for complex national infrastructure and buildings

[video case studies](#)

[Premier Modular](#): Focuses on permanent and temporary builds across sectors

[view case studies](#)

M&E

Press Fittings take the danger of an open flame out of the workplace, eliminating hot work permits, fire watchers or fire-related safety equipment. No brazing also means no need to nitrogen purge, and no need to transport gas and other brazing equipment to the job site.

As the use of flammable refrigerants in the HVAC and refrigeration industries continues to increase, the use of flame-free press fittings will increase.

Refrigerant Press Fittings let you make a permanent and reliable mechanical connection in around 10 seconds – increasing installation time up to 60% over traditional brazing.

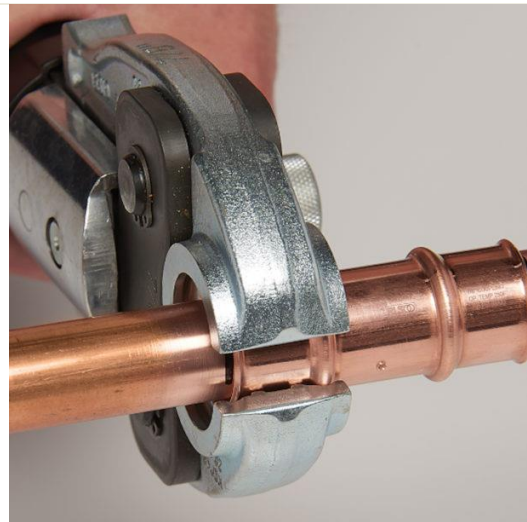
Tube ends are prepped in nearly the same way as brazing, but the press tool does all the connection work in seconds.

Benefits:

Open flame elimination
Better way of working: permit not required

Considerations:

1. Correct prep of pipe when cutting is essential, with deburring, cleaning of ends, verifying the o-ring is present and correctly seated before crimping.
2. Any errors in installation can create a leak path for the refrigerant to escape, with potential for flood risk.



Therefore, it is recommended that, along with competent installers, a product with a visible failsafe is used (markers on pipe to indicate failed connection).

3. Qualified plumbers are technically competent, but it is easy when installing for plumbers to fall back to traditional pipe install techniques which will create a failure in the install, and they should be made aware of this.

Risk:

Incorrect install could lead to flooding – see loss prevention guidance linked below, designed for those who design, install, and commission plumbing systems in domestic and commercial buildings.

[RISCAuthority Insurer Requirements for enhanced escape of water protection based on Approved Document G](#)

Increasingly, push-fit or crimped fittings are being used on larger construction sites, replacing the need for hot works so significantly reducing risk from fire. Fittings are available for all water systems and environments.

Part 4: Cutting

Makita have designed a hydraulic cordless **rebar cutter** that is spark-free and eliminates the requirement for hot works/permits. This method eliminates hot works which reduces fire risk on site and eliminates the requirement for a fire watch and all the additional processes involved in hot work activities.

It also improves the health and wellbeing of operatives by reducing high-noise levels and Hand Arm Vibration (HAVs) exposure due to its reduced vibration.



Battery powered, so an ideal solution for work away from a power source or in remote locations.

Posted by Mace: CCS best practice hub [Product link](#)

The Makita range of Cold Cut saws extends from mains to battery powered tools and includes the Makita LC1230 (305mm) mains TCT Cut-Off Saw; the DCS551ZJ (150mm) TCT and the DCS550 (136mm) TCT 18V LXT Brushless Lithium-Ion cordless metal saws.

The cold-cutting range also includes two cordless rebar cutters DSC162Z (16mm) and the DSC191Z (20mm) enabling users to effectively and efficiently slice through reinforcing bars. Makita have over 20 cold cutting products in their portfolio.

Cold cutting tools are also available from other suppliers. It would be a great benefit to users if webpages dedicated to these tools were readily available.

Tall Buildings: One Blackfriars, London (170 metres tall)

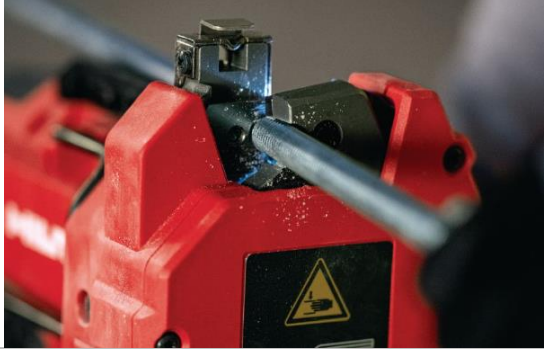
Hot works were reduced higher up the building by using Rehau Everloc plastic pipe and fittings in lieu of copper pipe and fittings where possible. [The](#) fittings consist of only two components – the fitting itself and a compression sleeve which forces the pipe up and over the fitting to make a permanent leak-proof joint. There is no O-ring, no preparation of the pipe required, and, as the pipe is expanded to fit onto the fitting, there is no bore reduction through the fitting, helping to reduce system pressure losses.



CONIAC FIRE SAFETY GROUP

Additional tools for cutting requirements as set out below.

STR 4-22 Rod Cutter



Cordless threaded rod cutter up to **10mm**

NRC 6-22 Cordless Rebar Cutter



Cordless rebar/threaded rod cutter for up to **25mm**

SC 6ML-22 Cordless circular saw for metal



Metal cutting cordless circular saws for cutting steel up to **60mm** in depth

SB 4-22 Portable band saw



Metal cutting cordless band saws for cutting metal up to **127mm**

Hydro Abrasive Water Jet Cutting (replaces grinding / welding)

Uses high-pressure water mixed with abrasive for cutting steel and other materials—completely cold, spark-free, **ideal for hazardous environments**.

Benefits

- Used successfully for refinery decommissioning, even on thick steel with refractory lining
- Drastically reduces the need for costly plant shutdown & preparation time for hot work
- No heat generation maintaining material properties/structure
- Capable of cutting virtually any material or thickness
- Jet cut creates its own start point so does not require an edge or need to overrun
- Cutting Head and manipulators are portable and versatile – ideal for restrictive areas
- Cut can be completed in a single pass but with a multi pass option if required
- Shock free cut can be used for controlled demolition
- Good quality angled cut leaves the surface already prepared for re-welding
- Environmentally friendly as uses no hazardous materials and creates no gases or dust



Sources:

[Cold cutting using water Jetting](#) -UHP (UK) Limited
[BDS Contracts \(MH\) Ltd multi-discipline contractor](#)



Q2 2025: TRIAL CUTTING

The Operations team at Hinkley are exploring an alternative method of work to plasma cutting for removal of the tunnel's internal ring-propping system. They have successfully conducted two cutting trials, cutting through >75mm steel. The trial aims to address the challenges faced when plasma cutting in tunnels, eliminating the creation of fumes within confined spaces.

Trial

Clipper Masonry Saw Bench, 500mm, 110V

The masonry saw bench is a fixed, electrically powered cutting machine, using a water-cooled diamond blade and operates from a 110 V supply, making it suitable for construction and refurbishment environments (other models/brands and power options are available). Can be used in place of disc cutting or angle grinding, supporting CDM 2015 expectations for risk elimination at the planning stage.



Example of model used on site to cut concrete blocks



[Video link](#)

Benefits

- Integrated water suppression cools the blade and cutting interface, preventing frictional heat build-up that could otherwise ignite combustible materials or dust
- Controlled cutting: fixed bench, sliding table and depth control enable accurate, repeatable cuts, reducing rework that could otherwise introduce additional cutting or grinding activities.

Usage examples:

- Cutting blocks or concrete elements for: door and window openings, service penetrations, lintel and masonry adjustments
- Controlled cutting of masonry in: plant rooms, schools, hospitals, offices, occupied or partially occupied premises; where hot work is undesirable or prohibited
- Pre-fabrication and preparation: off-line cutting of masonry components away from the workface

Residual risk considerations

- Electrical safety: maintain PAT testing and do not have in constant use
- Operator competence
- Consider dedicated cutting area for enhanced safety management (noise etc)

Suitable for use in occupied buildings, refurbishments, and live environments where hot work would normally be restricted or heavily controlled.



Reciprocating Saw

On the North Bridge refurbishment project in Edinburgh, there is enough scaffolding to reach from Edinburgh to Inverness. Scaffolding needs to be cut daily. This is a great example of using a tool that eliminates the need for hot works, including, as in this example, in semi-confined spaces.



[Product: Makita DJR187Z 18V Li-Ion LXT Brushless Cordless Reciprocating Saw - Bare](#)

Welding

SMAG accelerated welding	SRJ Weld-free Pipe Coupling
	
<p>The issue (Hinkley Point C) Unit 1's pool panels got too hot during welding, which led to distortion and meant re-working was needed, and teams needed to work in sequences to allow panels to cool before building up the weld. Additionally, when welding at height, teams had to frequently change position and amend scaffolding for access, which was inefficient.</p> <p>The solution Synergic metal active gas (Smag) welding was proven to meet stringent nuclear safety standards without causing the same heat and distortion issue. Although not a new technique, it had not previously been used for this type of nuclear application.</p> <p>This was achieved by the build team collaborating with the designer and regulator to introduce the innovative technique.</p> <p>The result Unit 2 is being built four times faster than Unit 1</p> <p>Video link: Hinkley Point C / Video Details Preparations To Install 'Heart' Of Nuclear Power Station (nucnet.org) (starts at 4.28)</p>	<p>Enables weld-free spool replacement in a safe and time effective manner, approved as a permanent repair solution to pipes between 1.25" and 16" in OD.</p> <p>Enables time efficient spool or modular tie in, especially where pressure testing is not practical (e.g. "golden welds").</p> <p>Claims: quick and safe to install, reusable, flexible design configurations, does not add stress to the pipe.</p> <p>Use case examples not known.</p> <p>Video links and further information available here</p> <p>*The final pipeline weld that cannot be pressure-tested, requiring 100% non-destructive examination and the highest quality control to ensure integrity.</p>

Part 5 - Prefabricated solutions

Off-site manufacturing can be integrated into both MEP and early-stage construction processes, offering innovative, value-driven solutions that help lower expenses and reduce production timelines. Offsite can reduce the need for high-risk on-site tasks, including hot works, significantly lowering the risk of fire hazards and workplace accidents – see below. Note: careful planning and design is essential.

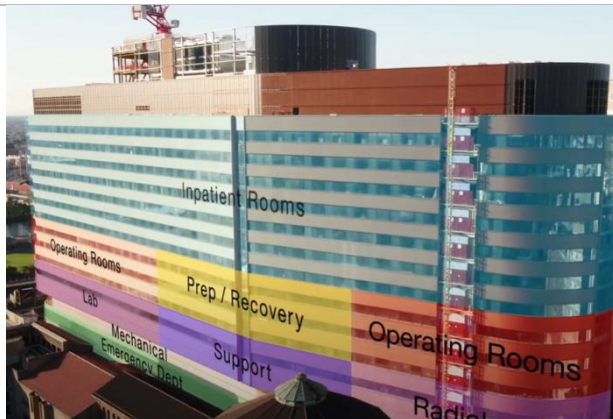
(1) UK – New Cross Scheme: North And Midlands

The New Cross scheme became financially viable with the use of an Off-site modular solution. This removed the requirement for scaffold, improved overall duration, lessening preliminary cost on a tight inner-city site. Offsite modular construction included all precast floors, walls, facades and cores, including offsite window and balustrade installation, modular bathroom pods and package plant rooms are also provided - minimising onsite activity and reducing the number of trades required onsite.



Considerations:

Where there are perceived higher initial costs, the long-term savings in labour, material waste, and project delays tend to offset these costs.



(2) US: Penn Pavillion - Bathroom Pods & Mechanical Racks

The Penn Pavilion megaproject is the largest capital project that Penn Medicine has constructed. The \$1.5b, 1.5M SF facility has state-of-the-art healthcare design and technology throughout. The project is located in University City Pennsylvania. The project team utilised a “multi-trade” manufacturing facility of 50,000 SF based one mile from the jobsite. PennFAB employed 60 full time staff, comprised of carpenters, electricians, sheet metal workers, pipe fitters, welders, sprinkler fitters, painters and more. In addition to shifting labor from University City, over 250 deliveries were diverted from the project.

Additional benefits from prefabrication include quality, worker safety and schedule reduction. Video link [here](#).

Prefabricated solutions: offsite M&E

What can be prefabricated?

- Heating, Ventilation, and Air Conditioning (HVAC) systems
- Pipe fabrication (welded)
- M&E Service distributions: modules, service risers, electrical systems
- MEP panels, bespoke MEP solutions
- Packaged plant rooms
- Bathroom pods
- Prefabricated drainage

Benefits:

- Manufacture piece by piece with precise, consistent quality and finish
- Offline batching ensures QA
- Lean manufacturing process
- Testing at each step
- Reduced wastage
- Reduced occupational health management of exposure to fumes on site



Prefab Solutions: Offsite Steelwork Fabrication

What can be fabricated:

- Columns, beams and trusses
- Components all cut to finished size
- Drilled and notched to specification
- End plates, brackets and stiffeners fully welded
- Haunches welded into position

Benefits:

- Semi-automatic and automatic processes used
- Quality control through Factory Production Control Systems
- Routine testing for repeat manufacturing
- Trial erection carried out to reduce onsite error rectification
- Final on site erection by bolted assembly
- Corrosion protection applied in advance



Trial Assembly



Controlled cutting



Automated Processes

[Painter Brothers](#) is a UK-based structural steel manufacturing company specialising in fabricating and supplying steelwork for large-scale infrastructure projects, including power distribution, rail, and telecommunications.

British Constructional Steelwork Association Ltd:

The [BCSA Directory](#) can be used to select a steelwork contractor who has the specialist skills to suit your project.

All BCSA RQSC Steelwork Contractor Members are regularly visited by experienced auditors to assess their capabilities.

Part 6: Emerging tools and work practices

Automated cage welder for tying rebar

[Video link](#)



Ties are automatically welded as unit turns, taking a couple of seconds per weld.

Previously a manual tying process, involving 16 operatives creating each tie manually at each intersection

- Worker fatigue and repetitive strain is eliminated from repetitive tasks
- Hot works is being used in a controlled and safe environment
- Made to strict production tolerances, minimising steel waste
- High volumes of production achieved, using one operative to operate machine, see output below.



Robotic Fire Watch (Fike)

The [Fike Robotic Fire Watch](#) system was introduced to the market in May 2023 by Fike (US), a provider of explosion protection, pressure relief, fire protection and thermal runaway prevention for industrial processes.

They developed a fire detection solution designed to monitor areas prone to fire hazards, such as those involving flammable, explosive, and high-value materials. The system includes flame detection, video analytics, smoke, oil and mist detection, and alarm notification. The detectors address both slow-growing and fast-eruption fires and can operate in all weather and light conditions with the highest immunity to false alarms.



Example use cases:

1. Monitoring fire risks during hot work operations in nuclear power plants, reducing the need for human fire watchers, saving costs and enhancing safety, also addressing the fire watch challenge in potentially high radiation areas. In these environments, human fire watch could be days or weeks: very expensive for the employer and tedious for the operative.
2. Industrial Facilities: In industrial settings, the system has been used to monitor areas with high-value equipment and materials, preventing significant losses by providing early warnings and allowing for quick response to potential fire incidents.
3. Deployment on construction sites where traditional fire protection systems are not yet installed or are temporarily out of service, providing continuous monitoring and early detection of fire hazards.

This is an exciting development in the market which automates the fire watch process and has the potential to provide more reliable, efficient and responsive fire detection compared to conventional fire watch methods.

Features:

- Fike IR3 Flame detectors
- On Board HD-Camera
- Smoke detection via Fike video analytics
- Alarm notification*
- Battery

* When a fire is detected, the unit immediately activates its integrated alarm and can be monitored by a building fire alarm panel or third-party equipment for SMS, mobile phone push, text or email notification.

Emerging technology in 2025: Silvanet Sensor

Designed to detect and monitor wildfires with ultra-early detection, these solar-powered gas sensors could potentially have an adaptative use for hot works monitoring in outdoor environments and can be scaled across multiple zones or projects.

Ultra-Early Detection: Gas sensors (hydrogen, carbon monoxide and others) detect smouldering fires before flames appear by ‘sniffing’.

AI-Powered Analysis: Reduces false alarms and improves detection accuracy

Solar-Powered: No need for external power or battery replacement

LoRaWAN* Connectivity: Wireless mesh network for real-time alerts

Long Lifespan: 10–15 years of maintenance-free operation

Compatibility: designed to link with additional technology such as cameras and other sensors via open integration architecture.



*(low power, low data rate)

Application	Benefit
Temporary Installations	Mount sensors near hot work zones to monitor for ignition risks.
During and Post-Work Monitoring	Leave sensors active for the required fire watch period during and after hot works for continuous, objective monitoring.
Remote Sites	Ideal for areas without power or network infrastructure—solar and LoRaWAN make it self-sufficient.
Data Logging	Provides timestamped environmental data for compliance and incident investigation.
Integration	Could link with digital permit systems for automated close-out and alerts.
Wildfires	For operatives working in wildfire locations

[Silvanet Wildfire Sensor | Dryad Networks](#)

Autonomous Drone Surveillance

Skydio drones provide autonomous thermal imaging with real-time data streaming and environmental mapping for fire and security monitoring.

Includes

Autonomous Thermal Imaging	Detects heat anomalies in real time using onboard infrared sensors
Real-Time Data Streaming	Sends live video and thermal data to site teams or control centres
Environmental Mapping	Creates 3D maps of work zones to identify fire risks and monitor changes
AI Navigation & Obstacle Avoidance	Operates safely in complex environments without manual control, and in the dark

Application

Conducting patrols during and post hot work
 Monitors site boundaries for unauthorised access or ignition risks (also good for arson detection)

<https://www.skydio.com/x10>



Skydio X10 is capable of resolutions of 640x512 and offers increased sensitivity to detect temperature differences as small as three-hundredths of a degree Celsius. In practice, this means:

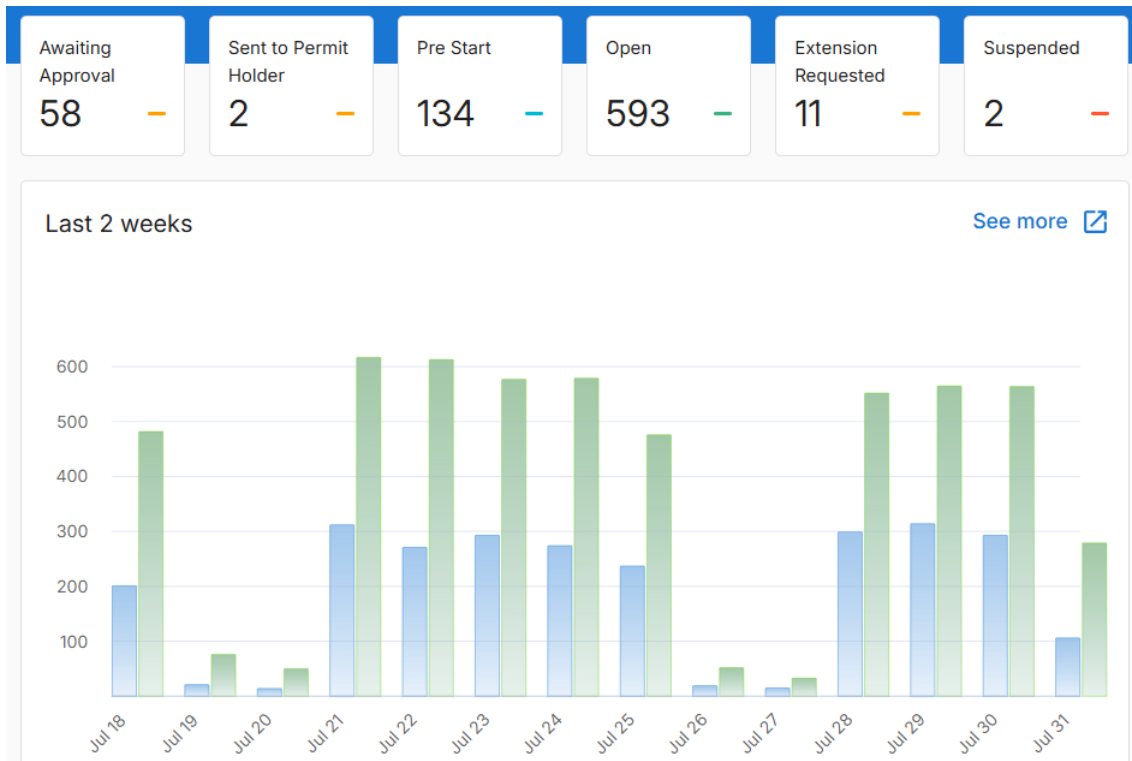
- **Sharper thermal images** with more detail
- Better performance in **low-contrast conditions** (fog, smoke, night-time)
- Improved detection range for small heat signatures (e.g., finding people or faults)

Part 7: Case Study - Digital hot work permits

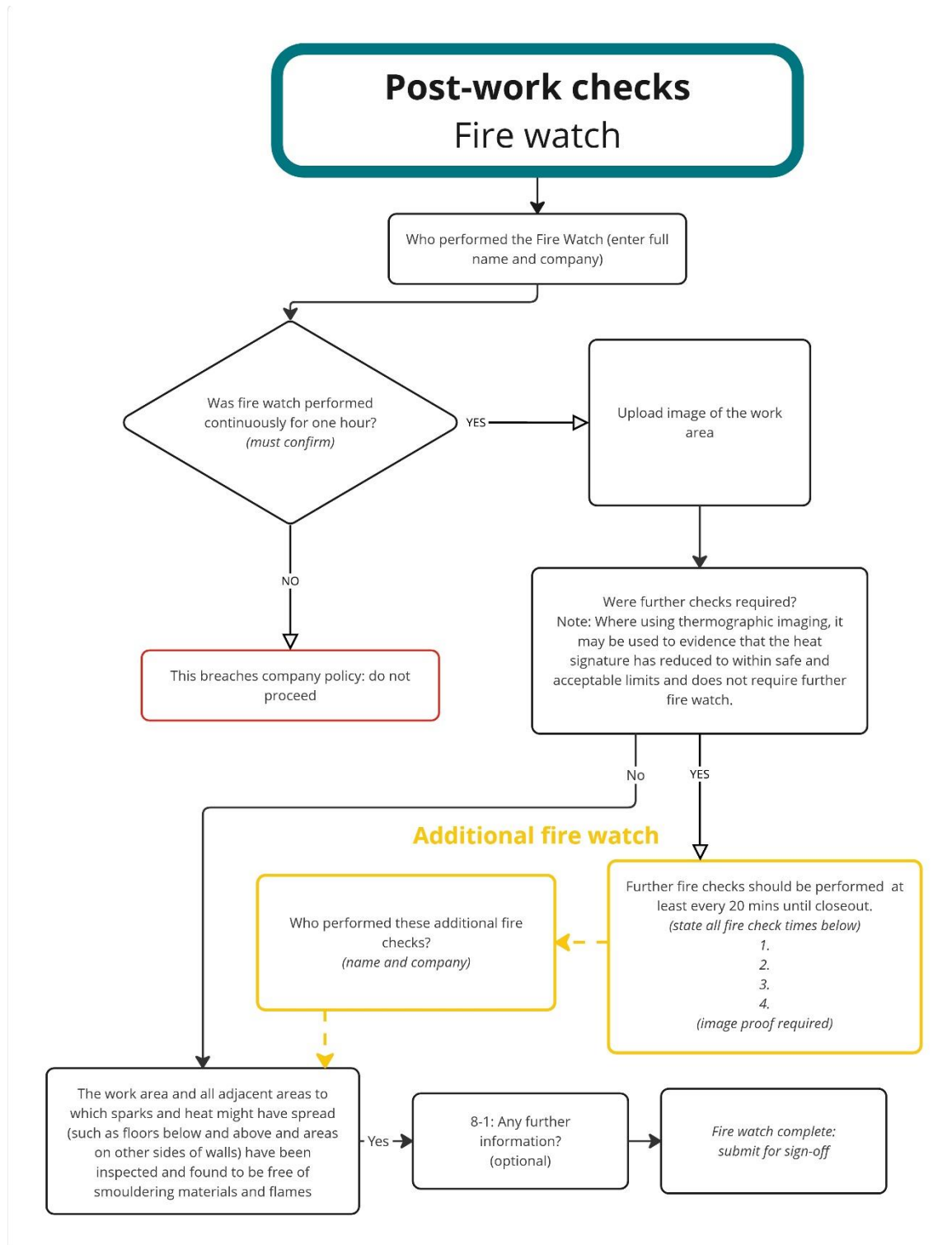
1/3

Benefits

- Digitising the permit process for hot work allows the data to be interpreted for compliance, and for the contractor to have a perspective of how much hot work is taking place across all projects. Where non-compliance is identified, the permit authoriser can be contacted and offered assistance or training to resolve any issues.
- Productivity is a considerable benefit, with an example from Hinkley, a site where workers were walking 40 minutes to obtain a paper permit from the site office, whereas a digital solution cuts the process down to just four minutes.
- Geolocation mapping: prevents overlapping of high-risk activities
- Ability to extract monthly report of permit usage: interrogate data, ensure compliance where required:
- Built-in safety hold points and fire watch countdowns, post-permit checks documented in real time
- Ensures only authorized personnel can issue/close permits
- Access to non-compliance data
- Target high permit usage sites for process audit
- Can add further protocols, such as linked confined space permit, or FRA
- AI-powered checks for non-compliance or bypassing of safety steps (duplicate images, incorrect extinguishers to those listed / extinguishers not present)
- One source of truth for evidencing efficient and effective management of hot work



Where guidance introduces new requirements to be adhered to, new process flows can be developed to guide users and ensure compliance with company procedure, see example custom flow below for Fire Watch.



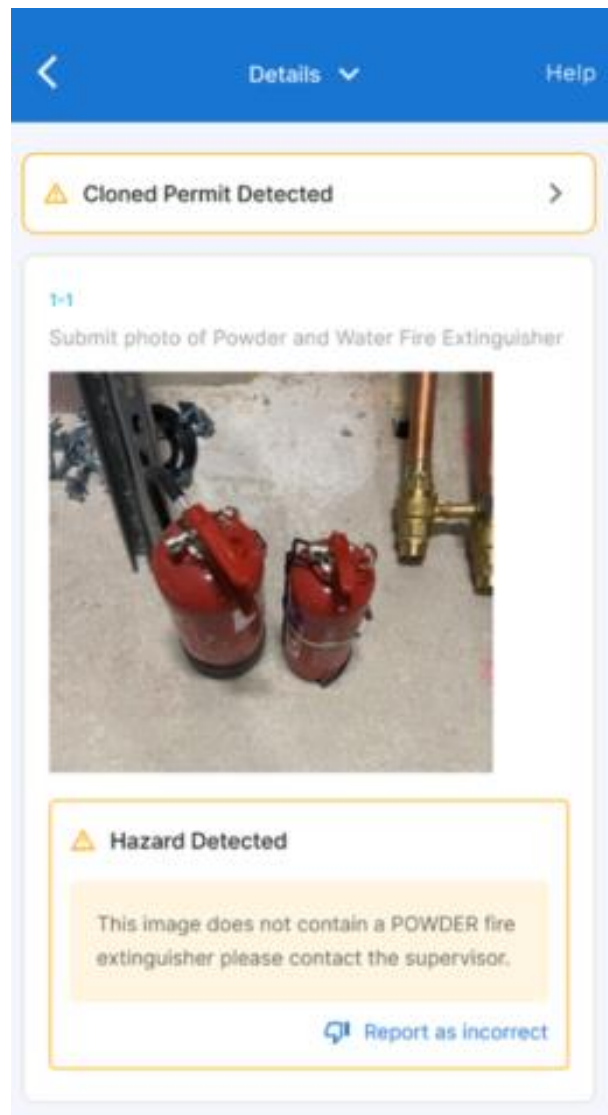
Both HSG 168 and JCOP have modified their guidance to reflect the incorporation of thermal imaging cameras 'as appropriate' (168) and 'routinely' (JCOP), see links in appendix for familiarisation with fire watch requirements.

Limitations

Limitations of digital permits can include not being permitted to use external software on high-security sites, inconsistent Wi-Fi (an issue with some site locations across the country), and subcontractors refusing to adopt the system, opting for other digital applications or paper permits, creating many sources of truth, which makes the process more difficult to monitor for compliance and reporting purposes.

Image: example of compliance detection

Note:
It is important that people on site understand who manages the permit system on a site. It should be clear to teams who the Hot Work Responsible Person is.



CASE Study: Fast track suspension system

1/2



HOURS SAVED*
614 HOURS

EMBODIED CO₂ SAVED
2,059 KG

MATERIAL WEIGHT SAVED
907 KG

This new build office project is part of the Tileyard North regeneration scheme. Rutland Mills is located next to The Hepworth in Wakefield, West Yorkshire. As part of the works, Morgan Sindall Construction utilised Grippple's *Fast Trak* suspension system along with *UniGrip*, *Universal Brackets* and *Cable Tray Clips* to suspend electrical and HVAC services on-site.

Project Summary	
Main Contractor	Morgan Sindall Construction
Subcontractors	KAM Electrical / Cool Air
Building Type	Commercial / Office
Services	Electrical / HVAC

Featured Products		
Fast Trak	UniGrip	Universal Bracket



"Hot works permits and fire watching activities take up a lot of time everyday we're on-site. By using Grippple products, we saved a lot of time as our team didn't need to prepare hot works permits each morning or wear additional PPE as all Grippple suspension solutions can be installed quickly and safely without having to cut, file and hot dip each component."

- Stephen Barrett, Project Manager, Morgan Sindall Construction -

SAVING SUMMARY

	Grippple solution	Traditional method
Overview	Fast Trak, UniGrip, Universal Brackets, Cable Tray Clips and Compact Clamps	Channel, threaded rod, channel nuts and munson rings
Installation Time	178 hours	793 hours
Total Material Weight	1,179 kg	2,086 kg
Total Embodied CO ₂	2,677 kg	4,737 kg
Total Labour Cost	£5,343	£23,789

*Figure based on one installer working for eight hours a day at £30 per hour

WWW.GRIPPLE.COM

BUS-CASE-RUTLAND-MILLS

Grippple Ltd | The Old West Gate Works | Savile Street East | Sheffield S4 7UD | Tel: 0830 018 4364 | Fax: 0114 275 1155 | Email: sales@grippple.com



PROJECT DETAILS

Tileyard North is a historic complex of nineteenth century mill buildings in Wakefield which had been derelict for 20 years. As part of the refurbishment, the developer was able to retain over 80% of the original building fabric. Morgan Sindall Construction were then appointed as main contractor to deliver Rutland Mills, a four-storey new build office development as part of the wider scheme.

Rutland Mills was completed in 2024 and is included within the 135,000 sq. ft masterplan. Tileyard North has become the UK's largest creative community outside of London helping to boost Wakefield's creative industries.

On a typical new build project, Morgan Sindall Construction's construction team would appoint 'fire watchers' throughout the site to ensure all hot works are performed in a safe manner to comply with building regulations. Hot works can involve the use of angle grinders and other equipment which apply heat to prepare building materials on-site. From an M&E perspective, this can include cutting threaded rod, channel and other materials into specific lengths so they can be used to suspend building services. Gripple's range of M&E suspension solutions are manufactured in Sheffield and are prefabricated prior to being delivered to site.

Morgan Sindall Construction opted to use Gripple on this project as they were able to eliminate the requirement for hot works permits and fire watchers as all wire and track suspension systems supplied by Gripple are ready to be installed straight from the box with no material preparation needed.

Gripple's innovative Fast Trak system was used throughout to suspend cable tray from the metal decking on each floor. Fast Trak is made up of a prefabricated slotted channel, whilst a patented 'Track' and 'Cartridge' allows you to safely install a complete trapeze bracket up to six times faster than traditional rod and strut. On the top floor of the building, installers utilised Gripple's UniGrip wire rope kits to suspend air conditioning units and electrical containment from the purlins above. This installation method ensured a quick and cost effective way to install services on-site.

In summary, Morgan Sindall Construction were able to install M&E services in a faster and safer way through less manual handling of building materials and less time spent at height due to a quicker installation. The carbon footprint of the site was also reduced as hot works permits and power tools such as handheld angle grinders were not required on-site.



Electric hot-melt project case study

On an Axter Southampton project (Oct 2024), the EPOT, in combination with Axter's Wilotekt-Plus system, provided a flame free installation by removing the need for LPG.

Feedback from operators:

The separate bucket burner compartment has streamlined the cleaning process, removing the need for manual flame cleaning. We appreciate the safety features such as the heated bars for adding hot melt blocks. The elimination of gas cylinder checks and replacements has greatly simplified our operations.

Comparison: Epot vs LPG tooling

The Epot outpaced the traditional LPG tooling in terms of efficiency, providing an overall quicker and more seamless waterproofing process. An evidence-based carbon based cost analysis is planned to support this data.

Axter's feedback

Taking a well-established and loved product with a proven track record and boosting this with advanced electric tooling means these systems will soon become the new standard in structural waterproofing, paving the way for a safer, greener future in construction. Worker health and safety has always been and remains at the forefront of Construction design excellence; adopting flame-free technologies is a necessary evolution for the industry.

Considerations: see page 13 of roofing section.

The full case study is available to view [here](#)



Conclusion

This guide demonstrates that flame free and cold work alternatives are no longer niche solutions; they are practical, proven methods that materially reduce fire risk across construction, refurbishment and maintenance activities. While hot work can be controlled, recent fire incidents continue to show that risk assessments and permits alone are not always sufficient, particularly where conditions change, combustible materials are subsequently introduced, or hidden voids are present.

A key message to take away from this document is that eliminating the ignition source altogether is the most reliable control. Cold cutting, flame free roofing systems, press fittings and off-site fabrication remove many of the variables that commonly undermine “low risk” hot work assessments, such as sparks travelling into concealed spaces, unrecognised combustibles, or temporary materials introduced during the works. By design, these methods also remove reliance on extended fire watches, which are known to be inconsistently applied during breaks or after completion, delivering both risk reduction and tangible time and cost savings.

Roof works remain a recurring source of major construction fires. Flat and pitched roofs with combustible elements, voids, or exposed insulation represent a high risk environment for hot work. Inverted warm roofs using combustible insulation (such as XPS), green roofs, and partially completed roof build ups can present a significant fire hazard until fully enclosed. Flame free solutions provide a more resilient approach where risk can change rapidly over the life of a project and where hidden fire spread is difficult to detect or control.

Emerging construction methods also reinforce the case for minimising hot work. Modular and mass timber construction, while offering many benefits, can introduce new fire exposures within voids and concealed spaces if hot work is undertaken on or adjacent to combustible elements. Designing out hot work through prefabrication, cold work techniques and factory-controlled processes is therefore increasingly important.

Ultimately, the most robust fire strategy is one that challenges whether hot work is needed at all, rather than relying on controls to manage it. Designers, clients and contractors should treat flame free and cold work methods as the default option and require clear justification where hot work is proposed.

Ask yourself on your next project:

- Can hot work be eliminated entirely through cold cutting, press fittings or off-site fabrication?
- Are roof systems and insulation types being considered alongside their construction phase fire risk?
- Are RAMS assumptions robust against changing site conditions and hidden combustibles?
- Could removing the need for fire watches save time, cost and reduce residual risk?
- Are modular or prefabricated solutions being fully explored to avoid high risk work in voids and at height?

By embedding these questions early, projects can move beyond compliance and towards genuinely safer, more predictable outcomes.

APPENDIX A: Further Reference and reading material

Regulations and Guidance

- 1 *The Regulatory Reform (Fire Safety) Order 2005*
- 2 *HSG 168 Fire Safety in Construction, 3rd Edition 2022*
- 3 *Joint Code of Practice: Fire Prevention on Construction Sites 10th edition, incorporating Amendment 1 & 2 - July 2025*
- 4 *Construction (Design and Management) Regulations 2015*
- 5 *National Federation of Roofing Contractors: Safe to Torch Guidance*
- 6 *HSG33 Health and safety in roof work*
- 7 *Liquid Roofing and Waterproofing Association Guidance Not No.13: Safe Drying and Preparation of Roof Substrates Prior to Installation of Liquid Waterproofing Systems*
- 8 *NFRC Safe2Torch Guidance*
- 9 *RC49: Recommendations for the storage, handling and use of acetylene cylinders*

Hot Work-specific guidance

- 10 *FM Global Pocket Guide to Hot Work Loss Prevention (sixth edition)*
- 11 *RC7: Risk control for hot work (2023): RISC Authority*
- 12 *Zurich Hot Works Whitepaper 2021 (1) An in-depth guide to hot works safety*
- 13 *Fire Claims: Lessons learnt from major losses and what can be done to mitigate the risk (zurich.co.uk), May 2021*

Fires from hot work

- 14 *Suspected spark from a weld cause of Rouen Cathedral fire on 11 July 2024*
- 15 *Staines: Tower block fire caused by welding work, says developer - BBC News, Jun 2024*
- 16 *Reading fire: Crane rescues worker next to burning high rise: November 2023*

Suppliers offering flame free alternatives (Roofing)

- 17 *Leister UNIROOF 300 roof welding machine*
- 18 *Sievert roof welding machine*
- 19 *Axter Wilotekt-Plus System Installation Video*
- 20 *Imperial Thermal Engineering*
- 21 *WJ Horrod*
- 22 *When to Use Flame-Free Roofing Systems - Garland UK*
- 23 *LSTA – Rolled Lead Sheet / LTSA Manual*

Greening the construction industry initiatives

- 24 *Major clients commit to low-carbon construction ‘incentives’ | Construction News*
- 25 *Norway is greening the construction industry: businessnorway.com, Apr 2024*
- 26 *World Economic Forum: agenda 2021*

Innovation and emerging technologies

- 27 *The Fike Robotic Fire Watch system: datasheet*
- 28 *Fike fire watch for nuclear power plants*
- 29 *Silvanet Wildfire Sensor | Dryad Networks*

Further reading

- 30 *RICS Article - How Hot Works Causes Fires*
- 31 *Freedom of Information request reference number: 8773.1 London Fire Brigade*
- 32 *BRE Global Fire compartmentation in roof voids, Feb 2015*
- 33 *Tall buildings – Industry guidance for the planning, design construction and maintenance of tall buildings [notably p141-2]*

Supporting material

- 34 *The RISC Authority have produced a video on [the Dangers of Hot Works](#) which provides guidance on the Hot Work Permit process. It is an excellent tool to use as induction material, funded by insurers, endorsed by JCOP, and is freely available.*



**Construction
Industry Advisory
Committee (CONIAC)
Fire Safety Group**