Roof system designers and construction-phase fire risk: Understanding CDM 2015 duties

Flat roofing commonly involves project-specific decisions about system type, build-up, detailing, sequencing and installation method. Those decisions may affect construction-phase fire risk, particularly where bitumen 'coffin' boilers, gas torches, hot melt boilers, hot-air welders, flammable primers or adhesives, or other heat-producing processes are proposed. Where a person or organisation prepares, selects or modifies a design, Construction (Design and Management) Regulations 2015 (CDM 2015). Regulation 9[1] requires the designer to consider foreseeable risks arising from the design and, so far as is reasonably practicable, eliminate them. If elimination is not possible, the risk must be reduced or controlled and sufficient information provided about any significant residual risk.

This guide is focused on flat roofing and is intended to clarify how those duties apply when construction-phase fire risk is influenced by the roof system design. It does not assume that the roof system manufacturer is always the designer, nor does it suggest that one flat roofing technology is inherently unacceptable. Responsibility follows the design decision.

Who may be a designer on a flat roof project?

"Designer" describes a function rather than a job title. More than one party may undertake design work on the same flat roof project, and each is responsible for the decisions within its control. Depending on the procurement route, relevant design decisions may be made by:

- an architect, consultant or other building designer who specifies or selects a roofing system, such as Reinforced Bitumen Membrane (RBM), Single-Ply Membrane (SPM), Liquid-Applied Membrane (LAM) or Hot-Melt, or makes design decisions that influence how the roofing works are to be carried out;
- a roofing manufacturer or system supplier that develops a project-specific build-up, specification or detail;
- a specialist roofing contractor that surveys the roof, selects the system, develops details, proposes substitutions or modifies the design; or
- another designer who controls an interface, detail or sequence that affects the roofing work.

A manufacturer supplying a standard product is not made the designer of the building simply by supplying that product. However, where they develop or modify a project-specific roof system specification, they are carrying out design work within that scope. Equally, a roofing contractor may be both a contractor and a designer where they make or change design decisions. The crucial question is not simply, ***"Who manufactured the product?"*** but ***"Who prepared, modified, specified or instructed the design decision that created or influenced the foreseeable risk?"***

What Regulation 9 requires

When preparing or modifying a design, a designer must take account of the general principles of prevention and relevant pre-construction information. So far as is reasonably practicable, the designer must eliminate foreseeable risks to anyone carrying out or affected by construction work. Where a risk cannot be eliminated, the designer must take steps to reduce or control it and provide information about the risk.

1. Eliminate	2. Reduce or Control	3. Inform
Can the roof system, detailing or installation method be changed to eliminate foreseeable ignition sources?	Can materials, detailing, sequencing or installation methods be changed to reduce the likelihood or consequences of fire?	Clearly communicate significant residual risks, limitations and essential precautions to those planning and carrying out the work.

Construction-phase fire risks that flat roof design may influence

- Use of bitumen boilers, gas torches for for drying and membrane installation, hot-melt boilers and materials, or other heat-producing processes.
- Incorrect selection of boiler—the boiler used for heating or melting roofing materials must be suitable for the specific material and intended application. Equipment must be compatible with the specified waterproofing system and operated in accordance with the manufacturer's instructions, particularly regarding temperature control and prevention of overheating.
- Flammable adhesives, primers, solvents, gases and their compatibility with the proposed installation method.
- Combustible insulation, timber, membranes or existing substrates exposed during installation.
- Heat, flame or sparks entering concealed voids, cavities, joints, penetrations, rooflight details or interfaces with walls and cladding.
- Temporary conditions before protective layers, fire-stopping, compartmentation or the complete roof system are installed.
- Refurbishment work where the existing build-up and concealed materials are uncertain or inadequately surveyed.
- Work on occupied buildings or close to people, sensitive operations, plant, stored materials or escape routes.

A generic disclaimer is not a design control—stating that ***"all fire safety is the contractor's responsibility"*** does not, by itself, discharge Regulation 9 where the specification creates or materially influences a foreseeable fire risk.

What the roof system designer is not being asked to do

Regulation 9 does not require the roof system designer to manage the construction site, supervise operatives, operate the hot-work permit system, prepare the site fire-risk assessment, or control day-to-day installation. Those matters remain with the contractor and/or principal contractor. However, site-management duties do not remove the designer's separate obligation to eliminate, reduce and communicate foreseeable risks arising from the design.

Relationship with contractor duties

The contractor and principal contractor retain their own duties to plan, manage and monitor construction work and to prevent risk from fire or explosion. **Regulation 29**[2] requires suitable and sufficient steps to be taken to prevent, so far as is reasonably practicable, the risk of injury during construction arising from fire or explosion. These are separate and complementary duties: the contractor manages the installation and site controls, while the designer addresses risks created or influenced by the design.

Who carries out the design-stage fire-risk assessment?

There is no single answer applicable to every flat roof project. Responsibility follows the design decisions being made, rather than a party's title or position in the contractual chain.

Any person or organisation that prepares, selects, specifies, modifies, arranges or instructs part of the roof design is a designer for those decisions. This may include an architect, consultant, manufacturer, system supplier, roofing contractor or specialist subcontractor. Each designer should, within the scope of its control:

- identify foreseeable construction-phase fire risks arising from its decisions;
- eliminate hot work where reasonably practicable;
- where a gas torch is proposed, undertake or contribute to the **Safe2Torch**[3] assessment;
- identify flame-free zones and alternative details on the roof plan;
- record assumptions, limitations and information still required;
- communicate relevant design information to other dutyholders; and
- review the assessment when the design, product, detail or site information changes.

Where several designers are involved, their assessments and decisions should be coordinated as the design develops. The Principal Designer should facilitate this coordination, but this does not remove the responsibility of individual designers for matters within their control.

Before installation, the roofing contractor should verify that actual site conditions correspond with the design information and assumptions. Where they differ, the affected work should not proceed until the fire-risk assessment and relevant design details have been reviewed.

A practical design review for roofing fire risk

Before issuing a project-specific roof specification, the designer(s) should be able to demonstrate that the following questions have been considered proportionately.

Stage		Questions to address
1	**Understand the project**	What is the roof construction? Are surveys adequate? Is the building occupied? What combustible materials, concealed voids, interfaces and site constraints are present?
2	**Identify foreseeable fire hazards**	Could the proposed materials, installation process, temporary condition or sequence introduce an ignition source or fuel, or allow hidden fire spread?
3	**Consider elimination**	Can flame, heat or another ignition source be avoided? Is a flame-free or lower-risk system reasonably practicable for the relevant detail, zone or project?
4	**Reduce remaining risk**	Can materials, build-up, detailing, sequencing, protection, prefabrication or installation limitations reduce the risk?
5	**Coordinate interfaces**	Does the design rely on information or decisions from other designers, the contractor, client or building operator? Have gaps and assumptions been clearly identified?
6	**Communicate residual risk**	Does the specification clearly state significant residual risks, prohibited applications, critical sequencing, required surveys and essential precautions?
7	**Review changes**	If products, details or methods change, has the fire-risk review been revisited before the change is accepted?

Design review is an ongoing process

The review is not a one-off exercise completed when the initial specification is issued. Relevant parts of the checklist should be revisited whenever proposed changes to the design, materials, installation methods, sequencing or site conditions could affect fire risk, including during construction. For example, introducing PV after the initial roof design should prompt a coordinated review of the affected roof design and associated construction activities. Any necessary changes to the specification, control measures and risk information should be agreed and communicated before the affected work proceeds.

Safe2Torch[3]

The purpose of Regulation 9 is not to prohibit hot works or to assume that every use of a gas torch can reasonably be removed. It is to ensure that the use of heat is a conscious design consideration, that reasonable opportunities to eliminate or reduce the risk are examined, and that the remaining work is clearly defined and controlled.

NFRC Safe2Torch should therefore be applied from the specification writing stage in new construction and the initial survey and specification-writing stage in refurbishment works, not introduced only once operatives arrive on site. The Safe2Torch checklist should be used to identify details and zones where direct torch application must be avoided and where flame-free or alternative detailing is required. Where the roof design is developed by more than one party, each designer should apply or respond to Safe2Torch within the part of the design it controls, and relevant information should be coordinated.

Safe2Torch assessment and roof plan

The project Design Risk Assessment should identify, at an early stage, whether hot work is likely to be required and where the use of a naked flame could create a foreseeable fire risk. This assessment should inform the roof system selection, specification and detailing before the work is issued for installation. For roofing work involving hot work, two linked stages should be distinguished:

1. Design-stage Safe2Torch assessment

During the survey and design process, the roof construction, existing materials, interfaces, penetrations and other foreseeable high-risk details should be considered. The Safe2Torch checklist should be used to identify where flame-free zones or alternative methods and details are required. The findings should be recorded on a roof plan showing, as far as reasonably foreseeable:

- areas where torch application is permitted;
- mandatory flame-free zones;
- combustible decks, insulation or existing materials;
- vulnerable interfaces, voids and concealed cavities;
- rooflights, penetrations, outlets and service entries;
- junctions with walls, cladding, timberwork and other combustible materials; and
- any areas requiring further investigation before work starts.

The checklist and roof plan should form part of the design information provided to the roofing contractor.

2. Site verification and control

Before work starts, the roofing contractor should check that the actual roof construction and site conditions correspond with the design information and assumptions recorded in the Safe2Torch assessment and roof plan. The contractor should then apply the Safe2Torch Safe System of Work and manage the necessary hot-work permits, supervision, fire watch, firefighting equipment and other site-specific controls. Where the construction, materials or interfaces differ from those anticipated, or where previously concealed conditions are exposed, the affected work should stop, and the design should be reviewed.

Safe2Torch does not replace the designer's duty under Regulation 9, or the contractor's duties under Regulations 13 and 29. It provides the established framework for identifying and controlling the fire risks associated with gas torch application in roof work.

The same principle applies across flat roofing. A single-ply system may involve hot-air welding; a liquid applied system may involve roof drying, flammable primers, resins or solvents; hot-melt systems and mastic asphalt involve heated materials and plant; and refurbishment work may expose combustible materials or uncertain existing construction. Therefore, the designer should still consider foreseeable risks arising from the system, detail and installation method within its control.

Information expected with a project-specific flat roof specification

- the roof construction and relevant project conditions considered, including the adequacy and limitations of surveys.
- the party responsible for any further design information or decisions still required.
- material assumptions, exclusions and information relied upon by the designer.
- how foreseeable construction-phase fire risks have been eliminated or reduced through the design.
- for torch-applied membranes and any roof surface drying works using a gas torch, the outcome of the design-stage Safe2Torch assessment, including high-risk zones and required flame-free or alternative details.
- any restrictions on heat, flame, hot work, adhesives, primers, solvents or installation near combustible materials.
- critical sequencing, temporary protection or interface requirements created by the design.
- significant residual risks requiring specific planning by the contractor or principal contractor.
- a clear requirement for design changes, substitutions or unexpected site conditions to be reviewed before installation.

Conclusion

Flat roof fire safety is a shared responsibility, but shared responsibility does not mean blurred responsibility. The architect, consultant, manufacturer, system supplier and roofing contractor may each be designers for different decisions on the same project. Each should address foreseeable construction-phase fire risks arising from the design work it controls, and those decisions should be coordinated.

For a roof system where hot working cannot be avoided, Safe2Torch should be embedded from the initial survey and design stage, through to site verification, and installation. The design-stage question is not simply whether a gas torch is used; it is where hot works is necessary, where it can reasonably be avoided, what details require alternative treatment and how that information is communicated to those planning and carrying out the work.

If you design the roof system, engage with the risk: eliminate it where reasonably practicable, reduce it where it remains, and communicate it clearly.

Legal and guidance references

Construction (Design and Management) Regulations 2015: Regulation 2 (interpretation and meaning of design); Regulation 9 (duties of designers); Regulation 13 (duties of a principal contractor); and Regulation 29 (prevention of risk from fire, flooding or asphyxiation): https://www.legislation.gov.uk/uksi/2015/51/contents

HSE, Managing health and safety in construction (L153): Guidance on the Construction (Design and Management) Regulations 2015: https://www.hse.gov.uk/pubns/books/l153.htm

HSE, Designers: roles and responsibilities under CDM 2015: https://www.hse.gov.uk/construction/cdm/2015/designers.htm

HSE, Fire safety in construction (HSG168), third edition: https://www.hse.gov.uk/pubns/books/hsg168.htm

HSE, Construction fire safety information: https://www.hse.gov.uk/construction/faq-fire.htm





For more information:

[1] CDM Regulation 9: https://www.legislation.gov.uk/uksi/2015/51/regulation/9

[2] CDM Regulation 29: https://www.legislation.gov.uk/uksi/2015/51/regulation/29

[3] NFRC Safe2Torch: https://www.nfrc.co.uk/knowledge/safe2torch.html

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