

DESIGN SAFE AND MAINTAINABLE BUILDINGS MANUAL

**The impact of the Buildings Decree on the roles and duties of the parties involved
in the integration of the safe maintenance of buildings into the design process**

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Bestelcode: ARB00009259
Rapportnummer: 13-161
ISBN: 9789490943233

Harderwijk, January 2013

CONTENTS

- 1 INTRODUCTION 5**
- 1.1 Background..... 5
- 1.2 Responsibility: ‘to prescribe’ or ‘to allow’ discussion..... 6
- 1.3 The objective of the base document for the safe maintenance of buildings 7
- 1.4 Organization of the base document 8
- 1.5 Document structure and guide to the reader..... 8

- 2 THE LIFE CYCLE OF A BUILDING..... 9**
- 2.1 Phasing 9
- 2.2 The project initiation stage 10
- 2.3 The design stage 10
- 2.4 The construction stage 11
- 2.5 The use stage 11
- 2.6 The design process in chart form (summary) 12

- 3 EXPECTATIONS OF PARTIES FOR THE SAFE MAINTENANCE OF BUILDINGS IN THE PROCESS 14**
- 3.1 Accountability for the safe maintenance of buildings in the design process . 14
- 3.2 The client, the ultimate owner and user 15
- 3.3 The architect/designer 20
- 3.4 The construction adviser and the building installations adviser 21
- 3.5 The contractor..... 22
- 3.6 The installation adviser, manufacturers, the installer and maintenance company 23
- 3.7 The authority (building control department) 24

- 4 ASSESSMENT FRAMEWORK FOR THE SAFE MAINTAINABILITY OF BUILDINGS 26**
- 4.1 Introduction to the assessment framework 26
- 4.2 Distribution of tasks between parties in the various stages..... 30
- 4.3 Assessment of atrium 33
- 4.4 Assessment of glazed lift shaft..... 34
- 4.5 Assessments of stairwells 35
- 4.6 Assessment of outside surface of external wall..... 36
- 4.7 Assessment of glazed roof..... 37
- 4.8 Assessment of sloping roof 38
- 4.9 Assessment of flat roof..... 39

- BIBLIOGRAPHY 44**

1 INTRODUCTION

1.1 Background

Integrated safety is an important aspect of all stages of a building's life cycle. Accordingly, hazards of all kinds must be assessed and managed comprehensively throughout development, design, construction, management and demolition. The assessment and management of these safety risks affects everyone involved (maintenance personnel, site workers, local residents and third parties in the vicinity). The safe maintenance of buildings, which is one element of integrated safety, is likewise vital, albeit that it is a new aspect in the design process.

The Dutch Buildings Decree addresses this subject. Section 6.12 (Articles 6.53 and 6.54) is concerned with compulsory provisions to be put in place for the maintenance of new buildings, and therefore implicitly with the plausible demonstration in the planning application of compliance with this requirement. Satisfactory solutions for maintenance must accordingly be put forward in the design process. Measures for the safe maintenance of buildings must be integrated into the design: safety-integrated design [1]. This is applicable to buildings, building sections and/or structures for which an integrated environmental permit is required. Furthermore, European Directive 2001/45/EC states that improvement of safe, healthy and hygienic working conditions is an objective which may not be made subordinate to purely economic considerations.

Interlude: Buildings Decree drafts

Article 6.53 Guiding Article

1. A building is to be constructed such that maintenance of the building can be performed safely.
2. Compliance with the requirement stated in the first paragraph is achieved through application of the instructions in this section.

Article 6.54 Safety provisions for maintenance

1. If maintenance cannot be performed safely without building-specific safety provisions, a building to be constructed must have satisfactory building-specific safety provisions for this purpose.
2. Rules may be given in a ministerial regulation in connection with the provisions of the first paragraph.

The new legal framework demands a careful design process. The duties and responsibilities of those involved must be coordinated in order to enable the client and designer to meet their obligations: to design a building that can be built and maintained safely and without detriment to health. This document explains how best to interpret the new obligation in the Buildings Decree.

1.2 Responsibility: ‘to prescribe’ or ‘to allow’ discussion

Many parties have responsibility for guaranteeing maintenance-safe buildings, which has the attendant risk of parties failing to comply with the statutory framework (Buildings Decree 2012). Amendments to legislation are accompanied by a risk that the people involved will not adapt their responsibilities and how they interpret them. The committee charged with a fundamental survey of the building industry, which was chaired by Sybilla Dekker, published its findings in May 2008 (‘private where possible, public where necessary’), thereby confirming this picture for the world of construction.

There is room for a degree of greater professionalism on the part of builders and of local authorities alike. Better-integrated management and a timely response to legal requirements are called for. The committee observed that a reason for construction parties to operate reactively is the frequently unclear distribution of responsibilities between local authorities and the construction partners, and between individual construction partners.

If we wish to incorporate the safe maintenance of buildings into the design process to the maximum extent, then a clear picture of the responsibilities of the parties involved in the design process will be needed. It is evident in the new 2012 Buildings Decree and the Working Conditions Act that the permit holder (client) at the construction stage and the owner and / or user at the use stage have responsibility for complying with the requirements of maintenance-safe buildings.

In practice the division of responsibilities is not always clear: construction and use are themselves complex because of the many professionals (various designers, construction supervisors, manufacturers, contractors, users and maintenance firms) that are engaged in the process, in which the client (permit holder) and the owner / occupier or the user delegates duties [2.3]. There is insufficient awareness that a permit holder and owner / user can never delegate responsibility in a way compatible with public law. In other words, outsourcing duties does not alter the responsibility set down in law (criminal law). However, the parties engaged to perform the work can be held liable under private law if the delegated duties lead to a claim for liability or an infringement.

The lack of clarity mentioned above arises because parties do not make explicit what they expect from each other, and moreover make unclear agreements, if any, about the results to be achieved. Another factor that undermines clarity is that parties already oversee the correct performance of duties and results achieved before the project enters a new stage.

1.3 The objective of the base document for the safe maintenance of buildings

This base document maps out the behavior to be expected of each participant in the design and construction process. This base document gives the contours of the integration of safe maintenance of buildings into the design process. The objective of the document is to analyze and record duties, authorities and output for the parties involved in a maintenance-safe structure. The results may be expressed on the level of objectives (stating the output to be achieved) but in some cases worked out in the form of solutions. The document presents the steps that should be taken with the parties involved in the design process. The document is an overall manual and set of guidelines for those involved in the life cycle of structures, from which the trade associations are able to produce their own documents (guidelines) for safe maintenance.

1.4 Organization of the base document

The expertise of various parties (the Central Industry Board for Skilled Trades (HBA), Arbouw, SBD (the Dutch flat roofing industry organization), AEDES (the federation of social housing institutions in the Netherlands), the Royal Association of Dutch Architects (BNA) and the Dutch Building Control Association (VBWT)) was used as input in developing the document.

1.5 Document structure and guide to the reader

The document first addresses a building's life cycle (Chapter 2) and continues with recommendations for the working method to be followed throughout the life course of a building. The objective is to guarantee satisfactory progress through design, construction and use, and the performance of their responsibilities by the permit holder, owner and user. The actions expected of each participant are identified with reference to the life cycle (Chapter 3). Chapter 4 gives flowcharts to be used by the designer in the design stage in relation to safe maintenance.

2 THE LIFE CYCLE OF A BUILDING

2.1 Phasing

The life cycle of a building consists of several stages where the responsibilities and the timing of transitions are interlinked. When proceeding through the stages of the life cycle the solution to the safe maintenance of buildings is refined from a coarse to a fine level of detail. Details of the project are established progressively, and the process accordingly becomes less susceptible to influence. This is depicted in Figure 1 in relation to the cost aspect. As the design process proceeds, there are fewer opportunities to make adjustments to the process, while the costs of the project increase as completion approaches.

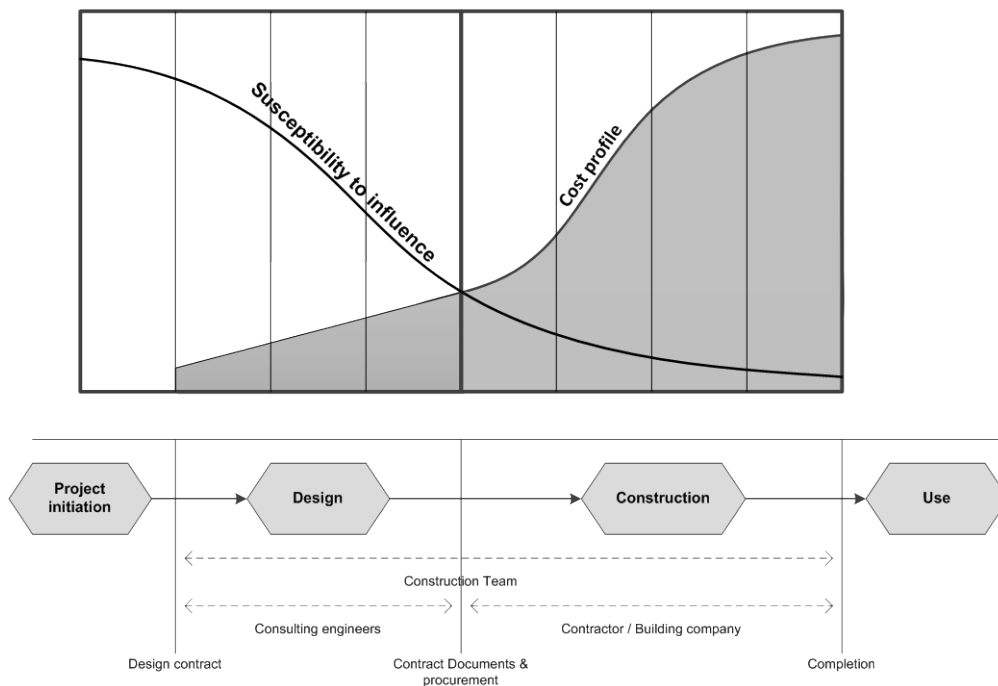


Figure 1: The susceptibility of the project to influence.

The figure clearly illustrates the dilemma of the design process: while the costs of the building investment increase strongly, there are fewer opportunities to make adjustments to the design and process. The need to give sufficient attention to the integration of safety measures for the safe maintenance of structures in the initial stages of the design process is therefore sufficiently demonstrated. It is achieved by involving the appropriate disciplines early in the project. The articles in the new Buildings Decree mentioned above (page 1) have a direct influence on the use stage,

which is determined in the design stage and reflected in what is known as the building file. This file documents subjects such as facilities that can be used in the event of maintenance or demolition, as well as hazards that must be taken into account in maintenance and demolition (Working Conditions Decree Articles 2.30 and 2.31).

The following sections outline the stages of the life cycle of a structure for the parties involved (client, designer / architect, building control department, labour inspectorate and contractor). The next chapter adds details of the duties and responsibilities of the parties involved in this process.

2.2 The project initiation stage

At the project initiation stage the client / initiator investigates his wishes and awards the design contract. He drafts the schedule of requirements and the constraints, on the basis of legislation. In doing so, he must have a clear picture of the consequences of the schedule of requirements and constraints. The client must also investigate in this stage the roles and duties to be given to the parties to be engaged, and how the process is to materialize. For example, he will investigate whether a construction team is to be assembled. The developing party will need a clear assignment stating that the safe maintenance of buildings must be incorporated into the design. The developing party will also have to state the effect of the constraints on the assignment. He must ask any supplementary questions that may be needed to clarify the assignment and constraints.

→ Safety-integrated organization is the motto at the project initiation stage.

2.3 The design stage

At the design stage the designer sets to work with the schedule of requirements and the defined constraints. Under normal circumstances the designer will produce an outline design, followed by a preliminary design and a final design. Frequently several 'designers' will be involved, e.g. the architect, structural engineer and installation adviser. Materials are largely determined and specification and development of the design proceeds from coarse to fine, in which reasons are given for the choices made by the designer.

The client will be required to monitor compliance with the requirements set by him (private) and by law (public). The client must define conditions at this stage to facilitate a satisfactory design process, and the client has a role in their verification. He must also insist on receiving a feasible design that can be implemented in a safe and healthy manner, and that can also be used in a maintenance-friendly and maintenance-safe way. He will thoroughly ascertain at this stage whether all aspects (e.g. the installations and the ability to clean) have been incorporated satisfactorily into the

design, and whether these aspects have been considered comprehensively from a maintenance-safe viewpoint. He will ensure coordination (design stage coordinator, Working Conditions Decree, including Articles 2.26, 2.29 and 2.30). See for example the method set out in the ‘safety in the design and planning process’ report [4]. The documentation of how safe and healthy maintenance is to be carried out is entered into the file (Working Conditions Decree Article 2.30c).

→ Safety-integrated design is the motto at the design stage.

2.4 The construction stage

An application is made at the construction stage (which corresponds with the implementation stage in the Working Conditions Decree, Section 5) for an integrated environmental permit in respect of the design, followed by execution. Experience shows that numerous matters still tend to change at the construction stage as insight evolves, or because of cost considerations, or the unavailability of certain materials. Construction parties may also come up with alternative solutions after contract award. It is important that the permit conditions and legal requirements are observed.

The client will therefore be obliged to monitor any changes and give feedback to both the designers (to assess any possible resultant reduction in quality) and the authorities (represented by the building control department). Otherwise the client will not know at the end of this stage what kind of building he actually has. While the above is not necessarily a task for the client directly, he is nonetheless required to make the necessary arrangements.

→ Safety-integrated execution is the motto at the construction stage.

2.5 The use stage

Much depends at this stage on the specific building user and whether he has instructed his own employees satisfactorily, or has fully informed the maintenance firms, and whether he has also arranged continuous guarantees for maintenance-safe use. The user is obliged to comply with the statutory requirements for maintenance-safe use. In the event of any change or alteration to the building, the user becomes a client. The same sequence of events as set out above then ensues.

Maintenance is performed at the use stage to keep all building functions intact (cleaning, repairing breakdowns, adjusting installations). Major maintenance is also performed, in which not all building functions remain available (alteration of the functions, restoration, renovation, rebuilding). Major maintenance frequently requires an integrated environmental permit. Major maintenance is viewed as a construction

stage in its own right, preceded by a design stage and a project initiation stage, with all the attendant consequences, such as a safe and healthy design for construction, maintenance and demolition.

The building owner, the user, or both, will often be advised by external experts. It is appropriate to note here that advisers of this kind can be called to account only with respect to the technical quality of their recommendations, possibly with restrictions attached. The implementation and application are entirely the responsibility of the organization that requested the advice.

➔ Safe and safety-integrated maintenance is the motto at the use stage.

2.6 The design process in chart form (summary)

The division of roles for maintenance-safe buildings in the stages of the life cycle is shown in Figure 2. The next chapter gives for each stage details of what can be expected of the professionals involved and of any instruments that are available to help them.

A similar process applies to renovation and major maintenance at the use stage. In these cases similar duties, roles, authorities and legal requirements arise from the Working Conditions Act and the Buildings Decree.

The demolition and construction stages are included in Figure 2 for the sake of completeness, although they are not mentioned further in this document. These stages are outside the scope of application of the Buildings Decree (Working Conditions Decree Section 5, Building process).

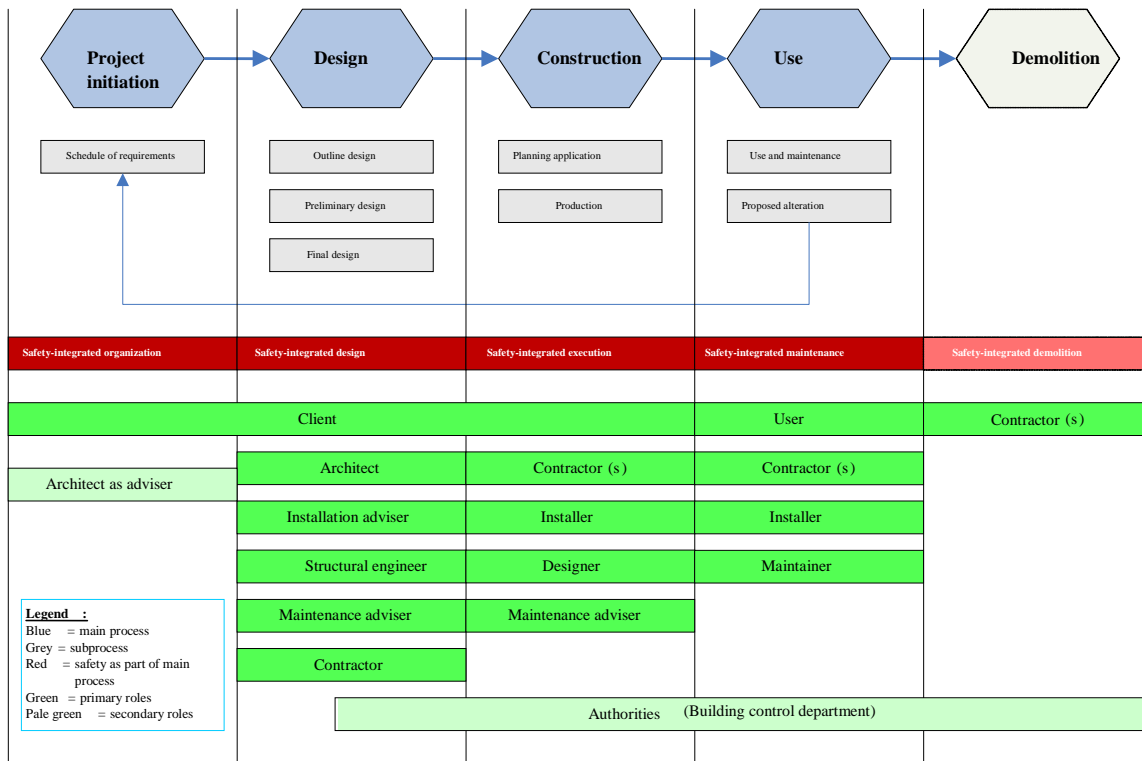


Figure 2: Division of roles for maintenance-safe building in the project initiation, design, construction and use stages.

3 EXPECTATIONS OF PARTIES FOR THE SAFE MAINTENANCE OF BUILDINGS IN THE PROCESS

Experience and discussion in practice have shown that the following duties belong with the roles described. The description is an interpretation of the legal requirements. The duties described are not legal obligations, but would appear to be the most practical way of interpreting the law and of assuring safety and health in the process of maintenance.

3.1 Accountability for the safe maintenance of buildings in the design process

An essential element in the collaboration between people and organizations is clarity about, and the prior agreement of, what is expected of those involved. Clear expectations at any rate mean the clear, logical and timely engagement of appropriate disciplines. This chapter gives details for each stage of what may be expected of those involved, so that the safe maintenance of buildings is incorporated into the life cycle, in particular into the design. These instruments and expectations express the accountability for the safe maintenance of buildings. What is important in the description is the roles and not the names of positions. For instance, there is always a designer, but not always an architect. The definitions and roles in the process are as follows:

- the client is the party who gives instructions for executing a building plan;
- the owner/user is whoever will use the building;
- the designer is generally the party who creates the architectural design of a building, which is usually the architect;
- the adviser for constructions and the adviser for building installations are different disciplines in the process that give advice specific to the discipline concerned. The respective advisers may be the structural engineer and the building physics consultant;
- the contractor is the party who constructs the building at the construction stage;
- installation advisers, manufacturers and installers support designers and/or the main contractor in respect of specific building elements;
- the maintenance company is responsible for the maintenance of the building during use;
- the authority, building control department is the public organ that enforces compliance.

Many parties involved in the process may share the same role. For example, at the use stage there may be one or more cleaning companies, and several companies that maintain installations. All these companies are included under the title ‘maintenance company’ in this document.

File

Council Directive 92/57 (temporary or mobile construction sites) includes an obligation to prepare a file. This obligation is referred to in Article 2.30 of the Working Conditions Decree. The file is intended to provide information at the use stage and in demolition about the visible and invisible risks in the building. Visible and invisible facilities are also described. There is also a description of any foreseeable maintenance to which risks are attached. This includes a statement of where any risky materials were incorporated, along with the precautions to be observed, as well as the presence of anchor points of possible use in maintenance. The file is meant to be a living document that is updated and completed in the course of construction and use. Regardless of the legal obligation it is quite conceivable in practice that the file will also have recommendations and rules that are less strongly related to safe and healthy maintenance or demolition, such as the maintenance of paintwork, guarantee certificates, as-built drawings and descriptions of installations. In summary, the file may be viewed as the building handbook.

The Working Conditions Decree places the responsibility for preparing the file with the design stage coordinator and the construction stage coordinator (Article 2.30 ff.).

3.2 The client, the ultimate owner and user

It is stated that during construction the client, and during use the owner or user, have primary responsibility for the safe maintenance of the building. These parties are able to remedy any noncompliance with the requirements for safe maintenance. What is concerned here is public law, from which perspective anyone able to ‘remedy’ a situation may be held to account for noncompliance with regulations. It is possible that the owner will be the first party to be held liable. At the construction stage the authority will hold the client responsible. At the use stage the responsibility in the first instance will generally transfer to the owner or user.

Where there is both an owner and a user, and an infringement occurs, the authority will decide depending on the circumstances by considering who ‘is able’ to end the infringement. Therefore the owner will be the first to be held liable. The following method for incorporating the safe maintenance of buildings is recommended for fulfilling this role satisfactorily.

At the project initiation stage:

- draw up a well thought-out and complete schedule of requirements, with explicit attention to the safe maintenance of buildings – at any rate pursuant to legislation (Buildings Decree 2012) – and any choices to be made regarding ambition;
- engage an architect who is aware of maintenance-safe buildings, or a safety expert for maintenance;
- make agreements about how to safeguard maintenance-safety expertise throughout the process.

At the design stage:

- the client ascertains the degree of compliance with the requirements for safe maintenance;
- the client appoints a design phase coordinator (Working Conditions Decree, Section 5) whose responsibilities include attending to safe and healthy maintainability;
- the client, or the design phase coordinator on his behalf, ascertains that he and the architect are aiming for the same safety level. For instance, he will request a risk analysis regarding the safe maintenance of buildings, and effect any necessary design changes, based on the methodology given in Chapter 4;
- he will also request the same safeguards of the designers of constructions and building installations who are to be engaged. Finally, he defines specific measures for the safe maintenance of buildings. It is advisable to opt for additional guarantees with high-risk buildings, such as by seeking a second opinion on the safe maintenance aspects of the design;
- the client applies for an integrated environmental permit at the end of this stage. The client is therefore also the applicant for the permit, albeit that he may authorize someone else (e.g. the architect) to act on his behalf. After acquiring the permit he is and remains the permit holder with ultimate responsibility for complying with the requirements under the permit and the regulations;
- the client supplies a design specification with drawings and a ‘Safety and Health Plan for Design’ accompanied by a file as referred to in the Working Conditions Decree.

At the construction stage:

- this is the point at which there is a transfer from the architect and advisers of constructions / building installations to the contracts manager and installer. The role of the architect at this stage is often advisory rather than initiating in nature, which makes it hard to push through modifications for safe maintenance in the design. This situation is improved if the architect performs project management on behalf of the client at this stage;
- the client ensures satisfactory information transfer from the architect and advisers of constructions / building installations to the subcontractors, particularly if the work is being performed in accordance with what is known as the classical model. The transfer can be smoother if an integrated construction team is involved from the project initiation stage, whereby all construction disciplines are involved from the outset. However, this measure is no guarantee of satisfactory attention to safe maintenance, even if responsibility for the design remains with the client;
- the client will have to take measures to organize his own supervision during construction, to verify that work complies with the permit and with his requirements. It could be decided to give the architect a more substantial role in which he monitors quality through a senior site supervisor. It cannot be taken for granted that the designer concerned will have the skills to perform this role satisfactorily. It is advisable to work with a senior site supervisor or site supervisor appointed by the client /architect, and whose job it is to supervise the execution of the design, in accordance with the permit and contractual documents, including the health and safety plan and the file;
- the client will have to clarify who he makes responsible for this, and identify where any unclear points may lie. It is useful to address safe maintenance in the contracts. He must also insist on a statement in the file and health and safety plan of where design changes, with their associated consequences, are maintained until actual construction;
- the client arranges for expertise to monitor compliance of the building delivered at the end of this stage with the agreements made. He may take advice at this stage. The relevant aspects of safe maintenance of the building are structural requirements for the external wall and installation engineering;
- this is a crucial time in his role as controller: after accepting the building it will become difficult to hold parties liable. Therefore he should put sufficient effort into this aspect.

At the use stage:

the client's role changes at this time: he stops being client and starts to be the owner, or transfers the building to a third party. This third party, the user, will often assume a client role in minor structural work and cleaning. Meeting the building owner's responsibilities calls for the following behavior:

- the owner arranges expertise to monitor compliance of the building with the agreements made. He may take advice at the start of the use stage. The relevant aspects of safe maintenance are structural requirements and installation engineering;
- the owner makes use of a file (Working Conditions Decree Section 5 Article 2.30). This file serves as a repository for changes in construction and installation engineering, and maintenance work;
- where an existing building changes owner, the future owner must request a file from the current owner. It is also advisable to have a risk analysis carried out to clarify any investment needed to prepare the building for safe maintenance. The output of the risk assessment is added to the file;
- if the owner leases the building to third parties, the responsibilities in respect of safe maintenance in the event of building work and alterations to installations and the building are documented. Misunderstandings will arise in practice if this documentation is dispensed with. It will then be unclear who has ultimate responsibility for safe maintenance in the event of minor alterations performed by a tenant, in relation to the overall safe maintenance of the building. Every alteration is recorded in the file, together with the consequences for safe and healthy maintenance.

User-specific

Important aspects of a maintenance-safe building are structural, installation engineering and organizational measures. These three elements complement each other and will therefore be considered in their mutual relationship. As mentioned above, both the owner and user are responsible for safe maintenance at the use stage. Proper fulfillment of this responsibility requires the following behaviors of the user.

The user is ultimately responsible for safe maintenance, management and use.

Specifically this means that the user:

- ascertains the existence of a thorough plan for safe maintenance, which is incorporated in the file;
- arranges for the definition of constraints for the implementation plan and the elimination of any gaps during execution.
- The building owner ensures that in the event of building work the level for safe maintenance is comprehensively assessed.

The user is responsible for drafting and executing the plan for safe maintenance, and if necessary for an occupancy permit or occupancy notification. The occupier:

- updates the file under the responsibility of the building owner;
- clarifies risks and eliminates any gaps in information;
- arranges for the registration of complaints and for any necessary corrective measures;
- promotes maintenance awareness among staff and visitors (new employees);
- provides information to staff and visitors / users;
- arranges maintenance (and checks the necessity), installation and structural measures;
- arranges for consistent attention to safe maintenance in the event of building work;
- arranges for the creation of an internal emergency response organization. This organization:
 - appoints permanent contact persons for emergency response;
 - arranges for evacuation facilities in the event of emergencies;
 - arranges effective emergency drills.

Employees are crucial in the execution of the organizational measures. Employees are required:

- to study the instructions;
- to be willing to develop awareness of safe maintenance;
- to take part in emergency drills under instruction;
- to comply with preventive measures;
- to take the initiative in respect of possible risks by reporting the situation or taking corrective action personally.

As with employees, visitors and individual users also have responsibility when in a building. This is partly in the interests of their own safety, but also in the interests of the safety of others. Anyone not complying with this behavior may be negligently putting others in danger. Everyone is required to:

- comply with instructions;
- report any dangerous situations;
- be aware of safe maintenance and related activities.

3.3 The architect/designer

The architect /designer lays the foundation for a high quality and sound maintenance-safe building. The following is his recommended working method.

At the project initiation stage:

he arranges for a transparent assignment, which means that he:

- is alert to the ambition that has been determined, and the constraints in combination with statutory requirements, which demands a critical attitude towards the client;
- advises his client to engage additional expertise to exchange ideas about the assignment from the perspective of safe maintenance, if appropriate in view of the nature of the assignment;
- advises his client to assemble an integrated design team at an early stage.

At the design stage:

- the architect communicates clearly with the client about the possible risks attached to certain design choices (e.g. because of tight budgets); it is best to record the decisions in writing to avoid misunderstandings later;
- he designs in accordance with the Buildings Decree;
- he takes the Working Conditions Decree Section 5 into account;
- he produces an integrated design with attention to safe construction, use, maintenance and demolition. This applies equally to the building and the installations. He maintains close contact with the installation adviser and construction adviser/structural engineer;
- he monitors for and detects obstacles where disciplines converge.

At the construction stage:

it is no longer always the case that the architect is closely involved with construction. His involvement, depending on the agreements made, may be limited to the aesthetic assessment and approval of changes. He then factors in the consequences for safety and health. If appropriate he recommends the engagement of an expert.

At the use stage:

the role of the original architect is extremely limited. Depending on the agreements made he continues to be involved in aesthetic changes, for which he may have stipulated that his permission is required. Regarding alterations that necessitate a new design, the same working method is recommended as for the project initiation and design stages.

3.4 The construction adviser and the building installations adviser

The construction adviser and the building installations adviser have an important role in the design of a maintenance-safe building. Their recommended working method is as follows.

At the project initiation stage:

he arranges for a transparent assignment, which means that he:

- is alert to the ambition that has been determined, and the constraints in combination with statutory requirements, which demands a critical attitude towards the client;
- will be well aware of when he needs to engage additional expertise to exchange ideas about the assignment from the perspective of safe maintenance.

At the design stage:

- the adviser clarifies any possible risks attached to certain choices, e.g. of tight budgets;
- he designs in accordance with the requirements of the Buildings Decree;
- he designs in accordance with the Working Conditions Decree, in particular Section 5;
- he contributes actively to compiling the file;
- he contributes actively to an integrated design in respect of health and safety during construction, use, maintenance and demolition, for both the building and the installations. He will therefore need sufficient expertise to work together with the other disciplines in inspecting the overall concept.

At the construction stage:

his involvement is usually limited to assessing and approving changes. Specifically, it may be expected of him in these cases that he oversees the overall maintenance. In this case too, if he does not possess this knowledge himself he will advise the client to engage an expert. The aspects that are relevant for use, maintenance and demolition will be recorded on his recommendation in the file.

At the use stage:

the role of the original adviser is extremely limited. Regarding alterations that necessitate a new design, the same working method is recommended as for the project initiation and design stages. He delivers the aspects that are relevant for the further use, maintenance and demolition to the controller of the file.

3.5 The contractor

The contractor is the party who constructs the building at the construction stage. The recommended working method for the contractor is as follows.

At the project initiation stage:

the contractor only has a role if a construction team or an integrated contract is involved, in which case the role is as follows:

- he will have to be alert to the ambition that has been determined, and the constraints in combination with the statutory requirements, which demands a critical attitude towards the client.

At the design stage:

likewise the contractor has a role only if a construction team or an integrated contract is involved. This role is as follows:

- he assesses the construction and cost aspects of the plans and offers that were proposed in the construction and/or design team and (if worthwhile) proposes one or more alternatives for the plans and offers that were proposed in the construction team;
- he advises on safe and healthy construction, maintenance and demolition as referred to in the Working Conditions Decree. He also takes the requirements given in the various occupational health and safety catalogues into account.

At the construction stage:

in both the classical model and where a construction team is used (which actually no longer exists at this stage) the contractor will have to ensure sound execution without losing sight of the importance of safe maintenance of the building. This means that he:

- assembles an expert team, which continuously monitors the safe-maintenance measures incorporated in the design;
- assesses any changes for possible impact on safe maintenance of the building in the event of deviation from the building plan, or engages an expert for this purpose;
- takes the initiative / gives warning if upon reviewing the situation the building plan provides an insufficient guarantee for safe maintenance of the building;
- ensures the creation of a change file, which will also be a repository for the findings of other parties (e.g. the installer and supervisor);
- in the event of deviation from the permit and/or building regulations, in particular the Buildings Decree, informs the authority in good time, or requests the authority to give permission, possibly in the form of a change to the permit;
- arranges for a smooth transfer to the owner/client on completion of the structure, through the file.

At the use stage:

the role of the original contractor is limited. Regarding alterations that necessitate a new design, the same working method is recommended as for the project initiation and design stages.

3.6 The installation adviser, manufacturers, the installer and maintenance company

Installation advisers, manufacturers and installers support designers and/or the (main) contractor. They have a developing role at the design stage, and during construction they provide the (main) contractor with specific building elements. They have little involvement at the project initiation stage, even though their involvement would benefit a maintenance-safe design substantially.

At the design stage:

- use is frequently made of an installation adviser who advises the designer about how to arrive at a comprehensively safe design: he must be able to assess the safe maintenance aspects of the building design in combination with the structural and installation-related measures, and identify any consequences for the installations and structural measures to be procured. Examples would include the planning of services shafts and the accessibility of plant rooms, services ducts and roof planes;
- it is expected of manufacturers/importers that they provide accurate product specifications and reliable information about installations and building materials.

At the construction stage:

it is expected of the installer that he:

- installs the installation in accordance with the manufacturer's instructions;
- notifies the client (or site supervisor) of any observed deviations in the building work from the structural design;
- has regard to the relationship between the installation and the building and discusses with the site supervisor/his client any consequences for the safe maintenance of buildings. Examples are accessibility and maintainability of plant rooms, external walls and roof planes;
- these observations are incorporated into the file.

At the use stage:

- the installer comprehensively reviews the relationship between the installation and a building in use in which he is to install an installation, regarding any consequences for the safe maintenance of buildings;
- the maintenance company performs maintenance in accordance with the importer's/manufacturer's instructions and the building portfolio defined at the design stage;
- the maintenance company informs the building owner of any impediments to maintenance in accordance with the regulations and/or the building portfolio.

3.7 The authority (building control department)

The authority (building control department) is responsible for both preventive and repressive supervision. Preventive supervision covers the assessment of the planning application and repressive supervision covers enforcement of the permit. If appropriate the authority will take advice from safety advisers with affinity for the safe maintenance of the building. The permit holder, the owner/user continues to have primary responsibility for the safe maintenance of the building.

At the design stage:

- the authority assesses the application based on the Buildings Decree and the assessment framework given in Chapter 4. If an equivalent solution is available, it may be advisable for the authority to discuss and explain this solution in preliminary consultations with the client. Whether or not an opportunity is given for preliminary consultation differs according to the municipality and situation concerned. The authority is alert to avoiding any misunderstandings arising from the interpretation of its role regarding the responsibilities for the safe maintenance of buildings;
- the authority assesses the integrated environmental permit application for compliance with the legal frameworks, including the Buildings Decree, and arranges for the granting of the integrated environmental permit.

At the construction stage:

- the authority monitors building work for compliance with the permit and requirements of the Buildings Decree (including structural requirements for safe maintenance).

At the use stage:

- the authority assesses any application for an occupancy permit for compliance with the regulations for maintenance-safe use. The authority may furthermore set additional requirements for the safe maintenance of the structure based on an occupancy permit application or an occupancy notification;
- the authority monitors building work for compliance with the organizational, installation and structural measures.

4 ASSESSMENT FRAMEWORK FOR THE SAFE MAINTAINABILITY OF BUILDINGS

4.1 Introduction to the assessment framework

When designing buildings the designer must incorporate into the design facilities for the safe and healthy maintenance of the shell (Buildings Decree assessment framework). The applicant for an integrated environmental permit is required to make a plausible case in the application for compliance of the building with this obligation by means of the documents to be submitted (e.g. the checklist). This chapter explains the assessment framework. Support to both the application in the design and the assessment and supervision by the building control department are covered. The explanatory notes to the assessment framework suggest first-choice solutions for each building element, which should be integrated into the design.

Only the stated building elements are assessed for safe maintainability in the assessment framework. If there are no provisions in the design, measures must be taken for the maintenance of the built object in respect of safe access to the parts of the building described in the assessment framework. This part of the explanatory notes makes allowance for making the building accessible with additional work resources in the exceptional situation that there is no integrated solution in the design. It is up to the client to demonstrate that the design has provisions for safe cleaning and maintenance. This chapter introduces the assessment framework, and draws a distinction between functions inside and outside the functional design of the building. The structure is as follows.

Definitions of functions of the building:

Atrium	Interior space in a building extending over more than one floor (storey), enclosed on more than one side by other spaces and possibly (part of) an exterior wall, usually covered with a fully or partially glazed roof.
Building interior	This refers to the various components to be inspected, as follows: atrium; glazed lift shaft; stairwells.
Glazed lift shaft	Structural cladding of the construction within which a lift cage moves that is made of glass or a comparable transparent or semitransparent material.
Stairwell	Circulation area containing stairs.
External wall outer surface	The external wall outer surface is the interface between this partition construction and the external space around the building.

Glazed roof	Flat or sloping roof consisting largely of glass or a comparable transparent or semitransparent material, including any openings in the roof for ventilation, air inlets and outlets, flues, escape and ventilation hatches, etc..
Sloping roof	Partition construction on top of a building between the interior space of a building and the surrounding exterior space, at an angle of 15° or more to the horizontal plane and including the roof openings mentioned under ‘glazed roof’.
Flat roof	Partition construction on top of a building between the interior space of a building and the surrounding exterior space, at an angle of less than 15° to the horizontal plane and including the roof openings mentioned under ‘glazed roof’.

The design of safely maintainable building elements must assume the integration of safe work positions and the safe accessibility of these work positions. This aim is achieved by observing the following principle.

1. Where possible work at a height or in a hazardous situation is avoided (proactive action) (tackling the problem at the source).
2. Facilities that are part of the building and the guarantee of the quality of the facilities are under the responsibility of the building owner (preventive action) (building-related collective).
3. The requirements set on the surroundings or the building in respect of facilities that are additional (e.g. mobile scaffolds) are under the responsibility of the building owner (preparatory action) (additional collective).
4. Facilities intended for the use of a single person (additional individual).
5. Facilities at the level of personal protection equipment, such as lines and harnesses (restrictive effect, individual).

Facilities suitable for safe maintenance (in no particular sequence).

Permanent work platform	Projecting part of a floor or an independent floor level (possibly in the form of a grid floor, etc.) and fitted with perimeter protection.
Movable suspended bridge	Temporary work platform (of modular construction) suspended on cables and that is stationary / movable along rails or other guides.
Cradle installation / exterior wall maintenance installation	Permanent work platform for persons, suspended on cables and movable along rails or other guides.
Robot installation	A fully automated / controllable cleaning machine for cleaning flat parts of exterior walls.
Aerial platform	A mobile work position for working at a height.
Mobile scaffold	A movable and detachable aluminum framework.
Safe-sit	An improved bosun's chair (lowering device) with one anchor point, one suspension cable and one safety cable.
Suspension points for work platforms	A roof-level construction for the suspension of a work platform.
Permanent hanging ladder / mast installation	Permanent hanging ladder: a movable hanging ladder tailored to the building for one person and equipped with folding work platforms that are entered at the top or the bottom end. Mast installation: a movable mast tailored to the building along which a work cradle for one person can be raised and lowered, which can be entered at the top or the bottom end.
Lifting scaffold	Temporary work platform that can be moved vertically along one or more masts.
Window-cleaning balcony	Permanent gallery fixed to the building for the maintenance of the external wall(s).

Permanent steps / ladder construction (in combination with integrated fall protection system)	Access path in combination with integrated fall protection system.
Movable bridges / ramps	Movable work platforms usually movable horizontally or along a slope on a rail or other guide.
Fixed roof edge / platform	Fencing or balustrade / platform.
Temporary roof edge protection	Detachable fall protection (fencing).
Permanent attachments for ridge and roof	Fixed, directly visible, building-related anchor points with a facility for attaching lines, ladders or fences.
Removable gutter protection	Temporary fencing on the roof plane attached to special-purpose anchor points, or supported on the external wall through the gutter construction.
Scaffolds	Steel construction, consisting of pipes, couplings or system components, based on drawings and calculations.
Permanent roof edge protection	Fixed fall protection; structural parapet, fencing or balustrade.
Rails with click attachment mechanism	Anchor points in combination with a line system for individual fall protection.

4.2 Distribution of tasks between parties in the various stages

The chart below shows the relationship between the functions and roles described in the above sections.

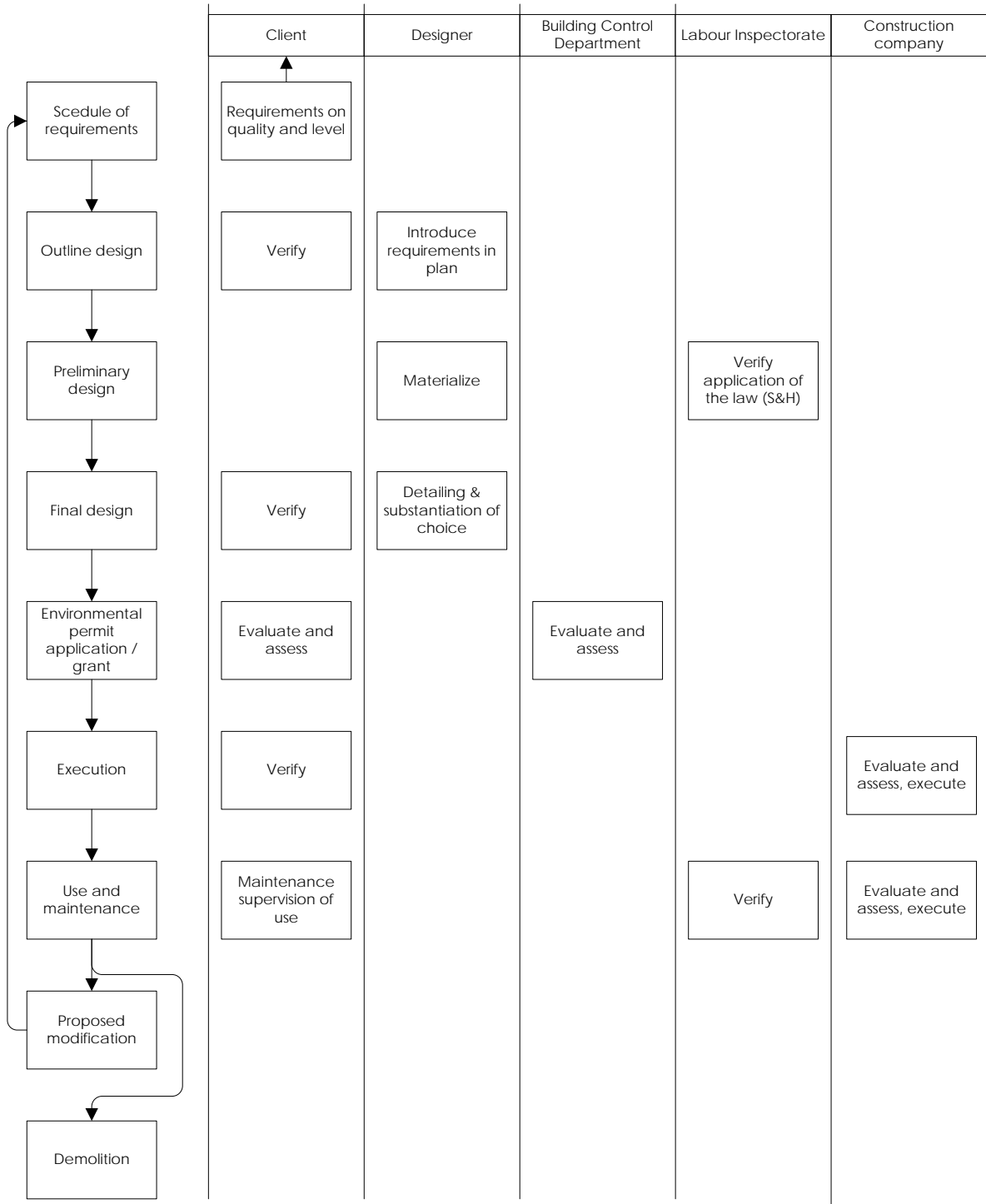


Figure 3: Roles in the life cycle according to the Ministry of the Interior.

Interpretation of the safe maintenance of building sections

The charts given in this chapter are intended to support the designer at the design stage in implementing measures to maximize maintenance safety. The charts were produced by parties involved in maintenance in the process of devising the assessment framework. The measures in the charts are compulsory unless equivalent safety is achieved in a different way. In the event of deviation from the given charts it must be demonstrated in the planning procedure that equivalent safety protection is achievable during maintenance.

A significant aspect is the ability to safely access the places where maintenance is to occur. This aspect must be addressed at the design stage. It would be difficult to implement these measures at a later stage without detriment to the design.

Compliance with these charts will give the client, the building user and the designer maximum assurance about the possibility of effective and safe cleaning and maintenance of the building elements concerned. The accountability of these parties is thereby harmonized. The charts are also intended to be used by supervisory organizations such as the building control department and the labour inspectorate in performing their duties. In other words the charts are used when giving planning permission in assessing compliance with the Buildings Decree Section 6.12 Articles 6.53 and 6.54 with respect to safe maintainability. The labour inspectorate uses the charts to assess whether cleaning and maintenance firms are able to perform maintenance work safely.

The charts identify the appropriate resources for the provision of safe and healthy maintenance. The charts are based on the various occupational health and safety catalogues that are applicable to the cleaning and maintenance sectors. In the event of deviation from the charts, cleaning or maintenance may be rendered impossible.

The charts below assume the following principle.

1. Where facilities are part of the building the quality of the facilities is guaranteed and under the responsibility of the building owner (preventive action) (building-related collective).
2. Where facilities are additional (e.g. mobile scaffolds) the requirements set on the surroundings or the building are under the responsibility of the building owner (preparatory action) (additional collective).
3. Facilities intended for the use of a single person (additional individual).
4. Facilities on the level of personal protection equipment, such as lines and harnesses (restrictive effect, individual).

Reasonableness principle

The measures on the various levels have an emphatically hierarchical relationship. Therefore the designer must first investigate higher-level options before resorting to measures at a lower level. Moving to a lower level is permitted only if there are good reasons to do so. This is the reasonableness principle. This consideration applies to every level in the chart.

Where carcinogens, biological agents and risk of falling are concerned, movement to a lower level in the hierarchy is allowed only if a higher-level measure is technically infeasible. Economic reasons for moving to a lower level may not be put forward where these risks are involved.

Other points for attention

In the design of work positions and functions the designer must seek to avoid risks in accordance with the occupational hygiene (OH) strategy.

Measures from multiple levels may be combined in order to reduce risk.

The design must take into account the ability to safely access the work positions for maintenance.

The various occupational health and safety catalogues provide solutions for significant risks in accordance with the occupational hygiene strategy.

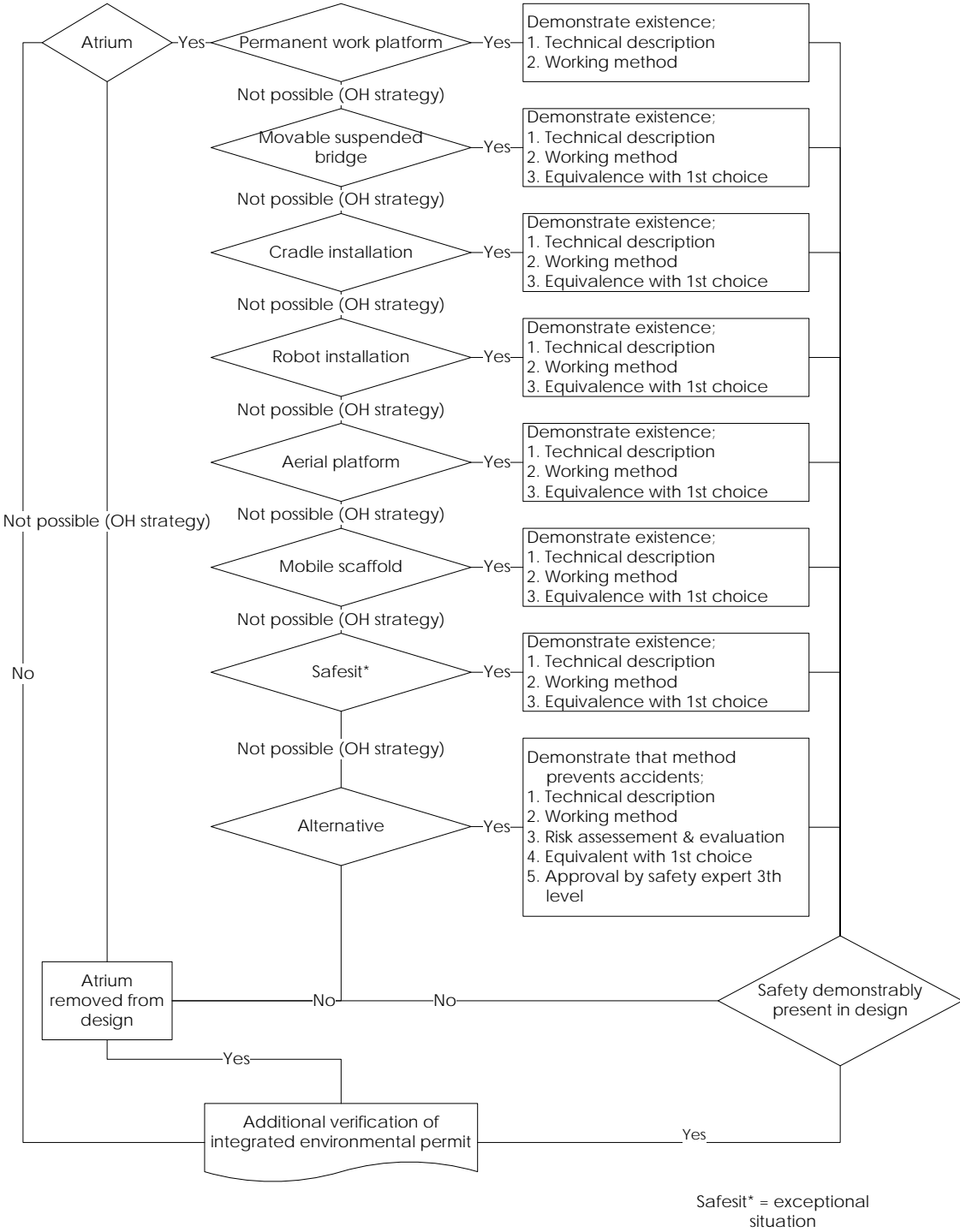
A sector risk inventory and analysis and the plan of action also shed light on risks and possible solutions.

The focus in the charts is on the work positions. The design may not disregard the safe accessibility of these work positions, and account must also be taken of necessary tools and materials (e.g. replacement parts) that may be needed in maintenance.

If it is necessary to resort to a lower level, it must be demonstrated that foreseeable maintenance can be performed safely (and healthily) to the same level of protection as in the first-choice measure. Examples are adjustments and additional instructions for use for achieving a level of protection that is equivalent to the first-choice measure. The reasoning must be substantiated with reference to the assessment framework for the safe maintenance of buildings as an appendix to the integrated environmental permit. The building control department may require a reasoned explanation from a certified safety officer regarding the equivalent level of protection to be achieved.

Flowcharts are given on the pages below showing the work equipment to be used to achieve the safe maintenance of each building element. The work equipment is given in order of decreasing preference. The preference is based on the extent of the contribution of the work equipment to reducing risk in the performance of maintenance work.

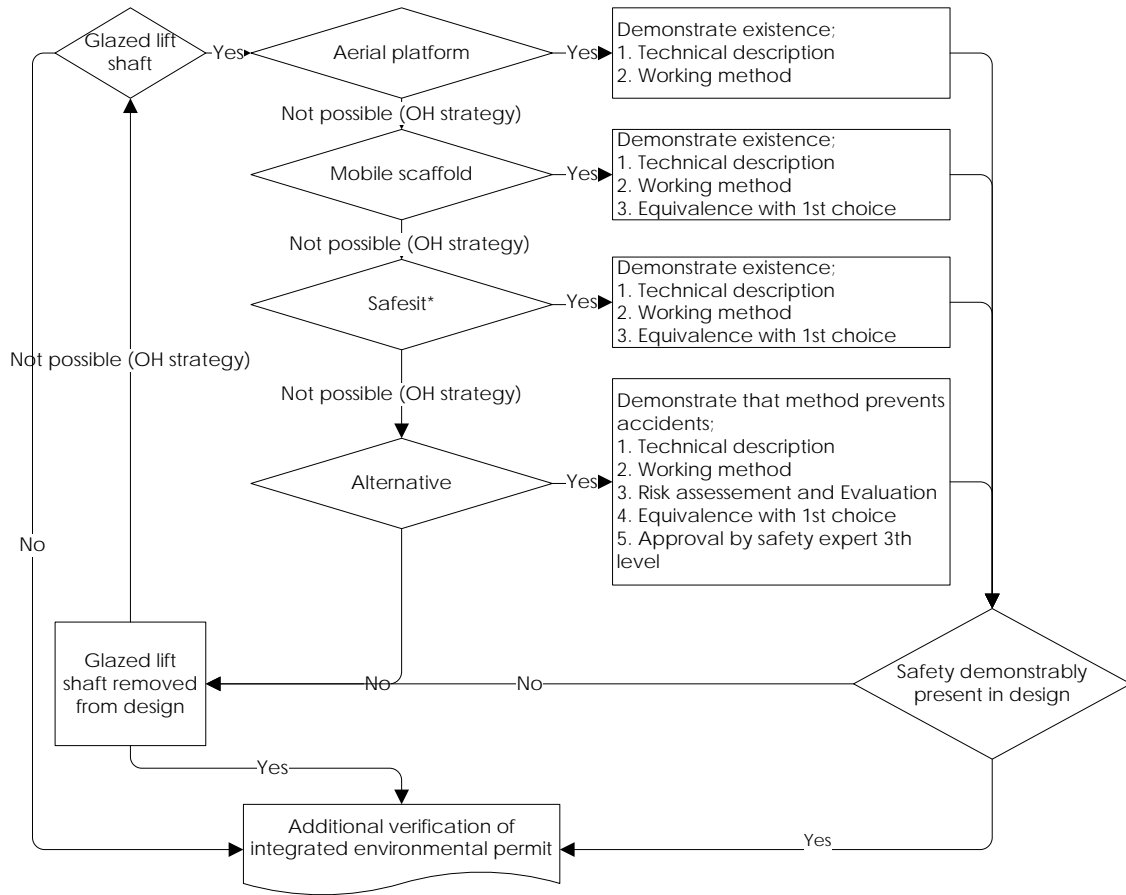
4.3 Assessment of atrium



Safesit* = exceptional situation

Figure 4

4.4 Assessment of glazed lift shaft



Safesit* = exceptional situation

Figure 5

4.5 Assessments of stairwells

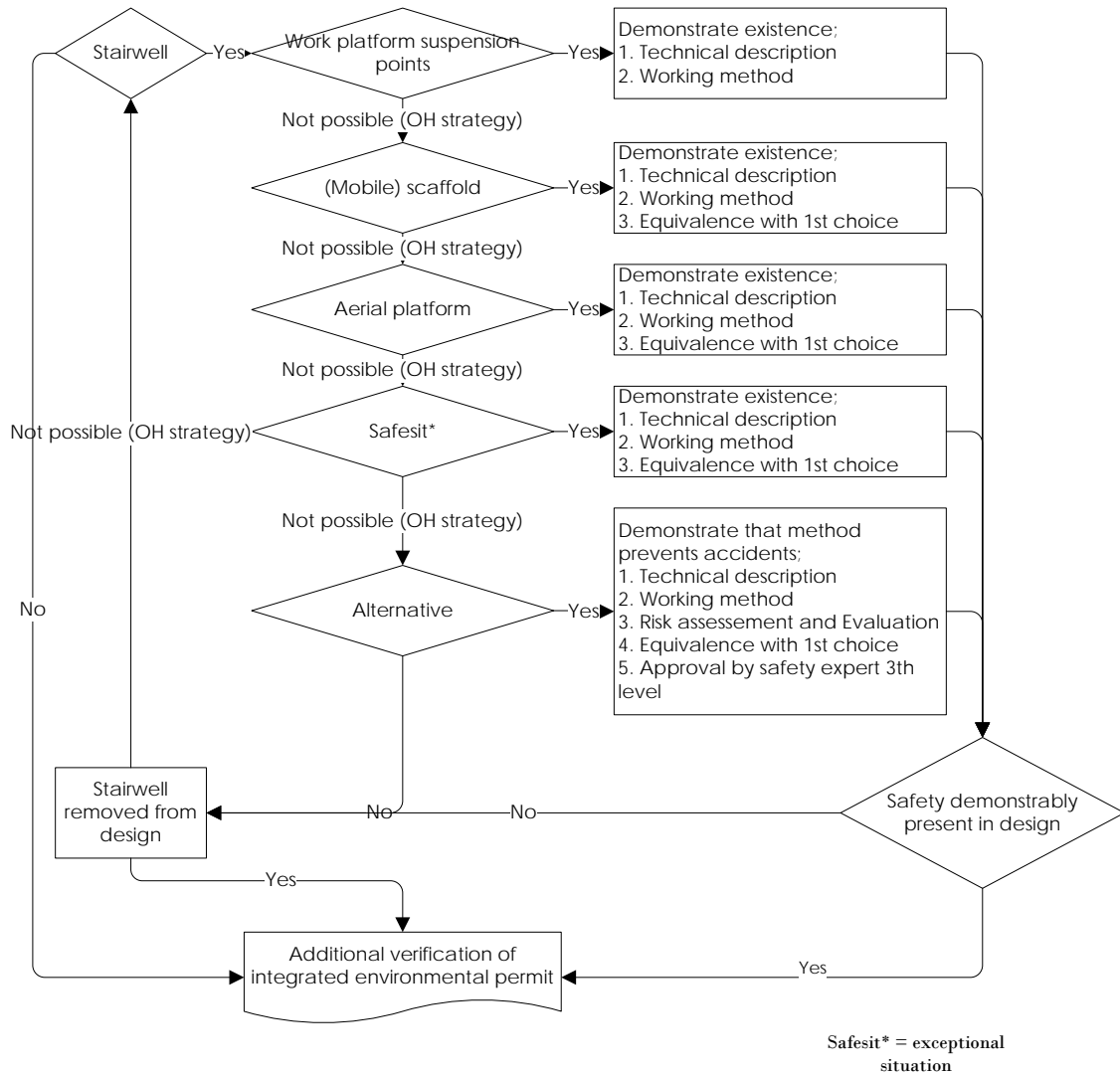


Figure 6

4.6 Assessment of outside surface of external wall

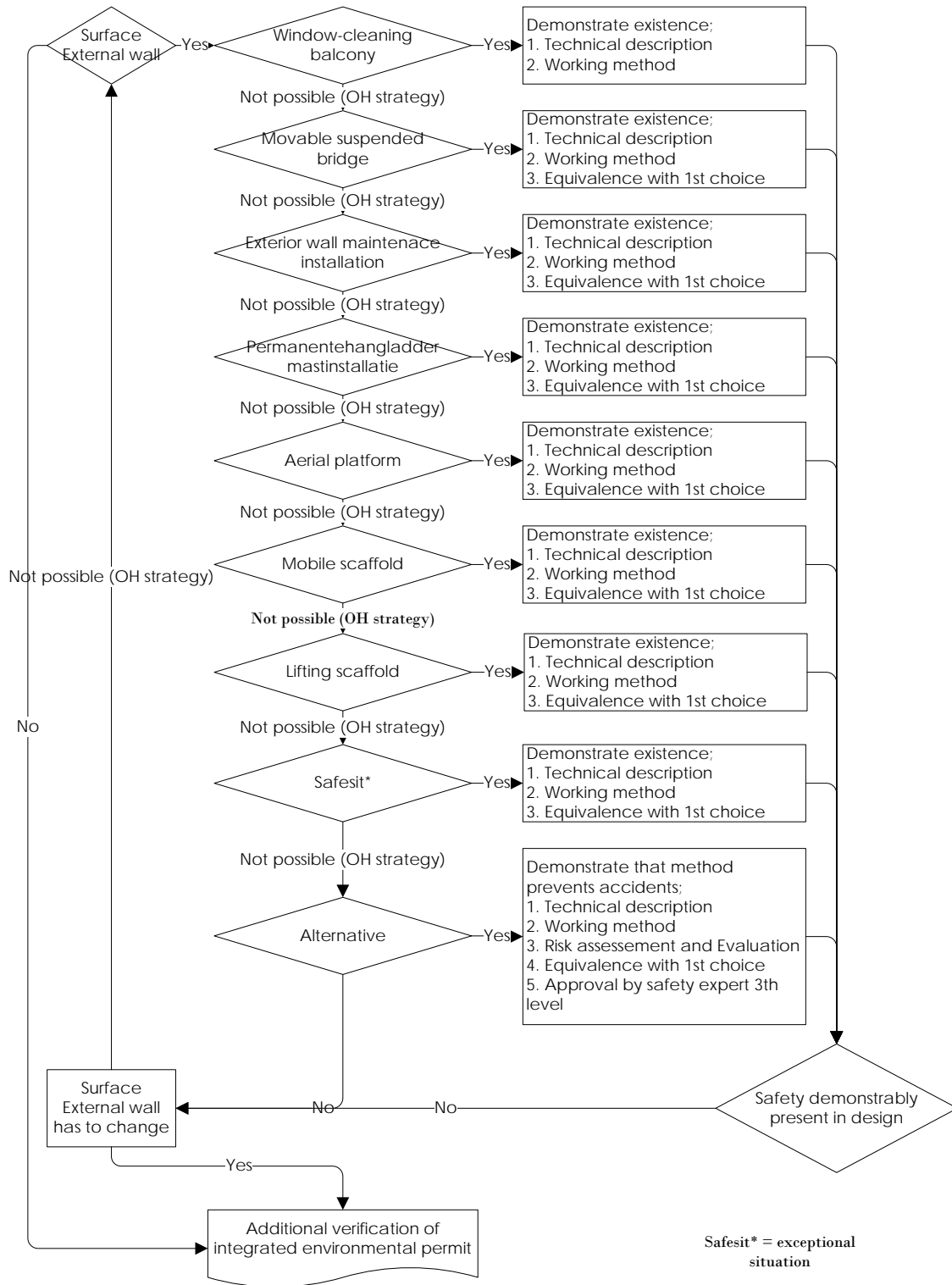


Figure 7

4.7 Assessment of glazed roof

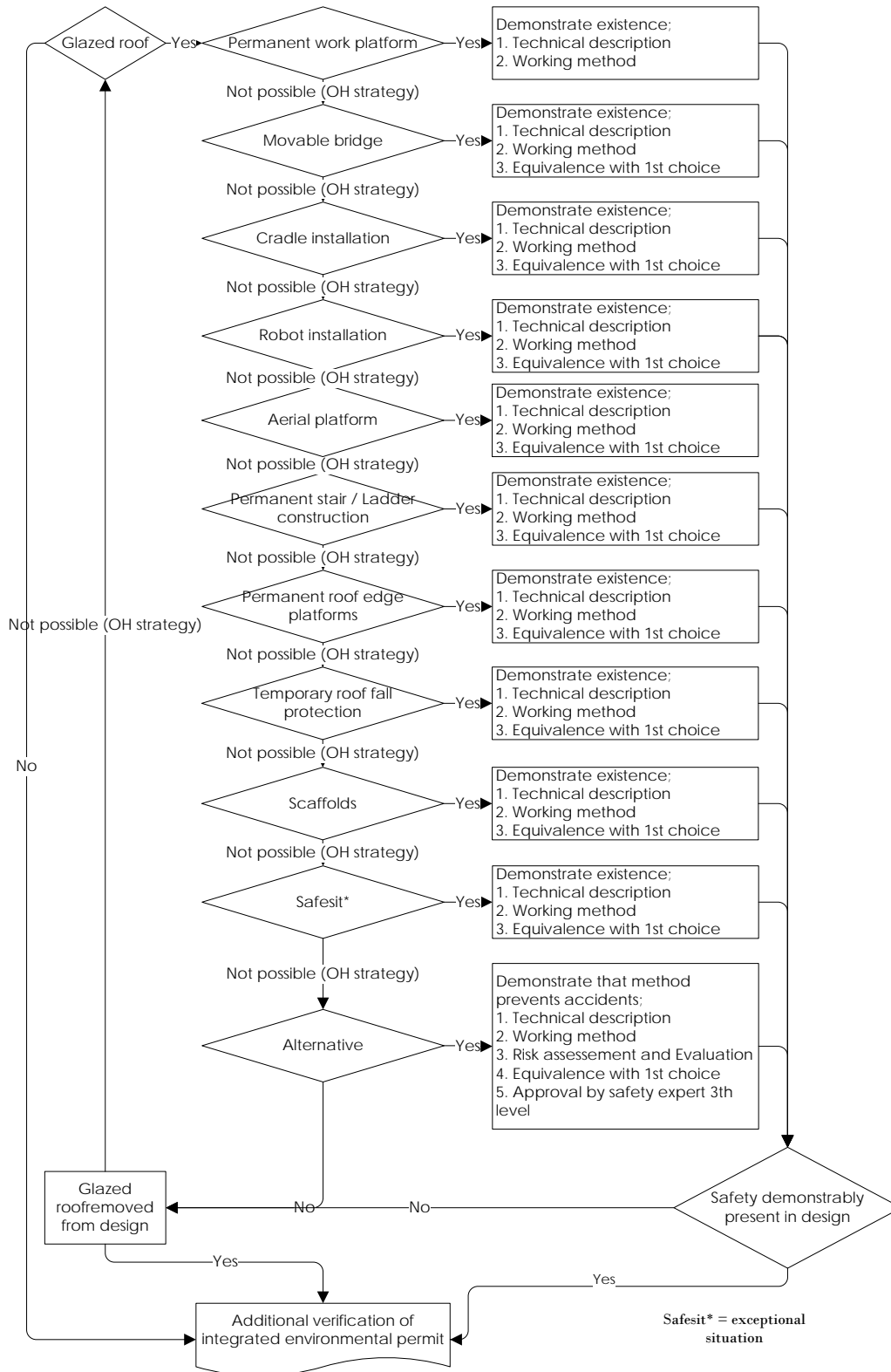


Figure 8

4.8 Assessment of sloping roof

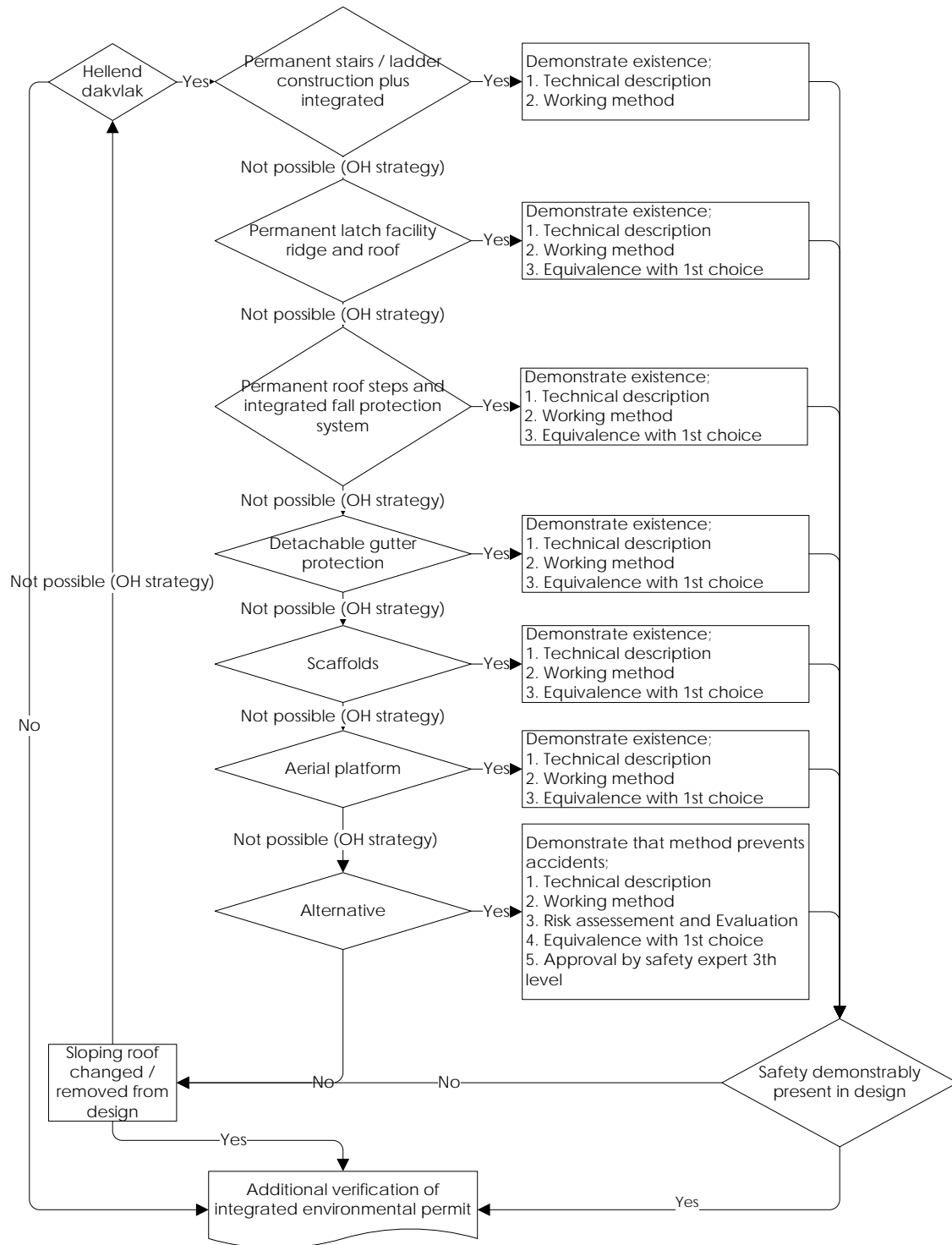


Figure 9

4.9 Assessment of flat roof

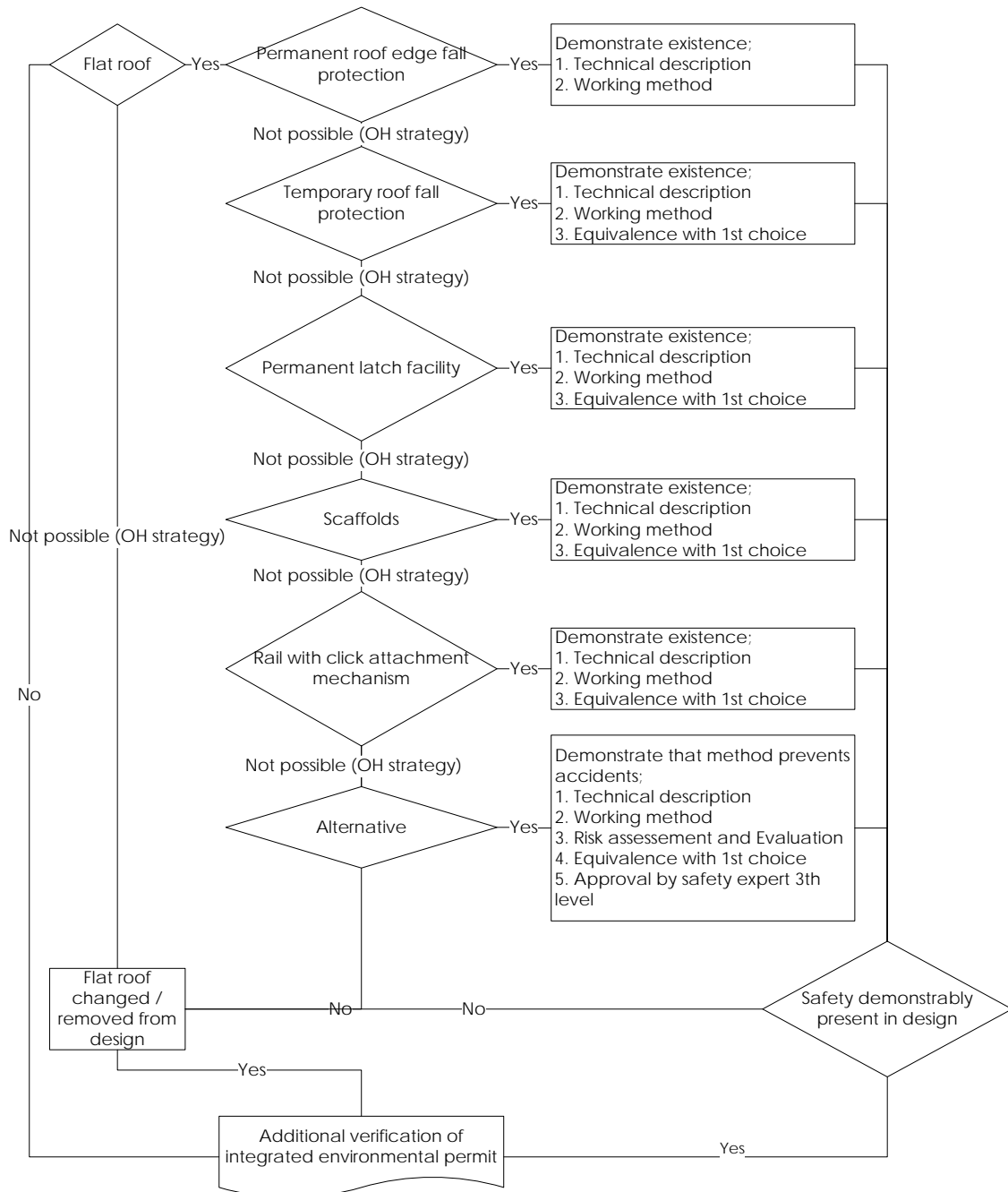


Figure 10

Technical and organizational constraints on use of devices

The conditions to be achieved are shown in the rows of the table below. These conditions are required when using the devices shown in the columns of the table.

These devices are identified in the above charts and in the explanatory notes to the assessment framework. The table does not include all devices.

A ‘0’ in the chart means ‘not relevant’, and a ‘1’ indicates that to be able to work safely with this device the corresponding condition must be achieved in the design.

N.B. the table is a tool, and it will have to be assessed for each project whether all conditions have been met.

no.	specific condition to enable the safe use of the device.	Permanent work platform, window-cleaning balcony	Mobile suspended bridges	Cradle installation, external wall maintenance installation	Robot installation	Aerial platform, lifting scaffold	Mobile scaffold	Suspension point for work platform	Permanent hanging ladder/mast installation	Scaffold	Permanent perimeter facility	Temporary perimeter facility	Permanent roof steps/stairs/ladder construction	Rails with click attachment mechanism	Permanent attachment (ridge, roof, line system)	Removable gutter protection	Safesit
1	Safely accessible operating position (perimeter protection)	1	1	1	1	0	0	1	1	0	0	0	0	0	0	0	0
2	Safely accessible entry position/attachment position (perimeter protection)	1	1	1	1	1	0	1	1	0	0	0	1	1	1	1	1
3	At a height above ## metres there must be provisions on the building for coupling (guide) (## manufacturer’s/supplier’s instructions included in contract documents and drawings)	0	0	1	1	0	1	1	1	1	0	0	0	0	0	0	0
4	Reliable inaccessibility under the working area; required material is part of the building inventory, description in building file	0	1	1	1	0	0	1	1	0	0	0	0	1	0	1	1

no.	specific condition to enable the safe use of the device.	Permanent work platform, window-cleaning balcony	Mobile suspended bridges	Cradle installation, external wall maintenance installation	Robot installation	Aerial platform, lifting scaffold	Mobile scaffold	Suspension point for work platform	Permanent hanging ladder/mast installation	Scaffold	Permanent perimeter facility	Temporary perimeter facility	Permanent roof steps/stairs/ladder construction	Rails with click attachment mechanism	Permanent attachment (ridge, roof, line system)	Removable gutter protection	Safesit
5	External wall areas upright or express details given of how all planes can be safely accessed (drawings and building file)	1	1	1	1	1	1	0	1	1	0	0	0	1	0	1	1
6	Automatically closing movable external wall sections in use	0	1	1	1	0	0	1	1	0	0	0	0	0	0	0	0
7	Facility in suspension bridge/cradle to attach belt, or attach belt to a separate cable from the bearing structure	0	1	1	0	1	0	0	1	0	0	0	0	0	0	0	0
8	Obstacle-free zone to 2 metres from the external wall to 1.5 metres above ground level	0	0	0	0	1	1	1	0	1	0	0	0	0	0	0	0
9	Check/inspection and maintenance for 10 years is incorporated in the contract documents	0	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1
10	Dutch language manual required and included in building file	0	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1
11	Safe accessibility of latch point	0	0	0	0	0	0	1	0	0	0	1	1	1	1	1	1
12	Line system is included in the building inventory	0	0	0	0	0	0	1	0	0	0	1	0	1	1	1	1
13	Obstacle-free (roof) plane for cable	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1
14	All parts of the roof plane are accessible, with details on drawing and included in the building file	0	0	0	0	0	0	0	0	0	0	1	1	1	1	0	0
15	Drop everywhere greater than 6 metres (attention given to 'pendulum effect')	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0	1
16	Attachment facility is part of the building structure and included in (as a starting point for) structural calculation	0	0	0	0	0	0	1	0	0	0	1	1	1	1	1	1

no.	specific condition to enable the safe use of the device.	Permanent work platform, window-cleaning balcony	Mobile suspended bridges	Cradle installation, external wall maintenance installation	Robot installation	Aerial platform, lifting scaffold	Mobile scaffold	Suspension point for work platform	Permanent hanging ladder/mast installation	Scaffold	Permanent perimeter facility	Temporary perimeter facility	Permanent roof steps/stairs/ladder construction	Rails with click attachment mechanism	Permanent attachment (ridge, roof, line system)	Removable gutter protection	Safesit
17	Clearly demonstrable structural latch anchor points or attachment points for temporary facilities, safety devices and latching	0	0	0	0	0	1	1	0	1	0	1	1	1	1	1	1
18	Rail is structurally fixed to building; attachment is part of building structure and structural calculation	0	1	1	1	0	0	1	1	0	0	0	0	1	0	0	1
19	Safe accessibility of latch point, included in the building file	0	0	0	0	0	0	1	0	0	0	1	1	1	1	1	1
20	Facility is structurally fixed to building; attachment is part of building structure and structural calculation	1	1	1	1	0	0	1	1	0	1	1	1	1	1	1	1
21	Attachment to building is sustainably protected against corrosion	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
22	Operating position safely accessible without use of individual safety equipment	0	1	1	1	0	0	1	0	0	0	0	0	0	0	0	0
23	Entry point safely accessible without use of individual safety equipment (roof edge protection)	1	1	1	0	1	0	1	1	0	0	0	0	1	0	0	1
24	Reliable inaccessibility under the working area	0	1	1	1	1	0	1	1	0	0	0	0	0	0	1	1
25	External wall is flat and upright	0	1	1	1	0	1	0	1	0	0	0	0	1	0	0	0
26	Details are included in design and planning application.	1	1	1	1	0	1	1	1	0	1	1	1	1	1	1	1
27	Scaffold to be expected is drawn, calculated.	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0
28	Storage space for regularly used equipment readily accessible (e.g. directly on the external wall with dedicated access)	0	0	0	0	0	1	1	0	0	0	1	0	0	0	1	1
29	Dutch language manual required and included in building file	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1

no.	specific condition to enable the safe use of the device.	Permanent work platform, window-cleaning balcony	Mobile suspended bridges	Cradle installation, external wall maintenance installation	Robot installation	Aerial platform, lifting scaffold	Mobile scaffold	Suspension point for work platform	Permanent hanging ladder/mast installation	Scaffold	Permanent perimeter facility	Temporary perimeter facility	Permanent roof steps/stairs/ladder construction	Rails with click attachment mechanism	Permanent attachment (ridge, roof, line system)	Removable gutter protection	Safesit
30	Regularly used equipment is included in the contract documents (in particular anchoring)	0	0	0	0	1	1	1	0	0	0	1	0	0	0	1	1
31	Anchoring facilities identifiably present above 14 metres working height (in accordance with drawing and calculation)	0	0	0	0	0	1	1	0	1	0	0	0	0	0	0	0
32	Load-bearing permanent flat space around building for deployment provided and guaranteed (width of zone 2 metres)	0	0	0	0	1	1	0	0	1	0	0	0	0	0	0	0
33	(Temporary) provision included in design and building	0	0	0	0	1	1	1	1	1	0	1	0	0	0	1	0
34	Facility is included in the contract documents / statement in file of which parts are to be maintained with this equipment.	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1
35	Maximum working height 14 metres	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
36	Annual assessment arranged	0	1	1	1	1	1	1	1	0	0	0	0	1	1	0	1
37	Assembly/dismantling/foreseeable maintenance of equipment is possible in safety, preferably without the use of individual safety equipment	0	1	1	1	0	0	1	1	0	0	1	0	1	1	1	1

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