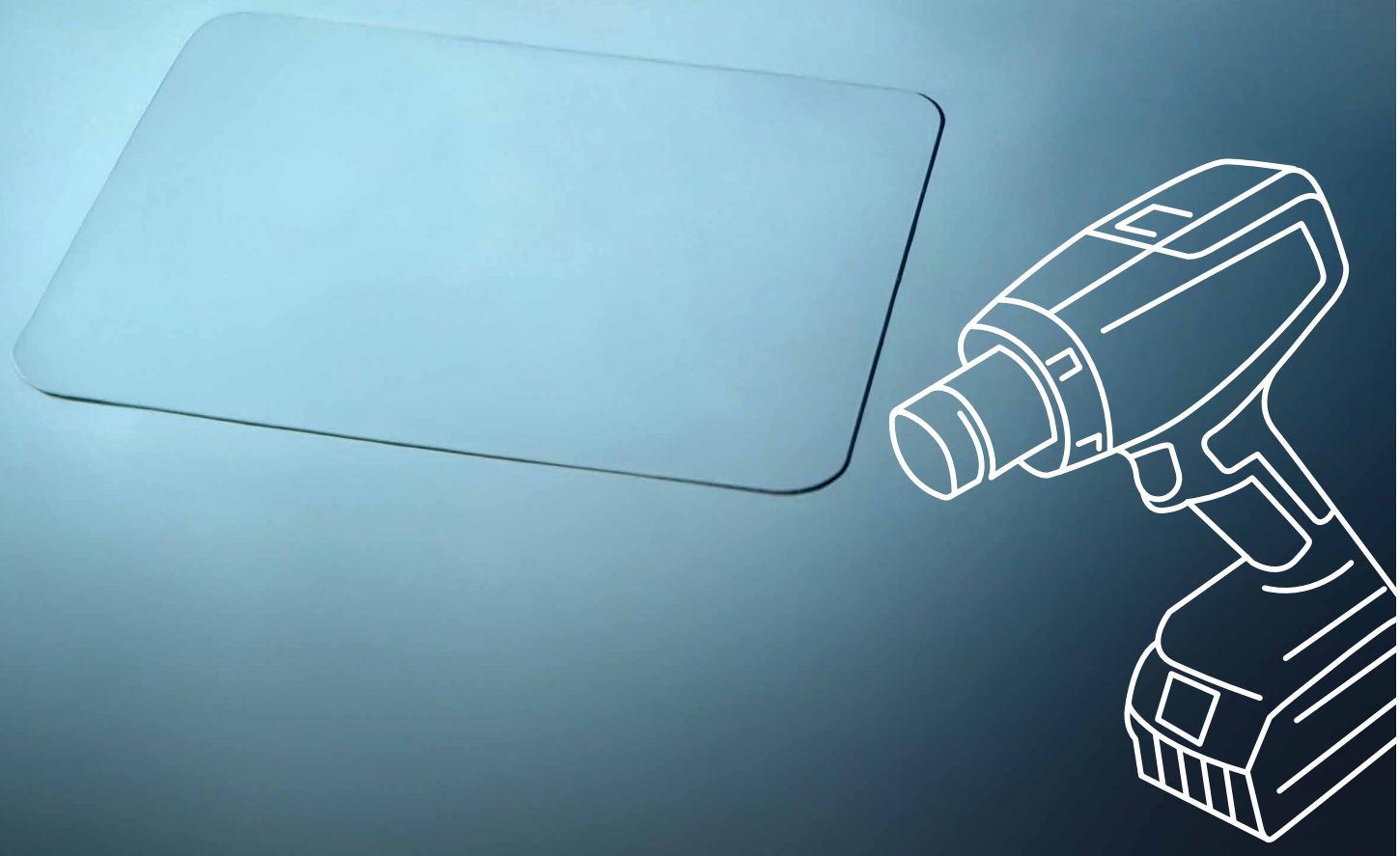
LEISTER®

Wireless Roof Repair: Efficient Solutions for Flat Roof Waterproofing

EXPERTISE | Mobile Hot Air Technology for Quick Repairs on the Roof



Author
Julian Schenk, Product Manager Business Line Hand Tools, Leister Technologies AG

Management Summary

Starting Point

Waterproofing flat roofs with plastic waterproofing membranes has been the established state of the art for years. In practice, leaks can occur for various reasons and lead to consequential damage to the building structure. Quick and professional repair is therefore essential. Many defects involve small, localized material or mechanical damage that can be easily and wirelessly repaired using battery-powered tools. "Cordless Roofing Repair" in this context refers to the targeted use of wireless tools for detecting, preparing, and repairing damage to the roof, in order to be able to work independently of power sources and power cables.

Aim

With this expertise, users receive practical guidance on how to detect, prepare, and repair damage to plastic flat roof waterproofing using battery-powered tools. Practical knowledge is imparted on assessing typical damage patterns and selecting suitable repair methods using cordless hot air tools and other accessories. The goal is to convey a basic understanding of the proper repair of plastic roof membranes using battery-powered equipment.

Scope and Target Audience

This expertise focuses on the repair of plastic flat roof waterproofing membranes using battery-powered hot air equipment and matching accessories. Complete renovations of roofs, the planning of new roof structures as well as other waterproofing systems such as bitumen or liquid plastics are not part of the expertise. The focus is on typical small and medium repairs to existing roof membranes.

The expertise is aimed at roofers, poly builders and service technicians who want to efficiently and safely repair damage on flat roofs using battery-powered tools, as well as at construction managers who need to assess or specify such work.

Recommendations

To carry out repairs on plastic flat roof waterproofing membranes using battery-powered hand tools, solid expertise in waterproofing technology and hot air welding is essential. The users should be familiar with the properties of the roof membranes used as well as the equipment settings (temperature, air volume) and ideally have attended training courses from material or equipment manufacturers. Exercises on test surfaces help to train the interaction of temperature, pressure and speed.

The key to a proper repair is careful preparation of the damaged area, the appropriate cleaning method, correctly set device parameters, and calm, even handling with adjusted speed. Finally, the repaired areas should be inspected and documented.

Table of Contents

1. Introduction

Flat roofs with synthetic waterproofing membranes are now widespread and form the top protective layer against weather influences in many buildings. To maintain this protective function, damage must be detected early and repaired professionally. In practice, smaller damages often occur, which can be efficiently restored using suitable plastic welding equipment.

With the availability of powerful cordless hot air devices and complementary testing systems, it is possible to carry out many of these tasks without a mains connection. In this expertise, wireless roof repair describes the targeted use of such battery-powered devices for the detection, preparation, and repair of damage to synthetic flat roof waterproofing.

The following chapters cover the process from damage detection through preparation to temporary and permanent repair. The focus is on typical small and medium repairs, where cordless tools can demonstrate their strengths in terms of safety, flexibility, and efficiency.

2. Detection of Roof Damage

Early detection of damage to plastic flat roof seals reduces consequential damage and keeps repair costs manageable. The basis is a targeted inspection of the roof with an eye to typical damage patterns.

Reason for an Inspection

Typical triggers for a roof inspection are:

Regular Inspection/Maintenance Contract

The inspection can be carried out internally by the operator or as part of a maintenance contract by a specialized company. In this case, the roof is inspected at regular intervals, the condition of the seal is checked and any anomalies are documented or minor defects are repaired directly. Important: Interventions in the seal should be carried out by specialized personnel so that the system guarantees are not compromised.

Water in the Property/Indications of Leakage

Damp spots, dripping water or the formation of odors can indicate a leak in the building structure. The cause does not necessarily have to be the roof, but flat roofs are among the typical areas of suspicion. A targeted roof inspection is therefore a sensible first step to confirm or rule out a leak.

After Extreme Weather Events

Strong winds, hail, storms or heavy snow loads can lead to hidden damage. After such intense events, a visual inspection makes sense, but not after every normal rain shower or thunderstorm.

After Additional Installations on the Roof

During installations or maintenance work on systems (e.g. ventilation or PV systems) damage to seals can occur. Connections, conduit routes and work areas should then be checked particularly carefully.

Inspection Methods and Tools for Leak Detection

Visual Inspection

The first step is a visual inspection. This involves systematically examining tracks, welds, connections, and penetrations. The goal is to identify anomalies that may indicate a potential leak or to highlight areas that require more detailed examination, for example:

- **Tensile stresses/material shrinkage,** especially at edges, connections and details
- **Conspicuous areas with new fixtures,** e.g. after installation of PV systems, pipelines, equipment or railings
- **Changed roof surface,** e.g. displaced or removed protective gravel, driving or sanding marks, damaged vegetation
- **Areas with frequent foot traffic or material storage,** such as paths to generators or work zones of other trades
- **Inspection pipes in green or used roofs** help to detect damage early and to locate water penetrating under the waterproofing membrane more quickly. This allows a potential damage to be limited to a specific area of the roof surface without having to remove the entire wearing layer.

Such areas are considered critical and are given special attention during further examination and leak detection.

Vacuum Testing with VACUUM PLATE 100-LP

A vacuum plate can be used for targeted testing of welds and surfaces. The Leister VACUUM PLATE 100-LP is placed on the surface to be tested, creating a vacuum through the integrated pump. If air enters, this indicates a leak in the tested area.

The VACUUM PLATE 100-LP can be used independently of the mains because it operates on battery power. It ideally complements visual inspection: Suspect areas can be tested before repair and the quality of welds can be checked after repair – in the sense of a consistently wireless testing and repair process.

Typical Damage Patterns on Flat Roof Seals

During inspection, similar, clearly recognizable damage patterns always occur:

Mechanical Damage

This includes holes, cuts or dents that can be caused by walking, tools, transported materials, fireworks or subsequent installations, for example.

Open or Defective Welds

Typical examples include overlaps that are not fully welded or are only glued, seam edges that are open, or fine cracks in the seam area. Due to temperature fluctuations and movements in the structure, an originally tight connection can open up over time and become leaky.

Age-Related Damage (Cracks, Embrittlement)

Weather conditions make certain roofing membranes brittle or porous. In combination with wind loads or improper loads, fine cracks develop, especially in areas of high stress such as edges, connections or details.

Improper Workmanship

Incorrectly designed corners, details and penetrations, unsuitable fastenings or mismatched materials lead to structural weaknesses where leaks can occur later.

Delamination and Blistering

Loose areas, hollow spaces or blisters indicate poor adhesion or moisture in the structure. These areas are sensitive to damage during inspections and when subjected to pressure from solid objects, which can quickly lead to leaks.

These damage patterns form the basis for choosing the appropriate repair method in the following chapters.

3. Repair Preparation Schedule

The repair of a plastic flat roof seal is always carried out on the basis of the specific damage pattern. The aim of the preparation is to define the material, scope and procedure in such a way that the repair can be carried out professionally, safely and with suitable equipment.

Technical rules and standards that were relevant at the time the roof was constructed apply to repairs. The damage pattern determines whether a local repair is sufficient or whether a larger area needs to be renovated. Existing details, connections and previous repairs must also be taken into account.

Step 1: Identify Material

The first step is to determine the roof structure and waterproofing material. The decisive factor is which plastic membrane is present (e.g. PVC, TPO/FPO, ECB, EPDM) and how it is connected to the substrate. The rule for a safe repair is: combine like material with like material. New membranes, moldings or patches to be installed must be compatible with the existing waterproofing. Test welds are carried out on separate strips of material or leftover pieces, ideally from the same object. This allows the temperature and hand speed to be determined/adjusted without compromising the existing waterproofing.

Step 2: Determine the Size of the Damage

Next, the size of the damage is assessed:

- **Localized damage** such as cracks, holes or other damages can usually be repaired with a suitable patch.
- **Large-scale damage** or areas with multiple damages often require cutting out and replacing a larger field.

Additionally, it needs to be clarified whether there are any consequential damages, such as dampened insulation or damaged substructure. In this case, the structure must be opened up locally, the affected layers repaired or replaced, and only then will the new waterproofing be repaired or supplemented.

Depending on the situation, a temporary repair may first make sense in order to stop the penetration of water in the short term and to avoid further consequential damages before a comprehensive definitive repair is carried out.

Step 3: Determine Cleaning Method

In order for a weld to become permanently tight, the substructure must be clean, dry and free of release agents. After removing roof loads as well as loose objects and dirt, a standard cleaning has proven itself, which is carried out in three steps:

1. Rough Cleaning

Loose particles such as dust, gravel, leaves and other dirt are removed with a broom, brush or blowing device. The goal is to eliminate all coarse foreign bodies that could impair adhesion.

2. Wet or Damp Cleaning

The area is then thoroughly wiped down with water or a suitable cleaner. Using a Scotch pad makes the job much easier, as it can reliably remove stubborn dirt and fine release agent residues.

3. Drying and Final Inspection

Finally, the area is completely dried. The surface can be dry-rubbed with a dry cloth to remove any remaining moisture and create an optimal welding base. This is followed by a visual and tactile inspection to ensure that the substrate is clean, dry and ready for welding.

Important

Depending on the material, manufacturer-specific cleaners may be required. Incorrectly chosen chemicals can damage the surface or impair weldability. Therefore, it is always advisable to follow the instructions and recommendations of the respective material manufacturer.

4. Repair Methods

Depending on the type of damage, a distinction must be made between a temporary or permanent repair. Temporary solutions are used for quick securing to prevent further damage, while permanent repairs restore the long-term tightness of the seal.

Temporary Repair (Gluing/Provisional Solution)

Temporary repairs are used when a quick fix is needed and a definitive repair will be done at a later date.

Cleaning and Preparation

Before gluing, the surface must be clean, dry and free of grease. A three-step process has proven effective:

1. Rough cleaning
2. Wet or damp cleaning
3. Drying and final inspection

Solvent-based or highly degreasing cleaners should be avoided as they can attack the surface or affect adhesion. However, care must be taken to ensure that the cleaner does not leave any grease marks.

Application of the Adhesive

The adhesive is applied and pressed according to the manufacturer's instructions. A slight warming with the battery-powered hot air hand tool can improve adhesion, provided that the adhesive used is suitable for this purpose.

Advantages and Disadvantages of Temporary Repairs

Advantages

- Quick execution
- Can be implemented with little material effort
- Can be done without or with very little solvent

Disadvantages

- Partially limited lifespan (e.g. only a few years)
- Mostly a later permanent repair is necessary
- Adhesion only possible on dry surfaces (possibly after drying)

Permanent Repair (Welding)

In the case of permanent repairs, the sealing is carried out in such a way that it corresponds again to the original system structure.

Cleaning and Preparation Work

The surface preparation is carried out according to the procedure described in Chapter 3: First, loose dirt is removed, then the surface is cleaned and cleaned again. Afterwards, it must dry completely. The substrate and insulation must be intact; if necessary, waterlogged or damaged areas are replaced before the new track is welded.

Welding with Battery-Powered Hand Tools

Welding is carried out according to the specifications of the material manufacturer using suitable nozzle geometries. The following principles apply to battery-powered hand tools:

- Starting values for temperature and air volume according to the device or material manufacturer.
- Adjusting the hand speed to the material, ambient temperature and layer thickness.
- Perform test welds on scrap pieces to adjust and determine the welding parameters according to the conditions.
- High welding temperatures should be avoided. Older materials can react sensitively and lead to burns/open welds.
- If bubbles form, it is advisable to slightly reduce the temperature and reduce the hand speed in the same proportion until a uniform, bubble-free weld seam is created.

When combining old and new tracks, changes in properties should be expected. Aged membranes react more sensitively to heat and mechanical stress. Therefore, repair areas should be carefully prepared and closely monitored during welding.

Quality Inspection of the Repair

Each weld seam must be inspected after completion of the work.

Visual Inspection

Seam appearance, edge profile and transitions are checked. For example, open edge zones, blisters, slight burns or uneven roughness are noticeable.

Mechanical Testing/Sample

With a weld seam tester multitool or a normal weld seam tester, the seam is locally lifted to assess the connection without damaging the repair. A destructive weld seam test can be carried out on sample welds on residual pieces, but only non-destructive tests are carried out on the finished repair itself.

Vacuum Test (Bell or Plate)

The tightness of seams and surfaces is checked using a vacuum bell or vacuum plate. A vacuum is created and the surface can be wetted with soapy water. If soap bubbles appear, air is escaping, there is a leak and the area must be reworked.

Substrate and Blister Inspection

Any noticeable bulges in the repair area should be examined in more detail to rule out cavities or moisture in the structure.

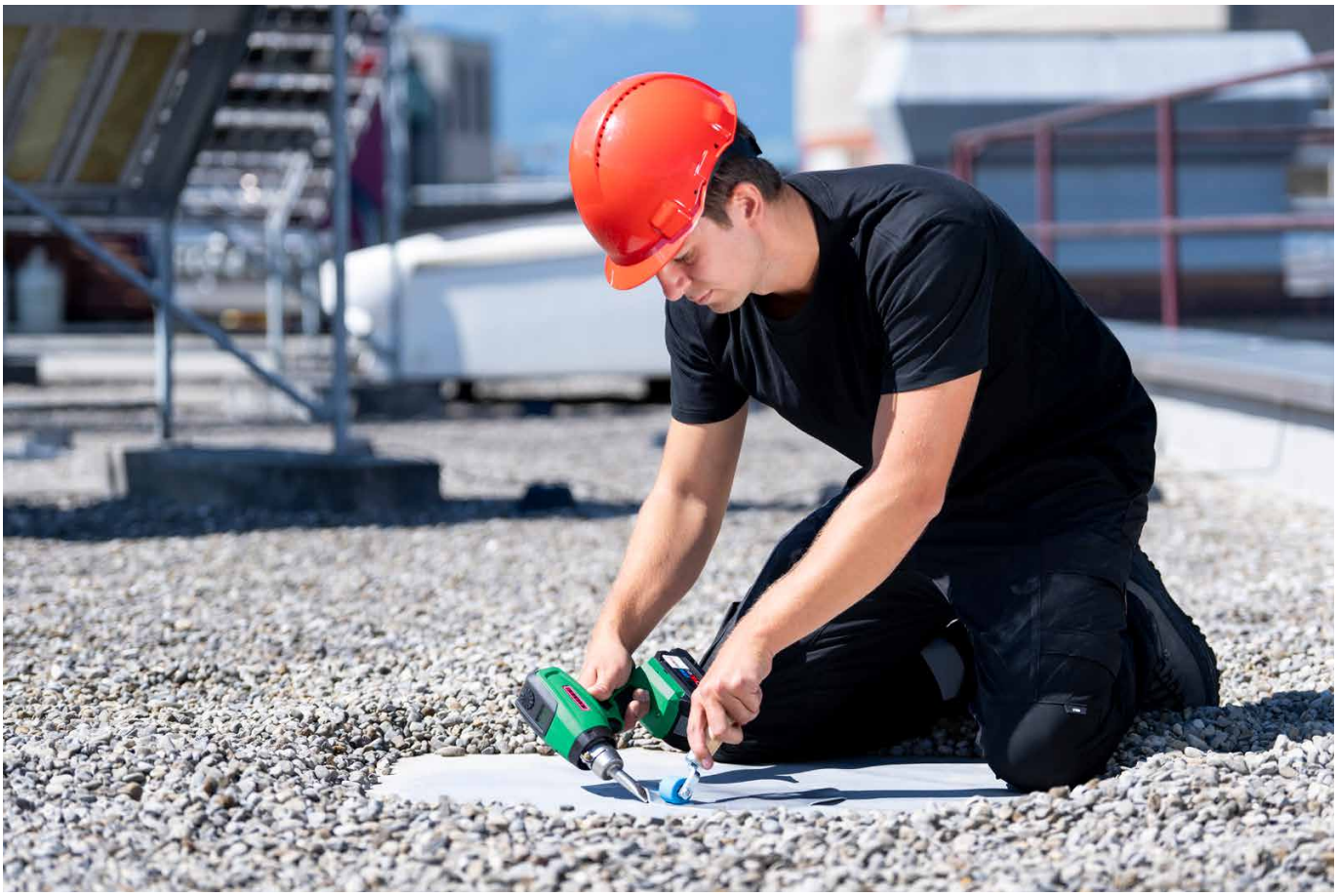
Completion

Only when all checks and inspections have been completed without any issues is the repair considered finished.

5. Conclusion

Wireless roof repair enables fast, efficient and safe repair of typical damage to plastic flat-roof membranes using battery-powered tools. Clear damage detection, structured preparation and selection of the correct repair method (temporary vs. permanent) are essential.

Correctly set welding parameters, test welds and consistent quality control are crucial for the repair to be permanently tight. This allows roofers, poly builders and service technicians to carry out numerous tasks wirelessly, flexibly and economically.



Sources

Image Sources

Images from the internal image database are the property of the Leister Group and are not listed in the list of sources.

Imprint

Julian Schenk
Product Manager Business Line Hand Tools
Leister Technologies AG

+41 41 662 76 74
julian.schenk@leister.com

Editorial
Anja Wieder, Manager Corporate Communications, Leister AG

Layout Design
Patrick Lussi, Graphic Designer, Leister AG

Legal Notices

Contents

We have carefully prepared the content of this white paper. We do not make any guarantee of any kind for the information. We reserve the right, without further notice, to change or update all information provided at any time.

Copyright | Commercial Property Rights

Texts, images, graphics and their arrangement are subject to copyright protection and other protective laws.
The reproduction, modification, transfer or publication of part or all of the contents of this white paper is prohibited in any form, except for private, non-commercial purposes.

All marks contained in this white paper (protected trademarks, such as logos and business names) are the property of Leister AG, Leister Brands AG or third parties and may not be used, copied or distributed without prior written consent.

Modifications

Modifications can be made at any time.

Leister AG
Galileo-Strasse 10
6056 Kaegiswil
Switzerland

leister.com
leister@leister.com
+41 41 662 74 74

LEISTER®
leister.com

Get in touch

Benelux
Leister Technologies Benelux BV
3991 CE Houten / Nederland
+31 (0)30 2199888
info@leister.nl

2270 Herenthout / België
+32 (0)14 22 69 93
info@leister.be

China
Leister Technologies Ltd. Shanghai
201 109 / PRC
+86 21 6442 2398
leister@leister.cn

Germany
Leister Technologies
Deutschland GmbH
42103 Wuppertal / Germany
+49 (202) 87006-0
info.de@leister.com

India
Leister Technologies India Pvt
600 041 Chennai / India
+91 44 2454 3436
info@leister.in

Italy
Leister Technologies Italia s.r.l.
20054 Segrate / Italia
+39 02 2137647
sales@leister.it

Japan
Leister Technologies KK
Yokohama 222-0033 / Japan
+81 45 477 3637
sales-japan@leister.com

Singapore
Leister Tech Asia Pte. Ltd.
Singapore
+65 9787 8712
info.sg@leister.com

USA
Leister Technologies LLC
Itasca, IL 60143 / USA
+1 855 534 7837
info.usa@leister.com

International Distribution
Leister International AG
+41 41 662 74 74
leister@leister.com