

ECHO BARRIER

Environmentally Sound

USER MANUAL



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Echo Barrier Acoustic Panels

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H-SERIES: Intelligent Noise Management

Lightweight, compact, flexible acoustic panels (Figure 1), unrivaled for all-around performance.



Figure 1. H-Series Acoustic Panels

Introduction

Echo Barrier leads the world in combating noise pollution with its modular system of portable acoustic panels. Internationally endorsed and certified, Echo Barrier is the first choice of responsible operators for both performance and sustainability.

Echo Barrier's H-series acoustic panels offer outstanding all-around performance, complementing exceptional noise absorption and reduction with portability, flexibility, durability and adaptability. They are also simple and quick to deploy.

Impressively resistant to water and extremes of temperature, Echo Barrier H-series acoustic panels rise to a multitude of challenges, such as those posed by rugged or difficult environments. ASTM E84 tests for flame spread and smoke development make the H-series suitable for projects subject to highly stringent fire regulations.

The H-series is simple and quick to deploy, clean and maintain. This user manual provides valuable information and clear instructions. Its prime aim is to ensure you get the best out of Echo Barrier's H-series acoustic panels, in terms of optimum noise mitigation on-site—no matter what the project or working environment—and of long-term value.

In this user manual, you will find:

- Guidance on health and safety
- Detailed information on installation
- Technical specifications
- Guidance on storage and transport
- Instructions for cleaning and repair

Customer Support

Multiquip offers expert and comprehensive technical support to its customers.

Our technical team is always available to advise on how best to deploy our acoustic panels in the context of a particular site, project or eventuality.

SAFETY INFORMATION

ADVISORY HEALTH AND SAFETY REQUIREMENTS

Compliance with the working instructions and risk assessments of the site's principal contractors.



Protective measures to comply with the principal contractor's risk assessment.



Gloves for handling abrasive materials



Safety footwear



High-visibility clothing for construction/traffic sites



Eye protection



Be aware that surfaces can become hot through exposure to sun radiation



To prevent ignition damage, **DO NOT** expose Echo Barrier panels to flammable substances



Manual handling:
Echo Barrier panels are flexible and can be rolled for ease of handling.

- Single panels can be lifted by a single person.
- Multiple panels must be lifted by more than one person.



Working at heights:

- Ensure safety harnesses are worn when working at heights
- Always use a working platform with a hand rail when installing the barriers at heights

WARNING SIGNS

YOU MUST FOLLOW INSTALLATION INSTRUCTIONS AND HEED WARNINGS BELOW AT ALL TIMES. PLEASE SCAN THE BELOW QR CODE TO ACCESS THE USER MANUAL THAT INCLUDES THE INSTALLATION INSTRUCTIONS.



WARNING – HIGH TEMPERATURE:

Placement of Echo Barrier panels under direct sunlight may cause extremely high temperatures on the panel surface. DO NOT touch without adequate protection.



WARNING – NO CUTTING:

Sharp cutting tools may cause irreparable damage to Echo Barrier panels. DO NOT use a blade or knife to cut fixings.



INSTRUCTION – FIT THIS WAY:

The front of Echo Barrier panels must face the noise receiver.

The back must face the noise source.

(Please see **Positioning and Fixing** section on page 7 for details)



INFORMATION – SUB-ZERO RESISTANCE:

Echo Barrier panels are cold resistant subject to BSEN 60068/2/1:2007.

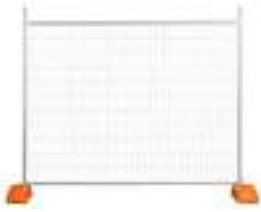
(Please see **Panel Specifications** table on page 11 for details)



INFORMATION – WATER RESISTANCE:

Echo Barrier panels are water resistant subject to BSEN 60529:1992 IPX9.

(Please see **Panel Specifications** table on page 11 for details)



Suitable structure for fixing the Echo Barrier panels



Fitting kits



Buffalo Bolts



Echo Barrier panels

Figure 2. Installation Components

BEFORE INSTALLATION

Please read these instructions carefully before commencing installation. Keep instructions in a safe place for future reference.

1. Check that there are sufficient and suitable components (Figure 2) to meet the particular noise-control needs of the project, site and environment. Check too that all components are in a serviceable condition.
2. Check all components carefully before assembly, to ensure that all of the necessary parts are present and none of them are damaged.
3. Is the supporting structure fit for purpose?
 - a. Is the structure stable?
 - b. Is the structure of sufficient height to carry the Echo Barrier panels?
 - c. Are the correct fitting kits/fittings available for attaching the Echo Barrier panels to the structure?
 - d. Ensure that the Echo Barrier panels can be safely fixed on the structure using the existing eyelets in the panels.
4. Consider the environmental/working conditions to which the Echo Barrier panels will be exposed.
 - a. Wind loading — In windy conditions, ensure that wind levels are consistently monitored. Additional bracing might be required. In very high winds, it might become necessary to remove the Echo Barrier panels from the structure entirely.
 - b. Prevailing weather conditions — Exposure to extreme heat, rain, sleet, snow and ice
 - c. Ground conditions — **DO NOT** install where the ground is liable to flooding, or where there are drainage gullies/ditches or evidence of subsidence.
 - d. The surrounding work zone and the likelihood of exposure to hot works/naked flames
 - e. The surrounding work zone and the likelihood of exposure to corrosive chemicals
 - f. Road and traffic conditions in the vicinity of the installation — Prevention of potential collisions with the fixing structure
 - g. Is there any requirement for additional support in the form of cantilever bracing?
 - h. Has a risk assessment been completed?
 - i. Has a temporary works assessment been completed?

NOTICE

The Echo Barrier panels should **NOT** be pierced to create additional fixing points.

POSITIONING AND FIXING

Positioning the Echo Barrier Panels to Create an Acoustic Shadow

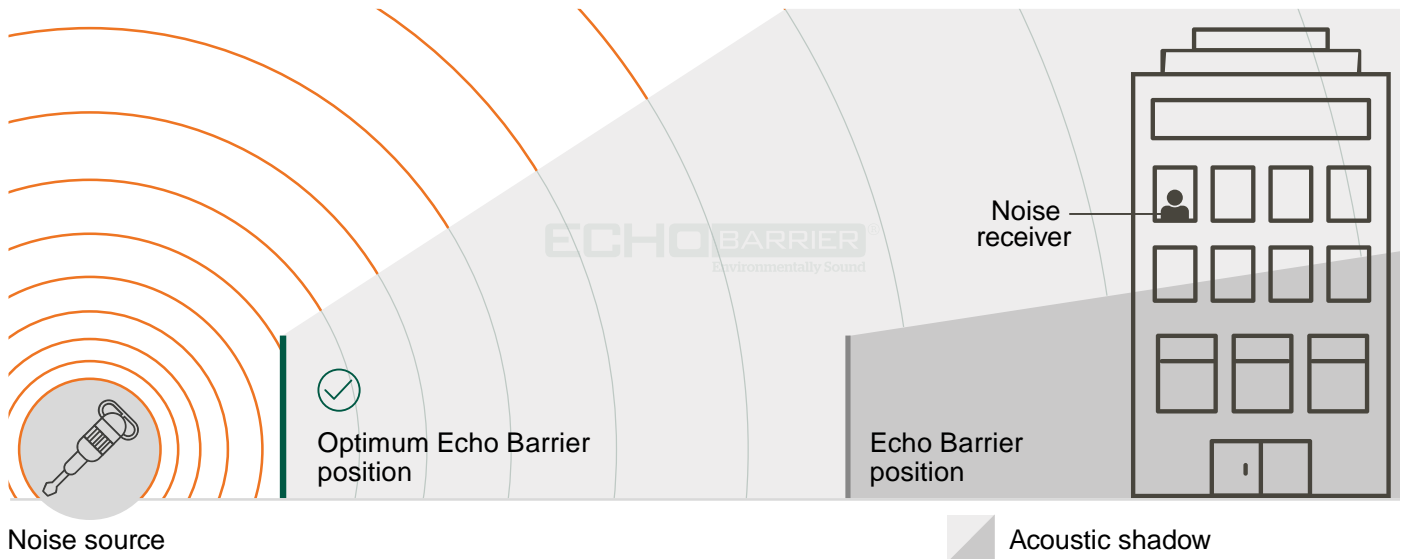


Figure 3. Acoustic Shadow

Please refer to the **Performance Guide** in this manual for advice on how to position the Echo Barrier panels in order to achieve maximum noise mitigation. See the **Key Factors in Successful Noise Mitigation** section.

Attaching the Echo Barrier Panels to the Supporting Structure

There are two easy ways of attaching the acoustic panels to the supporting structure:

- Echo Barrier's dedicated fitting kits
- Generic fixings (e.g. bungee hooks, cable-ties).

Echo Barrier panels can be installed vertically or horizontally, according to the specific on-site conditions and requirements.

Correct Orientation

The front of each Echo Barrier panel is different from its back (Figure 4).

- The front (which carries the Echo Barrier logo) must face the noise receiver.
- The back (a mesh surface) must face the noise source.

Orientation instructions are printed on the panels.



Front

Back

Figure 4. Panel Orientation

Installing Echo Barrier Panels

Provided the supporting structure is of sufficient height and strength to support the Echo Barrier panels, the panels can be attached to:

- Fencing
- Chain-link fencing
- Site hoardings (using drilled holes and fixing cables)
- Scaffold tubes
- Trusses
- Beams

Security

To minimize the risk of theft or damage through graffiti, Echo Barrier panels should be installed on the inner side (Figure 5) of any structure to which the public might have direct access.



Figure 5. Panel Security

Anti-Theft Cable

Security cables (Figure 6) can be used to padlock the Echo Barrier panels to the supporting structure.



Figure 6. Security Cable

Fixing Points

The existing eyelets (Figure 7) should serve as the sole fixing points for the Echo Barrier panels. You should not attempt to pierce any additional holes in the panels.



Figure 7. Eyelet

The eyelets at the top left-hand and right-hand corners are the principal fixing points of each Echo Barrier panel.

The central eyelet can be used for further securing the Echo Barrier panel to the supporting structure. It can also be used as a mid-fixing point if a panel is:

- straddling two supporting structures;
- being folded around a corner; or
- being installed horizontally.

The fixings in Echo Barrier fitting kits, or generic cable-ties, can be used for the central eyelets.

Overlapping the Echo Barrier Panels

When installing Echo Barrier panels either horizontally or vertically, the attachments should be made via the eyelets at the top left-hand or top right-hand corners of each panel.

The non-acoustic border of each Echo Barrier panel should overlap (Figure 8) the non-acoustic border of the adjacent Echo Barrier panel. This will serve to maximize noise reduction. As further Echo Barrier panels are added to create a barrier of a suitable size/configuration, they should also be overlapped.



Figure 8. Overlapping Panels

Folding the Echo Barrier Panels

Echo Barrier panels are flexible and can be folded to match the shape of the supporting structure. Whether fitted vertically or horizontally, Echo Barrier panels can be folded around corners to create an unbroken barrier for maximum noise reduction.

FITTING KITS

Echo Barrier's fitting kits (Figure 9) contain all the necessary components to optimize the installation and removal of the acoustic panels.



Figure 9. Fitting Kit Components

NOTICE

For proper installation, the manufacturer recommends one hook and two bungees per Echo Barrier panel, plus one additional hook for the last panel.

EXAMPLE: A 100-panel installation requires:

100 panels \times 2 = 200 bungees

100 panels \times 1 = 100 hooks + 1 add'l hook = 101 hooks

Dedicated kits are available for:

- Standard installation
- The creation of a vertical acoustic curtain or for extra-secure fixing. This kit includes Buffalo Bolts.

NOTICE

The recommended safe working vertical load for an M16 Buffalo Bolt is 364 lb. (165 kg). See Table 2.

INSTALLATION INSTRUCTIONS

NOTICE

For more detailed instructions, refer to the **Installation Instructions** included with your Echo Barrier panels.

1. Install a hook on the supporting structure (e.g. fencing).
2. Hold the Echo Barrier panel against the structure.
3. Place the hook through the top eyelet at either the left-hand corner or the right-hand corner of the Echo Barrier panel.
4. With the Echo Barrier panel hanging temporarily from a single hook, install a second hook on the fixing structure.
5. Attach the panel to this second hook, using the top eyelet located at the opposite corner of the panel.
6. The panel, now hanging from two hooks, should be fully supported and hanging square.
7. Fix the next Echo Barrier panel in the same manner, using the hook installed in Step 4 for the left-hand or right-hand eyelet of the new panel.
8. The borders of the panels should overlap.

INSTALLATION GUIDE

9. Following the procedure in Steps 4–6, secure the new panel with a further hook.
10. To secure each Echo Barrier panel further to the fixing structure, a hook (or a bungee or cable-tie) can be inserted into the center eyelet at the top of the panel.
11. Two or three hooks should be used for each Echo Barrier panel, further secured with appropriate bungees or cable-ties, in accordance with the site conditions.
12. Thread and attach a bungee through the eyelet in the center of the side of each Echo Barrier panel, thus forming a seal between the panel and the supporting structure.
13. Thread and attach a bungee through the central eyelet at the bottom of each panel.
14. In both of the above cases, the toggle of the bungee should emerge at the back of the Echo Barrier panel. Straighten the toggle to block the eyelet.
15. To attach a bungee to the supporting structure, thread the bungee through the eyelet. When the toggle emerges on the other side of the supporting structure, straighten the toggle, stretch the bungee, and hook it to the fence, ensuring a tight seal.

Cable-ties can also be used to secure the Echo Barrier panels to a supporting structure. The cable-tie should be:

- threaded through each eyelet as required;
- looped around a section of the supporting structure; and
- reinserted into an adjacent eyelet.

Removal of the Echo Barrier Panels

1. Move along the fence line, removing the hooks from the fence.
2. Unfasten or cut all the cable-ties that are securing the panel to the fixing structure. For cutting, use scissors, not a blade.
3. Unhook the panels once all of the fastenings have been loosened or cut.

NOTICE

DO NOT use a blade to cut fixings. This might result in damage to the panel.

VERTICAL INSTALLATION ON SCAFFOLDING AND CREATION OF A VERTICAL ACOUSTIC CURTAIN

Echo Barrier acoustic panels can be installed on the scaffolding of a multi-story building, providing noise mitigation for projects in built-up areas.

1. Ensure that the scaffolding:
 - has been designed, installed and certificated by a competent company;
 - has a safe loading limit sufficient to support the panels;
 - will withstand prevailing weather and environmental conditions; and
 - is suitably tied and braced. Refer to regional scaffold standards as necessary.
2. Ensure that adequate equipment is provided to allow safe access/egress from the installation point. Echo Barrier recommends that the panels should **NOT** be manually carried up ladders or transported on a mobile elevating working platform (MEWP).
3. In windy conditions it is recommended that the Echo Barrier be secured to the fencing at each fixing point. Lift the panels to the scaffold height, at a location near the planned installation point.

NOTICE

When installing a vertical screen or curtain, use M16 Buffalo Bolts (Figure 10), attaching the Echo Barrier panel with two bolts in the top eyelets and two bolts in the lateral eyelets. See Table 2 for safe working load data.



Figure 10. Buffalo Bolts

Removal of the Echo Barrier Panels

1. Move along the scaffolding, removing the fixings and releasing the panels from the structure.
2. Once the panels are released, remove and stack safely.
3. Store and reuse the fitting components as possible.

INSTALLATION GUIDE

Table 1. Echo Barrier H-Series: Panel Specifications

Applications	Results
Max noise reduction (lab tested)	Please refer to specific product specification sheet
Max noise absorption (lab tested)	Please refer to specific product specification sheet
Height	81 in. (2,050 mm)
Width	53 in. (1,335 mm)
Rolled dimensions	16 in. diameter (400 mm), 53 in. wide (1,335 mm)
Weight	Please refer to specific product specification sheet
Water resistant test standard	BSEN 60529:1992 IPX9
Fire resistant test standard	BS 7837-1996
Dust resistant test standard	BSEN 60529-1992
Cold resistant test standard (result)	BSEN 60068/2/1:2007
Tensile test standard (result)	Please refer to specific product specification sheet
UV resistant	3 years
Safety features	Night-time reflective strips, hazard icons
Quick install	1-man assembly (installation kits), rollable
Installation kits	Yes
Anti-theft	Security cable, data tag (requires special scanner)
Cleaning	Power wash
Identification code part number	Unique RFID number per unit (read with special scanner)
Manufacturer's warranty	1 year
Color options	On request (minimum order quantities apply)

Table 2. Buffalo Bolts: Technical Data

Recommended maximum safe vertical working loads for Bluemay Nylon Threaded Rod, Buffalo Bolts and T-Nut Connectors:

Size	lb. (kg)
M6	66 (30)
M8	110 (50)
M10	176 (80)
M12	265 (120)
M16	364 (165)
M20	474 (215)

Temperature range from +122°F to -22°F
(+50°C to -30°C)

NOTICE

Figures quoted are for vertical loads only—no data is available for inclined or horizontal loads.

Tightening and Use of Nuts

Care should be taken to not overtighten nuts when used with thermoplastic threaded rod.

NOTICE

Nuts should be tightened by hand and given half a turn with a spanner wrench.

NOTICE

It is not recommended to use steel nuts with thermoplastic threaded rod or bolts.

Table 3. Mechanical Data

Property	Dry Temp. °F (°C)	Units	Nylon 6.6
Tensile strength	73 (23)	lb-in. (N/mm ²)	.55 – .74 (62 – 83)
Elongation	73 (23)	%	20 – 200
Modulus of elasticity	73 (23)	lb-in. (N/mm ²)	15.3 – 24.2 (1,733 – 2,744)
Hardness: Rockwell	73 (23)		R112 – R120
Hardness: durometer	73 (23)		D80 – D85
Flexural strength	73 (23)	lb-in. (N/mm ²)	.76 – .86 (86 – 97)
Deformation under load 14 N/mm ² after 24 hrs.	122 (50)	%	1.0 – 3.0
Impact – Izod Notched at 50% RH	73 (23)	ft-lb. (J/m)	81 (110)

Table 4. Thermal Data

Property	Units	Nylon 6.6
Coefficient of linear thermal expansion	L/L°F (10 ⁻⁶ /K)	55.5 (100)
Melting point	°F (°C)	500 (260)
Flammability	Self-extinguishing	
Coefficient of thermal conductivity	Btu foot/hour/ft ² /°F (W/K.m)	.138 (0.24)
Deflection temperature: at 0.5 N/mm ²	°F (°C)	397 (203)
Deflection temperature: at 1.8 N/mm ²	°F (°C)	14 (60)

ECHO BARRIER DISCLAIMER

Echo Barrier Limited disclaims warranties of any kind other than those specifically contained in its Limited Warranty. Without limiting the foregoing, Echo Barrier Limited specifically disclaims any liabilities that may arise directly or indirectly as a result of the following:

1. On-site application or installation, including but not limited to damages as a result of any fault attributable to personnel installing the Echo Barrier panels
2. Unauthorized disassembly or repair
3. Damage due to improper handling
4. Normal wear and tear
5. Damage as a result of alteration, repair, or part replacement not authorized by Manufacturer
6. Misuse, willful damage, abnormal storage or working conditions, or abuse
7. Unreasonable use and/or negligence
8. Installation, use or maintenance of Echo Barrier panels which is not in accordance with the written recommendations and restrictions as contained in this **Installation Guide** or any signage on the Echo Barrier panel itself
9. Contact with corrosive or flammable substances
10. Submersion in water, whether by design or due to flood conditions
11. Damages due to severe weather conditions—i.e. heavy wind, thunderstorms, snowstorms, rainstorms, hurricanes, tornadoes, and hailstorms

UV EXPOSURE WARNING

Regular cleaning of the panel surfaces with a combination of chemicals can damage the UV-resistant coating on the fabric on the back of certain H-series panels. As a consequence, the color will fade through extreme exposure to sunlight.

NOTICES AND GENERAL WARRANTY

Please Note

This **Installation Guide** represents the general guidelines for effective installation and optimum use of Echo Barrier panels. Echo Barrier Limited reserves the right to alter these suggestions. It is the responsibility of the buyer/hirer, engineer, contractor, and/or their respective representative(s) to ensure that installation meets all applicable building standards and regulations. There is no performance warranty expressed or implied for any particular project or installation.

Copyright and Trademarks

© 2011 Echo Barrier Limited. All rights reserved.

All brand names and product names are trademarks, registered trademarks or trade names of their respective holders.

Regulatory

The product has been tested by certificated test bodies and found to comply with specific manufacturing standards.

For test results and specific standards please refer to the product specification sheets.

General

Every effort has been made to ensure the accuracy of the information given in this manual. However, in some cases changes in the product or availability could occur which may not be reflected in this document. Echo Barrier Limited reserves the right to make changes to specifications at any time without notice. Performance specifications are typical, but may vary depending on conditions beyond the control of Echo Barrier Limited, such as incorrect installation and/or maintenance of the product, and the working environment.

Performance specifications are based on information available at the time of printing. Echo Barrier Limited makes no warranty of any kind with regard to this material, including, but not limited to, implied warranties of fitness for a particular purpose. Echo Barrier Limited will not be liable for errors contained herein or for incidental or consequential damages in connection with the performance or use of this product.

This product is designed and manufactured with high-quality materials and components that can be recycled and reused.

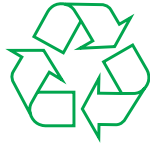


Figure 11. Universal Recycling Symbol

This symbol (Figure 11) means that, at their end of life, the items should be disposed of separately from regular waste. Please dispose of the product appropriately and according to local regulations, in compliance with the Environmental Protection Agency (USA), Department of Environment and Energy (AU), or Environment Agency (UK).

Please help us to conserve the environment we live in!

General Warranty Statements

Multiquip or Echo Barrier will not be held responsible for any de-fit/re-fit costs where components have been fitted incorrectly or damaged during assembly.

If any fault is found with the materials or workmanship, please refer to the manufacturer's warranty specific to your region or point of purchase. Remedial action will be taken, based on information received, on condition that:

- full details are supplied to Multiquip or Echo Barrier;
- the components have not been modified or tampered with; and
- Multiquip or Echo Barrier is informed of any damage/shortages prior to assembly.

This **Installation Guide** represents the general guidelines for effective installation and maximum use of the Echo Barrier. Multiquip or Echo Barrier Limited reserves the right to alter these guidelines without prejudice to their legal requirements. It is the responsibility of the buyer/hirer, engineer, contractor, and/or their respective representative(s) to ensure that the installation of the Echo Barrier panels meets all applicable building standards and regulations. There is no performance warranty expressed or implied for any particular project or installation.

Multiquip or Echo Barrier does not accept responsibility for any problems that may occur through incorrect assembly of any single or collective parts. The success of the noise reduction installation and operation is dependent on the siting of the acoustic barrier to block the line of sight between the noise source and the noise receivers, assessed by your acoustic calculations and assessment.

BARRIER NOISE MITIGATION

Echo Barrier's guide to successful noise mitigation with portable acoustic barriers. Echo Barrier leads the world in combating noise pollution with its modular system of portable acoustic panels.

This introductory guide defines:

- why Echo Barrier's portable acoustic panels are so effective at mitigating noise;
- why they offer superior performance in diverse operating conditions; and
- how you can achieve best results with them, in terms of both noise mitigation and broader commercial and reputational benefits.

Echo Barrier is committed to combating noise pollution and enhancing the sustainability of projects and businesses through the practical application of innovative technology.

Decibels, Noise Mitigation and the Human Ear

Noise levels are measured in decibels (dB). Since the decibel is a logarithmic (non-linear) unit of measurement, noise mitigation of just 3 dB is equivalent to a substantial (50%) reduction in noise energy, yet that reduction is only just perceptible to the human ear. If noise mitigation increases to 10 dB, it equates to a reduction in noise energy of 90%, which the human ear senses as noise reduction of 50%.

The chart below (Figure 12) places this in the context of the performance of Echo Barrier's H-Series acoustic panels. Taking this further, the chart makes clear why it becomes difficult to mitigate noise by more than 20 dB in the field (on-site).

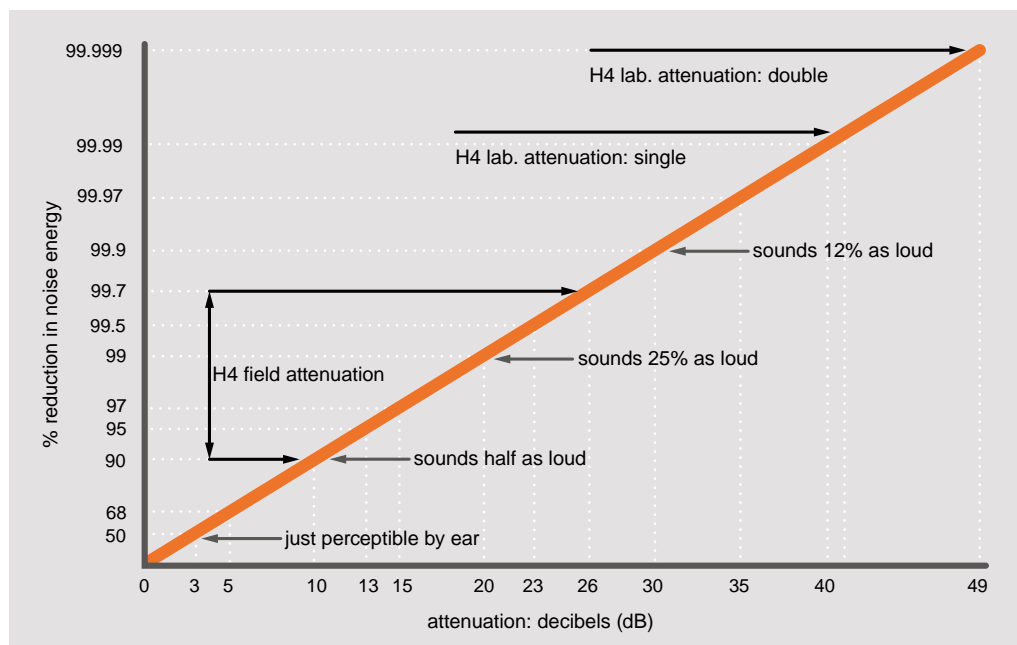


Figure 12. Barrier Noise Mitigation

NOTICE

Attenuation = Noise Mitigation

Especially important is that noise reduction of 20 dB equates to energy reduction of 99% (Table 5), yet the remaining 1% of energy represents 25% of the noise level perceived by the human ear.

Table 5. Noise Reduction		
Decibel reduction (dB)	Energy reduction (%)	Noise reduction as perceived by the human ear
10	90	Sounds 50% as loud (reduction of 50%)
20	99	Sounds 25% as loud (reduction of 75%)
30	99.9	Sounds 12.5% as loud (reduction of 87.5%)
40	99.99	Sounds 6.25% as loud (reduction of 93.75%)

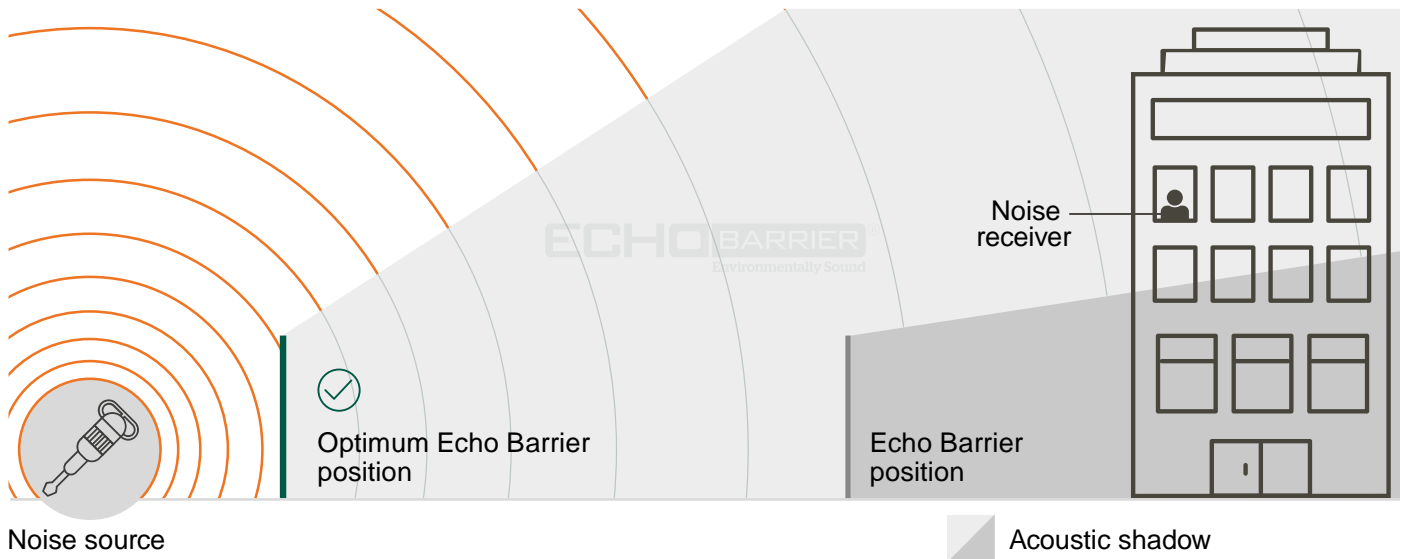
KEY FACTORS IN SUCCESSFUL NOISE MITIGATION

There are 4 key factors that determine the noise mitigation achieved by a barrier of any kind:

1. **Geometry** — The position of the barrier in relation to the noise source.
2. **Noise absorption** — The degree to which the barrier absorbs sound, rather than simply reflecting it. When noise is reflected, it can reverberate, amplifying noise pollution.
3. **Barrier mass** — Greater mass offers greater noise mitigation (i.e. results in greater transmission loss), but for the sake of practicality, a barrier also needs to remain manageable in terms of its size and weight, especially if it is to be portable.
4. **Barrier aesthetics** — If barriers are manufactured to a high standard and present a professional image, the perceptions of their performance can be considerably enhanced.

Geometry

Optimum configuration and noise mitigation with Echo Barrier's modular system



**Figure 13. Barrier Geometry:
The Key to Optimum Noise Mitigation**

The geometry of noise attenuation concerns the relative positions of:

- any barrier;
- the source of the noise it is intended to mitigate; and
- the noise receiver (the human ear).

The closer the barrier is placed to the noise source, the greater the noise mitigation, since the barrier's 'acoustic shadow' becomes larger—just as an object's visual shadow becomes larger when placed closer to a light source. If a barrier is made taller, this also increases the size of the acoustic shadow and reduces the amount of sound that passes over the barrier.

High-frequency sound is more directional than lower frequency sound. This means that higher-frequency sounds encountering a barrier are easier to mitigate than low-frequency sound, which is more likely to diffract and 'leak' around the barrier.

For optimum mitigation of low-frequency sound, any barrier should be as tall as practically possible. Echo Barrier's modular system of acoustic panels can respond to this need, since the panels can be readily assembled to create an acoustic 'wall' or 'curtain.'

Noise Absorption

Echo Barrier's patented technology means that sound is absorbed, not reflected.

Essentially, there are three kinds of barriers that are used in efforts to manage noise:

- Massive, heavy barriers made of hard materials such as wood, metal or glass
- Basic 'sound blankets' and conventional acoustic barriers which make use of generic sound-absorbing materials such as fiberglass and Rockwool
- Echo Barrier's high-tech acoustic panels, which are built around a lightweight composite which is highly sound-absorbent

The capacity of materials to absorb sound ranges from 0 (total reflection of sound) to 1 (100% absorption of sound, i.e. zero reflection). Hard materials such as wood, PVC, steel and glass in fact behave like acoustic mirrors, reflecting sound that strikes them and creating an echo. This means that a barrier made of hard materials can cause noise to be amplified rather than mitigated, the opposite of its intended effect. By contrast, the patented high-tech composite that forms the heart of Echo Barrier's panels 'cushions' and absorbs the noise. In fact, at certain frequencies it absorbs 100% of sound.

The soft, sound-absorbent materials used in basic 'sound blankets' and conventional acoustic barriers, such as fiberglass and Rockwool, are hazardous to handle. Echo Barrier's innovative panels, however, contain no hazardous components, and are easy and safe to handle. Moreover, Echo Barrier's lightweight composite vastly outperforms conventional sound-absorbent materials when it comes to attenuating low-frequency sound.

Conventional materials such as fiberglass and Rockwool also soak up water, which can reduce their performance by 50%. Echo Barrier's innovative composite is protected (to BSEN60529:1992 IPX6/IPX9) by a waterproof membrane, so that Echo Barrier panels can withstand wet weather conditions and be jet-washed safely, with no risk to their efficacy.

Barrier Mass

Mass and Weight: An Effective, Practical Balance

Generally speaking, the mass of a barrier has a major impact on the transmission of sound: the heavier the material, the less it vibrates, and consequently less sound passes through it. In practice, more sound tends to pass over a barrier rather than through it, so it can be advantageous for a barrier to be taller rather than simply greater in mass.

For a portable noise barrier to be both effective at noise mitigation and physically manageable, it needs to strike the optimum balance between mass, weight and dimensions. Echo Barrier's modular system of compact panels has been specifically conceived with this optimum balance in mind.

At the heart of each panel is Echo Barrier's lightweight, but highly sound-absorbent composite. The panels have been designed for easy and rapid configuration in order to provide maximum noise mitigation across diverse site geometries. The various components of Echo Barrier's system can be positioned, combined and layered to provide the best possible response to the particular conditions and challenges of a project. To create an acoustic wall or curtain, they can be linked both vertically and laterally, or doubled up in thickness (which substantially increases noise mitigation).

Intelligent Design

The absorption of low-frequency sound achieved by Echo Barrier's patented composite is comparable with the performance of conventional sound-absorbent materials that are more than twice as thick. As a result, Echo Barrier panels are much slimmer and lighter than conventional acoustic barriers—and they offer the same level of performance under both dry and wet conditions.

If barriers are to achieve optimum mitigation of noise, they must be particularly effective at absorbing frequencies in the 300 Hz – 800 Hz range (low/medium frequencies). Higher frequencies, by comparison, are relatively easy to block. Any sound-absorbing barrier (including Echo Barrier's panels) needs to be a minimum of 25 mm (1 in.) thick to be effective.

To absorb low frequencies (e.g. 250 Hz), conventional sound-absorbing materials need to be 100 mm (4 in.) thick. As a consequence, basic sound-absorbent blankets can become excessively heavy and cumbersome if they are to be effective across the full range of sound. These problems do not occur with Echo Barrier's modular range of acoustic panels, which are lightweight and can easily be layered to provide extra thickness and sound mitigation.

Portability and Reconfiguration

During the course of any project, the geometries between barriers, noise sources and noise receivers change frequently—sometimes constantly. As conditions change, so should your noise-mitigation measures if optimum results are to be achieved.

Massive hard barriers are not portable since they are too heavy and cumbersome to be reconfigured or moved around during the course of a project. By contrast, Echo Barrier offers a modular system of portable acoustic panels which are not only effective at attenuating sound, but also quick and easy to deploy. They offer flexibility and favor constant optimization of performance as circumstances and needs change.

Independent tests have shown that, in the field, Echo Barrier's panels can provide no less than three times the mitigation at low frequencies that was recorded in Echo Barrier's own laboratory tests and subsequently published.

Barrier Aesthetics

Looks Really Do Matter

Echo Barrier's panels are hand-finished to ensure both outstanding durability and unrivaled quality of visual presentation.

Echo Barrier's products thus prove an asset when it comes to projecting a professional and responsible corporate image on site. The panels can be printed with brand logos and community care messages, enhancing brand awareness and communication.

Independent research has shown that the evident quality of Echo Barrier's products enhances perceptions of their already exceptional performance. Notably, the high-quality presentation of Echo Barrier's products led research respondents to perceive them as considerably more effective at mitigating sound than typical shabby-looking barriers. Positive perceptions of this kind reduce the likelihood of complaints from people in the vicinity of a site. Echo Barrier's panels, which can be jet-washed, maintain their appearance throughout their usable life, remaining a visual as well as a practical asset.

Ease of Use, Safety and Environmental Responsibility

Echo Barrier's innovative acoustic panels are designed for easy transportation and for quick installation and disassembly.

When compared with conventional acoustic barriers, an Echo Barrier system can be installed twice as fast by half the personnel. This creates obvious economies, and rapid deployment proves invaluable for quick-turnaround projects such as nighttime rail maintenance and urgent road works. Echo Barrier offers a dedicated rapid installation kit for its lightweight panels, and the panels can be simply rolled up for easy storage and transportation.

During the course of a project, the panels can be readily reconfigured in response to changes in site geometry and requirements for noise mitigation. They can also be linked both vertically and laterally, and doubled up in thickness, to create an acoustic wall or curtain.

Health and Safety

Echo Barrier's panels are constructed with an innovative hi-tech composite that has been rigorously tested, both in the laboratory and in the field. They do not contain fibrous materials such as Rockwool and fiberglass (used in sound blankets and conventional acoustic barriers), which can prove hazardous since they irritate skin and can cause dermatitis. Not only will blankets eventually tear or rip, releasing fibers, they can also harbor large quantities of dust, which can prove a respiratory hazard. Moreover, the slimness and light weight of Echo Barrier's panels make for easy and safe handling, and they are resilient and tough, not prone to tearing or ripping.

Environmental Responsibility

Echo Barrier is proud to say that its latest generation of acoustic panels incorporates a substantial proportion of recycled materials. All panels returned at the end of their lifecycle to Echo Barrier are either recycled or disposed of in accordance with strict guidance provided by the Carbon Footprint Association.

PERFORMANCE GUIDE

**Table 6. Checklist:
Echo Barrier vs Other Acoustic Barriers**

Feature	Echo Barrier	Other Barrier	Reason
Acoustic performance			
Waterproof (to BSEN60529)	✓		Waterlogging compromises performance by up to 50%
3 kg/m ² or 5 lb/yd ² > weight > 2.5 kg/m ² or 4 lb/yd ²	✓		Optimum weight for most applications
Acoustic absorption > 80% (300 Hz – 800 Hz) 40 mm	✓		Achieve highest performance in the field
40 mm or 1.5" > thickness > 25 mm or 1"	✓		Effective sound absorption—but slim
Rapid installation kit	✓		Easy optimization of site geometry/rapid deployment
Aesthetics	✓		Considerably enhances perceptions of efficiency in noise mitigation
Panels can be doubled-up on site	✓		Increase mitigation where needed
Performance: total marks from possible 7	7		
Site practicalities and handling			
Rapid installation kit	✓		Install 2x faster with ½ the personnel
Lightweight	✓		Better/easier manual handling
No fiberglass/Rockwool	✓		Not hazardous to skin
No water retention	✓		Less weight/mess/mildew
No retention of dust i.e. non-porous	✓		Avoid respiratory hazards—dust diseases
Roll-up design feature	✓		Better/easier manual handling/storage/transportation
Scaffold curtain fit kit	✓		Quicker installation with fewer personnel
Minimum 5-year life (durable and well made)	✓		Value for money
Site: total marks from possible 8	8		
Site safety and security			
No fiberglass/Rockwool	✓		Not hazardous to skin
No retention of dust i.e. non-porous	✓		Avoid respiratory hazards—dust diseases
Fire-resistant	✓		Reduced fire risk
Lightweight	✓		Better/easier manual handling
Reflective strips	✓		Night-time visibility
Anti-theft cable	✓		Reduced potential for theft from site
Safety: total marks from possible 6	6		
Aesthetics and corporate image			
High-quality materials and construction	✓		Corporate image on site combined with durability
Color options	✓		Harmonize with corporate branding/environment
Printing of logos, messages, contact details	✓		Company branding, corporate image and marketing
Minimum 5-year life (durable and well made)	✓		Site looks professional and well run over project period
Aesthetics: total marks from possible 4	4		
Recycling			
Extensive use of recycled materials	✓		Substantially reduced carbon footprint
Comprehensive recycling policy	✓		Environmentally responsible
Recycling: total marks from possible 2	2		
Purchase Costs — ROI			
Cost per barrier divided by typical lifespan	✓		Industry norm is 6 months to 2 years. Projected life of Echo Barrier H4 range is 3–5 years outdoors, up to 10 years indoors
Total checklist marks from possible 28	28		

STORAGE AND TRANSPORTATION

LARGE PALLET (80" x 55" / 2.05 M x 1.4 M)

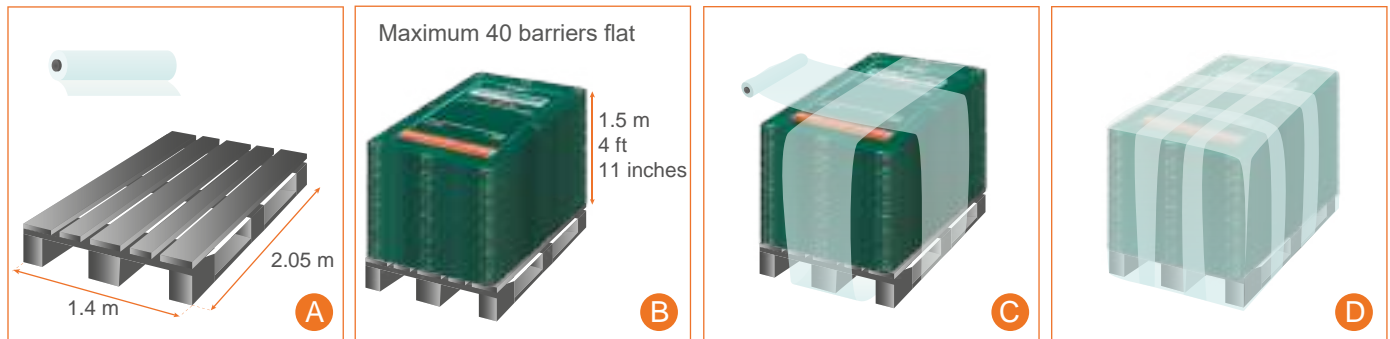


Figure 14. Storage and Transportation (Large Pallet)

1. Ensure the pallet (Figure 14A) is in good condition. Broken slats or protruding nails could damage the Echo Barrier panels.
2. Place the panels on the pallet (Figure 14B). When stacking panels, the stack should not exceed 40 panels.
3. Shrink-wrap the panels to the pallet (Figure 14C), with wrap running both top-to-bottom and side-to-side.
4. Shrink-wrap the entire pallet (Figure 14D) to secure the stack(s) of panels to the pallet.

SMALL PALLET (47" x 39" / 1.2 M x 1.0 M)

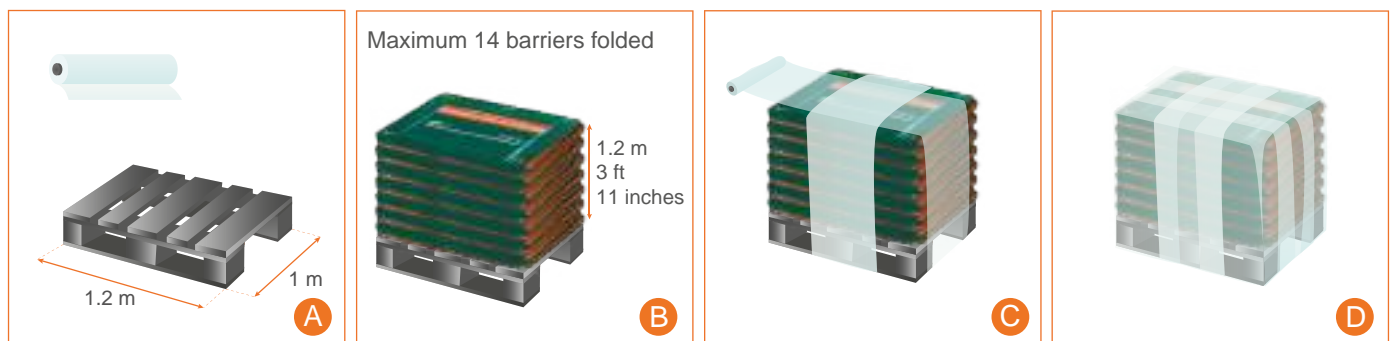


Figure 15. Storage and Transportation (Small Pallet)

1. Ensure the pallet (Figure 15A) is in good condition. Broken slats or protruding nails could damage the Echo Barrier panels.
2. Fold each panel in half. Stack the panels on the pallet, alternating the direction of the folded edges (Figure 15B). This will ensure that the stack is neat and stable.
3. Shrink-wrap the panels to the pallet (Figure 15C), with wrap running both top-to-bottom and side-to-side.
4. Shrink-wrap the entire pallet (Figure 15D) to secure the stack(s) of panels to the pallet.

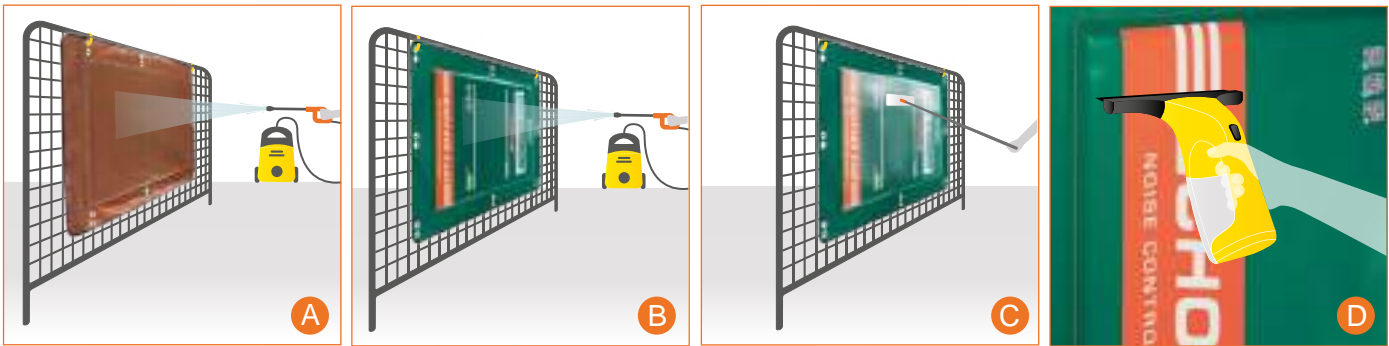


Figure 16. Cleaning the Panels

CLEANING INSTRUCTIONS

1. Hang the Echo Barrier panel on a fence (Figure 16A), with the back (mesh side) facing towards you.
2. Pressure-wash the mesh from top to bottom.
3. If necessary, scrub the mesh using warm soapy water and a stiff brush. Pressure-wash the mesh again to remove soap and residue.
4. Using a wet vac with a squeegee attachment (Kaercher or similar), remove surface water from the mesh.
5. Reverse the Echo Barrier panel and hang it with the front (green side) facing towards you. See Figure 16B.
6. Pressure-wash the surface dirt from the front of the panel (Figure 16B).
7. Scrub the front of the panel with warm soapy water and a stiff brush (Figure 16C).
8. Pressure-wash the front of the panel to remove soap and residue.
9. Using the wet vac, remove surface water from the front of the panel (Figure 16D), so that the panel is dry to the touch.

NOTICE

If surface water is not removed from the panel prior to stacking, it is possible that the panel will not look clean once it has dried.

GRAFFITI REMOVAL

1. Lay the Echo Barrier panel flat.
2. Pour Rapid Remover into a spray bottle, spray the affected area and leave for one minute.
3. Using a dry cloth, wipe the affected area. This will remove 60–80% of the graffiti.
4. To remove the remaining graffiti, apply some Rapid Remover to a dry cloth/sponge and scrub the graffiti.
5. Once all the graffiti is removed, clean the panel (following the instructions in the previous section), in order to wash away all traces of Rapid Remover.

PANEL REPAIR METHOD

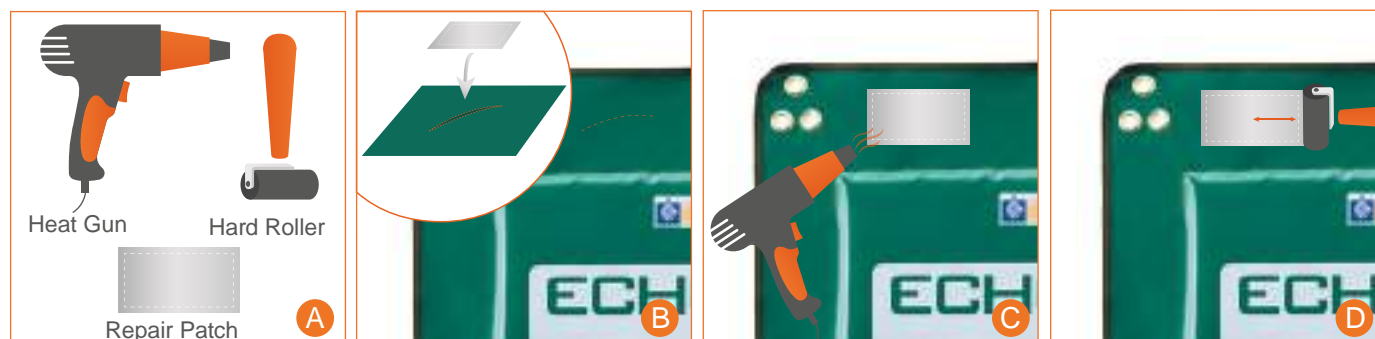


Figure 17. Panel Repair

Front of the Panel

1. Identify the damaged area and cut a neat patch (Figure 17A) to fit it. The patch should be slightly larger than the damaged area, and ideally rectangular.
2. Gently heat the edges of the damaged area with a heat gun, taking care to not melt the surface of the panel. Place the patch over the damaged area (Figure 17B), ensuring the edges are covered by the patch.
3. Using the heat gun, heat the edges of both the patch and the damaged area (Figure 17C). Without melting, they should become sufficiently soft to be pressed together.
4. Use a hard roller to press together the patch and the edges of the damaged area (Figure 17D), ensuring that they will not separate once they have cooled. If necessary, apply more heat whilst rolling.

CAUTION

The roller can become hot, so take care to not touch the metal parts.

NOTICE

If you are carrying out several repairs at one time, you will find that the hard roller will warm up, which will facilitate the process.

Back of the Panel

1. Identify the damaged mesh area and cut a neat patch of mesh to fit it. The patch should be slightly larger than the damaged area, and ideally rectangular.
2. Place the patch over the damaged area, ensuring the edges are covered by the patch.
3. Using the heat gun, heat the edges of both the patch and the damaged area. When the mesh starts to shrink on the edges of the patch and the damaged area, it is time to press the patch and the main body of mesh together.
4. Use a hard roller to press together the patch and the edges of the damaged area, ensuring that they will not separate once they have cooled.

NOTICE

In all cases please refer to your company's RAMS (Risk Assessment Method Statement).

NOTICE

If the patch is quite large, start the repair process at one end and work in small stages until the process has been completed for the entire patch.

USER MANUAL

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