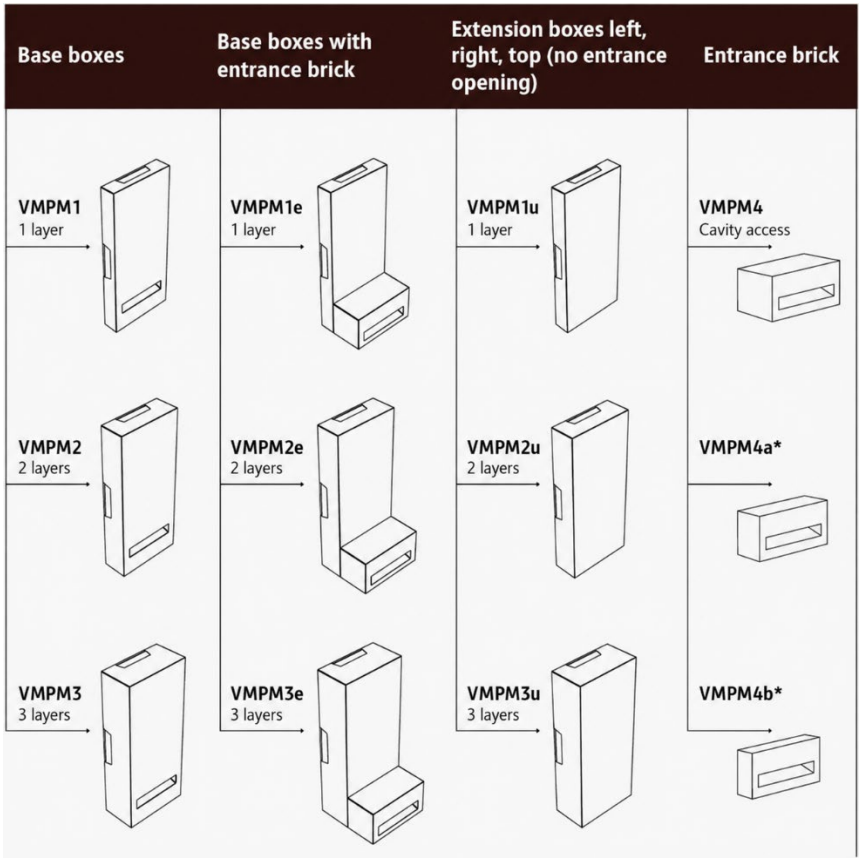
# Ecological factsheet

Modular integrated woodcrete bat boxes:
VMPM | VMPMe | VMPMu | VMPM4 | VMPMG1 | VMPMK1




| Type | No. | Material | Layers | Weight | Internal dimensions (L×W×H) | Internal depth |
|---|---|---|---|---|---|---|
| Base bat box | VMPM1 | Woodcrete | 1 layer | 3.9 kg | 38.5x17x2.5 cm | 1x 2.5 cm |
| | VMPM2 | Woodcrete | 2 layers | 5.5 kg | 37.6x17.5x2.5 cm •• | 2x 2.5 cm |
| | VMPM3 | Woodcrete | 3 layers | 7.1 kg | 36.7x18.2x2.5 cm •• | 3x 2.5 cm |
| Bat box + entrance brick | VMPM1e | Woodcrete | 1 layer | 6.2 kg | 38.5x17x2.5 cm | 1x 2.5 cm |
| | VMPM2e | Woodcrete | 2 layers | 7.8 kg | 37.6x17.5x2.5 cm •• | 2x 2.5 cm |
| | VMPM3e | Woodcrete | 3 layers | 9.4 kg | 36.7x18.2x2.5 cm •• | 3x 2.5 cm |
| Bat box extensions | VMPM1u | Woodcrete | 1 layer | 3.7 kg | 43.7x17x2.5 cm | 1x 2.5 cm |
| | VMPM2u | Woodcrete | 2 layers | 5.0 kg | 44.3x17.5x2.5 cm •• | 2x 2.5 cm |
| | VMPM3u | Woodcrete | 3 layers | 6.2 kg | 44.9x18.2x2.5 cm •• | 3x 2.5 cm |
| Entrance bricks | VMPM4 | Woodcrete | - | 2.3 kg | - | - |
| | VMPM4a* | Woodcrete | - | 1.1 kg | - | - |
| | VMPM4b* | Woodcrete | - | 0.7 kg | - | - |

*Only combine with base boxes
**Dimensions per layer

# General information

**Microclimate**

According to the Bij12 Knowledge Document for the common pipistrelle, the microclimate of a provision is determined by gradients, stability, and minimum and maximum temperatures (Bij12, 2024). Larger provisions generally offer a greater variety of microclimates (Schillemans et al., 2021).

**Occupancy rate**

In Unitura's own monitoring study into the use of provisions from the VMPM series, the average occupancy rate after two years was 63% for the common pipistrelle (Van Wijk & Jansen, 2023). However, this does not mean that 63% of the bat boxes are occupied by common pipistrelles at any given moment. It refers to provisions that are in use (based on the presence of recent droppings or individuals present) or have been used (based on the presence of older droppings). Because bats use a network of roosts (Bij12, 2024), boxes that have been occupied may well be occupied again. Further on in this factsheet, several links are provided to videos of VMPM boxes occupied by bats.

It is also important to be aware that some bat species have a longer acclimatisation period, which means that they may only start using a new provision after several years (Schillemans et al., 2021). The common pipistrelle is often one of the first species to be found, frequently within 1-3 years (Korsten, 2012). Nathusius' pipistrelle also generally finds bat boxes quickly, usually within 1-3 years (Korsten, 2012).

To increase the likelihood of successful occupancy by bats, it is important to take the placement requirements into account. See, for example, section 3.3 (p. 53) of the Bij12 Knowledge Document for the common pipistrelle (Bij12, 2024) or Unitura's Mitigation Handbook (Unitura, 2021).

## Formal requirements for provisions

Various institutes set requirements for bat roosts. For which functions/species/types of roosts do the boxes from the VMPM series meet these requirements?

### Bij12 Knowledge Document requirements

Only a Bij12 Knowledge Document for the common pipistrelle is available (Bij12, 2024). It sets the following requirements for provisions (see also p. 67 of the Knowledge Document):

| Roost/nesting site type | Internal dimension requirements for permanent provision | Complies |
|---|---|---|
| Summer roost or mating roost | 15 cm wide, 80 cm high \| depth 1.5 to 2 cm \| access slot 2 cm | Yes* |
| Maternity roost | Bespoke \| depth 2.5 cm \| access slot 2.5 cm high | Yes** |
| Mass hibernation roost | Bespoke \| depth 2.5 cm \| access slot 2.5 cm high | No |

* The VMPM series has cavity depths of 2.5 cm and an access slot of 2.5 cm (measured perpendicular to the surface). This is to make the boxes suitable as maternity roosts and to provide space for larger bat species as well. According to the Knowledge Document, this makes the boxes slightly less optimal for the function of summer roost/mating roost for the common pipistrelle, but it does make them immediately suitable as maternity roosts. The VMPM1 + VMPM1u combination is the simplest combination that meets the minimum requirements. Linked boxes must be connected vertically to meet the 80 cm height requirement.
** A maternity roost is always a bespoke provision. Make sure that several elements with different orientations are connected to meet the minimum requirements. The exact minimum requirements depend on the existing roost that has been found. In some cases, it may be necessary to combine the provision with facade boarding and other additional hiding places.

**NKNB requirements**

| Species | Roost/nesting site | Internal dimension requirements | Complies |
|---|---|---|---|
| Common and Nathusius' pipistrelle | Summer/mating and limited hibernation roost | Surface area: min. 0.35 $m^2$<br>Depth: 17-30 mm<br>Access slot: 17-20 mm high, 50-100 mm wide | Yes* |
| | Maternity roost | Surface area: min. 2.5 $m^2$<br>Depth: 17-30 mm<br>Access slot: 17-20 mm high, 50-100 mm wide | Yes** |
| Brown long-eared bat | Summer and mating roost | Surface area: min. 0.22 $m^2$<br>Depth: -<br>Access slot: 17-20 mm high, 50-100 mm wide | Yes* |
| Serotine | Summer roost | Surface area: min. 2.5 $m^2$<br>Depth: 25-30 mm<br>Access slot: 20-30 mm high, 50-100 mm wide | Yes** |

Source: https://nknb.nl/maatregel/vleermuiskast_in_gevel_huis/#3

* The VMPM series has an access slot of 2.5 cm (measured perpendicular to the surface). This is to make the boxes suitable as maternity roosts and to provide space for larger bat species as well. According to the NKNB, this makes the boxes slightly less optimal for the function of summer roost/mating roost, but it does make them immediately suitable for more species. The VMPM3 + VMPM3u combination is the simplest combination that meets the minimum requirements.
** A combination of 10 VMPM3 or VMPM3u boxes is required to meet the minimum requirements.

## Proven effectiveness

**Definition used here**

The extent to which it is plausible that a provision, when installed correctly, will be used by specific species for specific functions. This plausibility must be supported by data.

**Proven effectiveness by function**

In general, relatively little information is available on the proven effectiveness of bat boxes. The only knowledge organisation that makes clear statements on the effectiveness of boxes is the NKNB; see the table below.

Based on this information, combined with Unitura's research into the effectiveness of the VMPM series (Van Wijk & Jansen, 2023), it can be stated that boxes from the VMPM series, when used in the correct configuration, are effective for the following species/functions:

| Species | Roost/nesting site | Functionality | Status |
|---|---|---|---|
| Common pipistrelle | Summer roost and mating roost | ++ | Scientifically proven |
| | Hibernation roost | + | Scientifically proven |
| | Maternity roost | +/- | Scientifically proven |
| | Mass hibernation roost | - | Unknown |
| Nathusius' pipistrelle | Summer roost and mating roost | ++ | Scientifically proven |
| | Hibernation roost | + | Scientifically proven |
| Serotine | Small summer roost | +/- | Anecdotally proven |
| | Maternity roost | - | Anecdotally proven |
| Brown long-eared bat | Summer roost and mating roost | + | Anecdotally proven |

Source: https://nknb.nl/maatregel/vleermuiskast_in_gevel_huis/#2

## Visual material

Several maternity colonies have been recorded using linked boxes from the VMPM series (video and photos):

- 111+ common pipistrelle individuals in linked VMPM boxes: https://www.linkedin.com/feed/update/urn:li:activity:7066707003049447424/
- Maternity colony (25+ individuals) of common pipistrelle in linked VMPM2 boxes: https://www.linkedin.com/posts/rick-wortelboer-5a197b12_unitura-leystromen-leystromen-activity-7199313024308981763-LzHk?utm_source=share&utm_medium=member_desktop
- 69+ common pipistrelle individuals in VMPMK1: https://www.linkedin.com/posts/sicco-jansen-b6a51297_als-het-gaat-om-massa-winterverblijfplaatsen-activity-7199306941238571009-sjk_/?utm_source=share&utm_medium=member_desktop
- 96+ common pipistrelle individuals in linked VMPM boxes: https://www.linkedin.com/posts/rick-wortelboer-5a197b12_leystromen-dwergvleermuizen-unitura-activity-7215114153231872000-GDug?utm_source=share&utm_medium=member_desktop

Bats leaving integrated VMPM boxes via entrance bricks (video):

- 96+ common pipistrelle individuals in linked VMPM boxes: https://www.linkedin.com/feed/update/urn:li:activity:7216007589749272577/?updateEntityUrn=urn%3Ali%3Afs_feedUpdate%3A%28V2%2Curn%3Ali%3Aactivity%3A7216007589749272577%29

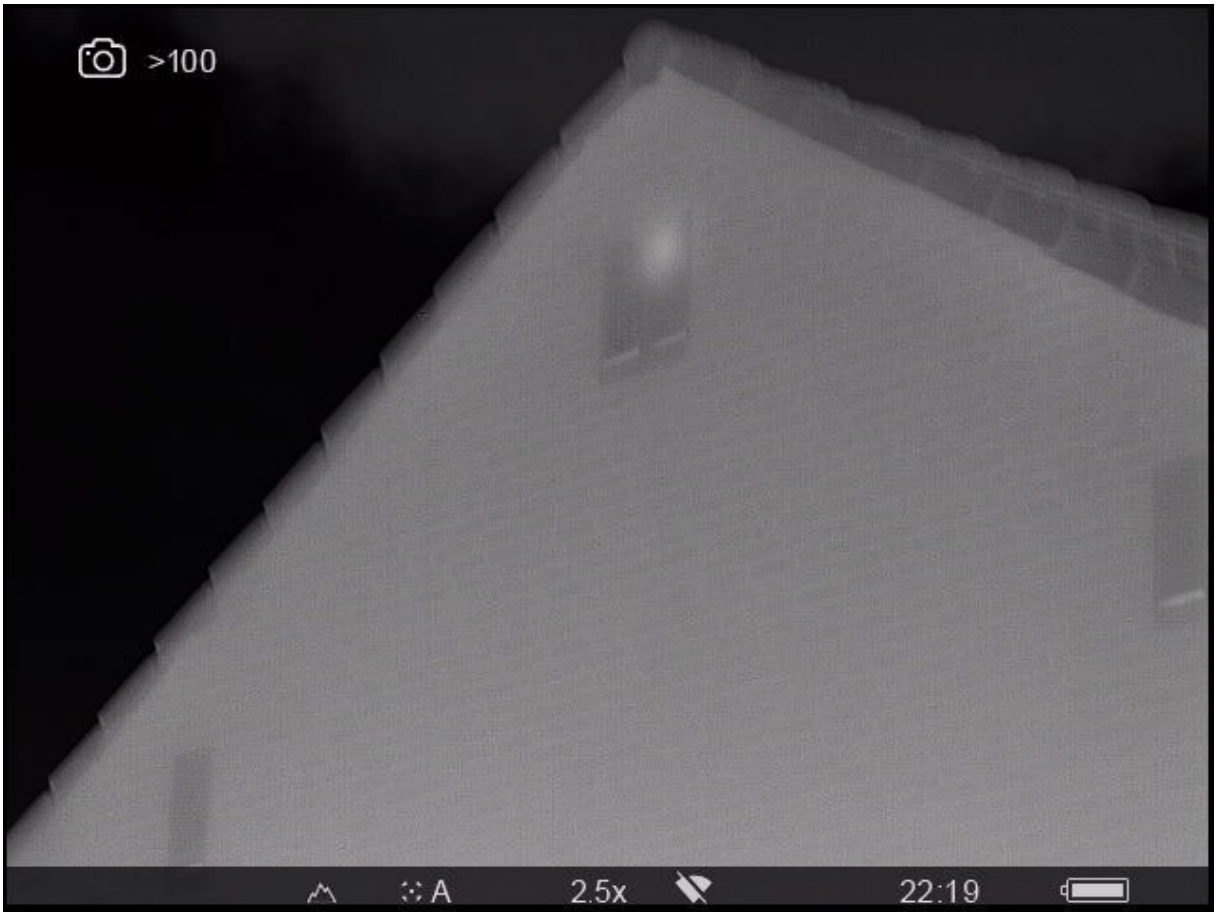



Figure 1: A thermal imaging camera clearly shows the heat from a group of bats in an integrated VMPM bat box. In this case, it was a large maternity colony. Photo: Rick Wortelboer via LinkedIn.

# Sources

Bij12 (2024). Knowledge Document: Common pipistrelle (version 2.0, April 2024). Accessed 10-06-2024 via https://www.bij12.nl/kennisdocumenten/kennisdocument-gewone-dwergvleermuis/

Korsten, E. (2012). Bat boxes: Application, use and success factors [Report]. Bureau Waardenburg bv, commissioned by the Dutch Mammal Society. Report no. 12-156. Available at https://ecopedia.s3.eu-central-1.amazonaws.com/pdfs/616.pdf

NKNB (n.d.). Bat box in facade (house). Accessed 10-11-2024 via https://nknb.nl/maatregel/vleermuiskast_in_gevel_huis/

Schillemans, M.J., Haarsma, A.J., Janssen, E.A., Limpens, H.J.G.A. (2021). Advice on agenda-setting for monitoring and research on bats in the context of the energy transition [Working document, Dutch Mammal Society].

Unitura (2021). Mitigation Handbook 2021. Downloadable from https://unitura.nl/downloads/

Van Wijk, S., & Jansen, S. (2023). Monitoring permanent bat provisions: A study into the occupancy rate of permanent bat boxes [Report, Unitura B.V.]. Downloadable from https://unitura.nl/downloads/