

# Solar panel installation

What you need to know to work safely

**This leaflet contains the essential health and safety top tips you should follow, even if you don't directly employ the people working on your job.**

## Planning the work

**The specific work must be planned to identify the hazards of the particular site and decide what precautions should be taken. The following things should be taken into account when planning – advice is given on some of these later in this sheet.**

- Can the roof structure safely take the weight of the panels as well as equipment and workers needed during the installation?
- Are there any fragile elements in the roof (such as fibre cement sheets, sky-lights or conservatories)?
- Will the finished installation interfere with future maintenance of the building (for example, how will flashings, ridge tiles etc. be reached/repared in future)?
- Are there any overhead power lines near the working area?
- How will the brackets and rails be fitted?
- How can workers get onto and across the roof and off again?
- Will you be working on one or more sides of the roof?
- How will materials and tools be taken up and distributed across the roof?
- Have the workers had suitable training and are they competent?
- How will workers be prevented from falling off the roof?
- How will workers be prevented from slipping down the roof slope?
- How are you going to deal with adverse weather conditions (such as rain, frost or snow)?
- Will you need to work in the roof space? If so, how are you going to check for bare wires, asbestos and vermin?
- How will you prevent anyone falling through the ceiling?

## Protecting others

- Agree and maintain a safe access route for the occupier/owner.
- Keep people away from the area below the work and remember to make the work areas child safe at the end of the working day (such as by removing or blocking ladders).



### What can happen if safety is ignored?

A contractor and a self-employed roof worker were both given suspended prison sentences and 280 hours of community service when they dropped some of their materials and injured a member of the public. They were both ordered to pay costs of £2,114.

## Working at height



An example of completely unacceptable installation work practices that could easily result in death or serious injury. Unsafe work at height like this would normally lead to immediate enforcement action by HSE inspectors.

- ✓ Solar panel installation is not short duration work and will need scaffolding or similar equipment.
- ✓ It should have a boarded working platform and full edge protection (double guard-rails and toe-boards) to stop people and tools from falling. Debris netting may also be necessary to prevent materials from falling on householders or neighbours.
- ✓ Edge protection should be provided along the eaves of the roof slope on which the work is being done. It should extend 2 m on each side beyond the area of work. If 2 m is not available (because the panel array is close to the gable end), gable end protection should be provided.
- ✓ Scaffolding should only be erected, altered or dismantled by a trained and competent scaffolder. It should be inspected before first use, then weekly and after anything that might have affected its safety (such as high winds).
- ✓ No-one should stand directly on unprotected fragile roof surfaces (such as roof lights or fibre cement sheeted roofs), or work within 2 m of them, unless barriers are provided to prevent access to the fragile area.
- ✓ Smaller fragile elements (such as roof lights) should be protected by barriers or secure covers. For large areas, safety nets placed close under the roof should be used along with a means of gaining access over the roof (such as staging).
- ✓ Ladders should only be used for access (not for working from), be securely tied at the top and extend at least 1 m (or five rungs) past the stepping off point.
- ✓ When using tools (such as drills, gas/cartridge tools and grinders), workers' health should, at the very least, be protected by wearing:
  - hearing protection (such as earplugs)
  - eye protection (such as impact-resistant goggles) and
  - respiratory protection (such as an FFP3-rated dust mask).

## Lifting

- ✓ Solar panels are heavy and expensive. You will need suitable lifting equipment (such as a hoist or safety pulley/gin wheel) fitted with an automatic brake.
- ✓ Some proprietary access systems have a built-in hoist facility.
- ✓ Use a 'spreader beam' to sling and lift up panels. Nylon lifting straps should be inspected for damage before each use.
- ✓ There may be opportunities to split parts and reassemble on the roof to avoid lifting heavy loads.
- ✓ Never exceed the safe working load (SWL) of any lifting equipment.
- ✓ Check that you are not exceeding the SWL of the working platform with the combined weight of workers, panels and equipment.
- ✓ Ensure that the method of loading onto the platform does not place workers at risk of falling.



### What can happen if safety is ignored?

A worker was installing panels on a farm building with no scaffolding provided; he fell from the roof and was killed. The health and safety failures were so serious that the police considered bringing a gross negligence manslaughter prosecution.

## Electricity

- ✓ Check any overhead cables entering the building. Electricity supply cables are generally uninsulated.
- ✓ You risk electrocution if a ladder or equipment comes close to, or touches, power lines. For lines serving domestic properties the minimum distance is 1 m. If there is any chance of coming closer than a metre to the wires and the supply cannot be turned off, the best solution is to get the electricity supplier to install temporary sleeving. For higher voltage overhead lines, the minimum distances are greater and you should seek advice from the electricity supplier.
- ✓ The use of 110 v centre tapped earth or cordless portable equipment is preferred. If you are using 230/240 v power tools and equipment, ensure they are undamaged and a residual current device (RCD) is used.

## Commissioning

- ✓ Electrical installation and connections work must be carried out by a qualified electrician.
- ✓ All solar heating panels can become extremely hot and pose a significant burns hazard. You will need to isolate or cover the panels to reduce their temperature during commissioning and maintenance.

## Future maintenance and access

- ✓ On all installations, consideration must be given to future safe methods of access for maintenance of the panels themselves and other elements of the building (such as flashings, roof tiles, chimneys and aerials).
- ✓ Larger installations may have fall protection systems (such as 'man-safe' running lines). These should be regularly inspected and maintained, and only used if there is a current inspection record and by persons trained in their use.
- ✓ Position safety isolation switches and invertors so they can be safely and conveniently accessed.
- ✓ Ensure you hand over operating and maintenance documents to the client upon completion.

## A good example



An example showing acceptable edge protection. HSE inspectors would expect to see this standard of protection during solar panel installation.

**See over for other examples of good practice.**



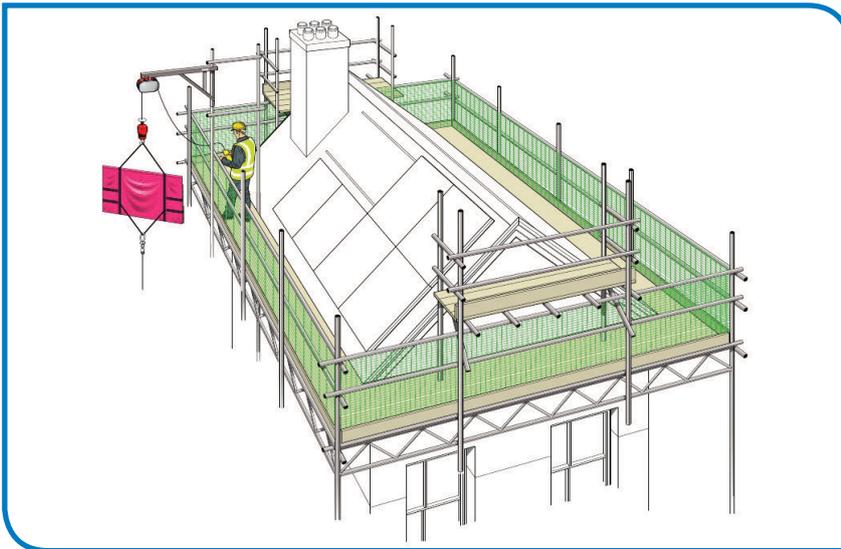
### Further information

This is just a summary. You can find out what else you need to know about health and safety at [www.hse.gov.uk/construction](http://www.hse.gov.uk/construction)

For skills and training or to find out more about the Green Deal, visit [www.cskills.org](http://www.cskills.org)

The content of this information sheet is in line with advice from the Health and Safety Executive. For more details, please see [www.hse.gov.uk/construction](http://www.hse.gov.uk/construction)

## Examples of good practice



This system provides fall protection around all edges of the roof of a domestic property.

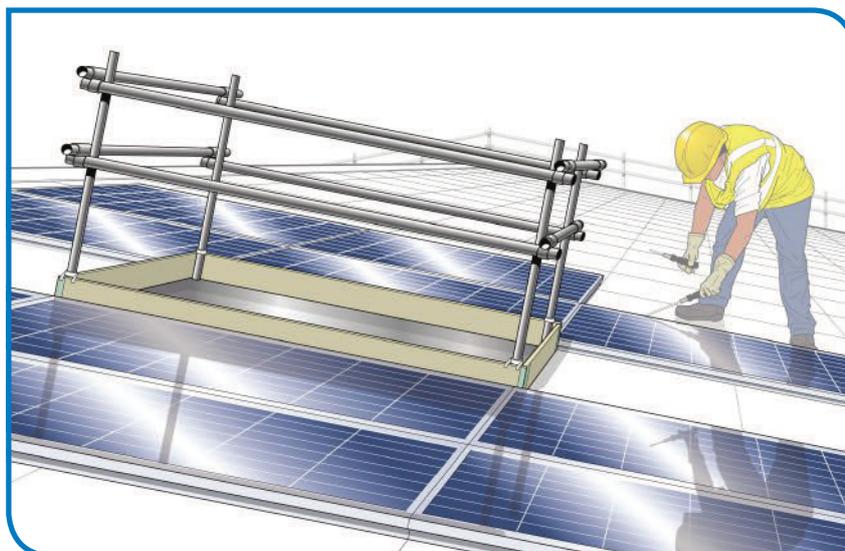
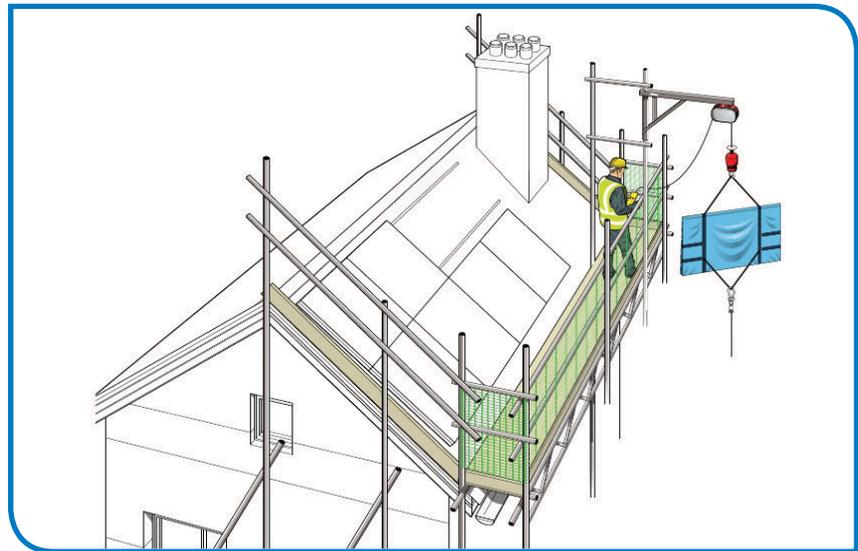
It would be an appropriate solution where panels are being fitted to both roof pitches and to within 2 m of the gable ends.

A powered hoist to lift panels to roof level is shown, but a manually operated pulley would also be acceptable.

(Some scaffolding components have been omitted for clarity.)

This alternative system provides guard-rails and toe-boards at the gable ends. This would provide sufficient fall protection around the working area when panels are being fitted to a single roof pitch.

(Some scaffolding components have been omitted for clarity.)



This illustration shows PV panels being fitted to the roof of commercial premises. The roof contains flush-fit roof lights of fragile material, while the rest of the roof surface is non-fragile and known to be capable of bearing the weight of solar panels and workers.

In this example, temporary edge-protection, made from scaffolding components, has been fitted around the roof lights for the duration of the work.

(Some scaffolding components and roof lights have been omitted for clarity.)

*(This information sheet was produced in partnership with The Health and Safety Executive.)*