



It might not always be fire!

**The risk might „simply“ be
Direct Current (DC)!**

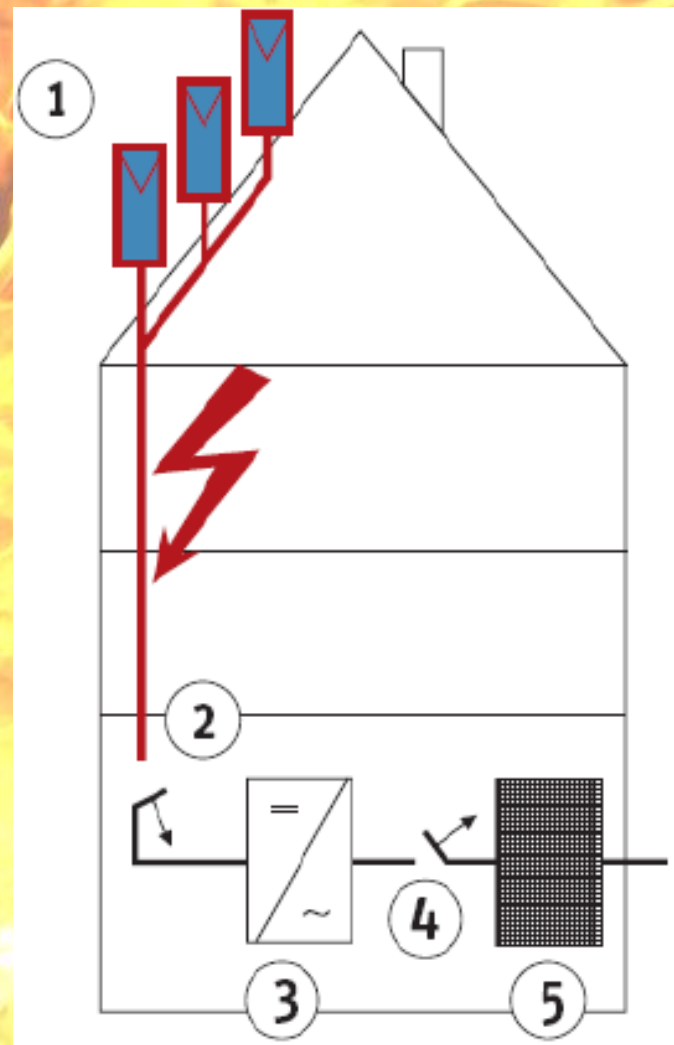


DANGERS:

In theory DC cables could be in the complete building!

The danger is caused by the impossibility to switch of the power cables from PV panels (1) to power inverter (3)

And even when switched off (2) inside the building, there is still power on the roof and in the cables into the house!



DANGERS:

With DC the standing of the arc has to be considered (origin & spread of fire)

Because of the arc under no circumstances connectors should be separated on DC side

Defect cable isolation due to the fire can increase the risk of a dangerous arc!

In case of storms & flooding the rectifiers, which are often installed in the cellar, and thus also the DC cables can get in touch with water



A smouldering fire can easily start here!



**Up to 900
Volt can be
generated
here**

**120 Volt
DC are
already
fatal !!!!**

What can/needs to be done in case of fire?

Switch off power?

Not possible!



What happens to the 152,000 solar PV installations in France?

**Foam in?
Possible!**

**Is not helping long term
and is not dark enough!**



**Environment protection?
No thanks!**

Foam only gives short term reduction of power!

Due to the slope of the roof water & foam slide down too quickly

Foam is electroconductive and thus a real danger for the fire men!



Cut the wires?

Who will do it?

Volunteers step forward!

Not possible!



Shoot it?

Possible!

Is very loud!

Is no good!



Let it burn down!

Possible, but ...



... one cannot really do that!

Let it burn – not possible!

Does not look good at all!



**Can the modules be covered?
Possible? How?
Who climbs up there?**



**Do we have enough foil?
Would the DIY market has some more?**

Do we have to wait for the night?



Are there switches?

What about safety switches?

Fire Brigade Switches

- **Topic 1** **Costs?**
- **Topic 2** **Retrofitting?**
- **Topic 3** **Operating mode?**
- **Topic 4** **Maintenance and costs?**
- **Topic 5** **Is the voltage on the roof off?**
- **Topic 6** **Probability of loss**



What happens to the old installation base?

What about safety switches?

Short-circuiting Switches

- **Topic 1** **Costs?**
- **Topic 2** **Retrofitting?**
- **Topic 3** **Operating mode?**
- **Topic 4** **Maintenance and costs?**
- **Topic 5** **Is the voltage on the roof off?**
- **Topic 6** **Probability of loss**



What happens to the old installation base?

So we do have to wait for the night?

NO!




**We use Prevento® Solar ...
and create an artificial night!**



Prevento® Solar – sprayed on!

Prevento® Solar also extinguishes fires!

A background image of a fire with bright yellow and orange flames against a dark grey background.

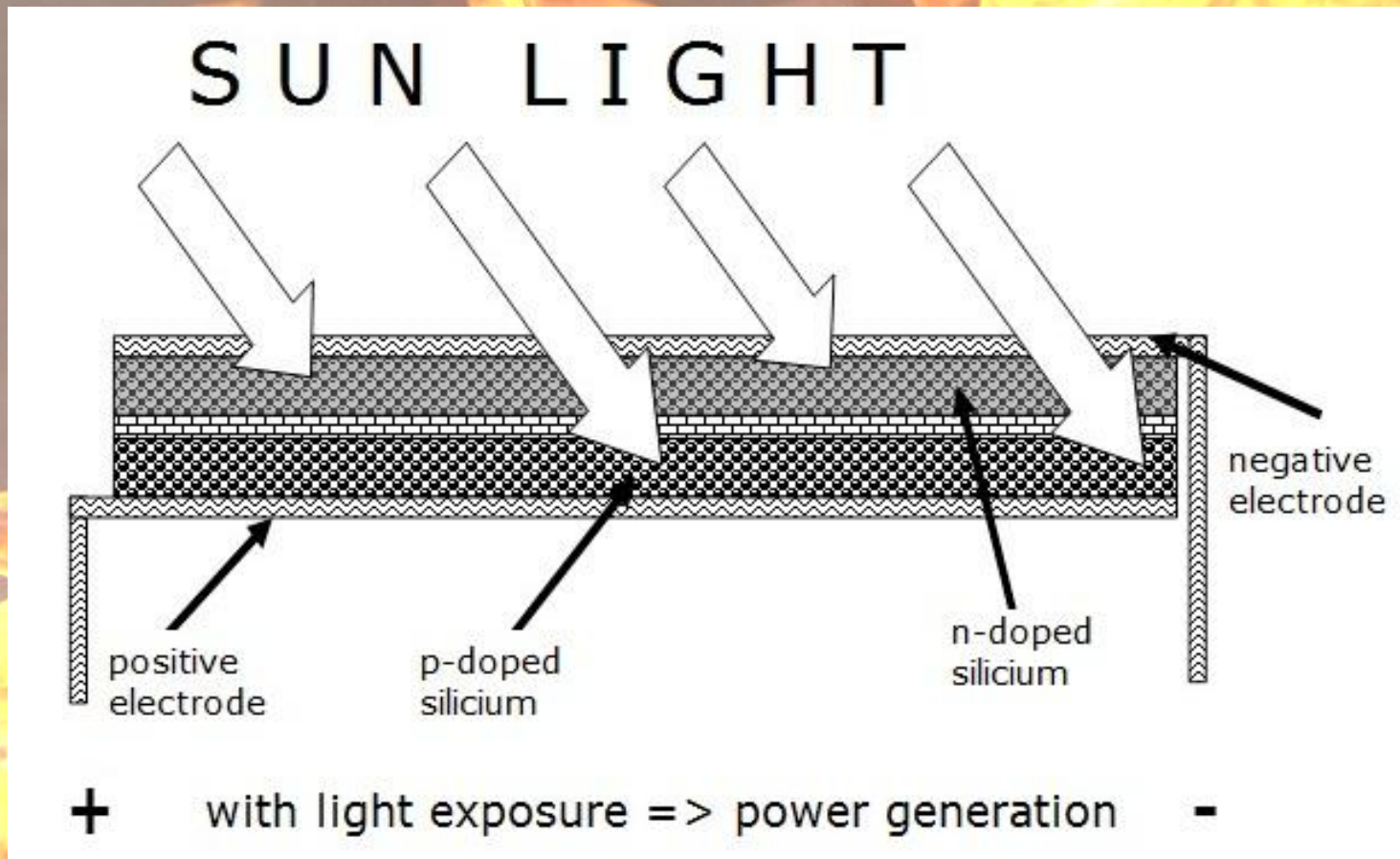
A sprayable, opaque and permanently elastic foil!

Prevento®solar

Resistant against rain & spray jet

Easy & without trace to be taken off again!

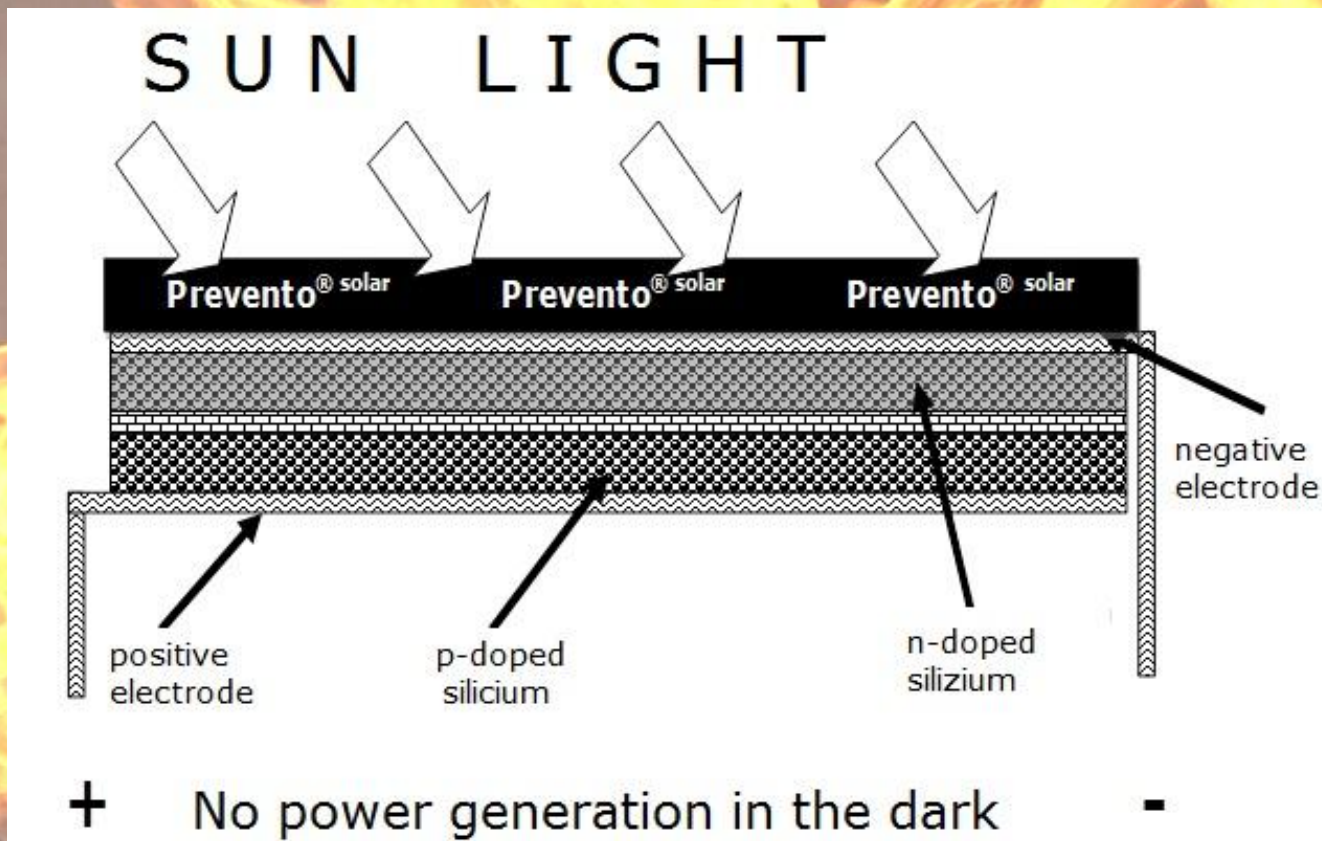
And how does it work?



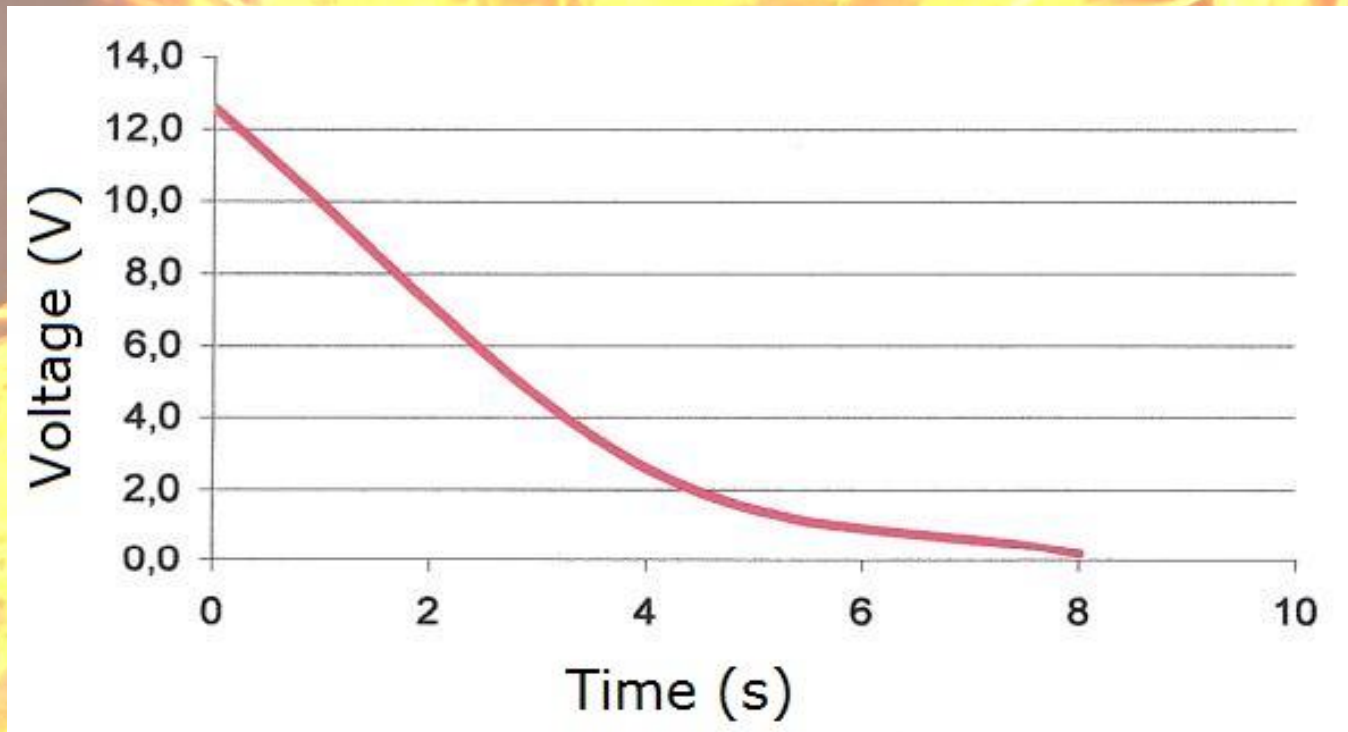
And how does it work?

1,0 to 1,5 mm Prevento Solar per m² = 1,0 to 1,5 Liter Prevento Solar per m²

Are sufficient to cover a PV panel to stop power generation!



**Voltage drop within 8 seconds
when applying Prevento[®] Solar
by means of a spray unit ***



*) Extract of a test report by KIWA Polymer Institut 17.02.2011

We can make **DAY** to **NIGHT!**

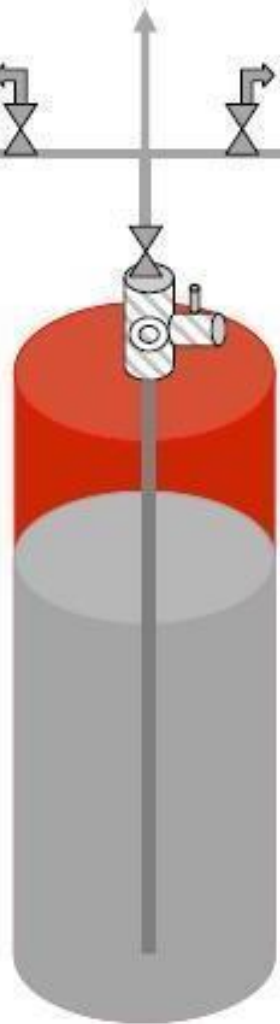


Stainless Steel container	>16 bar
Filling content	40,0 Liter
Refills	20 Liter ea.
Flexible hoses	2 x 10 m
Spraying lance	4 meter
Flat nozzle	9 l/Minute
Testing device	6 Liter
Accessories	




Installation Scheme with Prevento Solar



Installation Examples:



Legend:

-  Dry Pipeline
-  Release valve
-  Manometer
-  Shut-off devices
-  Plug-in connection
-  Safety valve
-  Pressure container in stainless steel, size up to 400 litre

Why Prevento[®] Solar ?

- **Prevento[®] Solar can be stored at central fire brigade bases**
- **Because the Fire Brigade is called for each fire anyway, they can bring and apply Prevento[®] Solar when needed!**
- **With central storage points a larger area can be covered to protect PV-Systems in one region/department**
- **The telescopic spray lance allows easy application and can also be used for fire extinguishing with Prevento[®] Solar and water between panel and roof!**

Report on German TV MDR



Prevento[®] Solar Advantages:

- **Covers PV panels fast, safe and effectively**
- **Easy to apply evenly by simply spraying onto PV panels**
- **Spraying lance can also spray water between panel & roof**
- **Resistant against spray jets and rain**
- **Covers smooth areas with an opaque film**
- **Stops further power generation of PV panel**
- **Durable for long time and not separating**

Prevento® Solar Advantages:

- **Does not contain any toxic components**
- **Ph neutral and mild on skin**
- **Minerally and without solvents**
- **Does not create or leaves any dirt behind**
- **Non corrosive and does not leave patches**
- **Can be peeled off like a film/foil**
- **Can be sprayed off with water by slightly harder spray jet**

Prevento[®] Solar Summary:

- **Prevento Solar[®] is a water-soluble and ca. 70% minerally based gel that can be sprayed with high adhesive forces on smooth and even anti-sticking coated surfaces with high opacity***

*** With increasing opacity less light can get through!**

Prevento[®] Solar Summary:

Prevento Solar[®] has been tested according:

Density: DIN EN ISO 2811, Part 1
Viscosity: DIN EN ISO 3212
Drying: DIN EN 23270
Adhesion/Tape-Test: DIN EN ISO 2409:1992

No volatile organic compounds as per:

VOC-Richtlinie (1999/13/EG)
Decopaint-Directive (2004/42/EG)
31. BImSchV (BGBl. I Nr. 44/2001)
ChemVOC-FarbV (BGBl. I 70/2004)

Prevento® Solar Summary:

No toxic agents / no dangerous substances,

CFC free as per:

(EG) Nr. 1907/2006 (REACH)

91/155/EWG,

93/67/EWG,

93/105/EG

2000/21/EG

Availability & Function of Safety Switches

- **Currently none of the so called safety switches are available!**
- **Existing PV systems cannot be retrofitted!**
- **The safety switches can only be installed with additional electricity!**
- **Such future switches need regular maintenance => every 6 months!**
- **These future switches will cost ca. 10 - 15% of total investment value!**

Availability & Function of Safety Switches

- **With overvoltage (lightning) lasting damages can occur at switches and panels**
- **With the so called fire brigade switch the cable still contains electric tension as of the panel**
- **Life period and warranty of these switches?**
- **No existing DIN EN Norm for such switch systems**
- **Big question mark currently on usability and availability!**

PREVENTO® SOLAR is the only usable product to bring PV modules to zero-potential

Reference:

OPEL Headquarter Rüsselsheim PV-Installation ca. 45.000 m²

Installation of ca. 12.600 Solar modules with 4 inclination roof parallel (lying) on **45.000 m²**



An area of 225.000 m² will be covered with 11 MW-Systems when installation will be finished



No switches will be installed – only Prevento[®] Solar!

Reference:

OPEL Factory Kaiserslautern PV-Installation ca. 34.000 m²

Installation of ca. 12.600 Solar modules with 4° inclination roof parallel (lying) on **34.000 m²**



Again - no switches will be installed – only Prevento® Solar!

Further References:

Administrative District Ebersbach Bavaria

The Prevento® Solar System will be used in the complete administrative district and will thus protect over 5.000 PV installations!

Training session with
Prevento® Solar System



Germany's largest building insurance company, the „**Bayerische Versicherungskammer**“ is actively recommending this system and will in future support all Bavarian Fire Brigades when purchasing Prevento® Solar Systems



**PREVENTO® protects you safely
by means of adequate and
safe innovations!**

**Let us know your needs and
we will find the solution
to extinguish your fires!**



**Thank you very much
for your kind attention!**