

# Original BAADER AstroSolar® Safety Film (OD 5.0)

For construction of high-quality objective-filters for observing the sun with telescopes, binoculars or cameras.

Tested safety film with high-quality optical characteristics; reduces intensity of sunlight by 99.999%



## Short instruction: How to build your own objective solar filter

(see separate sheet for detailed instruction incl. images)

1. Cut two equal sized rings from stiff cardboard. The inner diameter has to be the same as the full aperture of the telescope lens (or mirror), the outer diameter has to be 10cm (~4") larger.
2. Cover one full face of each cardboard-ring with double-faced adhesive tape. Cleanly cut any inner and outer excess of film, so that only the two cardboard faces are covered with sticky tape.
3. Stretch out a square piece of "Kleenex-Tissue" flat on a hard, plane surface (a table) and secure the four corners of the tissue with clear adhesive tape. The tissue must be stretched out flat without ripples.
4. Cut a square piece of AstroSolar® Safety Film 5.0 a little larger than the outer diameter of the stiff cardboard rings. To facilitate cutting and to protect the film from fingerprints, only cut AstroSolar® Safety Film 5.0 sandwiched between the two included protective layers (white silk paper and/or transparent or white plastic).
5. Gently place AstroSolar® Safety Film 5.0 onto the flat Kleenex-tissue and secure the four corners with tape – **but do not stretch it!** AstroSolar® Safety Film 5.0 must not be put under stress tension in order to retain its precision optical property. Now remove the protective sheet facing upwards.
6. Hold one cardboard ring with the sticky side down 10mm above the film and let it fall down onto the film, so that the ring touches the film all around at the same time.
7. Turn around the cardboard ring with the film-covered side facing upward, lay it back onto the Kleenex and remove the second protective layer. Stick the second cardboard ring against it. Now you have created a round film-holder with AstroSolar® Safety Film 5.0 cleanly and securely fastened without creases and ripples – but most of all: **without stressing the film!**
8. Now put a 50mm (2") wide stripe of strong cardboard around the telescope dew cap or front end and tape the ends with double-tape. Repeat this procedure 3 times with double-faced adhesive tape between each layer to produce a stiff 50mm high cardboard cylinder to precisely fit onto your telescope.
9. At last securely glue the AstroSolar® Safety Film 5.0 holder onto the 50mm cylinder while the cylinder is still mounted onto the front end of your telescope. **Your homemade solar filter is ready! Store it properly!**

## Technical Details / Certification

Baader Planetarium's AstroSolar® Safety Film 5.0 is a specially manufactured streak- and blister-free film which is only 0.010 mm thick and attains the optical quality of plane-parallel glass filters. The base material is not "Mylar". The highly uniform molecular structure of this material is the result of demands in nuclear- and elementary-particle physics. The coating is subject to constant quality control. Its reflective properties of over 99.999% are tested repeatedly, to assert the reduction of intensity of sunlight by a factor of over 100,000. AstroSolar® Safety Film 5.0 is coated on both sides of the film, which ensures a highly uniform filtering, while neutralizing occasional microscopic holes in the coating (which are also much more present in single layer coated filters). One layer of this film is sufficient for the construction of a safe, high-resolution solar instrument filter. Since AstroSolar® Safety Film 5.0 is the only film-material made to not deteriorate the optical wavefront, it does allow to attain high magnification with any long-range optics without reducing sharpness or contrast of the solar surface. The quality of the solar image and eye safety is immeasurably better than what can be achieved by using so-called "Mylar rescue blankets" or similar materials, which must be used in several layers.

**Important note: The eye safety norm EN ISO 12312-2:2015-11 for naked eye solar viewers does not apply to front aperture filters, covering long-range optics. AstroSolar® Safety Film 5.0 is not authorized to be used for naked eye solar observation or production of solar viewers. For direct solar viewing without telescope, binocular or camera optics, inquire for our EN ISO 12312-2:2015-11 certified eclipse shades equipped with AstroSolar® Silver/Gold Film.**

## Please observe the following safety precautions

1. Before each and every solar observing session, inspect your AstroSolar® Safety Film 5.0 for mechanical damages, broad scratches, streaks, extensive wipe marks and other quality degrading influences. Also check the filter's fit and, if necessary, tape it to prevent slipping.
2. Never use the filter at the eyepiece (where you look into the telescope), only attach it onto the objective (where light enters the telescope); otherwise it can become dangerously hot inside the instrument – and inside the eyes. In case of binoculars, be sure both objectives are securely covered; with cameras cover the viewfinders front lens.
3. A filter made of this durable material is relatively resistant to breakage (even during intentional attempts) in comparison to a glass filter. However, care must be taken with sharp pointed objects. Also be aware that the coating can be damaged by scratching or rubbing and take this into account when storing the filter. A filter with damaged film should be destroyed immediately to avoid accidental use.
4. Emphasize the importance of caution to those observing with you, especially children. Intentionally removing or damaging the filter can endanger their eyesight. This is no place for jokes. **Never leave the telescope outside unattended during the daytime!**
5. Do not use AstroSolar® Safety Film 5.0 with open-truss telescopes unless the tube is covered by a shroud. Always cover additional finderscopes and telescopes with a securely fastened lightproof front cover. Unprotected viewing through the finder would have the same catastrophic consequences as viewing through the main telescope. Additionally, an uncovered finder directed at the sun can produce exceedingly unpleasant skin burns.

## Important hints for visual safety. Please read before use!

*AstroSolar® Safety Film 5.0 is not authorized to be used for naked eye solar observation and production of solar viewers but only for front aperture filters, covering long-range optics. For direct solar viewing without telescope, binocular or camera optics, inquire for our EN ISO 12312-2:2015-11 certified eclipse shades equipped with AstroSolar® Silver/Gold Film.*

*AstroSolar® Safety Film 5.0 reduces the intensity of incident sunlight by a factor of 100,000. According to current medical research, the filter (when used together with additional optics) provides complete protection against thermal damage to the retina (photocoagulation).*

*Under certain circumstances, any intense source of light (e.g. spotlight, laser beam, welding arc, the sun) may trigger photo-toxic processes in the eye. In extreme cases, such reactions can have an additive effect over time, leading to deterioration of the vision.*

**Please note:** *This filter provides protection similar to good welding glasses, but even these glasses are not meant for uninterrupted use – there are no studies which prove that welding glasses completely hinder phototoxic reactions with absolute safety during long-time use, and the same reservations must apply to this solar filter.*

*Therefore, exercise your own best judgment when using this product.*

*Although we have never heard of a single case of eye damage in 25 years of sales of this product to thousands of telescope users, and knowing that welders ply their trade for years, while the solar filter's use can be measured in minutes, we want to inform you about the current state of scientific knowledge.*

*In any case, it is advisable to interrupt solar observation occasionally and look at other objects. If you have any doubts at all, especially in cases of known excessive eye sensitivity, consult your ophthalmologist or optician.*

## GUARANTEE

*We guarantee the filtering capability of this solar safety film (reduction of light intensity by 99.999%). If your Film has arrived damaged, we will replace it free of charge. We cannot accept further liability, especially in cases of improper use.*

For larger requirements, such as instruments with large aperture, order AstroSolar® Safety Film 5.0 in rolled sheets of 50x100cm (approx. 4 Sq.Ft.) or 117x117 cm (46"x46")

*Please also note the instructions on the reverse side*

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www.baader-planetarium.com

# BAADER AstroSolar® Safety Film 5.0



## INSTRUCTIONS FOR USE

Baader Planetarium produces and distributes Solar Film for more than 25 years. AstroSolar® Safety Film 5.0 provides a natural white solar image without false blue or orange color. Sharpness and contrast largely exceed the quality of most commercial glass filters available on the market.

The basic film of AstroSolar® has been tempered in an elaborate ionization process to be free of inherent stress. Due to the added processes applied, AstroSolar® Safety Film 5.0 attains the quality grade of a planeoptical polished glass window of highest precision. AstroSolar® Safety Film 5.0 must not be put under stress tension.

### FOR YOUR OWN SAFETY PLEASE OBSERVE FOLLOWING CONDITIONS:

#### Handling of AstroSolar® Safety Film 5.0

1. Do not touch the metalized surfaces with bare fingers. Fingerprints contain sweat, salt and urea, which acts as a weak acid to destroy the metal layers over time.
2. For cutting and trimming AstroSolar® Safety Film 5.0, always keep the film enclosed between the two protective sheets of clear or white plastic film and white paper, to avoid scratches and fingerprints. Cut the required shape from the plastic/Film/paper-sandwich. Sketch the required final shape of the film onto the covering paper before cutting the sandwich to protect the film. Dispose of all sheets of paper and plastic film after they have served for protecting the Film during trimming and mounting operation.
3. Be attentive. AstroSolar® Safety Film 5.0 looks like an ordinary piece of metalized plastic – but it is not. Greatest care has been applied to metalize both sides of the fine optical grade carrier film without destroying its isotropic tempered state. Never put any stress onto the Film during handling or mounting – stress tension would dramatically worsen the optical properties. Take greatest care to mount AstroSolar® Safety Film 5.0 “stressfree” – but without creating ripples and creases.

#### Additional notes on AstroSolar® Material

4. The metal coatings on AstroSolar® Safety Film 5.0 film are equivalent to high reflective layers applied onto a telescope mirror. Treat the surfaces of AstroSolar® Safety Film 5.0 with equal care as you would with your telescope mirror. If you want to “clean” AstroSolar® Safety Film 5.0 from dust and pollen-grains, do not “rub” the surface. Only rinse the film with running water and add dishwasher detergent. For careful wiping use pharmaceutical cotton-wool for applying and removing the detergent.
5. Before each solar session carefully inspect your AstroSolar® Safety Film 5.0 for mechanical damages, broad scratches, streaks, extensive wipe marks and other quality degrading influences. Small pinholes do not degrade the eye safety or image sharpness of AstroSolar® Safety Film 5.0. Hold the filter at arms length towards the daylight sun to detect dangerous defects with a quick look. Small pinholes may become visible but will not be dangerous, because the light going through will be dispersed across a wide area like in a “camera obscura”. This scattered light however will cast a “hue of light” to slightly overlay the solar image information and reduce image contrast somewhat. For highest photographic performance and when using large telescope apertures at high magnification it is therefore advisable to “blacken out” these pinholes. Use thick black laquer (black paint) and directly apply the paint onto the inner (telescope) side of AstroSolar® Safety Film 5.0 with a very thin, sharp brush to just cover the size of the pinhole while holding the filter towards the sun.
6. Always store your solar filter in a closed container and avoid the film faces to rub against any other surface during transport or storage.

Metal coatings on film are prone to ageing just like the coatings of a telescope mirror. A damaged, aged, frequently cleaned film which shows large areas of scratches or wipe marks must be discarded and not be used for solar observation.

All this effort will be worthwhile. If treated appropriate as detailed above AstroSolar® Safety Film 5.0 delivers the same image quality as an extremely expensive precision polished glassfilter, far better than all common “float glass” solar filters available at economy price.

#### WARRANTY

We warrant AstroSolar® Safety Film 5.0 to be manufactured and inspected with greatest care – especially to be free of uncoated areas or areas where the optical density is lower than the stated density.

However, we do not warrant for AstroSolar® Safety Film 5.0 when treated or stored improperly or when the solar filter has not been inspected for damages before each observing session.

**Never leave your Solar Telescope outside unattended to prevent children or uninformed visitors from looking at the Sun without proper guidance!**

**Only use this product if you feel well informed about its properties and the requirements for safe handling and storage.**

*Please also note the instructions on the front side*