

DAS Dark Site Windscreens

Instructions for Installation, Use and Stowing

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This publication is intended to assist DAS members using the windscreens at the Edmund G. Kline Dark Site in safely installing, using, and stowing the windscreens.

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Wind Screens for the DAS EGK Dark Site

The Denver Astronomical Society Edmund G. Kline Dark Site east of Deer Trail, Colorado is located in a Great Plains environment that is subject to high southerly winds. Indeed, the wind rose for a wind energy survey conducted several miles NW of the dark site indicates that about 60% of the winds in that region come from the SW to SE quadrant. Further, the average (mean) wind speed is 12.6 mph at 66 feet above ground level (AGL), indicating average wind speeds at ground level in the 9-10mph range. This is a wind speed that can begin to make astronomical observing or imaging difficult.

Experience at our dark site indicates that while many of the high winds are in the daytime, a common situation is for high winds from any direction to subside at dusk, only to begin rising again from the south in the late evening as sky-clearing occurs. Steady winds of 15 mph are not uncommon. During these events, gusts often reach speeds in excess of 20-25mph at ground level during prime observing hours (9 pm to 3 am) before the winds subside just before dawn. These high southerly winds make astronomical imaging impossible and can make observing not only unpleasant, but impractical and even dangerous, especially for users of large Dobsonian telescopes.

The new windscreens were intended to make observing and imaging feasible during the many clear nights when this wind situation exists. To minimize costs and reduce infrastructure and restoration requirements at a site that may only be used for several more years, it was decided to focus on the worst and most prevalent southerly winds and to develop a system that had as few permanent structural elements as possible, but was still robust enough to handle high winds.

The solution chosen was a temporary wind screen structure to hold porous, grommetted, woven polyethylene wind screen material developed for tennis courts and other athletic facilities. The porous screen reduces wind loads and the buffeting and noise often associated with tarpaulins, while dramatically reducing wind speeds within 10 feet downwind of the screen. The support structure consists of 1) concrete footings, into which are embedded vertical 24-inch-deep plastic anchor pipes, 2) two 10-ft galvanized steel poles that fit snugly into the anchor pipes, drilled and fitted with metal hook loops, 3) a smaller-diameter, adjustable 10-20-ft nested galvanized steel top bar with compression fittings that can be affixed to the upright poles and to which the top of the wind screen can be attached, and 4) carabineers, bungee cords, ball-end cords, and short guy ropes that capture the windscreens from the upwind side and reduce billowing into the observing pad area.

There are currently 6 windscreen stations at the Dark Site. The Northern-most large observing pad has been fitted with anchors for a double windscreen. The middle pole for this screen has double eyelets. Please don't use this special pole for other wind screen locations

The Southern-most (prototype) pad has permanently installed poles that require a 14-foot-wide screen.

Installing the Windscreen Frame



For each screen, you will need the following support hardware:

- Two vertical poles that will be inserted into 24-inch deep polypro sleeves.
- One nested top bar
- 10-14 small hook bungee cords or ball-end cords
- Several extra carabineers (4 should already be installed on the screen)
- One upwind guy rope with a carabineer tied to one end.



Installation is easier if you have access to a stool or a small utility ladder.

1. Begin the assembly by inserting the two 10-ft metal poles into the plastic tubes in the footings, with hook-loops pointing inward.
2. If you plan to use the full 8-foot height of the wind screen, install the top bar by loosening the compression bolt on the loops at each end and sliding them over the top of the pole.
3. Finish by pushing the compression bolt through the holes and use a 7/16th-inch wrench to press the attachment hardware onto the poles.



(Note the position of the eye-ring on the inside of the bar.)

IMPORTANT

Please do not attach the top bar to the poles before inserting the uprights in the fittings! This has already resulted in damage to the top bar and attachment hardware and could also damage the plastic sleeve-anchors or even cause personal injury.



It's easier for two people to install the top bar. But if you are alone, or want to fold the windscreen over the top bar at a lower height (to reduce sky blockage), remove the compression bolt and snap the pole attachment assembly around the pole, resting it on the second-highest metal loop.

If you want to use the screen full height, raise the ends above the loops on the top of the uprights, one side at a time. Be sure to reattach the compression bolt.

Installing the Windscreen



1. lay out the windscreen as shown so that the grommeted horizontal seam in the middle of the screen faces the direction from which the wind is expected to blow (normally south). (Note: the horizontally aligned grommets must be exposed.)

2. In this position, attach the bottom corners of the screen to the poles with carabineers.



3. Then raise the top corners of the screen and attach them to the top loops with carabineers. Quickly attach ALL of the grommets to the poles with bungee cords to avoid stressing individual grommets.

4. Finally, wrap small hooked bungee cords or ball-end cords around the top bar and attach them to at least 5 of the grommets along the top of the windscreen.

*NOTE: A ball-end cord is installed by first pushing the cord-end loop through the windscreen grommet from the **upwind** side, wrapping the cord over the bar from the **downwind** side, and slipping the loop over the ball on the upwind side.*



(You may want to fold over the top bar at 6.5-ft height to reduce sky blockage for a Dobsonian telescope, a small equatorial telescope, or a binocular chair. In this case, bungee cords are not needed across the top edge.)



4. To reduce billowing of the windscreen into your observing space, attach the optional up-wind guy rope to the center grommet on the mid-point horizontal seam with a carabineer and affix it to the tent stake found at most of the wind screen-ready pads or in the garden box. Try not to make it too tight.

Removal and Stowing

At the end of each observing session, the screens should be removed; folded in half at the grommated seam; rolled, and tied; and stored lengthwise in the garden box in the warming hut (see the next page.)

NOTE: If winds are high during teardown, it is advisable to begin removing wind-screen attachments from the top, rather than the bottom of the screen.



Also, remove all of your equipment from the observing pad before disassembling the wind-screen .

After the windscreen is removed and folded, the top pole should be disassembled, the vertical poles pulled out of the anchor pipes, and all poles stored flat on the timbers to the north of the Brooks Observatory.

The open pole inserts should be stoppered with the plugs to prevent dust, water, and animals from getting in the 24-inch-deep holes.



The last person to leave the dark site should check that all the poles are removed and stowed, the plugs are in place, and the wind screens are properly stored in the garden box.

Care and Handling of the Windscreens



Windscreens and installation hardware (carabineers and bungee cords) are now stored in a large garden box in the warming hut.

If possible, roll and unroll the windscreen on one of the concrete pads, not on the ground. The windscreens should only be folded once, so that the grommets along the horizontal seam in the middle of the screens are visible.



Properly folded windscreen

12 x 8-ft Windscreens should be folded once, rolled as tightly as possible, and secured as shown here. (Note the improperly folded screens at the top of the picture.) Folding causes warping, scoring, and sagging of the screens, reducing their effectiveness.

Folding over is no longer required due to the long length of the storage box.

One of the screens is 14 x 8 feet and only fits the permanent bars at the SE pad on the site. When rolled, it is noticeably thicker than the other screens. It should not be used on the smaller 12-ft-wide frames. Likewise, the smaller screens should not be used on the large frame.

**Thank you for following these instructions
and ensuring a long and useful life for our
windscreens!**

A big thanks to David Delassus for purchasing and fabricating the hardware required to support the windscreens, and to the DAS members who installed them.