



GROWING FACILITIES

DUCTSOX[®]
Textile Air Dispersion Products



Textile air dispersion products feature innovative options that optimize air movement within plant growth facilities. Plants require water, nutrients, light, and air movement to grow and thrive. The quantity and quality of each may vary by stage of growth and type of plant. In nature, weather patterns drive air movement and can be highly unpredictable. Most indoor growing environments focus closely on water, nutrients, CO₂, and light exposure to optimize plant growth. From germination to final stages, air movement is an easily overlooked factor.

CUSTOM ENGINEERED

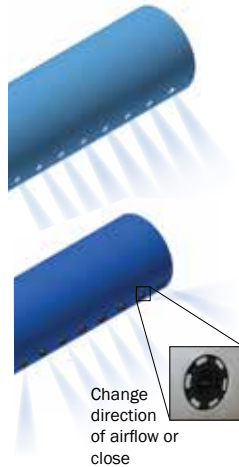
Every DuctSox fabric ductwork/diffuser is custom engineered. Options such as diameter, length, suspension, fabric, and airflow are part of the design process for every project. This ensures optimum draft prevention or draft control for indoor growing facilities.

AIRFLOW

Air movement within a Growing Facility can be critical for healthy plant growth. Whether the desired air movement is no throw, controlled flow, or high velocity, fabric systems can be configured to ensure optimum growing conditions.

ORIFICES

- ▶ Orifice size and orientation based on required air throw distance
- ▶ Orifice sizes: ½" - 5" diameter/Sewn-in Grommet (SG) outlets 2" or 3" diameter

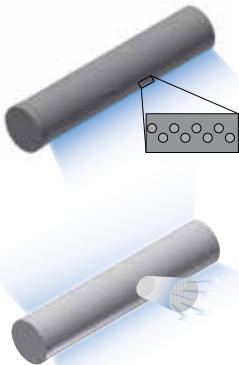


NOZZLES

- ▶ Adjustable or Fixed
- ▶ Provides jet-type airflow
- ▶ Type, location, and quantity based on airflow requirements

LINEAR VENTS

- ▶ Delivers airflow through precision cut orifice patterns
- ▶ Vent size referenced by airflow per linear foot



AIR-POROUS FABRIC

- ▶ Supply air is delivered exclusively through porous fabric

When air movement is desired, open orifices provide optimum throw per outlet. Placement of the orifices will drive airflow rotation within the growing environment, generating either a gentle flow pattern or more aggressive pattern. For applications that may require modifications to the airflow pattern, the Adjustable Nozzle is an ideal option. The 2" or 3" diameter nozzles are adjustable up to 120 degrees with little impact on airflow delivered.



FABRIC SELECTION

For indoor growing environments, fabric is determined by air dispersion characteristics and durability. Most fabrics are polyester and perform particularly well in high-humidity environments. As an added safeguard, some fabrics include an antimicrobial treatment.

Higher Draft	Non-porous fabrics such as TufTex, DuraTex, or ChemSox/PolyTex
Controlled Draft	Air porous fabrics such as Verona or antimicrobial treated Sedona-Xm
No draft	Highly porous fabrics such as DT200 or antimicrobial treated Microbe-X

For greenhouse facilities, ChemSox/PolyTex is a frequently used option for overhead air dispersion. Since it is 72% translucent, the majority of the natural light is able to reach the plants.



CLEANLINESS

DuctSox fabrics have been tested for mold and mildew growth as part of UL compliance. Most of our fabrics are constructed of a moisture-resistant polyester that can be easily cleaned. Polyester systems can be unzipped and removed for laundering. A ChemSox/PolyTex system can be unzipped and sprayed down.

FOUR AREAS OF FOCUS FOR GROWING FACILITIES & AIR DISPERSION

CRITICAL GROWTH

applications may benefit from unique air dispersion patterns. Similar to a laboratory environment, special air porous fabrics can uniformly disperse airflow.



UNDER TABLE

systems allow designs for low velocity/displacement or high vertical draft between rows. Key considerations include sizing, suspension, fabric selection, and access for cleaning.



OVERHEAD

systems feature high airflow mixing within the space and benefit greatly from strategic air dispersion to ensure proper drafting at plant level. Other considerations include fabric translucence and shadowing.



GROWTH CHAMBERS

require very specific airflow patterns to ensure consistent plant growth. There are many airflow options for Growth Chambers, including dedicated down draft, rotational uplift, or displacement.





DuctSox are placed in between shelving.

CRITICAL GROWTH AIRFLOW MOVEMENT AROUND YOUNG PLANTS

When sprouting new plants, airflow and temperature can be critical. As an example, for the custom application pictured above, DuctSox engineers provided a unique solution allowing uniform air delivery and volume control for each level of shelving.

The rectangular shape of the fabric duct/diffuser is achieved using the physical shelving above and below the DuctSox. Airflow is dispersed through all panels of the diffuser, but the large upper panel is constructed of a higher air permeability to target 50-70 FPM vertical air movement.

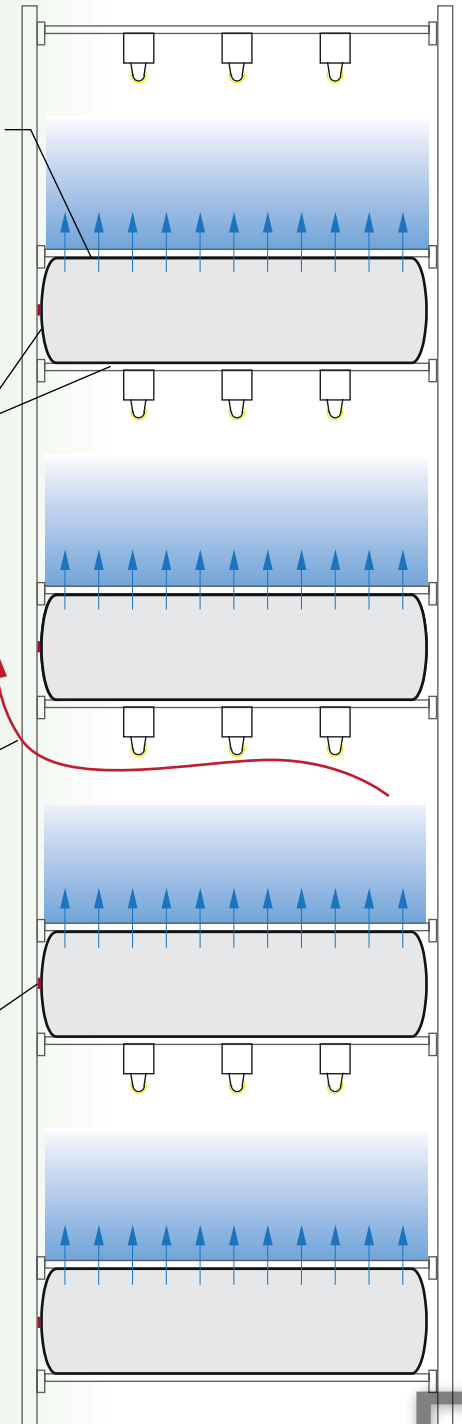
Access ports are included in the DuctSox to take pressure readings to confirm airflow to evaluate if maintenance may be required.

High air permeable fabric on top panel ensures uniform vertical airflow up through potted plants preventing cross contamination. This ensures an isolated environment from germination to early growth stage.

Low air permeable fabric on bottom and sides prevents heat gain and condensation.

Heat from lighting is re-directed by the fabric panel and passes to aisle for return air.

Access port to test pressure and evaluate maintenance.



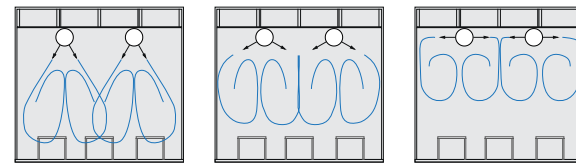
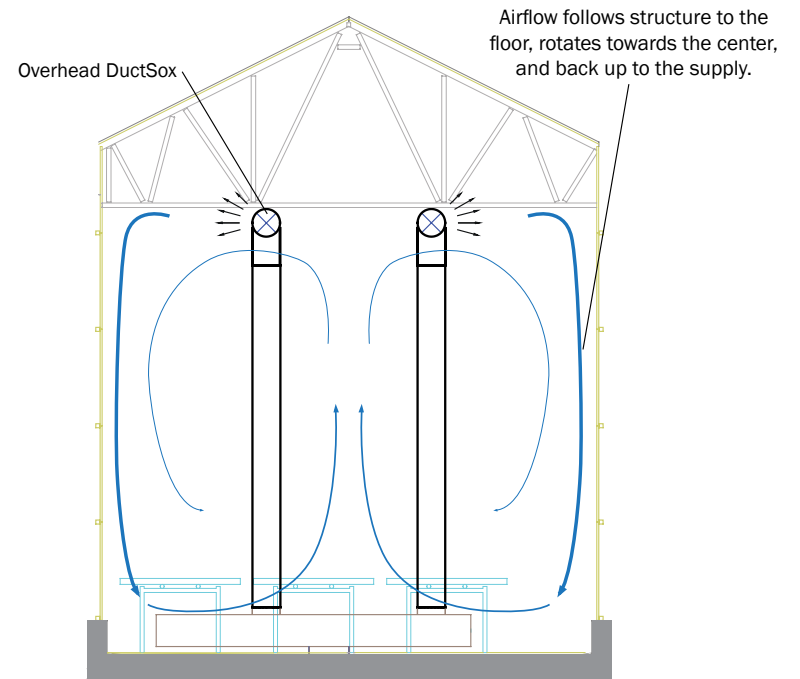


OVERHEAD

CREATING DRAFTS OR CONTROLLING AIR

As plants age, air movement is beneficial to ensure strength and maximum output. In many applications, “off-the-shelf” fabric duct is used to bring in the airflow while supplementary fans generate air movement. With DuctSox, the engineered fabric system allows strategic air outlet sizing to induce spot or general air movement throughout a greenhouse space. Special attention is paid to maximize air rotation within a space to prevent colliding airflow patterns.

Because every DuctSox system is designed for a specific space, the airflow pattern can be customized to ensure optimum performance for any confined growing environment.



Outlet size and location impact how complex or simple the airflow patterns are. For best results, designers can optimize for the plant height and desired air movement.

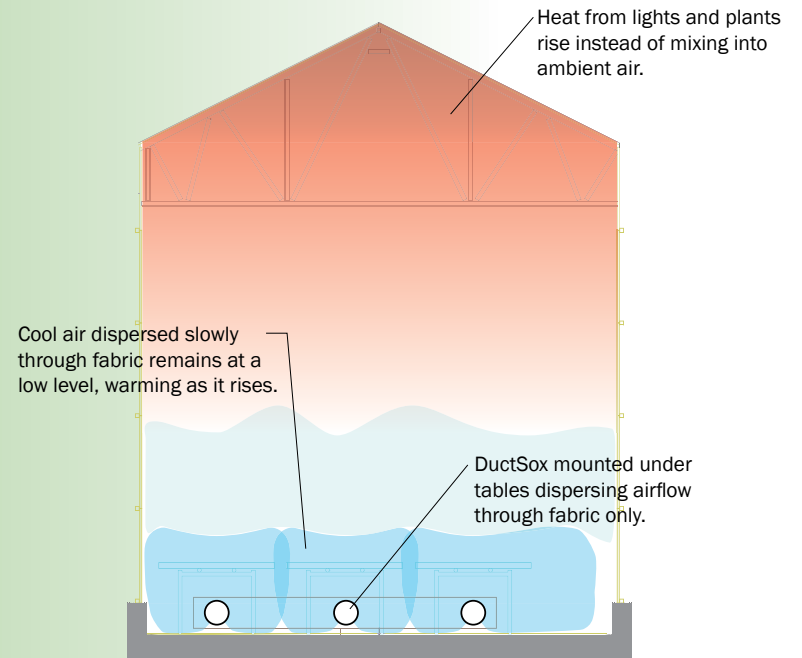




UNDER TABLE

LOW VELOCITY FOR CONTROL & THERMAL DISPLACEMENT

Delivering airflow below plants is not natural. The concept has evolved as growers seek more efficient and cost effective cooling options for managing the temperature of the soil and the space the plants occupy. The polyester-based DuctSox fabrics are flexible and lightweight. Installing the fabric below the tables is a much easier option than metal ductwork.



Vertical air jet



High velocity discharge causes localized drafts.



Slow air dispersion through the fabric results in uniform airflow.

AIR DISPERSION

Similar to diffusers mounted on a ceiling, the floor will impact air dispersion.

In some applications, orifices or vents are used to disperse the air. When opposing air streams collide (photo, far left), it creates a vertical air jet. For low velocity or displacement models, this jet would not be desired.

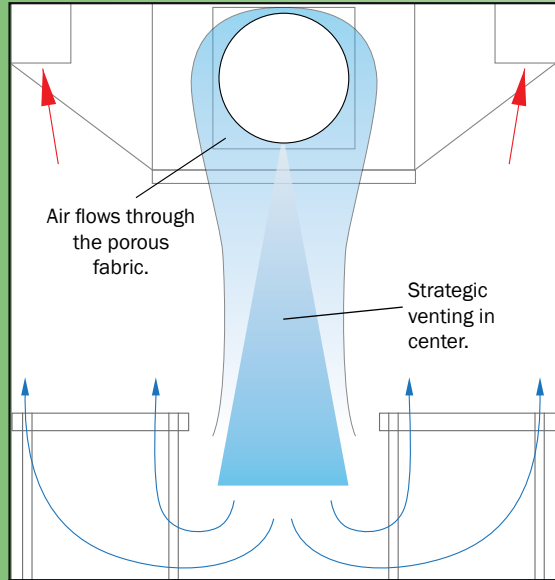
The smoke test (at left) shows a recommended design featuring air porous fabric that disperses the airflow with low velocity.



GROWTH CHAMBERS

CONTROLLING AIR VELOCITY FOR CONFINED SPACES

In Growth Chambers, precise control of air movement is critical to managing temperature. Excessive draft may cause leaf or plant dehydration, while insufficient drafting may produce weaker plants.



Combining air porous fabrics and strategic venting results in precisely controlled airflow patterns, as shown in both the photo and illustration at left. Systems may require a mix of air porous fabrics and high volume linear vents. Airflow delivered through the fabric becomes entrained into the vent and delivered to the occupied space, limiting entrainment of heat from lighting.

General air dispersion patterns as shown in photo at left.

Stability Chamber: Vertical draft in center creates uplift through plants to return air.



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To find a DuctSox representative, please scan.

Products may be covered by one or more of the following patents: 6565430, 6558250, 5769708, 6425417, 6626754, 6280320, 6960130, 6958011, 6953396, 8434526, 8676545, 8808075, and 8844578. Other patents pending.