



**INSTALLATION, OPERATION
AND MAINTENANCE MANUAL
FOR
CG SERIES
CLEAN ROOM CEILING GRIDS**

**USA
HEAD OFFICE
AND FACTORY**

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SALES OFFICES ACROSS CANADA AND USA

Retain instructions and maintain in a legible condition.
Please give job number when contacting
factory for information and/or parts.

www.engineeredair.com

If any errors or omissions are noted please contact the nearest Engineered Air Technical Service Department.

To ensure warranty is honored, only qualified personnel should be employed for installation, service and troubleshooting. If further information is required please contact the nearest Engineered Air sales office.

Warning:  **Improper installation, adjustment, alteration, service or maintenance can cause property damage, injury or death. Read the installation, operating and maintenance instructions thoroughly before installing or servicing this equipment.**


Warning:  **This unit is connected to high voltages. Electrical shock or death could occur if instructions are not followed. This equipment contains moving parts that can start unexpectedly. All work should be performed by a qualified technician. Always disconnect and lock out power before servicing. DO NOT bypass any interlock or safety switches under any circumstances.**

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YOU HAVE RESPONSIBILITIES TOO

This installation, operation and maintenance manual cannot cover every possibility, situation or eventuality. Regular service, cleaning and maintaining the equipment is necessary. If you are not capable of performing these tasks, hire a qualified service specialist. **Failure to perform these duties can cause property damage and/or harm to the building occupants and will void the manufacturer's warranty.**

INTRODUCTION

Engineered Air ceiling grid systems are high quality products designed and manufactured to provide many years of trouble-free operation. We recommend that this manual be read thoroughly to ensure proper installation, efficient operation and proper maintenance of this equipment. The submittal record is considered to be part of the Installation, Operation and Maintenance Manual.

SAFETY PRECAUTIONS

Read, understand and follow the complete manual before beginning the installation, including all safety precautions and warnings attached to product and/or packaging.

Warning:



This grid module is connected to high voltages. Electrical shock or death could occur if instructions are not followed. This equipment contains moving parts that can start unexpectedly. All work should be performed by a qualified technician. Always disconnect and lock out power before servicing. DO NOT bypass any interlock or safety switches under any circumstances.

Warning:



T5 or T8 FIXTURES: These fluorescent fixtures have select ballast and lamp configurations. Ballast and lamps shall only be replaced with the exact ballast and lamp combination as noted in the submittal record.

LED FIXTURES: These fixtures have been modified for use only with LED lamps and will not operate fluorescent lamps. Use only LED self-ballasted lamps for lamp replacement. **ONLY USE EXACT LED REPLACEMENT LAMPS.**

WARRANTY

LIMITED WARRANTY ENGINEERED AIR will furnish without charge, F.O.B. factory, freight collect, replacement parts for, or repairs to products covered herein which prove defective in material or workmanship under normal and proper use for a period of twelve (12) months from the initial start-up or eighteen (18) months from the date of shipment, whichever expires sooner, provided the customer gives ENGINEERED AIR written notice of such defects within such time periods and provided that inspection by ENGINEERED AIR establishes the validity of the claim and all pertinent invoices have been paid in full. The repairs or replacements will be made only when the complete product(s) or part(s) claimed to be defective are returned to ENGINEERED AIR or a depot designated by ENGINEERED AIR, transportation charges prepaid. Repairs or replacements as provided for by this paragraph shall constitute fulfillment of all ENGINEERED AIR's obligations with respect to this warranty. The refrigerant charge is not included in any part of this warranty. This warranty does not apply to any products or parts thereof that have been subject to accident, misuse or unauthorized alterations, or where ENGINEERED AIR's installation and service requirements have not been met.

The foregoing warranty is in lieu of all other warranties, express or implied. ENGINEERED AIR specifically disclaims any implied warranty of merchantability and/or fitness for purpose. Under no circumstances shall ENGINEERED AIR be liable to, nor be required to indemnify, Buyer or any third parties for any claims, losses, labour, expenses or damages (including special, indirect, incidental, or consequential damages) of any kind, resulting from the performance (or lack thereof) of this Agreement or the use of, or inability to use the goods sold hereunder, including, but not limited to, damages for delay, temporary heating/cooling costs, loss of goodwill, loss of profits or loss of use. Furthermore, the parties agree that the Buyer's sole remedy under this Agreement shall be limited to the limited warranty set forth in the preceding paragraph relating to the repair or replacement of any defective goods. Under no circumstances shall any claim or award against ENGINEERED AIR exceed the original contract price whether awarded through arbitration, litigation or otherwise.

ENGINEERED AIR Warranty is void if:

1. The unit is not installed in accordance with this manual.
2. The start-up and operation of the unit is not performed in accordance with this manual.
3. The unit is operated in an atmosphere containing corrosive substances.
4. The unit is allowed to operate during building construction.

RECEIVING

Caution:

For skids larger than Four (4) Feet wide, Engineered Air recommends the use of 'Eight (8) Foot forks' on all forklifts whether the modules are being removed from the freight carrier's truck or being moved around the construction site. This will reduce the risk of property damage, injury, or death.

All Engineered Air Ceiling Grid Modules are carefully constructed and inspected prior to shipment to insure the highest standards of quality and performance. These modules are double-wrapped in the factory, unless more is required by specification. Shipped loose hardware is not wrapped unless otherwise specified.

Carefully inspect all parts after receiving them from the transporting agent. The Grid Modules are pre-cleaned and then wrapped, do not un-wrap them outdoors or in a dirty environment.

Carefully inspect all parts for any damage that may have occurred in transit. Any damage must be reported immediately to the carrier and the required damage report filed. Isolate damaged equipment in a separate holding area to prevent it from being installed.

Compare parts with the shipping documentation to make sure your shipment is correct, free of damage and complete. Your signature verifies that you have received all equipment in satisfactory condition.

CRATE IDENTIFICATION

Each crate prepared by Engineered Air has been thoroughly inspected and all contents are recorded by use of a factory printed 'ship loose' parts list. **Two inventory lists are then shipped with each crate describing the contents and quantity of each item contained within the crate.** One list is shipped inside the crate and the second is placed in an envelope and attached to the outside of the crate. Each crate has an identifying crate number. This crate number can also be found on the packing list.

Inventory: Engineered Air recommends inventorying all crated items. As crates are opened and parts are used during installation of the ceiling system, parts are often lost or misplaced. To prevent this from occurring, mark off items as they are removed from the crate. This will help minimize delays and back charges caused by having to replace lost or misplaced parts. If any item is missing from the crate notify Engineered Air immediately.

TEMPORARY STORAGE

Temporary storage should be consistent with the requirements of the project specification.

If the modules are to be stored prior to installation the following precautions are required:

- Store in a well drained area that will not accumulate surface water.
- Store in an area where the module(s) will not get damaged.
- The entire perimeter of the module(s) must be supported by a level surface and the supporting surface must be adequate for supporting the entire weight of the module(s).
- All protective covers that were provided for shipping must be in place.
- Protect from rain or snow.

INSTALLATION

Caution:



The Engineered Air grid modules are wrapped with two (2) or more layers of protection. Each layer may be removed at different protocol levels and transport the grid module from the most practical exposed areas to the more stringent protocol levels. Engineered Air recommends the use of a padded platform accessible by a forklift. Most damage occurs when direct pressure is placed upon individual grid members.

Verify all suspension rods and grid-to-grid holes are in the correct locations and orientation. Verify electrical connection(s) and sprinkler pipe connection(s) are in the correct position. Verify pigtails for light bar connections are visible and located on the proper side. To help with grid orientation, grid modules have tag labels affixed in the **Northwest** corner of the grid. **See submittal layout for room orientation.**

Lift Grid Modules into Position: Lift grid into position using a protected surface platform or rigging attached to the suspension holes or rods. **WHEN RIGGING, DO NOT RIG HOLES AT AN ANGLE. Use a spreader bar, as required.** Verify top and sides are lined up evenly. NOTE: Throughout the module installation the lift will be required to hold up the grid module. *Use a lift that is suited for grid module weight and max capacity. Use caution to not damage or pinch pig tail wiring when mating adjacent grid modules.*

Grid Mating Surface: Prior to installation of adjacent grid modules, clean mating surface on both grid modules. **DO NOT APPLY CAULKING TO MATING SURFACES.** Applying caulking to mating surfaces will increase overall room dimensions of a completed system, create alignment difficulties with adjoining structural hardware and cause intersecting lenses to not fit properly. Caulking should only be applied at adjoining grid seams as shown in the submittal.



Attachment to Suspension Blocks: Attach suspension blocks (extrusion) to the top of each grid module using the supplied (¼-20) hardware kit. Turn the supplied threaded rod into the extrusion until it bottoms out in the ceiling extrusion nut groove. Tighten the hex nut against the extrusion to prevent the rod from backing out. The Grid may now be attached to the turnbuckles and to the ceiling for suspension. Refer to job specific field connections, drawings, and notes on the submittal.

- **Torque requirements for Fasteners:** Suspension Block-to-Grid Module connections shall be: ***Snug Tight***

AISC (*American Institute of Steel Construction*) and **RCSC** (*Research Council on Structural Connections*) defines **Snug Tight** as: *the condition that exists when all of the plies in a connection have been pulled into firm contact by the bolts in the joint and all of the bolts in the joint have been tightened sufficiently to prevent the removal of the nuts without the use of a wrench.*

Attachment of Adjacent Grid Modules: After each assembly has been lifted into position and secured to the structural assembly, install and align proper fasteners for the grid to grid mating surfaces. Verify top and sides of the module are lined up evenly. First install fasteners in four (4) places on the long side and then two (2) places on the short side. Once proper alignment of grid is completed the remaining fasteners should be installed.

- **Torque requirements for Fasteners:** Grid-to-Grid Module connections shall be: ***Snug Tight***

Leveling of Ceiling Grid: The overall ceiling system shall be leveled within ± 0.062 inch in 10 feet and not over ± 0.10 inch throughout the room. Check and level the ceiling grid modules using a laser transit. Adjust the grid height by turning the turnbuckle connections on the threaded rod. Once leveled; tighten the locking nut onto the turnbuckle.

PROTECTING THE SYSTEM

Structural Stability: During construction and installation, the contractor shall be responsible for the structural stability of the system. The structure shown on the Engineered Air drawings has been designed for stability under the FINAL installed configuration only.

Electrical: Protect all exposed wire ends by use of appropriate wire connectors.

Wrapped Parts: Keep all items wrapped for maximum protection until it is absolutely necessary to remove the wrapping and use those components.

Close off all Openings: To minimize particle contamination during construction and installation, close off all exposed openings.

Mask off Exposed Areas: Engineered Air recommends masking off exposed areas relating to the interior of a grid. This will minimize cleanup and wipe down prior to any gel prep and start-up.

CAULKING REQUIREMENTS

Engineered Air provides caulk sealant for filling voids where air may leak. Sealing of the system is done upon complete installation of the Engineered Air system and is the responsibility of the installing contractor. All grid systems come pre-sealed with caulking in all possible penetrating seams. Due to circumstances beyond our control during shipping, sealant may dislodge in areas requiring a seal. Engineered Air recommends each unit be inspected for apparent loosening of sealant and reapplication shall be required if this condition occurs.

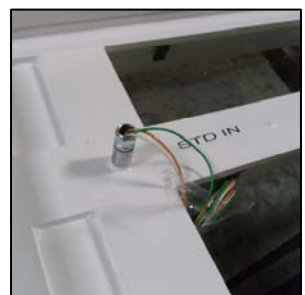
- Completely caulk all grid seams and around all grid penetrations. Additional sealing locations include, but are not limited, to: electrical penetrations, sprinkler pipe penetrations, grounding screws, damper ports, etc.
- If silicone caulking is required by the project specifications, use approved primer on the mating surfaces prior to caulking. Follow product instructions for cure time prior to using caulking.
- **USE ONLY approved caulking!** Caulking shall meet all project specification requirements and be factory approved for our system prior to installation. **See the submittal record for approved caulking.**



ELECTRICAL CONNECTIONS

Ceiling Grid Modules come pre-wired at the factory with light bar assemblies built into the grid system. Each system has a source grid that connects to the power supply from the main facility power. Due to lighting requirements and cleanroom design, some light bars may need to be installed in the field by the installing contractor.

- Grid-to-Grid connections: Along the grid level there are two types of electrical lines that require connecting procedures: High Voltage and Low Voltage wiring. Refer to job specific field connections, electrical drawings, and the submittal.
- High Voltage Connections may be located above and/or within the grid. The connection for the high voltage wiring should only be performed by a licensed electrician and must follow all applicable electrical codes and shall be to the approval of the local authority having jurisdiction. Please refer to the submittal layout drawing and locate the electrical



sheet for exact power supply locations. This drawing will identify the grids associated with each circuit. Amperages are based on the maximum ampacity rating of the wire. Where applicable, cover electrical connections, at the module joints, with the supplied wire separator cover. Refer to the job specific drawing in the submittal.

- Low Voltage is located in the lower section of the grid. The connection for the low voltage wiring should only be performed by a licensed electrician and must follow all applicable electrical codes and shall be to the approval of the local authority having jurisdiction. Use listed/certified connections.
- Grid modules are labeled and marked (Intertek-ETL) to show the maximum ampacity rating of the interconnecting wiring and the maximum fuse or breaker size of each circuit. Each light bar (fixture) is individually labelled (Intertek-ETL).
- When additional light bars are added in the field, wiring should only be performed by a licensed electrician and must follow all applicable electrical codes and shall be to the approval of the local authority having jurisdiction. Light bars are factory wired with pigtail wiring for connection to the appropriate building circuit.

FIRE PROTECTION SYSTEM (SPRINKLER) CONNECTIONS

It is the sprinkler contractor's responsibility to hard pipe all sprinkler mains and branch lines to the connections in the grid modules and attach all sprinkler heads. After installation, they should be pressure tested to confirm that they meet all applicable fire sprinkler codes. Sprinkler piping must be independently supported.

- **Ceiling Grid Modules:** The sprinkler connection size is determined by the number of sprinkler heads. Refer to job specific sizes, drawings, and notes on the submittal. **Sprinkler heads may be shipped loose.**
- All sprinkler heads shall be installed by a licensed fire protection contractor.
- Follow the sprinkler head manufacturer's installation instructions.
Over-tightening may cause the system to leak and can cause damage to the threads of the sprinkler head.



PERIMETER GRID AND WALL CLOSURE

When the cleanroom system includes wall closure provisions, Engineered Air will provide wall closure kits for head track installation and/or closure angles. The kits are provided for use on two-foot centers and include a two-piece hanging clip and hardware. Refer to job specific sizes, drawings, and the submittal. Installation of these field installed components is by others.

GEL POUR REQUIREMENTS

Cleaning: Vacuum and clean the grid of all foreign objects and debris. Wipe down grid modules (**NOT the Light Lens**) using a 10% isopropyl alcohol and 90% deionized water solution as required by the specified cleanroom procedures. Do not over-wipe caulking as it may loosen. Let the grid completely dry for at least 12 hours, any alcohol will destroy the GEL. **Lens material shall be cleaned with 100% de-ionized water only.**

- Some project specifications require a blow down period prior to GEL and filter installation.
- Ceiling Grid modules must be level prior to pouring GEL.
- GEL shall be stored and handled in a temperature-controlled environment at all times. Room temperature is recommended to be maintained at 70-80°F (20-27°C) for a period of 24 hours prior to the GEL being installed in the system.
- Follow all GEL manufacturer's installation instructions and specifications for required GEL temperature and maximum shelf life and pot life.
- Provide protection on all walls, floors and over any equipment to avoid GEL contact during the pour and set-up.
- Top Load Grid Modules: Pour GEL to fill the trough to a height of 1/8" from the top of the trough.
- Bottom Load Grid Modules: Pour GEL around all electrical, sprinkler, and perimeter GEL cups to a height of 1/16" from the top of the cups.
- After the GEL pour, wipe down all grid members with site protocol-approved cleaning solution. Remove all spillage and debris adhering to grid modules left from the GEL pour.
- All work to remedy GEL leaks is the contractor's responsibility.



FILTERS, BLANK PANS, AND DIFFUSION SCREEN INSTALLATION

Prior to installation, verify that the GEL is at the proper level and has completely set-up as per the GEL manufacturer's instructions. Review layout drawings for location and quantity of parts. Verify all sizes for each part.

FILTER INSTALLATION: Filters are the most delicate part of the system and proper handling is an absolute requirement. **Carefully stack filters according to the manufacturer's instructions. Filters must be stored indoors and in a conditioned space prior to being installed.** Filters are packaged for single or double staging. This is determined by the project specification. Single stage filters are bagged once and then boxed individually. Double stage filters are bagged twice and then boxed individually or separated by cardboard sleeves. Double staging adds one more step to the particle free process both in the packaging and staging procedures. This provides the installer the assurance of a cleaner product to

install when properly staged. When installing a filter, do NOT handle or place any objects on the media of the filter. Doing so may damage the filter which could cause it to fail certification.

Inspect each filter prior to installation for any damage. Follow the original filter manufacturer's handling instruction at all times. DO NOT rack or twist the filter frame or put pressure on the filter media at any time. Engineered Air recommends that two people install each filter and only handle the frame of the filter.

- **Top Load Filters:** Can be loaded from the top of the grid or angled in through the bottom of the grid and then lowered into the ceiling grid GEL trough.
BE CAREFUL NOT TO COME IN CONTACT WITH OBJECTS UPSTREAM OF THE GRID.
- **Bottom Load Filters:** Shall be loaded from the bottom, centered on the knife edge and between the filter clips, and lifted into place. Then rotate the filter clips $\frac{1}{4}$ turn to lock the filters into position.
- **Filter Removal:** Reverse the appropriate installation instructions. Removing filters may take some finesse. This process must be done slowly to keep the GEL from being pulled out of the trough.
- **Blank Pans:** All blank pans are installed using the same procedures as the filters on the same system. See Filter Installation.
- **Diffusion Screens:** The diffusion screens are specifically manufactured to work with the Engineered Air flush grid and screen clips.



If **Filter Dampers** are to be installed on the upstream side of the filters, they should be installed on the filters prior to loading. Dampers may be shipped loose to the field and will be installed by the system installing contractor unless otherwise agreed upon to be installed by the filter manufacturer. Follow damper manufacturer's instructions for installation.

Warning:

This face screen installation procedure must be followed for secure installation of the diffusion screens.

DIFFUSION SCREEN INSTALLATION: Verify the correct size and location of the screen being installed. On each diffusion screen you will find mounting holes along the long sides of the screen. Place the mounting holes on one side of the screen onto the corresponding screen clips on the inside of the flush grid. Then push the opposite side of the screen into the grid and onto the screen clips, the screen should snap into place. Inspect the diffusion screen to make sure that all the clips have properly seated in the mounting holes and are tightly engaged. A hex key wrench may also be inserted into the screen at each clip, making sure to not come in contact with the filter; a gentle tug downward will ensure positive screen clip engagement. Some variation in the height of the diffusion screen is normal. See details below.



PLACE MOUNTING HOLES ON ONE SIDE OF SCREEN CLIPS



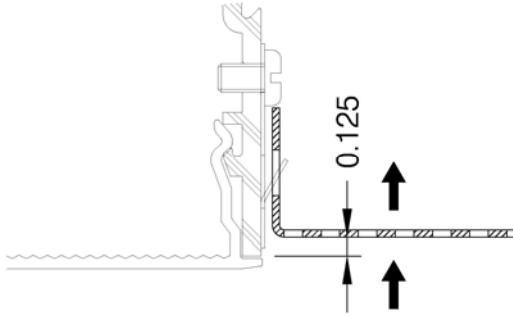
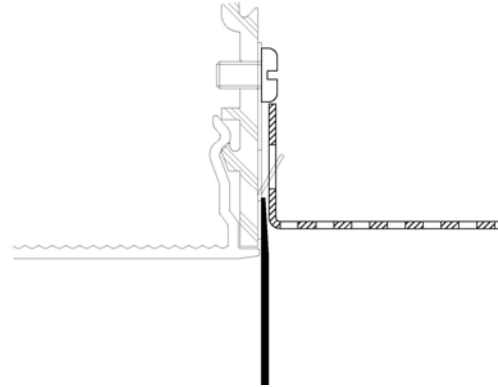
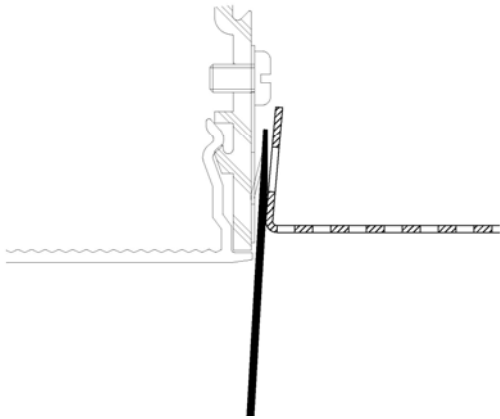
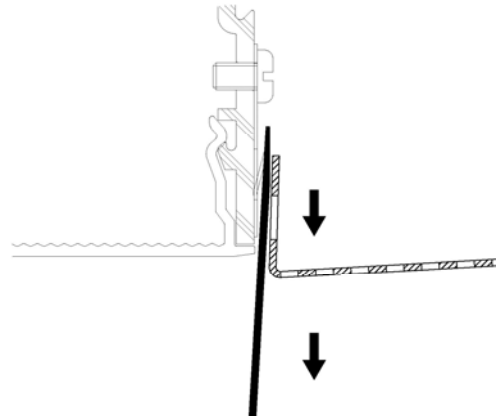
PUSH OPPOSITE SIDE ON TO SCREEN CLIPS



SCREEN WILL SNAP INTO PLACE

DIFFUSION SCREEN TEST: Using moderate pressure, push up on the screen below each of the clip locations to test and ensure that all the clips have engaged. If the screen does not engage into the clips at any location it will be necessary to remove the screen and bend the flanges slightly outward, by hand. This may be necessary due to bending during shipping and handling. Repeat these steps as necessary until all the clips engaged.

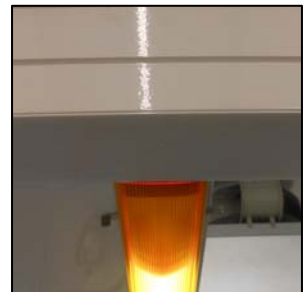
FACE SCREEN REMOVAL: To remove, gently push one side of the screen up approximately 1/8 of an inch. Then insert a putty knife between the screen and the screen clip so as to disengage the tongue, of the clip, from the mounting hole of the screen. Lower the screen at this edge and then repeat the procedure on the second clip on that same side of the screen. Once the screen is free on that side, lift the other side off the remaining clips. See details below.

**LIFT SCREEN UP 1/8 INCH****INSERT PUTTY KNIFE BETWEEN
SCREEN AND CLIP****DISENGAGE TONGUE FROM MOUNTING HOLE****LOWER SCREEN FROM CEILING**

LENS INSTALLATION

Install the light lens after all the filters, screens, electrical items, ionization fixtures and light bars have been installed. Inspect the lens for any signs of cracking. If there are any cracks then do not use the lens and use a new lens. NOTE: Whitening on the legs of the lens may be caused by repeated installation and removal of the lens. This is normal and the lens can still be used as long as the lens is not cracked.

- Install the lens by inserting the leg of the lens that is away from you into the grid channel.
- Rotate the other leg of the lens towards you and into the grid channel. This leg may need to be pushed in with your fingers to get the leg inside of the grid channel.
- Carry on this process down the lens continuously towards the opposite end.
- With the palm of your hand push up along the length of the lens to make sure it is seated in the grid channel properly.
- DO NOT use excessive force to install the lens as this may cause the lens to crack.
- To remove the lens, pry between the lens wings and the edge of the grid channel. Do not pry on the prism of the lens; this may cause the lens to crack.
- **DO NOT use alcohol to clean the Acrylic light lens in the grid.** Lens material may be cleaned with 100% de-ionized water only.



BEFORE START-UP

- Clean all powder coated and/or stainless steel surfaces with a 10% isopropyl alcohol and 90% deionized water solution as required by cleanroom procedures.
- Check application of all sealant at locations in traffic areas.
- Check all fan compartments for loose debris and remove any foreign objects.
- Verify all filters and blanks have been installed.
- Check all connections: Sprinkler, electrical, ducting, etc. for proper fit.
- **Fan Filter Units (FFU's):** See Manufacturers O&M Manual prior to start-up of system. DO NOT START SYSTEM UNTIL O&M MANUAL HAS BEEN REVIEWED.