

EngA[®]

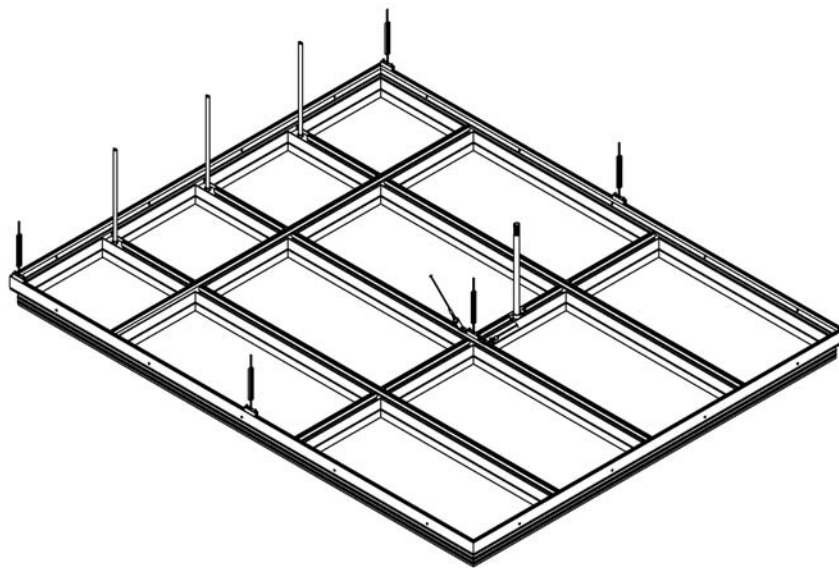
ENGINEERED AIR[®]

INSTALLATION, OPERATION AND MAINTENANCE MANUAL

FOR

Nano-T[™]

SUSPENDED CEILING GRIDS



**CANADIAN
HEAD OFFICE
AND FACTORY**

1401 HASTINGS CRES. SE
CALGARY, ALBERTA
T2G 4C8
Ph: (403) 287-4774
Fx: 888-364-2727

**USA
HEAD OFFICE
AND FACTORY**

32050 W. 83rd STREET
DESOTO, KANSAS
66018
Ph: (913) 583-3181
Fx: (913) 583-1406

**CANADIAN
EASTERN FACTORY**

1175 TWINNEY DRIVE
NEWMARKET, ONTARIO
L3Y 5V7
Ph: (905) 898-1114
Fx: (905) 898-7244


SALES OFFICES ACROSS CANADA AND USA

Retain instructions with unit and maintain in a legible condition.
Please give model number and serial number when contacting
the 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 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.**

The installer is responsible for providing qualified, trained personnel to install and operate the equipment. Consult all local building, occupational safety, electrical, gas and any other codes applicable to the installation of this equipment

- Only trained and qualified service personnel should install or service air conditioning equipment.
- Untrained personnel can perform basic maintenance, such as cleaning and replacing filters. All other operations should be performed by trained service personnel. When working on our system, observe precautions in literature and on tags and labels attached to unit.
- Follow all safety codes. Wear appropriate PPE safety glasses and work gloves. Read these instructions thoroughly

WARRANTY

ENGINEERED AIR will furnish without charge, F.O.B. Factory, freight collect, replacement parts for, or repairs to parts covered herein which prove defective in material or workmanship under normal and proper use within one year from the date of delivery, provided the customer gives ENGINEERED AIR written notice of such defects and provided that inspection by ENGINEERED AIR establishes the validity of the claim and all pertinent invoices have been paid in full.

The correction of such defects or replacement will be made only when the complete product or part(s) claimed defective are returned to ENGINEERED AIR, transportation charges prepaid, if such return is requested by ENGINEERED AIR.

Repairs or replacements as provided by the foregoing paragraph shall constitute fulfillment of all ENGINEERED AIR's obligations with respect to this warranty. ENGINEERED AIR shall not be liable for any damage to person, property, loss of revenue, or expense incurred, irrespective of cause. 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 installation and service requirements have not been met. The foregoing warranty is in lieu of all other warranties, expressed or implied.

Component parts such as electrical motors, controls and/or accessories not manufactured by EngA shall be warranted under the terms and conditions of the warranty by the manufacturer of said component parts.

Items Not Covered By this Warranty:

Work or repairs made without EngA's authorization or those items that require periodic replacement due to wear, such as but not limited to fan motors, filters, lamps, ballasts, and fan bearings that are outside of the standard warranty period.

SUBMITTAL RECORD

Engineered Air's cleanroom system is designed and manufactured to the submittal supplied by EngA and approved by the Customer. All changes and/or variations thereof are to be resubmitted or documented by correspondence. Contained in the submittals are the systems specifications, complete system layouts, vendor acknowledgments, schematics and ship loose parts information.

Spare Parts and Replacement Parts List:

- **Spare Parts:** Spare parts are defined as an added item to the purchase order. The customer, depending on their requirements, can request a spare parts list. These parts are normally non-stocked items that require a longer lead-time upon placing an order.
- **Replacement Parts:** The replacement parts in a particular system are covered under the EngA warranty. Many of these parts are listed in the submittal and have data sheets accompanying them. Replacement parts are part of the assembled units and can be identified by the individual unit tag number.
- **Ship Loose Parts:** The ship loose parts are items that require field installation and are shipped separately from assembled units.

RECEIVING AND INSPECTION

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.

The EngA 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 EngA is given a thorough inspection 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 will then receive a crate number. This crate number can also be found on the packing list.

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

- If any item is missing from the crate please notify Engineered Air immediately.

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.

STORING PRODUCT

Engineered Air cleanroom components are comprised of sensitive materials intended for application in spaces which require validation and certification. The material has been completely cleaned and carefully packaged to meet the required industry standards prior to leaving the factory.

It is the responsibility of the contractor or end user (receiving company) that receives the product to provide proper storage. Cleanroom components shall not be left outside in the elements. Due to the delicate nature of

the product inside the package, all components must be stored in a conditioned space to avoid damage from humidity and temperature effects.

Once the receiving company accepts the shipment (see receiving and inspection), it becomes the property of the receiver. It is the receiving company's obligation to provide proper storage. Engineered Air will not be liable for internal damage which has occurred through improper storage by the receiving company. Any costs associated to fix this damage will be the sole responsibility of the receiving company.

STAGING GRID MODULES

The EngA 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 particle exposed areas to the more stringent protocol levels. EngA recommends use of a padded platform accessible by a forklift. Most damage occurs when direct pressure is placed upon individual grid members.

INSTALLING GRID MODULES

Double-Check Each Grid: Verify all suspension rods and grid-to-grid holes are in the correct location and orientation. Verify electrical connection and sprinkler pipe connection is 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.** Verify top and sides are lined up evenly. NOTE: Throughout the installation procedure, 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 as a completed system, create alignment complications with adjoining structural hardware and cause intersecting lenses to not fit properly. Caulking should only be applied at adjoining grid seams as shown. Refer to submittal for section details.



Attachment to Suspension Blocks: Attach suspension blocks (extrusion) to the top of each grid module using the supplied (1/2") 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 structure assembly, proceed to install and align proper fasteners for the grid to grid mating surfaces. Verify top and sides of 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 level by turning the turnbuckle connections on the threaded rod. Once leveled; snug 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 EngA drawings has been designed for stability under the FINAL installed configuration only.

Electrical: Close off all exposed wire ends by use of appropriate wire nuts.

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: EngA 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 penetrate. Sealing of the system is done upon complete installation of the EngA system and is the responsibility of the install 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. EngA recommends each unit be inspected for apparent loosening of sealant and reapplication shall be required if this condition occurs.

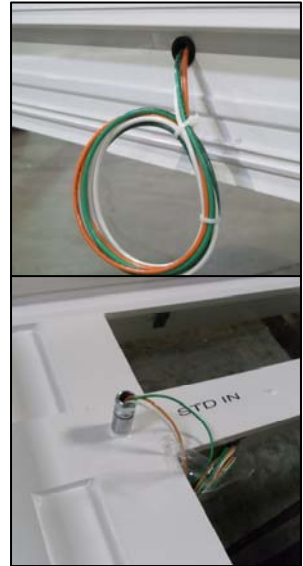
- Completely caulk all grid seams and around all grid penetrations. Additional sealing locations include but are not limited to: electrical penetrations, sprinkler pipe penetrations, grounding screws, damper ports, etc.
- If silicone caulking is required by the client, use approved primer on the mating surfaces prior to caulking. Follow product instructions for cure time prior to using caulking.
- **USE ONLY approved caulking!** Caulking shall meet all customer specification requirements and be factory approved for our system prior to installation. **See submittal 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 receives the power supply from the main facility power. Due to lighting requirements and cleanroom design, some light fixtures may need to be installed in the field by others.

- **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. 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 were calculated according to the maximum amps allowable for each grid module. *DO NOT* exceed the number of lamps per circuit unless the change is approved by the Engineered Air. 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. Use listed/certified connections.
- Because grid modules are INTERTEK (ETL) labeled prior to it leaving the factory, any field modifications are the responsibility of the field contractor. Field modifications to the electrical fixtures may be separately listed with INTERTEK (ETL), at the contractor's expense.



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.

- **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 must 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, EngA 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.

FILTERS INSTALLATION

FILTER INSTALLATION: Filters are the most delicate part of the system and proper handling is an absolute requirement. *Filters should NOT be stacked flat. 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 customer 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 enables 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. EngA recommends that two people install each filter and only handle the frame of the filter.

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.

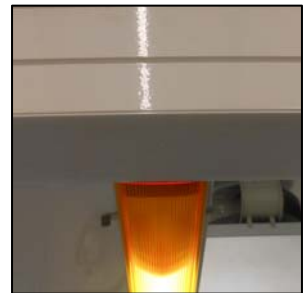
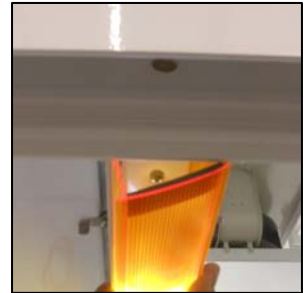


- **Bottom Load Filters:** Shall be loaded from the bottom, centered on the knife edge and between the filter clips, and lifted into place. Then rotate the filter clips $\frac{1}{4}$ turn to lock the filters into position.
- **Filter Removal:** Reverse the appropriate installation instructions. Removing filters may take some finesse. This process must be done slowly to keep the GEL from being pulled out of the through.

LENS INSTALLATION

Install the light lens after all the electrical items, ionization and light fixtures 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 one leg of the lens into the grid channel, the leg that is away from you.
- 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.
- Continue this process down the lens towards the opposite end continuously.
- 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% Alcohol and 90% deionized water solution.
- 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.

NOTES
