Originally founded as Bullocks Manufacturing during the post-war residential housing boom, I.C.E. Manufacturing was recognized for innovation and excellence early in our history. After the company established a reputation for designing, manufacturing and installing natural gas conversion burners for oil and coal-fired furnaces, founder Don Bullocks returned from an ASHRAE trade show with a natural gas line burner. Inspired, he set out to manufacture the first direct-fired makeup air unit in his home country of Canada.

Today, the natural gas revolution continues with I.C.E. Manufacturing at the forefront of the commercial direct-fired industry. Don had the vision long before many others by designing a product that has outlived his legend. Our BMA Series is named for him (Bullocks Makeup Air). This forward thinking has carried on through such advanced products as the HTDM, the gas valve technology available on the BMA, and the industrial-quality GIDM product line.

All of our products have withstood the test of time. Many new products are on the horizon to meet the ever-increasing concern over energy costs, consumption and impact on our environment. We are building on our heritage to bring exceptional gas-fired products to market.

I.C.E. is committed to success – the success of our customers and our employees. To us, success is driven by loyalty that comes from service, quality and innovation. With our vast experience in the HVAC industry, we continue to listen to and understand the needs of our customers. And we trust we will be able to serve you well into the future.
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AC Series
Air Turnover Units

Design Flexibility
- All capacities are engineered, specifically, for the application.
- Furnace capacities are designed, manufactured, tested and verified.
- Heat transfer coils are designed and manufactured, specifically, for each unit.

Performance
AC Series – air turnover units are premium space circulating units. The AC Series units boast quality components and construction, with unparalleled flexibility and performance.

Uniform space temperatures
- Uniform space temperatures provide more comfort and reduced building stratification.
- Heat loss and fuel consumption are reduced to a minimum with even space temperatures.

Reduced operating costs
- The highly efficient propeller fan provides the lowest electrical consumption to distribute air throughout a building.
- Outside air is not required for operation, the air turnover unit can re-circulate up to 100% space air.

Numerous configurations available including:
- Single or multiple discharge/inlet openings
- 20% outdoor inlet opening with motorized damper
- Full mix box with 100% outside air capability. Available with two position summer/winter ventilation mode or integrated modulating economizer.
- Indoor/outdoor construction
- V-bank filter section with pleated filters and hinged access doors
- Direct expansion or chilled water cooling coils available in blow through or draw through arrangements
- Electric, hot water or steam heating coils

Lower installation costs
- Base mounted air turnover units only require a few hours to stack and wire.
- The units do not have to be hung or supported and do not require ductwork to be cut through the roof.

Rapid temperature recovery
- Air turnover units constantly circulate large volumes of air providing rapid response to temperatures deviating from a set-point.

Outstanding indoor air quality (IAQ)
- Air is constantly rotated throughout the building. This prevents stagnation.
AC Series
Air Turnover Units

Typical Applications
Air Turnover units are ideal for large open space heating, cooling, ventilation and filtration requirements. They are widely used in manufacturing, distribution and warehouse facilities. Air turnover units are also very effective at controlling humidity levels in a space.

Construction
- Welded structural iron frame, primed with epoxy rust inhibitor
- Bonderized G90 zinc rich “paint grip” 18 gauge sheet metal
- Industrial alkyd enamel machine gray 3 mil thick casing finish
- Expanded metal inlet/discharge screen (recommended for heating applications)
- Two inch thick Insulated casing with perforated “sound trap” liner in fan deck

Premium Propeller Fan
High efficiency six bladed airfoil turbine prop moves the high volumes of air with the lowest Hp and sound

Stainless Steel Four Pass Drum and Tube Heat Exchanger
Continuously welded stainless steel drum and tube heat exchanger with 80+% efficiency and unsurpassed longevity
AC Series
Air Turnover Units

Standard Accessories
- Hinged access doors with stainless steel piano hinges, compression latches and safety switch
- Numbered control wiring, terminal strip and component identification labels
- EEPAC high efficiency fan motor with adjustable 1.5 s.f. V-belt drive
- Control transformer with service switch and circuit breaker
- All wiring external to control cabinet within BX cable or conduit
- ETL certified ANSI gas train, flame monitoring and safety controls
- Dead front fused disconnect switch
- Spark igniter and flame rectification
- Fan and high limit switch

DIDM Furnace
Industrial Four Pass Heat Exchanger
- PowerFlame™ forced draft industrial burner provides excellent combustion with low maintenance
- Fireye™ flame safeguard provides the safest and most reliable flame monitoring available
- Maxitrol™ regulators
- Hydraulic main gas safety shut-off valve

Unit Mounted Control Enclosure
Standard Dead-front Safety Disconnect Switch
Optional Accessories

- Sealed combustion to allow burner operation in negative pressure or contaminated spaces
- Induced draft blower to improve flue venting on horizontal flue applications (DIDM Furnace only)
- Factory Mutual (FM) or Industrial Risk Insurers (IRI) gas train with hydraulic shut-off valve and controls
- On/off, two stage or full modulation burner forced draft burner
- Mix box section with motorized dampers to provide ventilation. Honeywell™ W710 electronic fully integrated economizer with enthalpy sensor. Differential enthalpy R/A and O/A sensor also available.
- Full occupied/unoccupied seven day programmability
- Complete temperature control packages including DDC interfacing or computer control
- D/X cooling, chilled water, steam, hot water and electric coils
- TEFC, high efficiency or two-speed motors
- Variable frequency drives
- Nema 4 or 12 control enclosure
- Remote control enclosure
- 10 point circuit analyzer
- Return and/or discharge smoke detector(s)
- Seven day time clock with night stat
- Sound attenuation
- Automatic greasing canisters
- Vibration isolation; spring or RIS
- Extended grease lines
- Epoxy paint finish
- Special materials of construction
- Custom paint color
Air turnover units are extremely effective at heating and cooling large buildings. Few units are required to cover vast spaces and provide even temperatures throughout. High levels of inventory and storage have very little effect on performance.

Since air turnover system requires no discharge ductwork the units can virtually be placed anywhere. When located near dock doors air turnover units provide quick recovery to infiltration.

**Typical Selection**

1. Determine building volume
2. Subtract expected inventory to determine net volume
3. Select recommended air turns based on Figure 1
4. Calculate total air volume required
5. Using standard ASHRAE methods determine building heat loss
6. Select qty of units required
7. Select ICE AC Series model required

**Example—Heating Application**

Building dimensions (L x W x H).

\[
300' \times 200' \times 30' = 1,800,000 \text{ cu. ft.}
\]

Expected inventory displaces approximately 20% of building volume.

\[
1,800,000 - (1,800,000 \times 0.2) = 1,440,000 \text{ cu. ft.}
\]

Select recommended air turns/hour, from Figure 1. 2.3

Total air capacity: Net Bldg Volume x Air Turns/Hr ÷ 60 Min/Hr =CFM

\[
55,200 \text{ CFM}
\]

Building heat loss = 1,600,000 Btu/Hr

Quantity of units required from Figure 2

One

Unit selection from performance specification tables

AC model 054/175
Sound Attenuation

- Sound attenuation is optional on all AC Series units.
- Units supplied with cooling include the sound attenuation features as standard

Two inch thick insulation with perforated liner in top of discharge section

- Cooling units are provided with adjustable supply air grilles as standard
- Heating unit have expanded metal screens on discharge, grilles are optional

Sound attenuation package:
Perforated liners provided on fan section including fan divider partitions. Sound is captured by the liners and muffled in the two inch thick fiberglass insulation.
**Performance Specifications**

All capacities are ETL™ certified. Choose from eight standard model sizes.

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<tr>
<th>Model</th>
<th>CFM</th>
<th>Fan Qty</th>
<th>Fan Dia.</th>
<th>w/o Filters</th>
<th>w/ Filters</th>
<th>w/ Cooling</th>
<th>H/X Model</th>
<th>Heat Output (BTUH)</th>
<th>Inducer Hp</th>
<th>Gas</th>
<th>Oil</th>
<th>8-14&quot; w.c.</th>
<th>1-5 psi</th>
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Notes:
1. Heat exchanger performance 80% efficient minimum.
2. Maximum furnace size shown for each model, smaller furnaces can be selected.
3. Contact factory for oil, LP and combination unit performance specifications
* Larger propeller supplied
** Optional – induced draft blower
## Cooling Selection

Choose up to 400 tons of cooling per unit

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<th>Cooling</th>
<th>Bypass</th>
<th>Net</th>
<th>FL</th>
<th>FH</th>
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Notes:
- Performance based on 78 Deg F DB & 66 Deg F WB entering air
- Saturated suction temperatures of 45 Deg F using R-22 Refrigerant

---

Blow Through Coil w/ Air Bypass Damper

Draw Through Coil Configuration

ICE single and double deflection adjustable grilles
NOTE:
1. UNIT SPLIT FOR SHIPMENT, FIELD BOLTING REQUIRED
2. CONSULT FACTORY FOR HEATING OUTPUT GREATER THAN 6,000 MBH

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NOTE: DATA SUBJECT TO CHANGE WITHOUT NOTICE. DIMENSIONS ARE SUBJECT TO MANUFACTURING TOLERANCES.
**DATA SUBJECT TO CHANGE WITHOUT NOTICE. DIMENSIONS ARE SUBJECT TO MANUFACTURING TOLERANCES.**
NOTE:
1. UNIT SPLIT FOR SHIPMENT, FIELD BOLTING REQUIRED
2. RIGHT HAND UNIT SHOWN, LEFT HAND OPPOSITE SHOWN
3. CONSULT FACTORY FOR HEATING OUTPUT GREATER THAN 6,000 MBH
### Note

1. Unit split for shipment, field bolting required.
2. Consult factory for heating output greater than 6,000 MBH.

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NOTE:
1. UNIT SPLIT FOR SHIPMENT, FIELD BOLTING REQUIRED
2. CONSULT FACTORY FOR HEATING OUTPUT GREATER THAN 6,000 MBH
### Vertical Air Turnover Unit - Heating/Cooling/De-Humidifying with V-Bank Filters

**Title**

VERTICAL AIR TURNOVER UNIT-HEATING/COOLING/DE-HUMIDIFYING WITH V-BANK FILTERS

**Note**

DATA SUBJECT TO CHANGE WITHOUT NOTICE. DIMENSIONS ARE SUBJECT TO MANUFACTURING TOLERANCES.

---

#### Model Specifications

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**Note:**

1. Unit split for shipment, field bolting required
2. Consult factory for heating output greater than 6,000 MBH

---

**Image Description:**

- **Vertical Air Turnover Unit:**
  - **Flue Conn. (E):** Gas connection point.
  - **GAS Conn.:** Gas inlet and outlet connections.
  - **INLET SECTION:** Inlet section for air intake.
  - **CONTROL PANEL:** Control panel for unit operation.
  - **ADJUSTABLE DISCHARGE GRILLES:** Adjustable discharge grilles for air output.
  - **HEAT EXCHANGER SECTION:** Heat exchanger section for temperature exchange.
  - **COOLING COIL SECTION:** Cooling coil section for cooling purposes.
  - **FAN/V-BANK SECTION:** Fan section with V-bank filters for filtration.
  - **HEATING OUTPUT MODEL MBH RANGE:** Range of heating output models.

---

**Table:**

- **Model:** Identification code for each model.
- **Heating Output MBH Range:** Range of heating output in MBH for each model.
- **A:** Height dimension.
- **B:** Width dimension.
- **C:** Front view dimensions.
- **D:** Rear view dimensions.
- **E:** Top view dimensions.
- **F:** Side view dimensions.
- **G:** Height dimension.
- **H:** Width dimension.
- **J:** Depth dimension.
- **V-Bank Filters QTY/Size X 2:** Quantity and size of V-bank filters.
- **Max. Coil Size X 2:** Maximum coil size dimensions.

---

**Diagram Notes:**

- Indicators for various components such as heat exchanger, cooling coil, and control panel.
- Dimensions are provided for each section to facilitate installation and operation.

---

**Title:**

INDUSTRIAL COMMERCIAL EQUIPMENT MANUFACTURING LTD.

**Note:**

DATA SUBJECT TO CHANGE WITHOUT NOTICE. DIMENSIONS ARE SUBJECT TO MANUFACTURING TOLERANCES.
### Model Specifications

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<th>B</th>
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<th>C 2.3-WAY</th>
<th>D</th>
<th>E 1-WAY</th>
<th>E 2.3-WAY</th>
<th>F 1-WAY</th>
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<th>H</th>
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<th>Max. Coil Size x 2</th>
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**NOTE:**
1. UNIT SPLIT FOR SHIPMENT, FIELD BOLTING REQUIRED
2. CONSULT FACTORY FOR HEATING OUTPUT GREATER THAN 6,000 MBH
3. *6360 SIZE FLAT FILTER BANK NOT TO EXCEED 130,000 CFM
4. *6460 SIZE FLAT FILTER BANK NOT TO EXCEED 160,000 CFM

---

**Title:**

VERTICAL AIR TURNOVER UNIT-HEATING AND COOLING (LOW UNIT HEIGHT OPTION)

**Note:**

DATA SUBJECT TO CHANGE WITHOUT NOTICE.
DIMENSIONS ARE SUBJECT TO MANUFACTURING TOLERANCES.
### Vertical Air Turnover Unit - Heating/Cooling/Ventilating

**Title**: Vertical Air Turnover Unit - Heating/Cooling/Ventilating (Low Unit Height Option)

**Note**: Data subject to change without notice. Dimensions are subject to manufacturing tolerances.

#### Model Specifications

<table>
<thead>
<tr>
<th>Model</th>
<th>Heating Output MBH Range</th>
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**Notes**:
1. Unit split for shipment, field bolting required.
2. Consult factory for heating output greater than 6,000 MBH.
3. *6360 size flat filter bank not to exceed 130,000 CFM.
4. *6460 size flat filter bank not to exceed 160,000 CFM.
DATA SUBJECT TO CHANGE WITHOUT NOTICE.
DIMENSIONS ARE SUBJECT TO MANUFACTURING TOLERANCES.

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VERTICAL AIR TURNOVER UNIT LOUVERED INLET PLENUM OPTION

DATA SUBJECT TO CHANGE WITHOUT NOTICE.
DIMENSIONS ARE SUBJECT TO MANUFACTURING TOLERANCES.
VERTICAL AIR TURNOVER UNIT HORIZONTAL DISCHARGE HEAD OPTION

DATA SUBJECT TO CHANGE WITHOUT NOTICE.
DIMENSIONS ARE SUBJECT TO MANUFACTURING TOLERANCES.
### Vertical Air Turnover Unit Induced Draft Fan Option

**Recommended Stack Dia.**

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SIDE VIEW

FRONT VIEW

NOTE:
1. STANDARD SECTION HEIGHTS AS 'C', SPECIAL SIZES ALSO AVAILABLE
   CONSULT FACTORY FOR DETAILS
2. MULTIPLE EXTENSION DUCTS MAY BE USED UP TO 30 FEET.
   DATA SUBJECT TO CHANGE WITHOUT NOTICE.
3. EXTENSIONS MAY BE INCORPORATED INTO OTHER SECTION HEIGHTS
   CONSULT FACTORY FOR DETAILS

MODEL | A | B | C
024   | 39| 84| 36-102
030   | 45| 104| 36-102
042   | 57| 114| 36-102
048   | 63| 126| 36-102
054   | 70| 146| 36-102
060   | 80| 185| 36-102
6360  | 85| 225| 36-102
6460  | 85| 300| 36-102
AC-6460 AIR TURNOVER UNIT-HEATING
(HEATING OUTPUT – 1,000-3,250 MBH)
DRAIN PIPE TRAPS

Condensate from the cooling coils runs into a drain pan. A trap is required at the outlet of the pan to allow the condensate to drain freely.

Since the pressure inside the unit can be either positive or negative, different arrangements are recommended for trapping. See figures below.

**DRAW-THRU UNITS**

**MINIMUM DIMENSIONS:**
A - 1 1/2 TIMES OPERATING
   SUCTION (kPa x 0.102) + 51 mm
B - 1/2 OF OPERATING
   SUCTION (kPa x 0.102) + 25.4 mm

A - 1 1/2 TIMES OPERATING
   SUCTION (in. WATER) + 2'
B - 1/2 OF OPERATING
   SUCTION (in. WATER) + 1'

**BLOW-THRU UNITS**

**MINIMUM DIMENSIONS:**
A - OPERATING PRESSURE
   (kPa x 0.102) + 25.4 mm
A - OPERATING PRESSURE
   (in. WATER) + 1'
AC SERIES – STANDARD SPECIFICATION

Part 1 – General

Supply ICE (US), Inc. Model AC size __________ indirect fired air turnover unit. Unit(s) is to be designed for (indoor) (outdoor) installation. The capacity and configuration shall be as detailed on the drawings.

The unit shall be capable of delivering ______ cfm using a qty of ___ / ____ Hp motors operating on ______ volts ____ ph 60 hz. The power burner capacity shall be capable of ________ btu/hr firing on natural gas. The 4 pass heat exchanger shall have a minimum efficiency of 80%. The heater shall have an output of _________ btu/hr in accordance to ANSI requirements. The entire unit shall be ETL certified, listed and labeled.

TESTING

Unit to be completely factory run tested. An instantaneous flow meter shall be used to confirm the firing rate. A full combustion test is to be conducted complete with analyzer computer print out. A detailed test report and installation and maintenance manual shall be sent with the unit.

Part 2 – Products

2.1 UNIT CASING
A. Unit exterior casing shall be constructed of heavy gauge galvannealed steel. The unit shall incorporate a minimum two inch structural iron welded support frame. The entire structural iron frame shall be primed with a high build epoxy rust inhibitor. Formed and bolted sheet metal structural frames are not acceptable.

B. The fan wheel shall be mounted on a heavy duty machined and polished solid steel shaft. The shafts maximum operating speed is not to exceed 75% of its first critical speed. The propeller motors shall be T-frame ODP type with a 1.15 s.f. The motors shall be mounted on a fully adjustable base.

C. The bearings are to be heavy duty pillow block type. Fan bearings shall have an L-10 bearing life base of 100,000 hours. The propellers are to be driven with adjustable 1.5 s.f. V-belt drives up to 7½ Hp.

D. Unit shall have a hinged and gasketed fan access door with heavy duty roller action, full compression latches to provide easy access to maintain and inspect motors, belts & bearings. Each door is to be equipped with electric safety door switches. Lift off panels are not acceptable.

2.2 BLOWER / MOTOR SECTION
A. Unit shall be supplied with (two) (three) (four) low noise propeller fans. Each propeller fan shall have a minimum of six airfoil blades. Four blade props are not acceptable due to RPM, excessive tip speed and potential dynamic imbalance. The unit shall be statically and dynamically balanced at the factory.

B. The bearings are to be heavy duty pillow block type. Fan bearings shall have an L-10 bearing life base of 100,000 hours. The propellers are to be driven with adjustable 1.5 s.f. V-belt drives up to 7½ Hp.

C. Fan wheels shall be mounted on a heavy duty machined and polished solid steel shaft. The shafts maximum operating speed is not to exceed 75% of its first critical speed. The propeller motors shall be T-frame ODP type with a 1.15 s.f. The motors shall be mounted on a fully adjustable base.

D. Unit shall have a hinged and gasketed fan access door with heavy duty roller action, full compression latches to provide easy access to maintain and inspect motors, belts & bearings. Each door is to be equipped with electric safety door switches. Lift off panels are not acceptable.

2.3 HEAT EXCHANGER SECTION
A. The heat exchanger shall be four pass design. Minimum efficiency shall be ETL certified to be no less than 80% at full firing rate. The heat exchanger manufacturer shall have a minimum of ten years experience fabricating and producing furnaces.

B. Internal baffling of the secondary tubes is not acceptable. The heat exchangers primary and secondary heat transfer surfaces shall be constructed of 409 series stainless steel. Units shall be provided with multiple condensate drains when modulating. The heat exchanger section shall have an internal radiation shield to maintain a jacket loss of less than 2% of the rated output.

C. All heat transfer surfaces, including headers and the front collector box, shall be inside the casing and in the air stream. The construction of the heat exchanger shall permit free, unrestricted lateral, vertical and peripheral expansion during the heating and cooling cycle without damage or strain to any part.

D. The heater shall be equipped with an optional direct drive radial blade induced draft blower. The combustion chamber is to operate under a negative pressure. The fan is to be adequately sized to insure proper draft conditions. When high turndown modulations is required the unit is to be capable of 15:1 modulation. A discharge damper on the induced draft fan is to be mechanically interlocked to the main gas actuator to proportion exhaust with intake. The induced draft fan shall be directly connected to an air tight collar and collector box header located inside the heat exchanger casing.

E. The unit shall be equipped with a (on/off) (2 stage) (full modulation) power burner. On modulating units the main firing rate shall be factory adjusted and certified for a minimum turndown ratio of 15:1. The burner shall be equipped with a combustion air proving switch, removable pilot assembly and positive pilot combustion air supply. The combustion air damper shall be interlocked with the main gas valve to insure a proper air/gas mixture.

F. A solid state programmable safeguard relay with (flamerod) (ultra violet scanner) and purge card shall continuously monitor main and pilot flame. The main and pilot valve train to the burner shall be completely factory pre-piped This assembly shall be wired and include the following minimum components; main and pilot manual shut-off valves, main and pilot pressure regulators, main and pilot automatic shut-off valves and adequate unions and test ports for unconstrained service.
Part 2 – Products

2.4 CONTROL/MANIFOLD COMPARTMENT

A. Unit controls shall be contained within a hinged enclosure. Control enclosure shall have a dead front fused disconnect switch. Terminal strip, components and all wiring shall be labeled and/or numbered. Wiring in the control panel shall be run in PANDUIT wiring duct. The controls for the heater shall include:

- Blower motor starter w/ambient compensated overloads and auxiliary contact(s).
- Primary to 120v control transformer
- 6,000 volt ignition transformer
- Control fuse block w/ slow blow fuse
- Fireye flame safeguard relay w/ LED status, ultra-violet flame detection & pre-purge cycle
- Discharge and/or return air temperature control sensor
- Solid state temperature control circuit w/ space proportional adjustable thermostat
- Manual reset temperature high limit safety switch
- Differential air proving safety switch
- High and low gas pressure safety switches
- Fan switch

B. All wiring shall be in compliance to the latest N.E.C. standard. External wiring to control enclosure shall be run in conduit. The gas manifold shall be approved by ANSI and include:

- High gas pressure regulator
- Manual shutoff & test firing lubricated valves
- Main gas motorized automatic shutoff valve w/ proof of closure switch
- Auxiliary main gas motorized automatic shutoff valve
- Pressure regulating valve
- MIDCO modulating control valve
- Pilot pressure regulator
- Pilot automatic shutoff valve
- Pilot manual shutoff valve
- Pilot needle valve
- Multiple test ports

C. Manifold pipe shall be painted with a rust inhibitor. Units are to be complete with a 10 point diagnostic center. The lights are to include; power, control fuse, blower, burner, burner airflow switch, ignition, pilot gas valve, main gas valve, safety limits & flame failure.

2.5 CONTROL PANEL

A. Control panel shall consist of an enclosure w/ lamacoid identification labels, control switches. Control panel shall include:

- Blower light
- Burner light
- Flame failure light
- System on-off switch
- Summer/winter switch
- Temperature selector

Part 3 – Optional Accessories

3.1 INDUCED DRAFT BLOWER

A. The heater shall be equipped with an optional direct drive radial blade induced draft blower. The combustion chamber is to operate under a negative pressure. The fan is to be adequately sized to insure proper draft conditions. A manual locking discharge damper quadrant is to be provided for adjusting furnace pressure. When full modulation is required the discharge damper is to be electronically interlocked to the main gas valve to control draft from low to high fire.
3.2 V-BANK FILTER SECTION
A. V-Bank filter section shall be provided with hinged access doors on both sides. Access doors are to be fully gasketed and supplied with the same industrial compression latches used with the rest of the unit.
B. Flat filter sections visually showing loaded filters on unit exterior are unacceptable. Angular racks shall hold 2 in. thick 30% efficient pleated type filters. Filters shall have an average arrestance of 76.4% in accordance with ASHRAE standard 52.1 Filter velocities not to exceed 500 FPM.
C. The filter section is to be an integral section of the unit finished with the same casings.
D. A complete additional set of construction filters shall be provided for each unit.

3.3 FLAT FILTER SECTION
A. A flat filter section shall be provided with lift-out filter tracks. Flat filter sections are utilized only when the unit height is a concern. The flat filter section reduces overall height of a unit when provided with filters. Filters shall have an average arrestance of 76.4% in accordance with ASHRAE standard 52.1 Filter velocities not to exceed 500 FPM.
B. Expanded metal shall be supplied around the perimeter of the unit to provide support to all filters and eliminate the possibility of a filter being pulled in to the fan section.
C. A complete additional set of construction filters shall be provided for each unit.

3.4 AUTOMATIC INLET DAMPER
A. An inlet damper shall provide up to twenty percent outdoor air. The damper shall be provided with a flanged duct connection. The direct drive spring return actuator is provided with an adjustable clutch to balance the percentage of outdoor air required.

3.5 MIXBOX AND DAMPER SECTION
A. A mix box integral section shall support the unit and provide access to the dampers. Return air and inlet dampers are to be of galvanized steel construction. A minimum of six breaks per blade shall be provided to strengthen the blades. Maximum leakage rate not to exceed 20 cfm per square foot at 4 in. w.c. differential pressure. Dampers are to be operated with direct drive spring return actuators.
B. Optional – low leak aluminum airfoil dampers are to be provided. Dampers are to be complete with blade and jam seals. Maximum leakage rate not to exceed 5 cfm per square foot at 4 in. w.c. differential pressure. Dampers are to be operated with direct drive actuators.
C. Optional – low leak insulated aluminum airfoil dampers recommended when outdoor design is below 0 Deg F. Maximum leakage rate not to exceed 5 cfm per square foot at 4 in. w.c. differential pressure. Dampers are to be operated with a direct drive actuators. Standard air leakage data is certified under the AMCA ratings program. Dampers are to be designed for operation down to -40 Deg F.
D. Blades are to be internally insulated with expanded polyurethane foam and thermally broken. The complete blade shall have an insulating factor of R-2.29 and temperature index of 55.

3.6 COOLING COIL SECTION
A. Cooling coil plenum shall consist of double wall construction, single wall coil sections are not acceptable. The coil section shall be insulated with (1) (2) inch thick fiberglass insulation.
B. The plenum shall feature a double sloped 304 stainless steel condensate pan with drain. All pans are to be minimum 18 gauge 304 stainless steel continuously TIG welded. Multiple coils shall be stacked horizontally and include intermediate drain pans to reduce refrigerant pressure drop and possibility of water carry over.
C. Coils shall feature 0.020 in. minimum copper tube wall thickness. The fins shall be rippled and made of a minimum of 0.006 in. aluminum sheet. Coils shall feature (direct expansion interlaced multi –circuit design) (chilled water). Coils to be pressure tested to 250 psig to ensure no refrigerant leaks. Coils are to be designed around 400 CFM per ton. Coil bypass with manual adjustment damper shall be provided to prevent CFM per ton ratio exceeding 500. The differential air pressure drop over the coil shall not exceed 0.33 in. w.c.
D. Discharge section top shall be double lined with two inch thick insulation and perforated liner. Discharge section shall acoustically attenuate airborne noise and provide (single) (dual) directional control. Minimum 2 in. thick steel blades shall be painted with industrial paint to match unit. Each blade shall be individually adjustable. When a dual bank of airfoil type blades are provided they will provide vertical and horizontal air diffusion control.

3.7 OPTIONAL – HOT WATER COIL SECTION

3.8 OPTIONAL – ELECTRIC COIL SECTION

3.9 OUTSIDE AIR PLENUM
A. An integral plenum shall be included with the unit to introduce outside air prior to the filters. The plenum casings shall be constructed the same as the unit and finished to match. Inlet plenum is to be designed to prevent water from entering the unit.
B. When the plenum is exterior wall mounted, customer shall advise color suitable for the building. A wall mount flange with gasket will run the perimeter of the inlet plenum.
C. The inlet velocity in to the louvered plenum is to be less than 500 FPM free area. The louvered inlet plenum is to be equipped with expanded metal where necessary.
3.10 INTEGRAL SERVICE PLATFORM W/ LADDER
A. A full OSHA approved service platform is to be provided for complete access to burner and gas manifold. The service platform is to feature 12 gauge expanded metal screen and a welded 3 in. structural iron frame. The service platform is to be equipped with a four in. high kick plate and locking chains.
B. Optional – OSHA approved ladder is to include hand guide rails and concrete securing feet.

3.11 OPTIONAL – DISCHARGE SECTION
A. For outdoor units an interior trapezoidal shaped discharge section shall be provided to distribute air inside the building. The discharge shall be double lined with two inch thick insulation and perforated liner. Discharge section shall acoustically attenuate airborne noise.
B. Diffuser screens are to be located on the font of the discharge. The discharge plenum shall be equipped with (single) (double) adjustable air double deflection airfoil type blades.

3.12 OPTIONAL – AUTOMATIC GREASING CANISTER
A. Bearings are to be equipped with automatic greasing canisters. Microprocessor controlled greasing canisters shall deliver 350 psig lubrication on a precision cycle to increase bearing longevity and practically eliminate bearing maintenance.
B. All (four) (six) (eight) unit bearings are to be automatically lubricated every second day from a 240 cc lubrication canister. The greasing canisters with pump driven microprocessor are to be located in the main control panel for ease of adjustment. The grease canister shall contain a minimum quantity of grease to ensure two year supply prior to canister tank replacement.

3.13 OPTIONAL – SEALED COMBUSTION
A. A duct sleeve shall be provided directly on the burner to mount an outdoor combustion duct. The burner shall draw all air for combustion from outside.

3.14 OPTIONAL – HUMIDICIAATION PLENUM
A. Unit is to have a double lined humidification discharge plenum. The internal liner is to be minimum 22 gauge G90 galvanized steel. The unit shall include the humidifier mounted, wired and tested from the factory.
B. Gas to steam microprocessor controlled humidifier. The humidifier is to automatically cools discharged hot water to 140 °F to meet governing code requirements and to prevent damage to PVC drain piping.

- Control to ±3% RH
- Steam output rangeability up to 40 to 1 closely tracks humidity set point
- Low nitrogen oxide (NOx) emissions of less than 20 ppm
- Diagnostic test at unit start-up verifies system performance
- 82% burner efficiency rating
- Variable speed blowers and modulating gas valves provide consistent humidity output
- Full burner modulation and PID control provide accurate, responsive, and adjustable RH control
- The temperature sensor enables the controller to hold water at a preset temperature allowing rapid response to a call for humidity, enables freeze protection, and allows rapid warm up
**BMA**
Direct Gas-Fired Makeup Air Units

- 100% makeup air and 80/20 units
- Stainless steel burner
- DX or evaporative cooling section option
- 30:1 turndown ratio

**OSD**
Direct Fired Makeup Air/Curing Units

- Recirculating & Dual Air Dual Temperature Sequence
- Exceptional spray booth control packages using PLCs
- Booth balancing option with variable frequency drive on exhaust
- Premium makeup air/curing units for the refinishing industry

**IMA**
Industrial Gas-Fired Units

- 100% makeup air & 85/20 units
- Suitable for any automotive or high-end industrial applications
- Backward inclined blowers standard on sizes 140 and up

**GIDM**
Indirect Gas-Fired Units

- Four-pass drum and tube industrial grade stainless steel heat exchanger
- Industrial quality forced draft power burner
- High efficiency (80%) and excellent durability
- JIC wiring available for the automotive industry

**HTDM**
High Turndown Indirect-Fired Units

- Stainless steel two-pass drum and tube heat exchanger with forced draft power burner
- Best turndown ratio for power burners in the industry (up to 60:1)
- Inputs of 200, 400, 600, 1000 & 1500 MBH
- Up to 85% (minimum efficiency)

**MTI**
Indirect Gas-Fired Units

- Indoor or Outdoor packaged indirect-fired heating systems
- Stainless steel heat exchanger suitable for 100% outside air
- Excellent temperature control through brand name components
- Wide variety of configuration options
- Superior serviceability through design and simplistic operation

**AC**
Air Turnover Units

- Vertical air turnover heating systems
- An effective and economical solution to heating, ventilating or conditioning large spaces
- Four-pass indirect-fired heat exchanger
- Optional A-coil cooling section

**CUSTOM BUILT UNITS**

- ICE has the capability to build a wide variety of custom-built units for any type of commercial or industrial application
- Specializing in heat recovery and custom air handler with heating or cooling coils