AIR MAKE-UP UNIT INSTALLATION, OPERATION AND MAINTENANCE MANUAL

READ MANUAL THOROUGHLY BEFORE INSTALLING OR OPERATING UNIT

MODEL#:__________________________________________________________

SERIAL #:_________________________________________________________

UNIT TAG:__________________________________________________________

JOB #____________________________________________________________

INSTALLER AND SERVICE CONTRACTOR
WARNING: IMPROPER INSTALLATION, ADJUSTMENT, ALTERATION, SERVICE OR MAINTENANCE CAN CAUSE PROPERTY DAMAGE, INJURY OR DEATH. READ THE INSTRUCTIONS, OPERATION AND MAINTENANCE INSTRUCTIONS THOROUGHLY BEFORE INSTALLING OR SERVICING THIS EQUIPMENT. THE SERVICE AND START-UP OF EQUIPMENT MUST BE CONDUCTED BY QUALIFIED TECHNICIANS ONLY.

| NAME: |___________________________ |
| ADDRESS: |_________________________ |
| TELEPHONE |______________________ |
| FACSIMILE: |_______________________ |

FOR YOUR SAFETY
IF YOU SMELL GAS – OPEN ALL AREA DOORS AND WINDOWS DO NOT TOUCH ELECTRICAL SWITCHES AND CALL GAS SUPPLIER IMMEDIATELY

FOR YOUR SAFETY
THE USE AND STORAGE OF GASOLINE AND OR OTHER FLAMMABLE VAPORS & LIQUIDS IN OPEN CONTAINERS IN THE VICINITY OF THIS EQUIPMENT IS HAZARDOUS.

THESE INSTRUCTIONS ARE TO BE USED AS A GUIDE ONLY. UNIT DESIGN IS SPECIFIC TO EACH ORDER AND ALL INFORMATION MAY NOT APPLY TO ALL UNITS. DATA IS SUBJECT TO CHANGE WITHOUT NOTICE. SAVE THESE INSTRUCTIONS FOR REFERENCE AND MAINTENANCE IN LEGIBLE CONDITION.
RECEIVING AND WAREHOUSE NOTES:

INSPECT THE UNIT UPON ARRIVAL FOR ANY SHIPPING DAMAGE. IF ANY PARTS ARE MISSING OR DAMAGED, MARK BILL OF LADING AS TO DAMAGE AND NOTIFY CARRIER IMMEDIATELY. IF THE UNIT CANNOT BE INSTALLED IMMEDIATELY, STORE IT AND ALL ACCESSORIES IN A CLEAN DRY PROTECTED LOCATION.

DO NOT ATTEMPT TO HANDLE OR SUSPEND UNIT UNLESS YOU ARE EXPERIENCED IN RIGGING SUCH EQUIPMENT. DO NOT HANDLE THE UNIT ATTACHING HOOKS, JACKS OR CHAINS TO THE UNIT CASING OR COMPONENTS. SPREADER BARS ARE REQUIRED WHEN USING SINGLE POINT LIFTS. SEE RIGGING AND INSTALLATION NOTES.

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1.0 GENERAL INFORMATION

1.1 GENERAL NOTICES

NOTE: RECIRCULATION OF ROOM AIR MAY BE HAZARDOUS IN THE PRESENCE OF FLAMMABLE SOLIDS, LIQUIDS & GASES

EXPLOSIVE MATERIALS (paint vapors, powder dust, grain dust, coal dust, gunpowder)

CERTAIN SUBSTANCES MAY BECOME TOXIC WHEN EXPOSED TO HEAT (i.e. refrigerants, aerosols, etc.)

NOTE: RECIRCULATION IS NOT RECOMMENDED IN NON-INSULATED BUILDINGS

WHEN UNIT IS OPERATED IN RE-CIRCULATION CONFIGURATION (80/20), CARE MUST BE TAKEN TO ENSURE THAT A MINIMUM OF 4 CFM OF OUTSIDE VENTILATION AIR IS INTRODUCED FOR EVERY 1000 BTUH OF RATED INPUT.

THE SPECIFIC INSTALLATION AND WIRING DRAWINGS ARE LOCATED IN THE REMOTE CONTROL CABINET SHIPPED ALONG WITH THE UNIT. REMOVE AND READ THE MATERIAL PRIOR TO INSTALLING THE UNIT.

1.2 INSTALLATION AND SERVICE INSTRUCTIONS

THE INFORMATION PROVIDED IS A GUIDE TO THE PROPER INSTALLATION, OPERATION AND TROUBLESHOOTING OF A COL-MET AIR MAKE-UP UNIT. RETAIN THE MANUAL AS A REFERENCE FOR OPERATION AND FOR MAINTENANCE PERSONNEL.

SHOULD CONTACT WITH THE FACTORY BE NECESSARY, CONTACT YOUR LOCAL REPRESENTATIVE AND HAVE HIM (HER) CONTACT OUR SERVICE DEPARTMENT. BE READY TO PROVIDE THEM THE UNIT MODEL NUMBER AND THE UNIT SERIAL NUMBER. THE SERIAL NUMBER CAN BE FOUND IN THE UNIT MOUNTED BURNER/MOTOR CONTROL CABINET.

INSTALL AND WIRE THE EQUIPMENT IN ACCORDANCE TO THE APPLICABLE NATIONAL AND LOCAL GOVERNING BODIES’ CODES. REFER TO CURRENT NEC, NFPA, ANSI AND NATIONAL GAS CODES.

AUTHORITIES HAVING JURISDICTION SHOULD BE CONSULTED BEFORE MAKING THE INSTALLATION. LOCAL CODES MAY REQUIRE SAFETY CONTROLS AND OR INTERLOCKS NOT TYPICALLY PROVIDED WITH OUR UNITS.

1.3 LOCATING UNIT

PRIOR TO LOCATING THE UNIT, CHECK WITH THE AUTHORITIES HAVING JURISDICTION.

THE UNIT SHOULD BE LOCATED WITH REQUIRED CLEARANCES FOR SERVICE AND MAINTENANCE. INSURE THAT THE UNIT IS INSTALLED LEVEL. PROVIDE ADEQUATE CLEARANCE AROUND THE UNIT FOR SERVICE TO THE BLOWER, BURNER AND GAS TRAIN.
NOTE: THE HEATER IS DESIGNED TO DISCHARGE AIR AT TEMPERATURES UP TO 160° F. AVOID DIRECTING AIR ABOVE 100° F DIRECTLY AT PERSONNEL. IF INTRODUCING THE AIR INTO THE GENERAL BUILDING AREA DO SO AT A HEIGHT TO AVOID DIRECT DISCHARGE ON PEOPLE IN THE AREA.

ENSURE THAT THE POSITION OF THE HEATER RELATIVE TO SUPPORT BEAMS IS CORRECT SO AS TO PROVIDE ADEQUATE SUPPORT FOR THE EQUIPMENT. FOR ROOF MOUNTED UNITS, CHECK THE SPACING OF THE ROOF STRUCTURE BEAMS TO AVOID INTERFERENCE WITH AIR DUCTS.

1.4 LOCATING THE ACCESSORIES
A REMOTE PANEL SHALL BE SHIPPED WITH EACH UNIT. THIS CABINET SHOULD BE LOCATED IF POSSIBLE WITHIN CLOSE PROXIMITY TO THE MAIN UNIT SO AS TO REDUCE FIELD WIRING. THIS CABINET SHOULD BEWIRED BY A LICENSED ELECTRICIAN.

1.5 FACTORY TESTING & START-UP CHECKLIST
ALL SHIPMENTS ARE MADE F.O.B. THE FACTORY. THE UNIT IS SECURELY STRAPPED OR BLOCKED TO HELP PREVENT SHIPPING DAMAGE AND EACH SHIPMENT IS INSPECTED PRIOR TO LEAVING THE PLANT. ALL PARTS, WHERE FEASIBLE, ARE STRAPPED TO OT=R INCLUDED IN THE UNIT. UPON RECEIPT OF GOODS, CHECK THE SHIPMENT AGAINST THE BILL OF LADING TO INSURE ALL ITEMS HAVE BEEN RECEIVED. CAREFULLY CHECK THE UNIT FOR PHYSICAL DAMAGE IN THE PRESENCE OF THE CARRIER’S REPRESENTATIVE. SHOULD PARTS BE MISSING OR DAMAGED NOTE ON THE BILL OF LADING AND IMMEDIATELY FILE A CLAIM WITH THE CARRIER. COL-MET DOES NOT ASSUME RESPONSIBILITY FOR THE HANDLING OF THE GOODS IN TRANSIT AND IS NOT RESPONSIBLE FOR THE INITIATION OF FREIGHT CLAIMS FOR UNITS SHIPPED F.O.B. FACTORY.

NOTE: IF QUESTIONS ARISE OR INSTALLER/SERVICE PERSONNEL ARE IN DOUBT PLEASE FEEL FREE TO CONTACT YOUR LOCAL SUPPLIER OR COL-MET DIRECT AT 1-888-452-6684.
2.0 INSTALLATION

2.1 GENERAL ASSEMBLY INSTRUCTIONS
STANDARD UNITS ARE SHIPPED ASSEMBLED AND READY FOR INSTALLATION.

THE INLET HOODS USUALLY SHIP LOOSE AND REQUIRE FIELD ASSEMBLY. THE HARDWARE NEEDED TO BOLT/SCREW THE HOODS AND RELATED DUCTWORK IS PROVIDED. CARE SHOULD BE TAKEN TO AVOID INSTALLING THE INLET HOOD INTO THE PREVAILING WIND WHENEVER POSSIBLE. IF HIGH WINDS ARE PRESENT, CUSTOMER MAY BE REQUIRED TO INSTALL A WIND BLOCKING DEVICE. ALSO V-BANK FILTER SECTIONS MAY BE SHIPPED SEPARATELY.

WHEN A REMOTE DAMPER UNIT IS FURNISHED, THE INSTALLING CONTRACTOR WILL BE REQUIRED TO WIRE THE DAMPER MOTOR TO THE UNIT’S TERMINAL BLOCK.

2.2 CLEARANCE
A MINIMUM OF (3) THREE FEET CLEARANCE FROM THE UNIT TO COMBUSTIBLE CONSTRUCTION MUST OBSERVED.

2.3 RIGGING AND HANDLING
THE EQUIPMENT HAS BEEN DESIGNED FOR LIFTING AND HANDLING FROM THE LIFTING EYES AND/OR FORMED BASE PAN. ALL LIFT OPERATIONS MUST UTILIZE A LOAD SPREADER WITH SUFFICIENT WIDTH TO INSURE THAT THE LIFTING CABLES CLEAR THE SIDES OF THE UNIT. IF A SPREADER IS NOT AVAILABLE, INSERT WOOD STRIPS BETWEEN THE UNIT AND THE CABLES WHERE NECESSARY. UTILIZE ALL LIFTING EYES SIMULTANEOUSLY WHEN LIFTING THE UNIT INTO PLACE.

NOTE: DURING SHIPMENT, UNLOADING AND INSTALLATION OF THE UNIT, NUTS AND BOLTS MAY HAVE BEEN LOOSENED. IT IS RECOMMENDED THAT PRIOR TO RIGGING, INSTALLING AND STARTING THE UNIT, ALL FASTENERS BE CHECKED AND TIGHTENED WHERE NECESSARY. TURN BLOWER SHAFT MANUALLY TO INSURE THAT THE BLOWER TURNS FREELY WITHOUT RUBBING OR BINDING. INSPECT THE TERMINALS AND WIRING CONNECTIONS IN THE UNIT CONTROL BOX TO INSURE THAT ALL CONNECTIONS ARE TIGHT.

INDOOR SUSPENDED UNITS
UNIT MUST BE LIFTED EVENLY FROM THE LIFTING HOLES PROVIDED AT EACH END OF THE UNIT WHEN SUSPENDING FROM THE ROOF STRUCTURE. IF UNITS ARE TO BE LIFTED FROM THE BOTTOM FOR MOUNTING ON A PLATFORM (AS WITH A FORKLIFT), UNIT MUST BE SUPPORTED WITH TIMBERS, BEAMS OR TEMPORARY PLATFORM.

NOTE: INFORMATION FOR INSTALLATION OF HEATERS IN AIRPLANE HANGARS SHOULD BE IN ACCORDANCE WITH ANSI/NFPA 409. ALSO NOTE: INFORMATION FOR INSTALLATION OF HEATER IN PUBLIC GARAGES SHOULD BE IN ACCORDANCE WITH THE STANDARD FOR PARKING STRUCTURES, ANSI/NFPA 88A, OR THE STANDARD FOR REPAIR GARAGES, ANSI/NFPA SSB.

DO NOT LIFT CABINET WITHOUT ADEQUATE SUPPORT
RIGGING INSTRUCTIONS

NOTE: THE MAXIMUM ANGLE PERMITTED FOR A VERTICAL LIFT IS 30 DEGREES.
NOTE: KEEP SNOW AWAY FROM INLET. AVOID PLACEMENT OF HOOD INTO PREVAILING WINDS, IF AT ALL POSSIBLE.
NOTE: FAILURE TO RIG AND SUPPORT AS DESCRIBED MAY RESULT IN METAL FATIGUE, FAILURE, PROPERTY DAMAGE, INJURY OR DEATH.

- STACK UNIT FROM LOWEST SECTION UPWARD
- FACTORY SUPPLIED CAULKING MUST BE INSTALLED IN FIELD BY CONTRACTOR/INSTALLER BETWEEN ALL DUCT SECTIONS.
- LIFTING EYES AND CHANNEL SLOTS ARE DESIGNED TO BE LIFTED STRAIGHT UP VERTICALLY
- OUTDOOR UNITS MUST BE FIELD CHECKED TO BE ADEQUATELY CAULKED WEATHER TIGHT AT ALL JOINTS, DUCT CONNECTIONS, GAS CONNECTIONS, ETC.
- ALL BOLTS MUST BE UTILIZED
2.3.1 ROOF CURB ASSEMBLY & INSTRUCTION ALL ROOFTOP UNITS ARE AVAILABLE WITH AN OPTIONAL FULL PERIMETER ROOF CURB. THIS ROOF CURB IS AVAILABLE IN 14", 24" OR SLOPED HEIGHTS.

THE ROOF CURB IS TO BE PROVIDED BY BUILDING OWNER OR MAY BE PURCHASED SEPARATELY FROM THE FACTORY. IF PROVIDED BY THE FACTORY FOLLOW APPROPRIATE ASSEMBLY DRAWINGS AND TIGHTEN THE ROOF CURB TO THE BUILDING. RAIN TIGHT SEAL MUST BE PROVIDED BY THE BUILDING OWNER OR THE INSTALLING CONTRACTOR. CERTAIN ROOF CONSTRUCTIONS REQUIRE SPECIAL CARE AND INSTALLATION REQUIREMENTS.

VERIFY THE INSTALLED UNIT HAS BEEN ASSEMBLED AND FASTENED TO THE ROOF STRUCTURE INSURE THE FOLLOWING:

1. INSTALL CURB LEVEL AND SQUARE.
2. RUN ROOF FLASHING UP UNDER FACTORY PROVIDED "DRIP LIP" AND SECURE.
3. BEFORE LOWERING UNIT ONTO ROOF CURB INSTALL GASKETING TO TOP OF ROOF CURB.
4. REFER TO SPECIFIC ROOF CURB DETAIL PROVIDE WITH CURB ASSEMBLY.
5. INSTALL INSULATION ON THE EXTERIOR OF ROOF CURB IN A SLOPED FASHION TO ALLOW WATER RUNOFF WHENEVER POSSIBLE

PLEASE NOTE:
SCREW IN ABOVE CURB MEMBRANE.
USE GASKETED HEX SCREWS - 5/16" X 1-1/2"
PASTE SCREWS 18" APART.
1/4" X 2" NEOPRENE
2" X 4" WOODEN NAILER
UNIT BOTTOM PAN
GASKETED HEX SCREW
UNIT BASE FRAME
ROOFING PAPER
FLASHING
RIGID INSULATION
CANT STRIP
TOP AND GRAVEL

TYPICAL ROOF CURB CROSS SECTION

TYPICAL ASSEMBLY DETAIL

ROOF CURB DETAIL
2.4 CONNECT DUCTWORK

2.4.1 CONNECT DISCHARGE AIR DUCT OR DISCHARGE GRILLE TO UNIT OUTLET. IF UNIT IS INSTALLED ON A ROOF, BE SURE THAT THE DUCT GOING THROUGH THE ROOF IS ADEQUATELY FLASHED AND SEALED TO PREVENT LEAKAGE. PROVIDE OUTLET SCREEN ON DISCHARGE OF DUCT GRILLE OR THE BLOWER DISCHARGE FOR SAFETY WHEN UNIT IS NOT DUCTED.

2.4.2 INDOOR UNITS MAY BE INSTALLED DIRECTLY AGAINST THE WALL OR DUCTED DIRECTLY TO A WALL LOUVER.
- MAKE REQUIRED OPENINGS IN WALL AND LINE WITH STEEL FRAME, PRIOR TO POSITIONING UNIT OR ATTACHING OUTSIDE AIR HOOD TO WALL EXTERIOR. THIS WILL PREVENT CRUMBLING OF WALL BRICK.
- INSERT INSULATED FRESH AIR "COLLAR" THROUGH OPENING WITH FLANGES TURNED OUT TO PROVIDE RIGIDITY.
- ANCHOR INTAKE HOOD WITH BIRDSCREEN TO WALL.
- CAULK PERIMETER OF OPENING TO MAKE RAIN TIGHT.
- ROOM MUST BE LEFT FOR ACCESS TO THE ELECTRICAL PANEL AND BURNER ACCESS DOORS. (LEFT AND RIGHT SIDE OF UNIT)

2.6 EXHAUST INTERLOCK MAY BE USED TO INTERLOCK THE UNIT AND EXHAUST FAN(S). (Canadian units only). THE UNIT WILL THEN BE ENERGIZED ONLY WHEN THE FAN(S) ARE OPERATING. (REFER TO THE EXHAUST INTERLOCK WIRING DIAGRAMS PROVIDED WITH THE UNIT.)

2.6.1 THE UNIT'S TOTAL OUTDOOR AIR CAPACITY SHALL NOT EXCEED 110% OF THE RATED CFM FOR THE BUILDING EXHAUST SYSTEM. FOR APPLICATIONS INVOLVING MAKE-UP DIRECTLY INTO A BOOTH, THE TOTAL UNIT CAPACITY SHALL NOT EXCEED THE DISCHARGE CAPACITY OF THE BOOTH EXHAUST SYSTEM.

2.6.2 IT IS RECOMMENDED THAT THE EXHAUST AIR PROVING SWITCH BE SET TO OPEN WHEN THE EXHAUST VOLUME IS REDUCED BY MORE THAN 10% DUE TO BLOCKAGE IN THE EXHAUST, EXHAUST FAN BELT SLIPPAGE, ETC. (Canadian units only.)

2.6.3 CONNECT GAS SUPPLY.

2.6.4 RUN CORRECTLY SIZED GAS LINE TO UNIT. REFER TO NATIONAL FUEL CODE AND NATIONAL FIRE PROTECTION STANDARDS FOR PIPING INSTRUCTIONS. INSTALL AN APPROVED MANUAL SHUT-OFF VALVE, PLUG-COCK TYPE. NOTE: MINIMUM GAS LINE PRESSURE WHEN UNIT IS AT FULL INPUT IS AT LEAST 14" W.C. REFER TO UNIT SPECIFICATIONS. ALSO REFER TO UNIT SPECIFICATIONS FOR MAXIMUM GAS INPUT.

2.6.5 INSTALLING CONTRACTOR SHALL INSTALL BLEED AND VENT LINES IN ACCORDANCE TO THE APPLICABLE PIPING CODES.
2.6.6 CHECK MINIMUM AND MAXIMUM GAS INLET PRESSURE BEFORE CONNECTING GAS LINE TO UNIT. CHECK THE GAS LINE SUPPLY PRESSURE WITH A MANOMETER OR A GAUGE TO INSURE THE MAXIMUM INLET PRESSURE INDICATED ON UNIT’S SPECIFICATIONS ARE NOT EXCEEDED. ALSO, REFER TO THE UNIT’S SPECIFICATIONS TO DETERMINE THE MINIMUM GAS INLET PRESSURE REQUIRED TO OPERATE THE UNIT AT FULL FIRE. A PRESSURE READING OF THE GAS SHOULD BE TAKEN AT THE TEST PORT PROVIDED. ALSO, CHECK THE UPSTREAM PILOT LINE TEST PORT. INSURE THE UPSTREAM MAIN GAS MANUAL SHUT-OFF VALVE IS FULLY OPEN WHEN CHECKING PILOT LINE GAS PRESSURE. DO NOT EXCEED MAXIMUM INPUT FOR THE HEATER AS STATED ON THE UNIT’S SPECIFICATIONS.

2.6.8 REFER TO MANIFOLD DRAWING FOR VENTING INSTRUCTIONS, IF REQUIRED. ON REGULATORS LARGER THAN 1-1/4” IN. DIAMETER A LEAK LIMITER IS NOT PROVIDED. ALL REGULATORS NOT SUPPLIED WITH A LEAK LIMITER MUST BE VENTED OUTDOORS. ALL FIELD VENTING MUST BE CONDUCTED ACCORDING TO NFPA AND NATIONAL GAS CODE.
3.0 START-UP AND SERVICE INSTRUCTIONS

3.1 FIELD WIRING

3.1.1 POWER CONNECTION:

IF A DISCONNECT HAS NOT BEEN SUPPLIED WITH THE UNIT, INSTALL AN ELECTRIC DISCONNECT SWITCH WITH ADEQUATE AMPACITY (REFER TO THE UNIT SPECIFICATIONS) ACCORDING TO ARTICLE 430 OF THE NATIONAL ELECTRIC CODE, ANSI/NFPA 70-1987. ON INDOOR UNITS A HOLE IS TO BE MADE IN THE CONTROL COMPARTMENT SIDE PANEL TO BRING POWER LINES IN. THE HOLE SHOULD BE LOCATED NEAR THE MOTOR STARTER SPLITTER BLOCK OR FUSE BLOCK, IF FACTORY INSTALLED.

ON OUTDOOR UNITS THE HOLE MUST BE SEALED TO MAINTAIN WEATHER PROOF INTEGRITY TO THE CONTROL CABINET. IMPORTANT: TERMINATION OF THE CONDUIT FOR THE POWER SUPPLY MUST BE IN THE CONTROL COMPARTMENT. (NOTE: COVER MOTOR STARTER AND RELAYS IF DRILLING IN AND AROUND CONTROL PANEL TO AVOID DEBRIS CONTAMINATION.

3.2 CONTROL WIRING CONNECTIONS COMPLETE ALL WIRING TO ACCESSORIES (INTERLOCKS) ACCORDING TO THE WIRING DIAGRAMS PROVIDED WITH THE UNIT.

FOR INDOOR UNITS, MAKE AN ACCESS HOLE IN THE CONTROL CABINET TO BRING THE CONTROL WIRING TO THE TERMINAL STRIP. LOCATE THE HOLE AS CLOSE TO THE TERMINAL STRIP AS POSSIBLE TO PREVENT EXCESS UNSECURED WIRING COMING IN CONTACT WITH OTHER CONNECTIONS. ONE SIDE OF THE TERMINAL STRIP WILL BE LEFT FOR FIELD CONNECTIONS.

FIELD WIRING MAY BE REQUIRED ON UNITS SPLIT FOR SHIPMENT. REFER TO UNIT WIRING DIAGRAM. ALWAYS FULLY RUN AND TEST ALL FIELD CONTROL WIRING RE: CONNECTIONS.

INSTALL REMOTE PANEL IN DESIRED LOCATION, PROVIDED IT IS NOT A HAZARDOUS LOCATION OR SUBJECT TO FLAMMABLE VAPORS OR GASES.

COMPLETE FIELD WIRING TO SUPERVISOR PANEL AS INDICATED ON THE DRAWINGS PROVIDED WITH THE UNIT.

NOTE: (USE A SEPARATE CONDUIT OR SHIELDED WIRE WHEN REMOTE CONTROLS OPERATE ON mA or Vdc, CONTROL SIGNALS.

3.21 SUPPLY PRESSURE TESTING

DISCONNECT GAS PIPING TO THE UNIT AND MAIN SHUT-OFF VALVE WHEN PRESSURE TESTING GAS SUPPLY SYSTEMS OVER IA PSIG.

THE UNIT CAN BE ISOLATED FROM THE GAS SUPPLY SYSTEM BY CLOSING THE INDIVIDUAL MANUAL SHUTOFF VALVE DURING ANY PRESSURE TESTING OF THE GAS AND SUPPLY SYSTEM OF IA PSIG AND BELOW. REFER TO THE HEATER RATING PLATE FOR DETERMINING THE MINIMUM GAS SUPPLY PRESSURE FOR OBTAINING THE MAXIMUM GAS CAPACITY FOR WHICH THE HEATER IS SPECIFIED.
3.21.1 START-UP PROCEDURE

3.3.1 REMOVE SHIPPING BLOCKS FROM BLOWER OR VIBRATION ISOLATORS:

3.3.2 INSURE THAT MAIN FIRING VALVE IS CLOSED, BUT THAT GAS IS AVAILABLE IN THE SERVICE LINE.

3.3.5 CLOSE THE MAIN DISCONNECT SWITCH.

3.3.6 IF EQUIPPED, INSURE LOCAL ON/OFF POSITION IS IN CORRECT POSITION. IF AN EXHAUST FAN DISCONNECT SWITCH HAS BEEN FURNISHED, INSURE THAT THE SWITCH IS IN THE ON POSITION AND THE FAN IS POWERED. LIGHTS WILL INDICATE EXHAUST FAN ON AND UNIT ON.

3.3.7 WITH THE SWITCH IN THE ON POSITION AND THE EXHAUST INTERLOCK MADE, THE INLET DAMPER MOTOR WILL BE POWERED OPEN. WHEN THE APPROPRIATE DAMPER IS OPENED, A TIMER CIRCUIT ENERGIZE THE BLOWER MOTOR STARTER. A LIGHT IN THE PANEL WILL INDICATE THE BLOWER IS OPERATIONAL. CHECK THE FAN ROTAION. DO NOT ASSUME THE ROTATION IS CORRECT JUST BECAUSE AIR IS COMING INTO THE BOOTH. THE ROTATION IS MARKED ON THE FAN HOUSING.

STARTER CONTACTS SHOULD PULL IN AND HOLD WITHOUT CHATTERING (3 PHASE UNITS). IF THEY DO NOT OPERATE QUIETLY CHECK TO INSURE THAT THE PROPER VOLTAGE IS SUPPLIED TO THE UNIT.

3.3.8 IF HEAT IS DESIRED INSURE “SPRAY HEAT’ ON/OFF SWITCH IS IN THE CORRECT POSITION. **NOTE:** BURNER IS AUTOMATICALLY ENABLED DURING CURE CYCLE. WITH THE “SPRAY HEAT’ ON/OFF SWITCH IN THE ON POSITION, THE PILOT CIRCUIT WILL BE ENERGIZED. IF THIS IS NOT THE CASE CHECK TO INSURE THAT THE MANUAL HIGH LIMIT CONTROL IS SET AND FLAME SAFETY RELAY IS RE-SET. IN THE EVENT THAT THE FLAME FAILURE LIGHT COMES ON, JUST TURN OFF THE HEAT SWITCH AND TURN IT BACK ON TO RESET THE FLAME UNIT FOR ANOTHER IGNITION ATTEMPT.
3.3.9 PILOT - THE FLAME SAFEGUARD MONITORS THE PILOT FLAME THROUGH THE UV SCANNER. THE SCANNER DETECTS THE PRESENCE OF A FLAME AND IN TURN OPENS THE MAIN GAS SAFETY VALVE. IF NO FLAME IS PRESENT, THE UNIT WILL NOT ALLOW THE VALVE TO OPEN. THE SCANNER MUST HAVE AN UNOBSCURED VIEW OF THE BURNER AND MUST BE KEPT FREE OF SOOT AND CONDENSATION.

CLEANING AND MAINTENANCE OF BURNER:
PERIODIC MAINTENANCE WILL INSURE CONTINUED TROUBLE-FREE OPERATION OF YOUR BURNER. AT LEAST A YEARLY INSPECTION IS RECOMMENDED FOR HEATED INSTALLATIONS AND MORE OFTEN IF IN CONSTANT USE. YOUR OWN EXPERIENCE IS THE BEST GUIDE FOR DETERMINING THE FREQUENCY OF INSPECTION, BUT AS A MINIMUM THE FOLLOWING PROCEDURE SHOULD BE FOLLOWED:

- SHUT DOWN SYSTEM TOTALLY, DISCONNECTING OR LOCKING OUT POWER SUPPLY SO THERE CAN BE NO ACCIDENTAL START-UP DURING INSPECTION.
- INSPECT THE BURNERS CAREFULLY, INCLUDING UPSTREAM AND DOWNSTREAM SIDES OF MIXING PLATES AS WELL AS BURNER BODY FACE. ANY ACCUMULATION OF SCALE OR FOREIGN MATERIAL ON EITHER SIDE OF THE MIXING PLATES SHOULD BE REMOVED WITH A WIRE BRUSH. CHECK VISUALLY THAT NO HOLES IN THE MIXING PLATES ARE BLOCKED. IF ANY BURNER PORTS ARE PLUGGED (EVEN PARTIALLY) CLEAR THEM WITH A PIECE OF WIRE OR A DRILL BIT MATCHING THE DRILL SIZE FOR YOUR APPROPRIATE BURNER TYPE.

WARNING: DO NOT ENLARGE BURNER PORTS OR PERFORMANCE MAY BE DRASTICALLY AFFECTED.

IF ANY MIXING PLATES ARE LOOSE OR MISSING FASTENERS, TIGHTEN/REPLACE AS NECESSARY. ALWAYS USE ZINC PLATED OR STAINLESS FASTENERS.

- PUT SYSTEM BACK INTO OPERATION AND, IF POSSIBLE, VIEW FROM DOWNSTREAM SIDE WHILE CYCLING BURNER THROUGH FULL FIRING RANGE. THIS WILL GIVE A VISUAL CHECK FOR BLOCKED BURNER PORTS.
- OBSERVE FLAME PATTERN AND, IF NECESSARY, TAKE STEPS TO CORRECT VELOCITY AND/OR AIR DISTRIBUTION PROBLEMS. NOTE: CONTACT THE FACTORY BEFORE MAKE ANY ADJUSTMENTS)

3.3.10 IF THE CORRECT AIRFLOW IS RUNNING THROUGH THE HEATER AND THE HIGH TEMP LIMIT IS NOT TRIPPED THE INTERLOCKS CLOSED LIGHT ON THE FLAME SAFETY SHOULD COME ON. IF THE LIGHT BLINKS THE FLAME SAFETY IS IN PILOT TEST MODE AND THE RESET BUTTON SHOULD BE Pressed. IF THE FLAME FAILURE LIGHT COMES ON THEN THE SPARK PLUG SHOULD BE CHECKED FOR SOOT OR THE GAS SUPPLY MAY BE OFF. IF THERE IS AN AIR FLOW PROBLEM THERE SHOULD BE A READ LIGHT VISIBLE IN EITHER THE LOW OR HIGH AIRFLOW SWITCH.
PILOT ADJUSTMENT SCREW IS IN THE PILOT SHUTOFF. WHEN SETTING, ADJUST FOR A GOLF BALL SIZED PILOT FLAME.

3.3.12 GRADUALLY OPEN FIRING VALVE TO START MAIN FLAME. CHECK FOR FLAME OVER ENTIRE BURNER LENGTH.

3.3.13 CHECK LIMIT CONTROL AND GAS PRESSURE SWITCH SETTING. CYCLE UNIT ON LIMIT TO CONFIRM PROPER OPERATION ONSITE. LIMIT CONTROL (180° F).

3.3.14 FLAME SUPERVISION CHECK:

THE FLAME SUPERVISION RELAY SHOULD BE CHECKED PERIODICALLY TO INSURE THAT THE CONTROLS ARE OPERATIONAL. WITH THE UNIT ON FULL OPERATION AND FIRING, CLOSE THE MAIN AND PILOT MANUAL FIRING VALVE. THE UNIT SHOULD LOCK OUT.


3.3.15. CFM

THE UNIT DEPENDS UPON AN ADEQUATE SUPPLY OF AIR FOR GOOD COMBUSTION AND OPERATION. CARE SHOULD BE TAKEN TO INSURE THAT PROPERLY SIZED INLET HOOD AND DUCTWORK ARE INSTALLED AND THAT THE UNIT IS DISCHARGING THE DESIGN CFM.

NOTE: RECIRCULATION IS NOT RECOMMENDED IN NON-INSULATED BUILDINGS WHERE OUTSIDE TEMPERATURES FALL BELOW 32 DEGREES FAHRENHEIT (0 DEGREES CELSIUS)
4.0 TYPICAL TEMPERATURE CONTROLS, ELECTRICAL SCHEMATICS AND PANELS
# 5.0 Burner Unit

## 5.1 Burner Information

### Main Specifications

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<th>Parameter</th>
<th>Description</th>
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<tbody>
<tr>
<td>Input (Btu/hr./ft.)</td>
<td>1,200,000 maximum</td>
</tr>
<tr>
<td>Combustion Air Stream</td>
<td>0.2&quot; to 1.4&quot; w.c.</td>
</tr>
<tr>
<td>Ignition</td>
<td>Direct spark ignition (6000VAC).</td>
</tr>
<tr>
<td>Pilot</td>
<td>Interruptible pilot for natural gas, propane or butane.</td>
</tr>
<tr>
<td>Pilot Capacities/Pressures</td>
<td>35,000 Btu/hr. with pressure drops of:</td>
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<tr>
<td></td>
<td>Natural Gas</td>
</tr>
<tr>
<td></td>
<td>Propane</td>
</tr>
<tr>
<td></td>
<td>Butane</td>
</tr>
<tr>
<td>Burner Bodies</td>
<td>Standard Aluminum</td>
</tr>
<tr>
<td></td>
<td>Low Pressure Aluminum*</td>
</tr>
<tr>
<td></td>
<td>Standard Cast Iron</td>
</tr>
<tr>
<td></td>
<td>Corrosion Resistant, EN Plated Cast Iron</td>
</tr>
<tr>
<td></td>
<td>Low Pressure Cast Iron+</td>
</tr>
<tr>
<td>Burner Section Sizes</td>
<td>• 150mm (6&quot;) straight section</td>
</tr>
<tr>
<td></td>
<td>• 300mm (12&quot;) straight section</td>
</tr>
<tr>
<td></td>
<td>• 300mm (12&quot;) straight section with back inlet</td>
</tr>
<tr>
<td></td>
<td>• 300mm (12&quot;) straight section with pilot</td>
</tr>
<tr>
<td></td>
<td>• 150mm (6&quot;) by 300mm (12&quot;) tee section</td>
</tr>
<tr>
<td></td>
<td>• 150mm (6&quot;) by 300mm (12&quot;) tee section with pilot</td>
</tr>
<tr>
<td></td>
<td>• 300mm (12&quot;) by 300mm (12&quot;) cross section</td>
</tr>
<tr>
<td>Pipe Threads</td>
<td>NPT or BS.P</td>
</tr>
<tr>
<td>Maximum Upstream Air Temp</td>
<td>450°F (232°C)</td>
</tr>
<tr>
<td>Maximum Downstream Air Temp</td>
<td>850°F (454°C)</td>
</tr>
<tr>
<td>Maximum Temperature Rise</td>
<td>750°F (400°C)</td>
</tr>
<tr>
<td>Minimum Inlet Air Oxygen (O2)</td>
<td>18%</td>
</tr>
<tr>
<td>Flame Detection**</td>
<td>Flame rod or scanner</td>
</tr>
<tr>
<td>Fuels</td>
<td>Natural gas, propane or butane.</td>
</tr>
</tbody>
</table>

* For use with Natural Gas only.

** Burners over 6 linear feet include flame supervision at the far end. If pilot ignition is being used, two flame supervision units are required, one for the pilot and one for the far end. If using direct spark on the main flame, only one flame supervision unit at the far end is required providing ignition can be accomplished within 15 seconds. (Reference NFPA Requirement 5-9.2.2).

- Eclipse reserves the right to change the construction and/or configurations of our products at any time without being obliged to adjust earlier supplies accordingly.
- All information is based on laboratory testing. Different chamber size and air flow conditions may affect the data.
- All information is based on standard conditions (70°F at sea level). Contact Eclipse for performance data above ambient temperature.
- All inputs based on gross caloric values.
Operating Range & Duct Pressure Measurement

Inlet Air Temperature Correction

<table>
<thead>
<tr>
<th>Air Inlet Temp. (°F)</th>
<th>0</th>
<th>30</th>
<th>70</th>
<th>150</th>
<th>200</th>
<th>250</th>
<th>300</th>
<th>350</th>
<th>400</th>
<th>450</th>
</tr>
</thead>
<tbody>
<tr>
<td>Correction Factor</td>
<td>0.67</td>
<td>0.92</td>
<td>1.00</td>
<td>1.15</td>
<td>1.25</td>
<td>1.34</td>
<td>1.43</td>
<td>1.53</td>
<td>1.62</td>
<td>1.72</td>
</tr>
</tbody>
</table>

Air Velocity Calculation

\[
\text{Air Velocity (fpm)} = 1096.2 \sqrt{\frac{\text{Air Pressure Drop ("w.c." \)}}{\text{Air Density (lbs/cubic ft.)}}}
\]
6.0 SEQUENCE OF OPERATION

6.1 Press the F button on the temp control. 1 or 2 will be displayed next to the temp set point. The red numbers are the actual temperature and the green numbers are the set point. 1 is the temperature set point for spray operations. 2 is the temperature for curing the paint. Use the up/down arrows to change each set point. After both choices are made, be sure the controller is left in the #1 position.

6.2 Turn on the Fan and Light switches. The lights will come on immediately. The VFD will start ramping up the exhaust fan and the inlet damper will start to open. After 20 seconds the supply fan will start. As soon as the AMU fan starts the fan switch will light up. As the inlet damper continues to open the air flow will increase. After 90 seconds the inlet fan will be at full flow and the profile damper will be adjusting the burner pressure.

6.3 Adjust the Spray speed setting on the exhaust fan to balance the pressure in the booth by watching the magnehelic gage on the control panel. The spray speed adjusts the speed of the exhaust fan.

6.4 If heat is needed, turn on the Heat switch. This switch can be turned on at any time. The burner will light automatically as soon as the AMU decides it is safe to do so. If the heat fails to come up after a minute, turn the Heat switch off and then back on. This resets the Flame Safety relay and it will attempt to relight itself. It can take several tries if it is the first time. Sometimes air in the gas line can take a while to work its way out of new gas lines.

6.5 When the burner lights, the Heat switch will light up. The temperature will come up to the #1 temp setting on the Temp controller. Now you can paint your product.

6.6 When you are ready to cure the paint, turn the last switch from Paint to Cure. The Flash timer will come on. You will see a flashing green light on the timer that will flash faster as it nears its set point time. You can set this time as long or as short as you wish, from a few seconds to as long as you like. This will also give your workers time to exit the booth. When the Flash timer times out the booth lights will go out. If you did not choose to use heat during painting the burner will light at this time. The Temp controller will switch to the #2 temp set point and the burner will ramp up to maximum. At the same time the inlet damper will go to the cure position to reduce the air flow in the booth. After giving the AMU about 2 minutes to balance out at the new air flow, adjust the Cure speed setting to rebalance the pressure in the booth while curing.

6.7 Set the Cure timer to whatever cure time your product requires. Set the Cool timer to what time you wish for the part to cool down after curing.

6.8 When the Cure timer has finished the temp will go back to set point #1 and stay there until the Cool timer times out. At this point the burner and fans will shut down and the inlet damper will close. The Cure light will stay on.

6.9 Turn off the Fan switch. The booth lights will come back on to allow you to remove your product.
6.10 To run another cycle just turn the Cure switch back to Spray and turn the Fan switch back on. You will be back to step 2. You should not have to re-adjust the exhaust fan speeds again until your filters become loaded with paint.

6.11 Any time you can turn the Fan and Light switches off. The burner, lights, and fans will shut down and the inlet damper will close.

6.12 Photo of Control Panel
7.0 TROUBLE SHOOTING

7.1 ON START UP, IF THE UNIT WILL NOT OPERATE PROPERLY, IT MAY BE DUE TO INCORRECT WIRING BETWEEN THE UNIT AND THE CONTROL PANEL. TO CHECK FIELD WIRING, MARK EACH WIRE AND REMOVE FROM CONTROL PANEL. PLACE JUMPERS BETWEEN TERMINALS TO CONTROL SWITCHES. IF UNIT STARTS, HAVE AN ELECTRICIAN CHECK FIELD WIRING.

7.2 IF INLET DAMPER FAILS TO OPEN WHEN EXHAUST IS TURNED ON, CHECK THE FOLLOWING:
   ❖ MAIN DISCONNECT.
COL-MET SPRAY BOOTHS

- FUSES - MAIN CONTROL PANEL.
- ON OFF SWITCH ON THE REMOTE PANEL
- SAFETY RELAY (RESET).
- GAS PRESSURE TO UNIT IF UNIT HAS HIGH GAS PRESSURE SWITCHES.
- EXHAUST PROVING SWITCH (Canadian)
- DAMPER MOTOR LINKAGE.
- LOW LIMIT IF USED.

7.3 IF INLET DAMPER OPENS BUT BLOWER FAILS TO OPERATE, CHECK THE FOLLOWING CONTROLS - VISUALLY OR WITH A TEST LAMP OR JUMPERS:
- MAGNETIC STARTER (MANUALLY RESET).
- BLOWER MOTOR.

7.4 DAMPER OPEN, BLOWER IS RUNNING, BUT PILOT WILL NOT LIGHT; CHECK THE FOLLOWING:
- “SPRAY HEAT ON/OFF” SWITCH IN THE ON POSITION.
- INTERLOCK LIGHT ON THE VERIFLAME (AIR FLOW OK).
- GAS SUPPLY, PILOT SHUT-OFF VALVES.
- PILOT ADJUSTMENT.
- HIGH LIMIT (MANUALLY RESET).
- AUXILIARY CONTACT ON BLOWER STARTER (BLOWER INTERLOCK).
- AIR IN GAS LINE (BLEED).
- TRASH OR FOREIGN MATERIAL IN GAS AND I OR PILOT LINE

7.5 DAMPERS ARE OPEN, BLOWER IS RUNNING, PILOT COMES ON BUT UNIT LOCKS OUT AND SHUTS DOWN; CHECK THE FOLLOWING:
- VERIFLAME IS NOT IN PILOT TEST (RESET BUTTON LEFT IN).
- LOW AIR PROVING SWITCH ACROSS PROFILE PLATE (RED LIGHT).
- BLOWER RUNNING BACKWARDS.
- LOW AIR VELOCITY ACROSS PROFILE PLATE INLET OR DISCHARGE IS BLOCKED BLOWER WHEEL IS SLIPPING, OR THE BLOWER IS NOT MOVING ENOUGH AIR DUE TO EXCESSIVE STATIC LOAD.
- CHECK READINGS ON FLAME SAFEGUARD RELAY.
- IF UNIT HAS MAIN FLAME SUPERVISION, LOW FIRE SET TOO LOW, OR FIRING VALVE IS CLOSED.
- CHECK THAT UNIT FILTERS ARE CLEAN.
7.6 DAMPERS ARE OPEN, BLOWER IS OPERATING, PILOT IS ON, MAIN FLAME LOW FIRE IS ON, BUT UNIT WILL NOT MODULATE - CHECK THE FOLLOWING:
- WIRING OF TEMP CONTROLLER.
- SETTING OF TEMP CONTROLLER.
- TEMP CONTROLLER DOES NOT SHOW AN ERROR CONDITION.
- CHECK WIRING TO TEMPERATURE PROP.
- LINKAGE ON BUTTERFLY VALVE MAY BE JAMMED OR SLIPPING.

7.7 BURNER IS ON BUT DISCHARGE TEMPERATURE IS TOO LOW, CHECK THE FOLLOWING:
- INCORRECT GAS FIRING RATE.
- LOW GAS PRESSURE?
- MAIN FIRING VALVE NOT FULLY OPEN.

7.8 BLOWER IS RUNNING BUT BURNER IS OFF; CHECK THE FOLLOWING:
- UNIT OFF ON HIGH LIMIT (MANUAL RESET).

7.9 UNIT IS HUNTING FROM HIGH TO LOW FIRE:
- THE TEMP CONTROLLER NEEDS TO BE TUNED OR REPLACED.

7.10 UNIT RUNS, THEN LOCKS OUT AND SHUTS DOWN COMPLETELY.
- CHECK TO INSURE THAT THE PRESSURE DROP ACROSS THE PROFILE PLATE IS ABOVE .30" W.C.
- CHECK HIGH LIMIT HAS NOT BEEN TRIPPED.
- CHECK FOR LOOSE WIRING CONNECTIONS.

7.11 INTERMITTENT START:
- LOOSE WIRING - CHECK TO INSURE ALL WIRING CONNECTIONS ARE SECURE.
- UNSTABLE GAS OR ELECTRICAL SUPPLY
- FAULTY OR DIRTY UV SCANNER (PROPER FLAME SHOULD BE APPROXIMATELY 12-18" INCHES ON HIGH FIRE.)

7.12 SHORT FLAME:
- LOW GAS PRESSURE - ADJUST REGULATOR.
- PROFILE VELOCITY TOO HIGH - INSUFFICIENT SYSTEM RESISTANCE.

7.13 LONG LAZY FLAME:
- PROPER FLAME LENGTH ON HIGH FIRE SHOULD BE 12"-18" LONG.
- HIGH GAS PRESSURE - ADJUST REGULATOR MANIFOLD PRESSURE SHOULD NOT EXCEED RATING PLATE.(7" W.C. NATURAL GAS OR 3.5" W.C. PROPANE MAXIMUM.)

7.14 GAS FAILS TO SHUT OFF:
- DIRT ON VALVE SEAT- CLEAN
- DEFECTIVE MAIN SAFETY VALVE - REPLACE
- INCORRECT FIELD WIRING RECONNECTION

CHECK OVER AND FULLY TEST ALL FIELD WIRING RECONNECTIONS BETWEEN SECTIONAL UNIT SPLITS AND REMOTE PANELS.
8.0 OPERATING PRINCIPLES OF THE RAW GAS BURNER

THE RAW GAS BURNER IS DESIGNED TO OPERATE IN A DUCT OF FLOWING FRESH AIR. FUEL GAS IS FED DIRECTLY TO THE BURNERS; KINETIC ENERGY OF THE AIR STREAM FURNISHES COMBUSTION AIR. THE BURNER MUST BE INSTALLED TO FIRE WITH AND PARALLEL TO THE AIRFLOW. BY VIRTUE OF VELOCITY IMPACT AND SUCTION GENERATED BY THE DIVERGING SHAPE OF THE COMBUSTION BAFFLES, AIR IS INDUCED THROUGH THE AIRPORTS INTO THE COMBUSTION ZONE. THE AIR SUPPLY IS CONSTANT THROUGH ONLY THAT WHICH MIXES WITH THE GAS FLOWING FROM THE BURNER PORTS, TAKES PART IN COMBUSTION.

WHEN A VERY SMALL QUANTITY OF GAS IS ADMITTED TO THE BURNER, SUFFICIENT MIXING TAKES PLACE IN THE LOW FIRE SLOT WITHIN THE BURNER, CASTING AND COMBUSTION TAKES PLACE IN THIS ZONE. SINCE THE LOW FIRE IS CONTAINED WITHIN THE BURNER CASTING IT IS EFFECTIVELY SHIELDED FROM FIRE DISRUPTING UNCONTROLLED AIR ENTRY.

AS THE GAS SUPPLY IS INCREASED THE FLAME PROGRESSES INTO THE INTERMEDIATE FIRE ZONE WHERE AN ADDITIONAL SUPPLY OF AIR IS AVAILABLE. AT HIGHER OR FULL CAPACITY, MIXING OCCURS AT THE LARGER AIRPORTS OF THE HIGH FIRE ZONE AUGMENTED BY AIR SPILLING OVER THE END OF THE BAFFLES.

WITH A REDUCTION OF GAS SUPPLY THE REVERSE SEQUENCE TAKES PLACE – THE FLAME RECEDES TO A LOCATION OF LESSER AIR SUPPLY UNTIL THE LOW FIRE ZONE IS REACHED. THE SYSTEM ABOVE IS SUITABLE FOR A TURN DOWN RANGE OF APPROXIMATELY 30 TO 1.

WITH SUCTION GENERATED BY THE BLOWER THERE IS A PRESSURE IN THE GAS MANIFOLD OF LESS THAN ZERO AT LOW FIRE. THEREFORE, WHEN CHECKING THE MANIFOLD PRESSURE YOU WILL FIND THAT THE PRESSURE WILL RANGE FROM APPROXIMATELY 4.5" W.C. TO LESS THAN ZERO, WHEN THE UNIT IS MODULATING FROM HIGH TO LOW FIRE.
9.0 PROPER COMBUSTION FOR THE DIRECT FIRED BURNER

FOLLOWING ARE INDICATIONS OF PROPER COMBUSTION:
1. BLUEISH FLAME WITH ORANGE TIPS WHEN BURNING NATURAL GAS.
2. STABLE EVEN FLAME NOT PULSATING OR RADICAL PATTERN.
3. ON HIGH FIRE THE FLAME SHOULD RANGE 12-18" IN LENGTH.
4. ON LOW FIRE FLAME SHOULD RUN ALL THE WAY ACROSS THE BURNER AND BE 1-2 INCHES LONG.
5. FLAME SHOULD EMIT LESS THAN 5PPM CO WHEN CHECKED WITH A COMBUSTION ANALYZER
6. FLAME SHOULD NOT PRODUCE ANY SUBSTANTIAL ODOR

INSTRUMENTS REQUIRED:
PRESSURE DIFFERENTIAL GAUGE (MANOMETER OR MAGNEHELIC)
DUCT VELOMETER (ALNOR SERIES 6000)
THERMOMETER WITH A SCALE -30+ 200F.

REFER TO THE FOLLOWING EXAMPLES TO DETERMINE AIRFLOW AND BURNER CAPACITY FOR INSTALLATION.

9.1 EXAMPLE 1
TO DETERMINE THE AMOUNT OF AIR FLOWING THROUGH THE UNIT, MEASURE DISCHARGE AIR VELOCITY AND MEASURE DUCT AREA. (SQUARE FOOTAGE OF DUCT AREA MULTIPLIED BY THE AIR VELOCITY = CFM OF AIR BEING DELIVERED)

GAS CONSUMPTION PER FOOT OF BURNER =308 FT 3 REFER TO THE BURNER CAPACITY CHART, READING LEFT TO RIGHT. LOCATE THE VALUE 308 THEN FOLLOW THE VERTICAL LINE TO THE INTERSECTION WITH THE HORIZONTAL LINE CORRESPONDING TO .38" WC. PROCEED UP THE CURVE (OR DRAW A NEW SLOPE PARALLEL TO EXISTING CURVES) AND READ 0.5" WC. READ ACROSS THE VELOCITY AXIS AND THE VALUE 2900 FPM.
CFM THROUGH THE UNIT =2900 x 2.42=7,018
TEMPERATURE RISE: (AMU’s)

The equation for calculating the temperature rise capability of a burner can be determined by the following formula.

\[
\text{BTUs of burner} + \text{CFM of re-circulated air} + 1.08 = \text{The temperature rise capable of the burner system}
\]

1.08 is the density of gas & its specific gravity. Temperature rise is the difference in temperature from that desired and the ambient temperature.

<table>
<thead>
<tr>
<th>DESIRED DELIVERY TEMPERATURE</th>
<th>LOWEST EXPECTED OUTSIDE TEMPERATURE (DEGREES F.)</th>
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<tbody>
<tr>
<td>70°</td>
<td>99,000 94,000 88,000 82,000 77,000 71,000 66,000 61,000 55,000 49,000 44,000</td>
</tr>
<tr>
<td>75°</td>
<td>104,000 98,000 93,000 87,000 82,000 76,000 71,000 66,000 60,000 54,000 49,000</td>
</tr>
<tr>
<td>80°</td>
<td>108,000 103,00 98,00 92,00 87,00 81,00 76,000 70,000 65,000 59,000 54,000</td>
</tr>
<tr>
<td>85°</td>
<td>113,000 107,00 102,00 96,000 91,000 85,000 80,000 75,000 69,000 64,000 59,000</td>
</tr>
<tr>
<td>90°</td>
<td>117,000 111,00 106,00 101,00 96,000 90,000 85,000 80,000 74,000 69,000 64,000</td>
</tr>
<tr>
<td>95°</td>
<td>121,000 116,00 111,00 105,00 100,00 94,000 89,000 84,000 79,000 73,000 68,000</td>
</tr>
<tr>
<td>100°</td>
<td>112,000 120,000 115,000 109,000 104,000 99,000 94,000 89,000 83,000 79,000 72,000</td>
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## 9.1 AMU REQUIREMENTS

<table>
<thead>
<tr>
<th>Model</th>
<th>Phase</th>
<th>208V</th>
<th>240V</th>
<th>460V</th>
<th>575V</th>
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</thead>
<tbody>
<tr>
<td>812 AMU</td>
<td>1</td>
<td>42A</td>
<td>34A</td>
<td>30A</td>
<td>16A</td>
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<tr>
<td></td>
<td></td>
<td>Natural Gas</td>
<td>1PSI 1500CFH</td>
<td>Propane</td>
<td>1PSI 750CFH</td>
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<tr>
<td>1216 AMU</td>
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<td>N/A</td>
<td>50A</td>
<td>44A</td>
<td>23A</td>
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<td></td>
<td></td>
<td>Natural Gas</td>
<td>1PSI 2000CFH</td>
<td>Propane</td>
<td>1PSI 1000CFH</td>
</tr>
<tr>
<td>2026 AMU</td>
<td>1</td>
<td>N/A</td>
<td>50A</td>
<td>44A</td>
<td>23A</td>
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<td></td>
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<td>Natural Gas</td>
<td>5PSI 2500CFH</td>
<td>Propane</td>
<td>1PSI 1250CFH</td>
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<td>2734 AMU</td>
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<td>80A</td>
<td>70A</td>
<td>36A</td>
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<td></td>
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<td>Natural Gas</td>
<td>5PSI 3000CFH</td>
<td>Propane</td>
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<td>122A</td>
<td>106A</td>
<td>54A</td>
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<td></td>
<td></td>
<td>Natural Gas</td>
<td>5PSI 4000CFH</td>
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### Exhaust Loads

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<th>1 phase 240V</th>
<th>208V</th>
<th>240V</th>
<th>460V</th>
<th>575V</th>
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</thead>
<tbody>
<tr>
<td>2HP</td>
<td>12A</td>
<td>7.8A</td>
<td>6.8A</td>
<td>3.4A</td>
<td>2.7A</td>
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<tr>
<td>3HP</td>
<td>17A</td>
<td>11A</td>
<td>9.6A</td>
<td>4.8A</td>
<td>3.9A</td>
</tr>
<tr>
<td>5HP</td>
<td>28A</td>
<td>17.5A</td>
<td>15.2A</td>
<td>7.6A</td>
<td>6.1A</td>
</tr>
<tr>
<td>7.5HP</td>
<td>35A</td>
<td>25A</td>
<td>22A</td>
<td>11A</td>
<td>9A</td>
</tr>
<tr>
<td>10HP</td>
<td>40A</td>
<td>32A</td>
<td>28A</td>
<td>14A</td>
<td>11A</td>
</tr>
<tr>
<td>15HP</td>
<td>N/A</td>
<td>48A</td>
<td>42A</td>
<td>21A</td>
<td>17A</td>
</tr>
</tbody>
</table>

**NOTE1:** The Amperages listed do not include the exhaust fans. The bottom of the chart lists the loads for each to be added to the total load.

**NOTE2:** The gas pressures listed are MAXIMUM pressures. The minimum pressure for all models is \( \frac{1}{2} \) PSI. This pressure must be maintained at full flow or the AMU will not be able to achieve its design rating of 100 degree rise.

### 10.0 RECOMMENDED MONTHLY MAINTENANCE
1.) Check for loose connections in the wiring.
2.) Check the voltage at the unit while it is in operation.
3.) Check motor amperage draws against their rating plate values
4.) Inspect all contactors to ensure that they are clean and making good contact.
5.) Check all fittings, valves and lines for leaks.
6.) Check the burner; clean and adjust if necessary.
7.) Check the flame sensor; clean if necessary.
8.) Check the fuel supply pressure at the unit.
9.) Check the manifold pressure.
10.) Check all dampers, linkages and damper actuators; adjust and tighten as required.
11.) Clean or replace filters if necessary. Replace only with equivalent of supplied filter.
12.) Check operation of all safety controls

11.0 RECOMMENDED YEARLY MAINTENANCE
1.) Perform the monthly maintenance recommended.
2.) Inspect blower wheels and housings; clean if necessary.
3.) Inspect all set screws on blower wheels to ensure that they are secured to their respective shafts.
4.) Check ignition spark.
5.) Inspect and clean ignition electrodes.
6.) Check flame supervision relay.
7.) Inspect all operating and safety controls; clean and replace if necessary.
8.) Clean the burner.

NOTE: Refer to manufacturer literature provided for maintenance requirements of optional equipment.

12.0 REPLACEMENT PARTS
To order replacement parts, please provide the following information when contacting your local representative:
- Unit model number
- Unit serial number
- Address for replacement part delivery
- Company representative for us to contact should questions arise
- Part Description and model number from your record drawings.
WARRANTY
DIRECT FIRED SERIES WARRANTY

THE WARRANTY ON THE COL-MET SPRAY BOOTHS MANUFACTURING DIRECT GAS FIRED MAKE UP AIR UNITS IS ONE (1) YEAR FROM INSTALLATION DATE OR 13 MONTHS FROM DATE OF SHIPMENT FROM OUR FACTORY.

OUR WARRANTY APPLIES FOR ORIGINAL SHIPMENT ON ALL PARTS OR COMPONENTS FABRICATED BY OR INSTALLED BY US WITH THE EXCEPTION OF AIR FILTERS, UV SCANNERS, IGNITORS, AND BLOWER BELTS.

WITHIN THE ONE YEAR WARRANTY, REPLACEMENT PARTS WILL BE SHIPPED COLLECT AND CHARGED TO THE CUSTOMER'S ACCOUNT WITH CREDIT BEING ISSUED AFTER RECEIPT OF AND EXAMINATION OF THE RETURNED PARTS: FREIGHT PREPAID TO THE FACTORY.

THIS WARRANTY DOES NOT INCLUDE FREIGHT, LABOR, OR SALES TAXES THAT MAY BE INCURRED BY THE PURCHASERS AND IS SUBJECT TO THE FOLLOWING CONDITIONS:

1.) THE UNIT SHALL BE INSTALLED BY A QUALIFIED HEATING CONTRACTOR IN ACCORDANCE WITH THE PROVISIONS OF THE SERVICE MANUAL.
2.) THE UNIT SHALL HAVE BEEN INSTALLED IN ACCORDANCE WITH ALL STATE AND LOCAL CODES.
3.) THE UNIT SHALL HAVE BEEN SUBJECT TO ONLY NORMAL USE IN SERVICE AND SHALL HAVE NOT BEEN MISUSED, NEGLECTED, ALTERED OR OTHERWISE DAMAGED.
4.) THE UNIT SHALL HAVE BEEN OPERATED WITHIN ITS RATED CAPACITY AND WITH THE PRESCRIBED FUEL.
5.) ALL AUTOMATIC CONTROLS SHALL HAVE BEEN OPERATIVE AT ALL TIMES.
6.) THE UNIT HAS NOT BEEN ALLOWED TO EXCEED ITS PROPER TEMPERATURE LIMITS DUE TO CONTROL MALFUNCTION OR INADEQUATE AIR CIRCULATION.
7.) THERE IS NO EVIDENCE OF TAMPERING OR DELIBERATE DESTRUCTION.

NO REPRESENTATIVE OF COL-MET. NOR ANY OF ITS DISTRIBUTORS OR DEALERS IS AUTHORIZED TO ASSUME FOR COL-MET ANY OTHER OBLIGATION OR LIABILITY IN CONNECTION WITH THIS PRODUCT NOR ALTER THE TERMS OF THE WARRANTY IN ANY WAY. THIS WARRANTY IS LIMITED TO THE EXPRESS PROVISIONS CONTAINED HEREIN AND DOES NOT EXTEND TO LIABILITY FOR LABOR COSTS INCURRED IN REPLACING DEFECTIVE PARTS. AUTHORIZATION TO RETURN ANY ALLEGED DEFECTIVE PARTS MUST BE OBTAINED FROM THE FACTORY BEFORE THE PART IS TRANSPORTED AND THE TRANSPORTATION CHARGES FOR ANY ALLEGED DEFECTIVE PARTS SHALL BE PREPAID BY THE OWNER. COL-MET WILL NOT ACCEPT CHARGES FOR PARTS PURCHASED UNLESS THE CONDITIONS OF THE WARRANTY HAVE BEEN SATISFIED.
THE EXPRESS WARRANTIES HEREIN CONTAINED ARE IN LIEU OF ANY OTHER WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING THE WARRANTY OF MERCHANTABILITY AND OF FITNESS FOR ANY PARTICULAR PURPOSE. COL-MET SHALL NOT BE LIABLE FOR DAMAGES, INCLUDING SPECIAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGES ARISING OUT OF OR IN CONNECTION WITH THE PERFORMANCE OF THE DIRECT GAS FIRED MAKE UP AIR UNIT OR ITS USE BY THE OWNER. COL-MET LIABILITY IS LIMITED EXCLUSIVELY TO THE REPAIR OR REPLACEMENT OF THE DEFECTIVE PART. PARTS CAN BE OBTAINED FROM COL-MET ON THE BASIS THAT CREDIT WILL BE ISSUED IF DEFECTIVE PARTS RETURNED QUALIFY FOR REPLACEMENT PURSUANT TO THE TERMS AND CONDITIONS OF THIS WARRANTY