

engineering manual



Nu NRG™

HOT AF!
THERMAL MASS
HEATER

- Modular Design and Scalability
- BTUH Modulation
- Solar/Hybrid Assist/Off Grid Capabilities
- Stand-alone Or Duct Heater
- Consistent Space Temperature
- 41% Energy Savings or More!



Skil-aire
A division of Tithe Corporation

Excellence In Comfort and Environmental HVAC systems
800.625.7545 www.Skil-aire.com

SKL-EM-NU-1005-1

Skil-aire™. We Hang Around All The Best Places.



Table of Contents

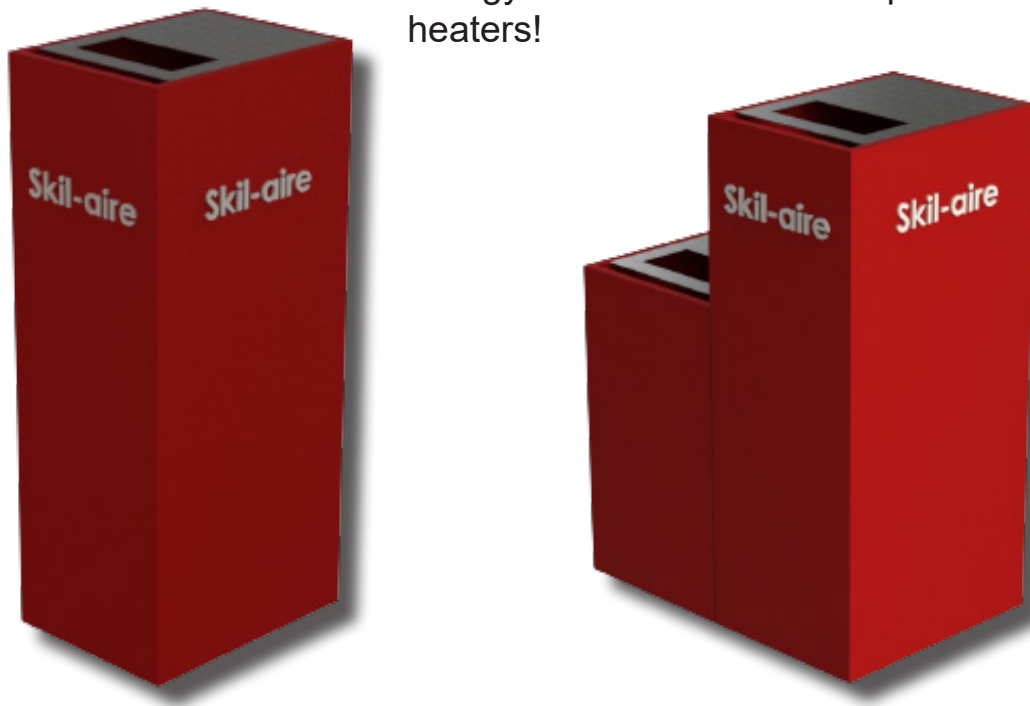
TOPIC	PAGE(S)
Table of Contents	2
Model Nomenclature	2
Furnace™ Series Overview	3
Technical Data	
Heater Performance Data	4
Electrical Data	4
Motor & Blower Data	4
Build Shape Configurations	4
Guide Specifications	
General	5
Products	6
Execution	8
Unit Dimensions	
1000 Series I - Build Shape	10
2000 Series I - Build Shape	11
3000 Series I - Build Shape	12
3000 Series U - Build Shape	13
Electrical Diagram	
Symbol and Legend	14
Power Schematic	15
Ethernet Network Layout	16
Panel Layout	17

Model Nomenclature

NU-1800-3	
Skil-aire Nu NRG™	1 - 208-230/1/60 3 - 208-230/3/60 4 - 460/3/60
1400 - 1400 ft² Nominal Heating Area	
1500 - 1500 ft² Nominal Heating Area	
1800 - 1800 ft² Nominal Heating Area	
2000 - 2000 ft² Nominal Heating Area	
2700 - 2700 ft² Nominal Heating Area	
3000* - 3000 ft² Nominal Heating Area	
4000* - 4000 ft² Nominal Heating Area	
*Consult to Factory for 3000 and 4000 series availability	

Nu NRG™

Skil-aire™ introduces its Nu NRG™ Heater. It's a **Hot AF!** Thermal Mass Heater using **41% less** energy for the same BTU output as conventional heaters!



The **Skil-aire Nu NRG™**, stand-alone or duct heaters. Modular and Scaleable with special design features. Significantly requires less energy than traditional strip-heat coils. Captures and uses all the heat produced efficiently

BTUH Modulation

- More Consistent Comfort Curve
- Less Temperature Swings
- Stays At Warmer Temperatures During Off Cycle

Flexible Power Supply Capabilities

- Solar
- Hybrid Assist
- Offgrid

Energy Saving Options:

- Super Efficient Variable Speed Motor
- Consistent Cost To Run - Less Fluctuations than Gas Prices
- Up To 41% Less Electricity Consumption

Safe!:

- No Carbon Monoxide or Flammable Gases
- No fossil fuels

Modular Design and Capabilities

- Packaged In Modular Chambers That Can Be Arranged to Different Applications.
- Ease Of Installation In Tight Spaces with 0" Clearance Install Rating.
- 18" x 18" x 24" Modular Chambers

Control Algorithms

- Equipped With Advanced Microprocessor To Maximize Electricity Savings
- Data Logging For Monitoring

TECHNICAL DATA: Nu NRG™

Heater Performance Data

Unit Series:	1000	2000	3000	4000
Heating Capacity MBH (Watts)	9.5-90.0 (2,784.0-26,377.0)	9.5-90.0 (2,784.0-26,377.0)	9.5-135.0 (2,784.0-39,565.0)	9.5-180.0 (2,784.0-52,753.0)

Electrical Data

Voltage	208-240/480	208-240/480	208-240/480	208-240/480
Phase	1 or 3	1 or 3	1 or 3	1 or 3
Hz	60	60	60	60
FLA	15 or 42	43	57	71
MOP	30 or 50	50	65	80

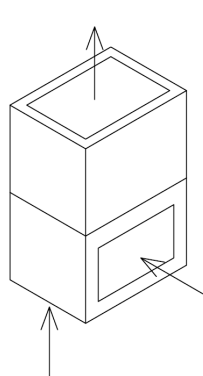
Physical Data

Unit Dimension (L x W x H) in.(mm)	18x24x36 (457x610x914)	18x24x54 (457x610x1372)	18x24x72 (457x610x1829)	18x24x90 / 18x24x108 (457x610x2286) / (457x610x2743)
Blower Section (L x W x H) in.(mm)	18x24x18 (457x610x457)	18x24x18 (457x610x457)	18x24x18 (457x610x457)	18x24x18 (457x610x457)
Heating Chamber (L x W x H) in. (mm)	18x24x18 (457x610x457)	18x24x18 (457x610x457)	18x24x18 (457x610x457)	18x24x18 (457x610x457)
Assembled Weight lbs.(kg.)	110 (50)	180 (82)	250 (113)	320 (145) / 360 (163)
Build Shape	I	I, L, U, Inverted T	I, L, U, Inverted T	I, L, U, Inverted T

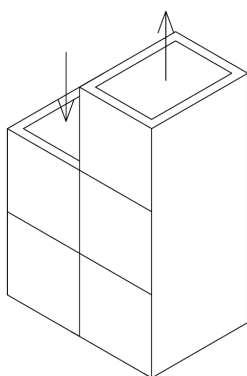
Motor & Blower Data

Variable Airflow CFM (cu.m/s)	300-2000 (0.142-0.944)
External Static Pressure in.wg (Pa)	0.08 (19.91)
Power HP (kW)	0.50, 0.75, 1.00 (0.37, 0.56, 0.75)
Voltage:	120/208-240
Phase:	1
Hz:	60
FLA:	0.78-4.3
MCA:	5
MOP:	5

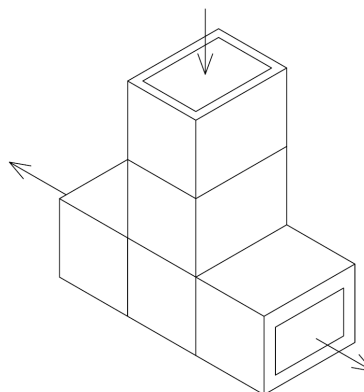
BUILD SHAPE CONFIGURATION



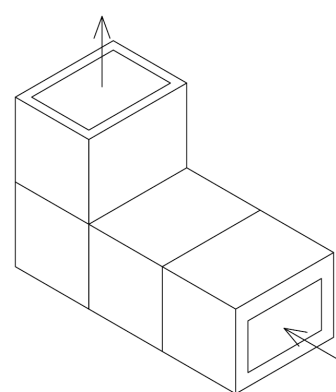
I-BUILD SHAPE



U-BUILD SHAPE



INVERTED T BUILD SHAPE



L-BUILD SHAPE

1.0 GENERAL

1.1 SECTION INCLUDES

1.1.1 Electric furnaces and accessories complete with controls.

1.2 RELATED SECTIONS

1.2.1 Section 22 05 00 - Common Work Results for Plumbing.

1.2.2 Section 26 05 00 - Common Work Results for Electrical.

1.3 REFERENCES

1.3.1 ASTM International (ASTM):

1.3.1.1 ASTM C1071 - Standard Specification for Fibrous Glass Duct Lining Insulation (Thermal and Sound Absorbing Material).

1.3.2 American Society of Heating Refrigeration and Air Conditioning (ASHRAE):

1.3.2.1 ASHRAE 62.1 - Ventilation for Acceptable Indoor Air Quality.

1.3.2.2 ASHRAE/IES 90.1 - Energy Standard for Buildings Except Low-Rise Residential Buildings.

1.3.3 Institute of Education Sciences (IEC).

1.3.4 National Fire Protection Association (NFPA):

1.3.4.1 NFPA 90A - Standard for the Installation of Air-Conditioning and Ventilating Systems.

1.3.4.2 NFPA 90B - Standard for the Installation of Warm Air Heating and Air-Conditioning Systems.

1.3.5 National Electrical Manufacturers Association (NEMA):

1.3.5.1 NEMA MG 1 - Motors and Generators.

1.3.6 North American Insulation Manufacturers Association (NAIMA).

1.3.6.1 NAIMA - Fibrous Glass Duct Liner Standard.

1.3.7 Underwriters Laboratories (UL):

1.3.7.1 UL 1995 - Heating and Cooling Equipment.

1.4 SUBMITTALS

1.4.1 Submit under provisions of Section 01 30 00 - Administrative Requirements.

1.4.2 Product Data:

1.4.2.1 Manufacturer's data sheets on each product to be used.

1.4.2.2 Preparation instructions and recommendations.

1.4.2.3 Storage and handling requirements and

recommendations.

1.4.2.4 Typical installation methods.

1.4.3 Verification Samples: Two representative units of each type, size, pattern and color.

1.4.4 Shop Drawings: Include details of materials, construction and finish. Include relationship with adjacent construction.

1.5 QUALITY ASSURANCE

1.5.1 Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with a minimum five years documented experience.

1.5.2 Installer Qualifications: Company specializing in performing Work of this section with minimum two years documented experience with projects of similar scope and complexity.

1.5.3 Source Limitations: Provide each type of product from a single manufacturing source to ensure uniformity.

1.5.4 Mock-Up: Construct a mock-up with actual materials in sufficient time for Architect's review and to not delay construction progress. Locate mock-up as acceptable to Architect and provide temporary foundations and support.

1.5.4.1 Intent of mock-up is to demonstrate quality of workmanship and visual appearance.

1.5.4.2 If mock-up is not acceptable, rebuild mock-up until satisfactory results are achieved.

1.5.4.3 Retain mock-up during construction as a standard for comparison with completed work.

1.5.4.4 Do not alter or remove mock-up until work is completed or removal is authorized.

1.6 PRE-INSTALLATION CONFERENCE

1.6.1 Convene a conference approximately two weeks before scheduled commencement of the Work. Attendees shall include Architect, Contractor and trades involved. Agenda shall include schedule, responsibilities, critical path items and approvals.

1.7 DELIVERY, STORAGE, AND HANDLING

1.7.1 Store and handle in strict compliance with manufacturer's written instructions and recommendations.

1.7.2 Protect from damage due to weather, excessive temperature, and construction operations

1.8 PROJECT CONDITIONS

1.8.1 Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's recommended limits.

2 PRODUCTS

2.1 MANUFACTURERS

2.1.1 Substitutions: Not permitted.

2.1.2 Requests for substitutions will be considered in accordance with provisions of Section 01 60 00 - Product Requirements.

2.2 ELECTRIC FURNACES

2.2.1 Design Characteristics:

2.2.1.1 Configuration of Airflow: Upflow.

2.2.1.2 Configuration of Airflow: Counterflow.

2.2.1.3 Configuration of Airflow: Vertical and horizontal.

2.2.1.4 Supply and Return Ducting (L x W): 16 x 22 inch (406 x 559 mm).

2.2.1.5 Supply and Return Ducting (L x W): 18 x 24 inch (457 x 610 mm).

2.2.1.6 Maximum Coil Dimensions (L x W): 22 x 26 inch (559 x 660 mm).

2.2.1.6.1 Maximum Coil Height (in/mm): _____.

2.2.2 ELECTRIC HEATING: NUMBER OF HEATING CHAMBERS: ONE.

2.2.2.1 Capacity: 9.5k to 90K BTUs (2784 to 2273 Watts).

2.2.2.2 Volts: 208-240/480.

2.2.2.3 Phase: 1 or 3 phase.

2.2.2.4 Hertz: 60.

2.2.2.5 Full-Load Amps: 15 or 42.

2.2.2.6 Furnace Electrical Connection:

2.2.2.6.1 Full-Load Amps: 15 or 42.

2.2.2.6.2 Maximum Overcurrent Protection (Amps): 30, or 50.

2.2.2.6.3 Minimum Circuit Ampacity: NEC and local codes.

2.2.2.6.4 Unit Dimensions (L x W x H): 18 x 24 x 36 inch (457 x 610 x 914 mm).

2.2.2.6.5 Blower (L x W x H): 18 x 24 x 18 inch (457 x 610 x 457 mm).

2.2.2.6.6 Heating Chamber (L x W x H): 18 x 24 x 18 inch (457 x 610 x 457 mm).

2.2.2.6.7 Assembled Weight: 110 lbs (50 kg) blower and heating chamber.

2.2.2.6.8 Build Shape: I.

2.2.3 ELECTRIC HEATING: NUMBER OF CHAMBERS: TWO.

2.2.3.1 Capacity (BTU): 9.5k to 90K BTUs (2784 to 22273 Watts).

2.2.3.2 Volts: 208-240/480.

2.2.3.3 Phase: 1 or 3 phase.

2.2.3.4 Hertz: 60.

2.2.3.5 Full-Load Amperes: 42 Amps.

2.2.3.6 Furnace Electrical Connection:

2.2.3.6.1 Full-Load Amps: 43.

2.2.3.6.2 Maximum Overcurrent Protection (Amps): 50.

2.2.3.6.3 Minimum Circuit Ampacity: NEC and local codes.

2.2.3.6.4 Unit Dimensions (L x W x H): 18 x 24 x 54 inch (457 x 610 x 1372 mm).

2.2.3.6.5 Blower (L x W x H): 18 x 24 x 18 inch (457 x 610 x 457 mm).

2.2.3.6.6 Heating Chamber (L x W x H): 18 x 24 x 18 inch (457 x 610 x 457 mm).

2.2.3.6.7 Assembled Weight: 180 lbs (82 kg) blower and heating chambers.

2.2.3.6.8 Build Shape: L.

2.2.3.6.9 Build Shape: U.

2.2.3.6.10 Build Shape: Inverted T.

2.2.4 ELECTRIC HEATING: NUMBER OF CHAMBERS: THREE.

2.2.4.1 Capacity (BTU): 9.5k to 135K BTUs (2784 to 33410 Watts).

2.2.4.2 Volts: 208-240/480.

2.2.4.3 Phase: 1 or 3 phase.

2.2.4.4 Hertz: 60.

2.2.4.5 Full-Load Amps: 56.

2.2.4.6 Furnace Electrical Connection:

2.2.4.6.1 Full-Load Amps: 57.

2.2.4.6.2 Maximum Overcurrent Protection (Amps): 65.

2.2.4.6.3 Minimum Circuit Ampacity: NEC and local codes.

2.2.4.6.4 Unit Dimensions (L x W x H): 18 x 24 x 72 inch (457 x 610 x 1829 mm).

2.2.4.6.5 Blower (L x W x H): 18 x 24 x 18 inch (457 x 610 x 457 mm).

2.2.4.6.6 Heating Chamber (L x W x H):

18 x 24 x 18 inch (457 x 610 x 457 mm).

2.2.4.6.7 Assembled Weight: 250 lbs (113 kg) blower and heating chambers.

2.2.4.6.8 Build Shape: L.

2.2.4.6.9 Build Shape: U.

2.2.4.6.10 Build Shape: Inverted T.

2.2.5 ELECTRIC HEATING: NUMBER OF CHAMBERS: FOUR.

2.2.5.1 Capacity (BTU): 9.5k to 180K (2784 to 44547 Watts).

2.2.5.2 Volts: 208-240/480.

2.2.5.3 Phase: 1 or 3 phase.

2.2.5.4 Hertz: 60.

2.2.5.5 Full-Load Amps: 70.

2.2.5.6 Furnace Electrical Connection:

2.2.5.6.1 Full-Load Amps: 71.

2.2.5.6.2 Maximum Overcurrent Protection (Amps): 80.

2.2.5.6.3 Minimum Circuit Ampacity: N.E.C. and local codes.

2.2.5.7 Unit Dimensions (L x W x H): 18 x 24 x 90 inch (457 x 610 x 2286 mm).

2.2.5.7.1 Blower (L x W x H): 18 x 24 x 18 inch (457 x 610 x 457 mm).

2.2.5.7.2 Heating Chamber (L x W x H): 18 x 24 x 18 inch (457 x 610 x 457 mm).

2.2.5.7.3 Assembled Weight: 320 lbs (145 kg) blower and heating chambers.

2.2.5.7.4 Unit Dimensions (L x W x H): 18 x 24 x 108 inch (457 x 610 x 2743 mm).

2.2.5.7.5 Blower (L x W x H): 18 x 24 x 18 inch (457 x 610 x 457 mm).

2.2.5.7.6 Heating Chamber (L x W x H): 18 x 24 x 18 inch (457 x 610 x 457 mm).

2.2.5.7.7 Assembled Weight: 360 lbs (163 kg) blower and heating chambers.

2.2.5.7.8 Build Shape: L.

2.2.5.7.9 Build Shape: U.

2.2.5.7.10 Build Shape: Inverted T.

2.2.6 ELECTRIC HEATING: NUMBER OF CHAMBERS: _____.

2.2.6.1 Capacity: 9.5k to _____ BTUs (2784 to _____ Watts).

2.2.6.2 Volts: 208-240/480.

2.2.6.3 Phase: 1 or 3 phase.

2.2.6.4 Hertz: 60.

2.2.6.5 Full-Load Amps: _____.

2.2.6.6 Furnace Electrical Connection:

2.2.6.6.1 Full-Load Amps: _____.

2.2.6.6.2 Maximum Overcurrent Protection (Amps): _____.

2.2.6.6.3 Minimum Circuit Ampacity: N.E.C. and local codes.

2.2.6.7 Unit Dimensions (L x W x H): 18 x 24 x _____ inch (457 x 610 x _____ mm).

2.2.6.7.1 Blower (L x W x H): 18 x 24 x 18 inch (457 x 610 x 457 mm).

2.2.6.7.2 Heating Chamber (L x W x H): 18 x 24 x 18 inch (457 x 610 x 457 mm).

2.2.6.7.3 Assembled Weight (lbs/kg): _____ blower and heating chambers.

2.2.6.7.4 Build Shape: L.

2.2.6.7.5 Build Shape: U.

2.2.6.7.6 Build Shape: Inverted T.

2.2.7 FAN; MODULATING AIRFLOW: 300 TO 2000 CFM (0.142 TO 0.944 CU M PER SEC).

2.2.7.1 External Static Pressure: 0.08. inches wg (19.91 Pa).

2.2.7.2 Motor: Variable speed drive motor system.

2.2.7.2.1 Power: 0.50 Hp (0.37 kW).

2.2.7.2.2 Power: 0.75 Hp (0.56 kW).

2.2.7.2.3 Power: 1.00 Hp (0.75 kW).

2.2.7.2.4 Volts: 120/208-240.

2.2.7.2.5 Phase: 1.

2.2.7.2.6 Hertz: 60.

2.2.7.2.7 Full-Load Amperes: 0.78 to 4.3.

2.2.7.2.8 Minimum Circuit Ampacity: 5.

2.2.7.2.9 Maximum Overcurrent Protection (Amps): 5.

2.2.8 CENTRIFUGAL FAN:

2.2.8.1 Factory balanced.

2.2.8.2 Resilient mounted.

2.2.8.3 Direct drive.

2.2.8.4 Fan Motors: Comply with requirements in the Division 23 section for common motor requirements for HVAC equipment.

2.2.8.5 Fan Motors: Comply with NEMA MG 1.

2.2.8.5.1 Features: Single speed, premium efficiency, with internal thermal protection and permanent lubrication.

2.2.8.5.2 Features: Multi-tapped, multispeed with internal thermal protection and permanent lubrication.

2.2.8.5.3 Features: Electronically controlled motor (ECM) controlled by integrated furnace/blower control.

2.2.9 HEATING ELEMENT: CERAMIC THERMAL MASS HEATING EMITTER PANEL.

2.2.10 ENCLOSURE: FACTORY PAINTED SHEET STEEL WITH FIBERGLASS DUCT LINER COMPLYING WITH ASTM C 1071 AND NAIMA'S "FIBROUS GLASS DUCT LINER STANDARD."

2.2.10.1 Duct Liner Thickness: 1/2 inch (13 mm).

2.2.10.2 Duct Liner Thickness: 3/4 inch (19 mm).

2.2.10.3 Airstream Coated Surface:

2.2.10.3.1 Per NFPA 90A or NFPA 90B.

2.2.10.3.2 Per ASHRAE 62.1.

2.2.10.4 Color: Manufacturer standard.

2.2.11 CONTROLS:

2.2.11.1 Sequencer: Switch activating heating element and fan.

2.2.11.1.1 Controls fan speed.

2.2.11.2 Summer Fan Switch: Connected to permit independent on-off switch of unit fan.

2.2.11.3 Thermostats: Comply with ASHRAE/IES 90.1, "Controls."

2.2.11.3.1 Solid-State Microprocessor: Wall-mounted.

2.2.11.3.1.1 Automatic and manual switching from heating to cooling.

2.2.11.3.1.2 Preferential rate control.

2.2.11.3.1.3 Seven-day programmability. Four presets per day.

2.2.11.3.1.4 Battery backup for program settings.

2.2.11.3.2 Solid-State Microprocessor: Freestanding.

2.2.11.3.2.1 Automatic and manual switching from heating to cooling.

2.2.11.3.2.2 Preferential rate control.

2.2.11.3.2.3 Seven-day programmability. Four presets per day.

2.2.11.3.2.4 Battery backup for program settings.

2.2.11.3.3 Solid-State Microprocessor: Wireless.

2.2.11.3.3.1 Automatic and manual switching from heating to cooling.

2.2.11.3.3.2 Preferential rate control.

2.2.11.3.3.3 Seven-day programmability. Four presets per day.

2.2.11.3.3.4 Battery backup for program settings.

2.2.11.3.4 Single-Stage, Heating-Cooling: Adjustable, heating-cooling, wall-mounted unit with fan on-automatic selector.

2.2.11.3.5 Two-Stage, Heating-Cooling: Adjustable, heating-cooling, wall-mounted unit with fan on-automatic selector.

2.2.11.3.6 Single-Stage, Heating-Only: Wall-mounted unit with fan on-automatic selector.

2.2.11.3.7 Two-Stage, Heating-Only: Wall-mounted unit with fan on-automatic selector.

3.0 EXECUTION

3.1 EXAMINATION

3.1.1 Do not begin installation until substrates have been properly constructed and prepared.

3.1.2 If substrate preparation is the responsibility of another installer, notify Architect in writing of unsatisfactory preparation before proceeding.

3.2 PREPARATION

3.2.1 Clean surfaces thoroughly prior to installation.

3.2.2 Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.3 INSTALLATION

3.3.1 Install in accordance with manufacturer's instructions, approved submittals and in proper relationship with adjacent construction.

3.4 FIELD QUALITY CONTROL

3.4.1 Field Inspection: Coordinate field inspection in accordance with appropriate sections in Division 01.

3.4.1.1 Operational Test: Confirm proper operation, capability, and compliance with requirements. Test and adjust controls.

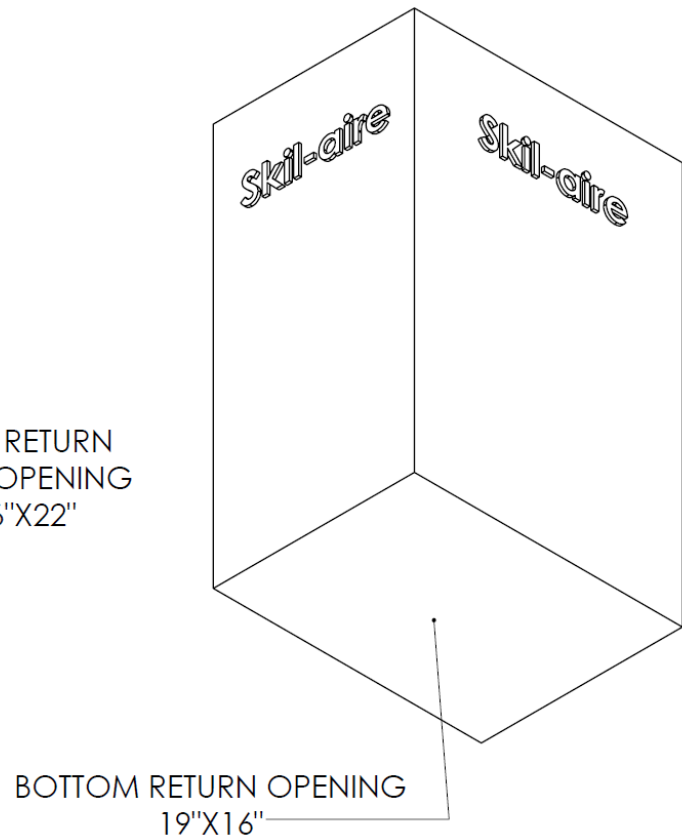
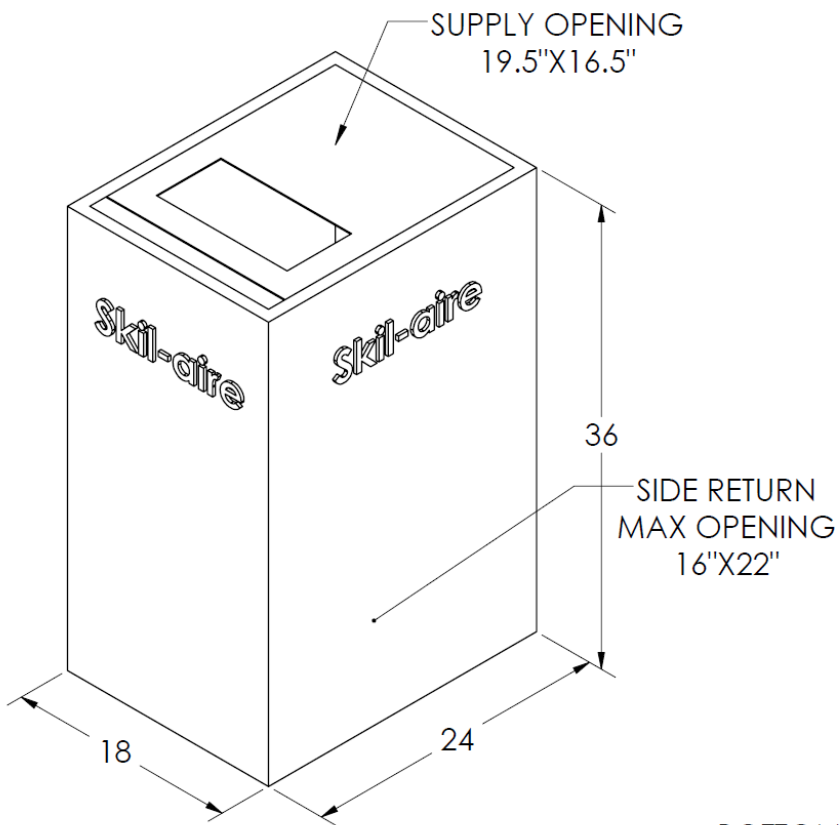
3.4.2 Manufacturer's Services: Coordinate manufacturer's services in accordance with appropriate sections in Division 01.

3.5 CLEANING AND PROTECTION

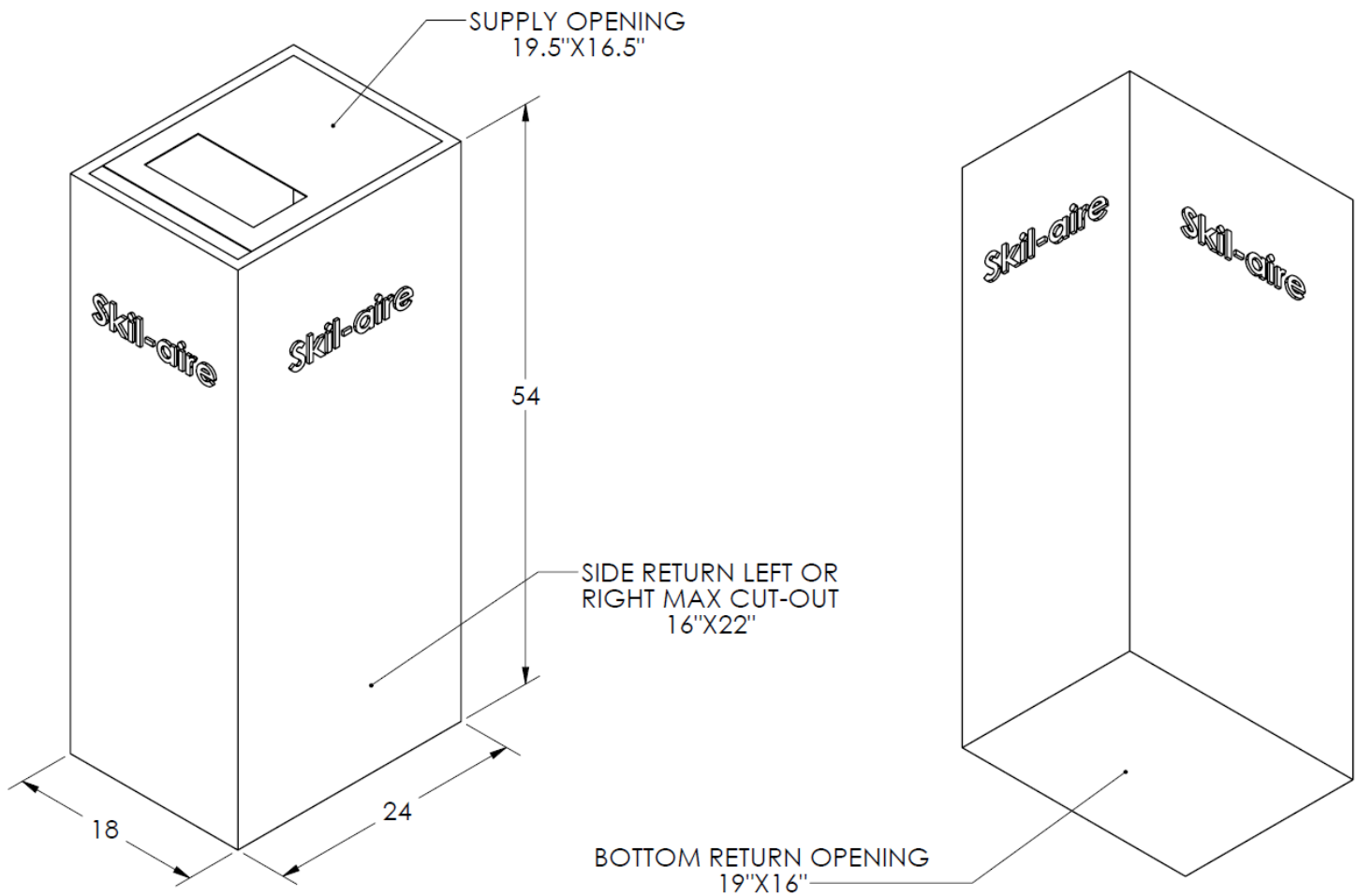
3.5.1 Clean products in accordance with the manufacturers recommendations.

3.5.2 Touch-up, repair or replace damaged products before Substantial Completion.

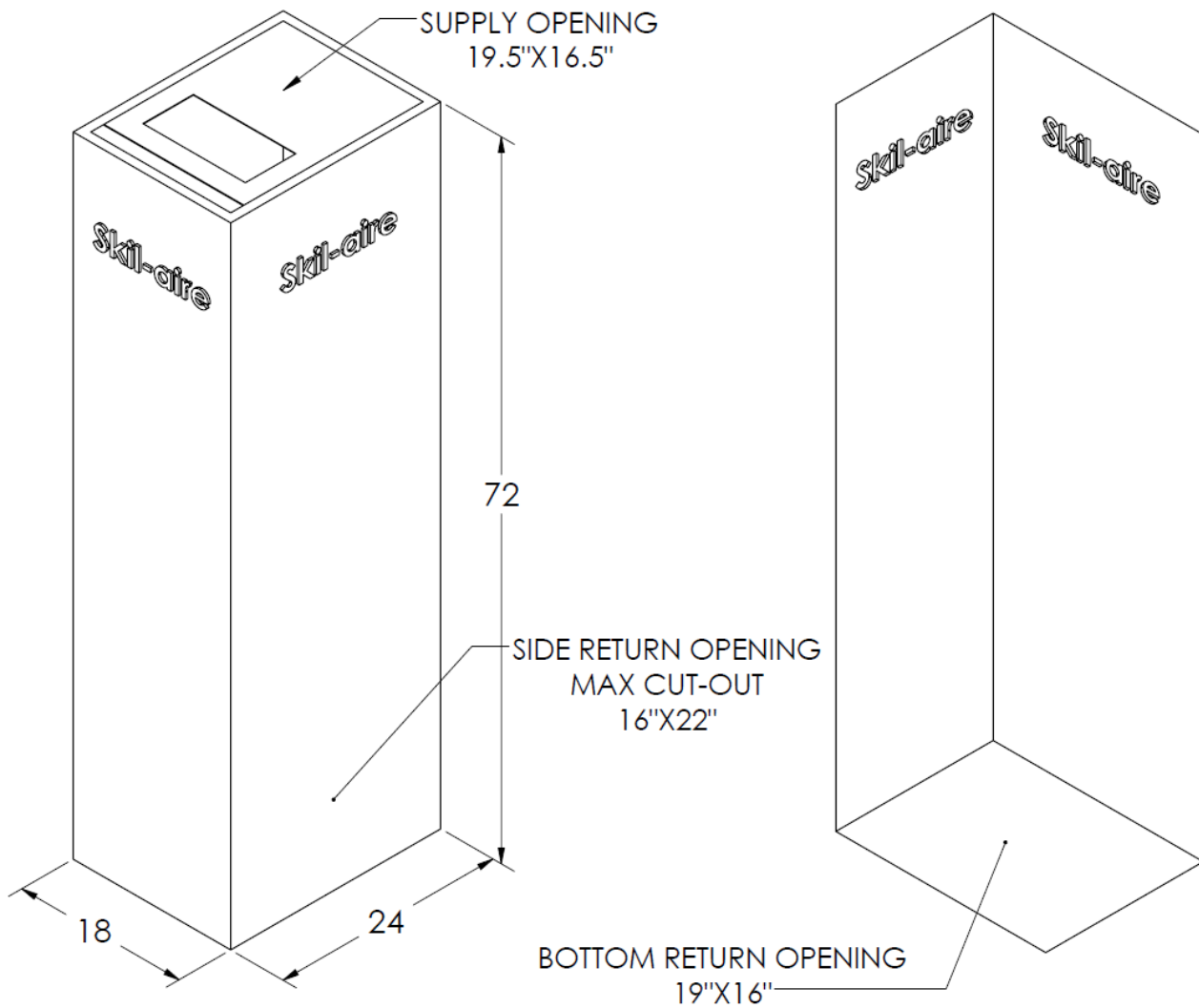
Nu NRG 1000 SERIES



Nu NRG 2000 SERIES



**Nu NRG 3000
I-SHAPE**



**Nu NRG 3000
U-SHAPE**

