4.2.3.3 Exposed Inlets. Exposed fan inlets shall be protected with metal screens to prevent the entry of paper, trash, and foreign materials.

4.2.4 Air-Cooling and Heating Equipment.

4.2.4.1 Installation.

4.2.4.1.1 Heating and cooling equipment shall be installed in accordance with the applicable NFPA standards and the manufacturer's instructions.

4.2.4.1.2 The equipment shall be approved for the specific installation. *(See 4.3.3.1.)*

4.2.4.2 Materials. Materials used in the manufacturing of fan coil units, self-contained air-conditioning units, furnaces, heat pumps, humidifiers, and all similar equipment shall meet the requirements of 4.3.3.1 and 4.3.3.2 unless otherwise specified in 4.2.4.2.1 or 4.2.4.2.2.

4.2.4.2.1 The requirements of 4.3.3.1 and 4.3.3.2 shall not apply to equipment tested and listed in accordance with ANSI/UL 1995, *Standard for Safety Heating and Cooling Equipment*, or *ANSI/UL 60335-2-40, Standard for Safety of Household and Similar Electrical Appliances, Part 2-40: Particular Requirements for Electrical Heat Pumps, Air-Conditioners and Dehumidifiers*.

4.2.4.2.2 Unlisted solar energy air distribution system components shall be accompanied by supportive information demonstrating that the components have flame spread and smoke developed indexes that are not in excess of those of the air duct system permitted by this standard.

4.2.4.3 Mechanical Cooling.

4.2.4.3.1 Mechanical refrigeration used with air duct systems shall be installed in accordance with recognized safety practices.

4.2.4.3.2 Installations conforming to ASHRAE 15 (packaged with ASHRAE 34), *Safety Standard for Refrigeration Systems and Designation and Classification of Refrigerants*, shall be considered to be in compliance with the requirement in 4.2.4.3.1.

4.2.4.4 Furnaces.

Δ **4.2.4.4.1** Oil-burning heating furnaces combined with cooling units in the same air duct system shall be installed in accordance with NFPA 31.

Δ **4.2.4.4.2** Gas-burning heating furnaces combined with cooling units in the same air duct system shall be installed in accordance with NFPA 54.

4.2.4.5 Duct Heaters.

4.2.4.5.1 Where electrical resistance or fuel-burning heaters are installed in air ducts, the air duct coverings and their installation shall comply with the provisions of 4.3.5.3.

Δ **4.2.4.5.2** The installation of electrical duct heaters shall comply with the provisions of *NFPA 70*, Article 424, Part VI, "Duct Heaters."

4.2.4.6 Evaporative Coolers. Combustible evaporation media shall not be used unless they meet the requirements of 4.2.2.2.

4.2.4.7 Heat Recovery Equipment. Equipment not covered by

4.3* Air Distribution.

4.3.1 Air Ducts.

4.3.1.1 Air ducts shall be constructed of iron, steel, aluminum, copper, concrete, masonry, or clay tile, except as otherwise permitted in 4.3.1.2 or 4.3.1.3.

4.3.1.2 Class 0 or Class 1 rigid or flexible air ducts tested in accordance with ANSI/UL 181, *Standard for Safety Factory-Made Air Ducts and Air Connectors*, and installed in conformance with the conditions of listing shall be permitted to be used for ducts where air temperature in the ducts does not exceed 121°C (250°F) or where used as vertical ducts serving not more than two adjacent stories in height.

4.3.1.3 Gypsum Board Air Ducts.

4.3.1.3.1 Gypsum board having a flame spread index not exceeding 25 without evidence of continued progressive combustion and a smoke developed index not exceeding 50 when tested in accordance with ASTM E84, *Standard Test Method for Surface Burning Characteristics of Building Materials*, or ANSI/UL 723, *Standard for Test for Surface Burning Characteristics of Building Materials*, shall be permitted to be used for negative pressure exhaust and return ducts where the temperature of the conveyed air does not exceed 52°C (125°F) in normal service.

4.3.1.3.2 The air temperature limits of 4.3.1.3.1 shall not apply where gypsum board material is used for emergency smoke exhaust air ducts.

4.3.1.4 All air duct materials shall be suitable for continuous exposure to the temperature and humidity conditions of the environmental air in the air duct.

4.3.1.5 The materials, thickness, construction, and installation of ducts shall provide structural strength and durability in conformance with recognized good practice.

4.3.1.5.1 Air ducts shall be considered to be in compliance with 4.3.1.5 where constructed and installed in accordance with the *ASHRAE Handbook — HVAC Systems and Equipment* and with one of the following as applicable:

(1) NAIMA *Fibrous Glass Duct Construction Standards*
(2) SMACNA *Fibrous Glass Duct Construction Standards*
(3) SMACNA *HVAC Duct Construction Standards — Metal and Flexible*
(4) ANSI/SMACNA *HVAC Air Duct Leakage Test Manual*

4.3.1.6 Where no standard exists for the construction of air ducts, the ducts shall be constructed to withstand both the maximum positive and the maximum negative pressures of the system at fan shutoff.

4.3.1.7 A duct enclosure used for the multiple distribution or gathering of ducts or connectors shall be constructed of materials and methods specified in 4.3.1.

4.3.1.7.1 Electrical wires and cables and optical fiber cables within a duct enclosure shall comply with 4.3.4.

4.3.1.8 Air Dispersion Systems. Air dispersion systems shall meet the following criteria:

(1) They shall only be installed in entirely exposed locations.