



Designation: F3215 – 22

Standard Specification for Food Waste Dehydrators¹

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1. Scope

1.1 This specification covers dehydrators intended for removing liquid by evaporation from processed or unprocessed food scraps and limited amounts of cardboard, paper, and biodegradable food service ware.

1.2 The values as stated in inch-pound units are to be regarded as the standard. The values stated in parentheses are mathematical conversions to SI units that are provided for information only and are not considered standard.

1.3 The following safety hazards caveat pertains only to the test method portion, Section 13, of this specification: *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety, health, and environmental practices and determine the applicability of regulatory limitations prior to use.*

1.4 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

2. Referenced Documents

2.1 ASTM Standards:²

- A6/A6M Specification for General Requirements for Rolled Structural Steel Bars, Plates, Shapes, and Sheet Piling
- A29/A29M Specification for General Requirements for Steel Bars, Carbon and Alloy, Hot-Wrought
- A53/A53M Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless
- A126 Specification for Gray Iron Castings for Valves, Flanges, and Pipe Fittings

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² For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

- A240/A240M Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications
- A269 Specification for Seamless and Welded Austenitic Stainless Steel Tubing for General Service
- A276 Specification for Stainless Steel Bars and Shapes
- A436 Specification for Austenitic Gray Iron Castings
- A505 Specification for Steel, Sheet and Strip, Alloy, Hot-Rolled and Cold-Rolled, General Requirements for
- A513 Specification for Electric-Resistance-Welded Carbon and Alloy Steel Mechanical Tubing
- A519 Specification for Seamless Carbon and Alloy Steel Mechanical Tubing
- A532/A532M Specification for Abrasion-Resistant Cast Irons
- A554 Specification for Welded Stainless Steel Mechanical Tubing
- A582/A582M Specification for Free-Machining Stainless Steel Bars
- A681 Specification for Tool Steels Alloy
- B43 Specification for Seamless Red Brass Pipe, Standard Sizes
- B75 Specification for Seamless Copper Tube (Metric)
- B0075_B0075M
- D2000 Classification System for Rubber Products in Automotive Applications
- D2287 Classification System and Basis for Specification for Nonrigid Vinyl Chloride Polymer and Copolymer Molding and Extrusion Compounds
- D3915 Specification for Rigid Poly(Vinyl Chloride) (PVC) and Chlorinated Poly(Vinyl Chloride) (CPVC) Compounds for Plastic Pipe and Fittings Used in Pressure Applications (Withdrawn 2015)³
- D3951 Practice for Commercial Packaging
- F104 Classification System for Nonmetallic Gasket Materials
- F437 Specification for Threaded Chlorinated Poly(Vinyl Chloride) (CPVC) Plastic Pipe Fittings, Schedule 80
- F439 Specification for Chlorinated Poly (Vinyl Chloride) (CPVC) Plastic Pipe Fittings, Schedule 80

³ The last approved version of this historical standard is referenced on www.astm.org.

F441/F441M Specification for Chlorinated Poly(Vinyl Chloride) (CPVC) Plastic Pipe, Schedules 40 and 80

F760 Specification for Food Service Equipment Manuals

2.2 *NFPA Standard*.⁴

NFPA 70 National Electrical Code

2.3 *UL Standard*.⁵

UL 508 Industrial Control Equipment

3. Terminology

3.1 Definitions:

3.1.1 *dehydrator, n*—a device intended for the removal of liquid by evaporation from processed or unprocessed food scraps and limited amounts of cardboard, paper, and biodegradable food service wear.

3.1.1.1 *Discussion*—Waste material is loaded into a mechanically agitated tank which is heated, via immersion heaters in an oil bath, to evaporate any liquid contained in the waste product. The evaporated liquid is conveyed by a closed-loop blower system through a condenser. The condensate is then drained to a sanitary sewer system and the dry air is reheated and pumped back into the dehydrator tank to accept more evaporated liquid. Dehydrators are not intended for processing glass, china, metal, wood, clam, or oyster shells. Dehydrators may consist of the following principal parts: tank, motor, agitator paddles, condenser, heaters, blower, condensate pump, discharge door, input door, and casters.

4. Classification

4.1 *General*—Dehydrators shall be of the following type, size, and options as specified.

4.2 Type, Size, and Options:

4.2.1 *Type A*—Capable of processing up to 140 lb (63.6 kg) per day.

4.2.2 *Type B*—Capable of processing 141 to 240 lb (64.1 to 109.1 kg) per day.

4.2.3 *Type C*—Capable of processing 250 lb (113.6 kg) per day.

4.2.4 *Type D*—Capable of processing 650 lb (295.4 kg) per day.

4.2.5 *Type E*—Capable of processing 900 to 1100 lb (40.9 to 500 kg) per day.

4.2.6 *Type F*—Capable of processing 2200 lb (1000 kg) per day.

4.2.7 *Type G*—Capable of processing 3300 lb (1500 kg) per day.

4.3 All equipment of the same model designation and options on the same purchase order shall have component interchangeability for serviceability.

5. Ordering Information

5.1 Purchasers should select the preferred options permitted in this specification and include the following information in procurement documents:

⁴ Available from National Fire Protection Association (NFPA), 1 Batterymarch Park, Quincy, MA 02169-7471, <http://www.nfpa.org>.

⁵ Available from Underwriters Laboratories (UL LLC), UL Headquarters, 333 Pfingsten Road, Northbrook, IL, 60062, <http://www.ul.com>.

5.1.1 Title, number, and date of publication for this specification.

5.1.2 Classification of size and type.

5.1.3 Electrical power supply voltage range (see 9.1).

5.1.4 Spare and maintenance parts required.

6. Materials

6.1 Unless otherwise specified, dehydrators shall be fabricated of materials as specified below. Materials shall be free from defects, which would adversely affect the performance or maintainability of individual components or the overall assembly. The unit shall be manufactured for cleanability.

6.1.1 *Corrosion-Resistant Steel*—Shall conform to the requirements of any 200, 300 or 400 series steel specified in Specification **A240/A240M**, Specification **A276**, Specification **A554**, and Specification **A582/A582M**.

6.1.2 *Corrosion-Resisting Material*—Corrosion-resisting material is other than corrosion resistant steel that is equivalent in the dehydrator application.

6.1.3 *Abrasion-Resistant Cast Iron*—Shall conform to the requirements specified in Specification **A532/A532M**.

6.1.4 *Austenitic Cast Iron*—Shall conform to the requirements specified in Specifications **A436** and **A276**.

6.1.5 *Copper Tube*—Shall conform to the requirements specified in Specification **B75**.

6.1.6 *Brass Pipe*—Shall conform to the requirements specified in Specification **B43**.

6.1.7 *Alloy Steel*—Shall conform to the requirements specified in Specifications **A6/A6M**, **A29/A29M**, **A505**, **A513**, **A519**, and **A681**.

6.1.8 *Black and Galvanized Pipe*—Shall conform to the requirements specified in Specification **A53/A53M**.

6.1.9 *Gaskets and Seals*—Shall conform to the requirements specified in Specification **D2287**, and Classifications **D2000** and **F104**.

6.1.10 *Stainless Steel Pipe*—Shall conform to the requirements specified in Specification **A269**.

6.1.11 *Plastic Piping and Fittings*—Shall conform to the requirements specified in Specifications **D3915**, **F437**, **F439**, and **F441/F441M**.

6.1.12 *Austenitic Gray Iron Pipe Fittings*—Shall conform to the requirements specified in Specifications **A126**.

7. Design and Construction

7.1 The dehydrator shall be complete and ready for condensate line routing and installation. The dehydrator requires no water connections and is complete with a power cable. The controls for the dehydrator shall comply with the requirements of UL 508, and Specification **A126**.

7.2 *Blower*—Blower shall be of corrosion-resistant materials. Solenoid or motorized valves shall be fully automatic and suitable for 450°F inlet air temp and 100°F ambient temp.

7.3 *Tank*—Tank shall be of corrosion-resistant steel with minimum sheet metal thickness of 0.070 in. (1.78 mm). Any tank frame structure shall be of corrosion-resistant steel with minimum metal thickness of 0.120 in. (3.0 mm).

7.4 *Mixing Shaft*—Each dehydrator shall be supplied with a suitable mixing shaft. Shaft shall be of corrosion-resistant material.

7.5 *Mixing Paddles*—Each dehydrator shall be supplied with a corrosion-resistant steel mixing paddles bolted onto the mixing shaft.

7.6 *Condenser*—The condenser shall be of corrosion-resistant steel with fin tubes of stainless steel.

7.7 *Mixing Shaft Seal*—The seals shall prevent soil and liquid leakage out of the dehydrator tank.

7.8 *Air Heaters*—The air heater is to preheat the air entering the dehydrator tank to 320°F to accept the evaporated liquid.

7.9 *Immersion Heaters*—The immersion heater shall heat an oil bath that conveys heat into the dehydrator tank to 300°F to evaporate any liquid contained in the waste.

7.10 *Drive Motor*—Thermal overload protection shall be provided either on the motor or in the control circuitry. Overload protection shall require manual reset to restart the motor.

7.11 *Casters*—The dehydrator shall be supported by at least four swivel casters of adequate capacity to support the equipment plus a full load of waste product.

7.12 *Plating, Coating, and Painting*—Dehydrators or their individual components, if not made of corrosion-resistant steel or corrosion-resisting materials, shall be plated, coated, or painted for corrosion protection in accordance with the manufacturer's standard practice.

7.13 *Wiring, Controls, and Circuit Protective Devices*—All wiring, controls, and circuit protective devices shall be in accordance with, UL 508A, or NFPA 70. The main electrical enclosure shall be of NEMA 4X construction and shall be provided with a main fused or circuit breaker disconnect device.

8. Operation Requirements

8.1 The dehydrator tank mixing shaft motor shall not operate if the input door is not in the closed position. Dehydrator mixing shaft motor shall stop and require a manual restart if the input door is opened during operation.

8.2 The dehydrator shall enter a "cool down" stage upon completion of a batch prior to discharging. This period should be long enough to allow for the contents of the tank to sufficiently cool before discharge.

9. Electrical Requirements

9.1 The equipment and controls shall meet the requirements of UL 508A, and NFPA 70. The dehydrator shall operate on the power characteristics (current, voltage, phase, frequency) specified.

9.2 *Controls*—All control equipment shall be capable of operation in an ambient room temperature of 115 ± 9°F (46 ± 5°C).

9.3 *Wiring and Circuit Safety Devices*—The dehydrator shall be delivered with a power cable with the end user to

supply a NEMA rated plug of minimum necessary capacity according to the current and voltage specified.

10. Lubrication Requirements

10.1 Means for effective and adequate lubrication shall be provided when required. Lubricating points shall be readily accessible, and the dehydrator shall be lubricated with the proper amount of lubricant prior to delivery.

11. Finish Requirements

11.1 The dehydrator shall be treated and painted in accordance with the manufacturer's standard practice. All surfaces of the machine, other than corrosion-resistant materials, shall be protected against corrosion in the use environment and shall present a neat appearance.

12. Performance Requirements

12.1 Performance test methods will be developed at a future date.

12.2 Energy performance test methods will be developed at a future date.

13. Test Methods

13.1 *Significance*—The purpose of this test method is to demonstrate the ability of the unit to meet the capacity requirements and to ensure that there is no leakage during operation.

13.2 *Procedure*—The machine shall be tested at full load capacity in accordance with the manufacturer's operating instructions. The machine shall function as intended without interruption or malfunction.

13.2.1 During the test, the energy in kW-hours (mega joules) shall be recorded and reported for information only.

14. Certification

14.1 Certificate of conformance to the standards cited in this specification shall be provided to the purchaser if required in the purchase document.

15. Product Marking

15.1 *Machine Identification*—Identification shall be permanently and legibly marked directly on the dehydrator or on a corrosion-resistant material securely attached to the machine at the source of manufacture. Identification shall include the manufacturer's model, serial number and name, and trademark to be readily identifiable. In addition, information required by the third-party certification body shall be included on the data plate.

16. Machine Manuals

16.1 The following information shall be supplied in the manuals:

- 16.1.1 Installation instructions.
- 16.1.2 Operating guide.
- 16.1.3 Maintenance procedures.
- 16.1.4 Service parts list.
- 16.1.5 Electrical schematics.