

INCH-POUND

A-A-58050A
 08 November 2000
 SUPERSEDING
 A-A-58050
 20 October 1995

COMMERCIAL ITEM DESCRIPTION

FLUORESCENT PENETRANT INSPECTION UNITS INTEGRALLY ASSEMBLED SINGLE UNIT AND SEPARATE MODULAR STATION TYPES

The General Services Administration has authorized the use of this commercial item description as a replacement for MIL-F-38762 (USAF) for all federal agencies.

1. **SCOPE.** This commercial item description covers fluorescent penetrant inspection units using the post-emulsification penetrant method.
2. **CLASSIFICATION.** This commercial item description covers three different types and six sizes of Fluorescent Penetrant Inspection Units, hereafter referred to as "unit or units."

Note: The length dimension is left to right, while the width dimension is front to rear.

- 2.1 **Types.** The units shall conform to the following types:

Type I - Integrally assembled single unit (Applicable only to Size 1)

Type II - Separate modular stations (Applicable to Size 2 - 6)

- 2.2 **Sizes.** The units shall conform to the following sizes:

Size	Designation	Frame Sizes	Tank Sizes
1	PT-18	102" long x 34" wide x 36" tall	17" long x 29" wide x 14" deep
2	PT-24	24" long x 34" wide x 36" tall	22" long x 29" wide x 20" deep
3	PT-36	36" long x 34" wide x 36" tall	33" long x 29" wide x 26" deep
4	PT-48S (Short)	48" long x 34" wide x 36" tall	43" long x 29" wide x 26" deep
5	PT-48	48" long x 34" wide x 36" tall	43" long x 29" wide x 26" deep
6	PT-72	72" long x 50" wide x 36" tall	67" long x 44" wide x 26" deep

Beneficial comments, recommendations, additions, deletions, clarifications, etc. and any data that may improve this document should be sent to: Oklahoma City Air Logistics Center, 3001 Staff Drive, Tinker AFB, OK 73145-5990.

3. SALIENT CHARACTERISTICS.

3.1 First Article Testing. When specified a sample shall be subjected to first article inspection (see 5.2 and 7.5g.)

3.2 Design and Construction. The units shall be designed and constructed to facilitate efficient inspection of parts and assemblies capable of being penetrant inspected. They shall be constructed to hold aircraft parts and inspection materials without deformation of the components. The units shall be designed and constructed so that during the normal inspection process there will be no leakage of penetrant, remover, developer, and/or water within the area bounded by the outermost extremities of the inspection unit; nor shall they leak from station to station, except for drain stations back to their respective reservoirs.

3.3 Tolerances. All tolerances for dimensional specifications for tank and frame sizes listed in this commercial item description are ± 0.5 inch unless otherwise noted.

3.4 Stations. These inspection units, except Type I, shall consist of the following stations: penetrant tank, penetrant drain, pre-rinse, remover, remover-rinse, developer, developer drain, dryer, rest, and inspection stations. All stations shall be a modular design to enable customization of installation with end-user procured accessories, such as 90 degree roller stations. Type I shall consist of a penetrant tank, remover tank, rinse tank, developer tank, dryer, and inspection station, integrally assembled in one unit.

3.4.1 Penetrant, Remover, and Developer Stations. These stations shall consist of a frame, tank, cover, and for Type II a slatted grille made from open (i.e. I, C, or hat section) aluminum extrusions. A drain connection and cutoff valve shall be provided at the bottom of the tanks using standard pipe sizes (0.5 inch for Size 1 increasing to 1.25 inch for Size 6)

3.4.1.1 Station Dimensions. The usable area inside the tank shall conform to the tank sizes listed in paragraph 2.2. The frame shall have overall outside dimensions not to exceed the frame dimensions listed in paragraph 2.2; height will exclude cover and cover handle. All tanks and covers shall be made of 16 gauge stainless steel. Type 304 stainless steel shall be used unless otherwise specified.

3.4.1.2 Type II Penetrant Station. The Type II station shall be equipped with an air-driven pump, with flow-on swivel nozzle & six (6) foot hose attached to the inside-top-right of the tank. The pump intake and return connections shall be on the bottom of the tank and include cut-off valves with plugs or caps to seal the connection in the event of pump failure. The slatted grill shall be made from 2 inch (nominal) extrusions, rest directly to the bottom of the tank, and have lateral openings or holes for movement of the penetrant to the pump intake. The air driven pump shall have adjustable flow control within convenient reach of the operator. In no case, shall the air driven pump or nozzle cause atomization of the penetrant.

3.4.13 Remover Station. The remover station shall consist of a frame, tank, and air agitation system. The agitation system shall include an air distribution manifold, manifold shutoff valve, air pressure regulator, and an air pressure gauge. All controls and gauges (i.e. manifold shutoff valve, air pressure regulator and pressure gauge) shall be readable from the front of the remover station. However, it is highly desirable to minimize protrusions from controls and gauges from the front of the stations. The agitation shall allow thorough agitation of the remover solution throughout the tank, and shall not cause the remover solution to foam.

3.4.2 Pre-rinse Station. The pre-rinse station shall consist of a frame tank, backsplash, slatted grille made from open aluminum extrusions, and a hand hose with swivel nozzle. The station shall be plumbed to provide both hot and cold water to the hand hose. Separate controls for water temperature, pressure regulation, and flow regulation shall be provided and shall be located on the front of the station. Gauges to measure water temperature and pressure shall be located on or at the front of the station. However, it is highly desirable to minimize protrusions from controls and gauges from the front of the stations. The hand hose connection shall be made within the tank, and the hose length shall be minimum of six (6) feet. A standard drain pipe connection and cutoff valve shall be provided at the bottom of the tanks.

3.4.2.1 Backsplash. The backsplashes shall be provided to prevent overspray from the rinse stations from reaching the rear of the unit. The backsplash shall be fabricated from corrosion resistant stainless steel.

3.4.3 Remover-Rinse Station. The remover-rinse station shall consist of frame, tank, backsplash, slatted grille made from open aluminum extrusions, one mercury-vapor inspection blacklight, two overhead fluorescent-tube blacklights for area illumination, full canopy to exclude visible light and a hand hose with swivel nozzle. The station shall be plumbed to provide both hot and cold water to the hand hose. Separate controls for water temperature, pressure regulation, and flow regulation shall be provided and shall be located on the front of the station. Gauges to measure water temperature and pressure shall be located on or at the front of the station. However, it is highly desirable to minimize protrusions from controls and gauges from the front of the stations. The hand hose connection shall be made within the tank, and the hose length shall be at least six (6) feet. The canopy frame shall be constructed such that a technician can hand carry small parts unobstructed from the remover station to the remover-rinse station, and from the remover-rinse station to the wet developer station; i.e. there shall be no canopy support post(s) in front of the station. A standard drain pipe connection and cutoff valve shall be provided at the bottom of the tanks. The length of station shall be 48" for Sizes 2 - 5, and 72" for Size 6.

3.4.3.1 Canopy. The remover-rinse station requires a full canopy with side curtains, split to allow ingress and egress through the station. The curtain material shall be weather resistant, waterproof cloth meeting the intent of MIL-PRF-20696, Type II, Class 2. The canopy shall provide a split top to allow access from an overhead conveyor. The curtain material shall be attached to the canopy with snaps, or hook & pile fasteners, for easy removal and replacement. The canopy shall not allow more than 20 lux of light from the outside.

3.4.4 Penetrant and Developer Drain Stations. All drain stations shall consist of a frame, drain pan, and a full roller top grille. The drain stations shall be structurally supported from below. Each station will conform to the requirements of paragraph 4.3.6. Design shall be such to insure that the penetrant or developer is completely directed back into its tank. The drain pan shall prevent fluids from running off inspected materials and dripping on the floor. The total length and width of the roller top grille shall conform to the length and width of the station and conform to the height of adjacent stations. However, the roller top grill shall be made in sections of 24 inches or less to facilitate easy removal for cleaning of the drip pan. The length of the Type II Size 4 drain stations shall be 24 inches to reduce total system length.

3.4.5 Dryer Station. The dryer station shall incorporate a full roller grille to facilitate the movement of parts from the developer drain station to the rest station. The dryer cabinet shall be designed with a split roof to allow access from an overhead conveyor with both ends opened. (Not applicable to Type I units.) Insulation of the dryer to conserve energy is highly desirable.

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3.4.5.1 Split curtains shall be provided for each end. The curtain material shall be attached to the dryer ends with snaps, or hook & pile fasteners, for easy removal and replacement. A curtain shall be provided for the split roof when the overhead conveyer is not used. The curtain shall be attached to the dryer roof with sewn-in magnets. The curtain material shall be weather resistant, waterproof cloth meeting the intent of MIL-PRF-20696, Type II, Class 2. However, an insulating or reflective coating on the inside of the curtains to conserve energy is highly desirable.

3.4.5.2 Dryer Dimensions and heater capacity. The interior & exterior dimensions, curtain dimensions, and heater capacity shall be as specified in TABLE I.

Type - Size	Exterior Dimension	Interior Dimension	Curtain Dimension	Wattage (minimum)
I - 1	18" L x 34" W x 18" T	16" L x 30" W x 16" T	30" W x 16" T	1500 Watts
II - 2	24" L x 34" W x 24" T	22" L x 30" W x 22" T	30" W x 22" T	3000 Watts
II - 3	36" L x 34" W x 36" T	34" L x 30" W x 30" T	30" W x 30" T	5000 Watts
II - 4	48" L x 34" W x 36" T	46" L x 30" W x 30" T	30" W x 30" T	8000 Watts
II - 5	72" L x 34" W x 36" T	70" L x 30" W x 30" T	30" W x 30" T	8000 Watts
II - 6	96" L x 50" W x 36" T	94" L x 48" W x 36" T	48" W x 36" T	12,000 Watt

TABLE I

3.4.5.3 Thermostats. The thermometer-thermostat shall be scaled from 100°F to 200°F, in increments of 5°F. The thermostat shall control the dryer temperature to plus or minus 5°F of this setting. The thermostat will be protected against accidental adjustment.

3.4.5.4 Dryer Drip Pan. The dryer shall have a drip pan that can be easily removed for cleaning any fallen developer residue.

3.4.6. Rest station. The station shall be similar to the drain station, paragraph 3.4.4.

3.4.7 Inspection Station. Type I inspection station will have one mercury-vapor inspection light. The Type II inspection station shall be provided with a full roller grille table top, dust pan, exhaust fan, two mercury-vapor inspection blacklights, two overhead fluorescent-tube blacklights for area illumination, an overhead white light, and a canopy. The canopy shall allow access of an overhead conveyer, and not allow more than 20 lux of light from the outside. The curtain material shall be attached to the canopy with snaps or hook & pile fasteners for easy removal and replacement. The dimension of the inspection station shall be as specified in TABLE II.

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Type – Size	Exterior Dimension	Tabletop Dimension	Roller Grille Dimension
I – 1	18" L x 34" W x 18" min T	16" L x 30" W x 16" T	N/A
II - 2	48" L x 48" W x 76" min T	48" L x 30" W x 22" T	48" L x 23" W
II – 3	48" L x 48" W x 76" min T	48" L x 30" W x 30" T	48" L x 23" W
II – 4	72" L x 60" W x 76" min T	72" L x 36" W x 30" T	72" L x 31" W
II – 5	72" L x 60" W x 76" min T	72" L x 36" W x 30" T	72" L x 31" W
II – 6	96" L x 72" W x 76" min T	94" L x 48" W x 36" T	96" L x 42" W

TABLE II

3.4.7.1 Dust pan. The dust pan shall be located directly under the table top for the exclusion of light. It shall cover the entire area below the table top.

3.4.7.2 Roller top grille. The roller grille table top shall have a material stop that can be positioned at either end of the inspection station. The full roller grille table top working width and length shall be as above in 3.4.7.

3.5 Voltage. All wiring, insulation, and electrical components shall be in compliance with the National Electric Code, NFPA 70. The Type I dryer heater element(s) shall be capable of operating from both 120 and 240 VAC, 50 or 60 Hertz. The Type II Size 2, Type II Size 3, The Type II Size 4, and Type II Size 5, dryer heater element(s) shall be capable of operating from both 208 and 240 VAC, 50 or 60 Hertz. Type II Size 6 dryer heater element(s) shall be capable of operating from 208, 240 and 480 VAC, 50 and 60 Hertz. The heater elements shall be the only components to operate directly from line voltage above 120 VAC. The initial line operating voltage shall be 240 VAC unless otherwise specified by the procuring activity. The rest of the equipment shall operate from 110-120V, 50 or 60 Hertz, single phase AC source and shall be Ground Fault Circuit Interrupter (GFCI) protected. The unit shall require a single connection to each source (one 120V and one 208V, 240V, or 480V source).

3.6 Controls. Each black light, white light, exhaust fan, and dryer heater circuit shall operate independently of any other unit and shall have a separate control or switch. Each line control or heater or dryer control shall be equipped with an indicator light at a single location at/near the dryer. However, it is desirable to deactivate the entire unit with a single switch.

3.7 Nozzles. The nozzle at the penetrant tank shall be a swivel, flow-on type, that does not cause atomization of the penetrant. The nozzles at the pre-rinse and remover-rinse stations shall have a spring-operated, lever-type hand swivel valve. Nozzles in the pre-rinse and remover-rinse stations shall be of the fan-shaped coarse spray type. Nozzles that have adjustable spray patterns shall not be used. The delivery rate of the nozzles shall be not less than 3 gallons per minute, and not more than 6 gallons per minute at 40 PSI pressure.

3.8 Blacklights. The blacklights which are employed to fluoresce the inspection medium shall have an initial intensity of 2000 microwatts per square centimeter at 15 inches. The blacklight wavelength shall be in the range of 320 to 380 nanometers, with a peak intensity of 365 nm. The lights shall be supported by adjustable brackets and directed toward the part to be inspected. The lights shall be readily dismountable from the adjustable brackets without removing or loosening and fasteners for fixtures, and have an insulated handle for inspector use.

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3.9 Baskets. Six wire baskets, with handles, made of corrosion resistant stainless steel shall be provided with the unit. They shall have hooks on one side to suspend the basket from the inside-front-top of the tank. Unless otherwise specified, the baskets shall have dimension of 12 inches long x 8 inches wide x 6 inches deep and a maximum mesh opening of 3/4 inch square.

4. REGULATORY REQUIREMENTS. The contractor is encouraged to use recovered materials in accordance with Federal Acquisition Regulation (FAR) 23.403 to the maximum extent practical.

4.1 Metric Products. Products manufactured to metric dimensions will be considered on an equal basis with those manufactured using inch-pound units, providing they fall within specified tolerances using conversion tables contained in the latest revision of Federal Standard No. 376, and all other requirements of this Commercial Item Description are met. If a product is manufactured to metric dimension and those dimension exceed tolerances specified in the inch-pound units, a request should be made to the contracting officer and AFRL/MLS-OL to determine if the product is acceptable.

5. QUALITY ASSURANCE PROVISIONS.

5.1 Contractor Certification. The contractor shall certify and maintain substantiating evidence that the product offered meets the salient characteristics of this Commercial Item Description, and that the product conforms to the producer's own drawings, standards, and quality assurance practices. The government reserves the right to require a government witnessed, pre-award, sample verification test at the contractor's site to insure conformance prior to first delivery and thereafter as may be otherwise provided for under the provisions of the contract.

5.2 First Article Inspection. First article inspection shall be performed on one complete fluorescent penetrant unit when a first article sample is required (see 3.1 and 7.5g). This inspection shall include the requirements of paragraph 5.3, Test Methods.

5.2.1 Acceptance Tests. Acceptance tests are intended to verify that production units are similar to the applicable specifications. The following are the minimum inspection requirements for production acceptance: paragraph 5.3.1 and paragraph 5.3.2

5.3 Test Methods. The following test shall be conducted in an ambient temperature range of 68-95 degrees Fahrenheit, and in the order given.

5.3.1 Examination of Product. The inspection units selected for inspection shall be inspected during manufacture and upon completion to determine compliance with the requirements of the contract and this specification with respect to material, workmanship, and dimensions.

5.3.2 Tanks. All tanks, drain pans, associated lines, outlet valves, etc., shall be penetrant inspected with materials listed on SAE AMS 2644. Each tank and drain pan shall have one of the penetrants of Type I, Method D, Sensitivity Level 2 applied to the interior seams, bends, welds, and connections. The penetrant shall dwell for at least 30 minutes. The developer, Form A, C, or D shall be applied to the exterior of these seams, bends, welds, and connections. All exterior seams, bends, welds, and connections shall be inspected under blacklight for indication of penetrant leakage. This inspection shall be

accomplished under low light (ambient light < 20 lux) conditions with a blacklight conforming to the characteristics of paragraph 3.10. Any leakage shall be cause for rejection.

5.3.2.1 Drain pans. The drain pan outlet shall be plugged and the pan filled with water. The outlet will be unplugged and allowed to drain into its associated inspection tank. Incomplete drainage shall be cause for rejection.

5.3.3 Dryer Stations.

5.3.3.1 Temperature rise. The temperature shall be checked in five locations (four corners and center) within the dryer cabinet using an ASTM E1 type thermometer or equivalent.

5.3.3.1.1 Normal Conditions. The thermostat controlling the temperature within the dryer cabinet shall be set at 160°F. The interior of the dryer cabinet shall reach a temperature of 155-165°F from an ambient room temperature of between 65-75°F in a maximum of 30 minutes. The dryer temperature not rising a minimum of 80°F within 30 minutes shall be cause for rejection.

5.3.3.1.2. Extreme Conditions. After the dryer has returned to an ambient temperature between 65-75°F, the thermostat controlling the temperature within the dryer cabinet shall be set at 120°F above the ambient temperature. The interior of the dryer shall reach the set temperature within a maximum of 60 minutes. The dryer temperature not rising 120°F within 60 minutes shall be cause for rejection.

(Note: This test is used to ensure the dryer will bring parts from a minimum penetrant dwell temperature of 40F to a maximum dryer temperature of 160F within the extended dwell time.)

5.3.3.2 Thermostats. After the test for temperature rise has been completed, the thermostat shall be set at 160°F and the dryer cabinet shall reach and be stabilized at this temperature for 30 minutes. The thermometer specified in 5.3.3.1 shall then be used to check the temperature at the thermostat element, at each end with 2 inches of the curtains, and at the center of the upper shelf four inches from the near edge (a total of four readings). The thermometer shall remain at each location for ten minutes prior to reading the temperature. The average of the four readings shall be within 155°F to 165°F. An average temperature outside of the range 155°F to 165°F shall be cause for rejection.

5.3.3.3. Temperature recovery. The test for temperature recovery shall be conducted while the temperature of the dryer cabinet is still stabilized. The curtains of the cabinet shall be opened to maximum for one minute and then closed for eight minutes. The temperature shall be measured at the locations stated in 5.3.3.2. An average temperature outside the range 155°F to 165°F shall be cause for rejection.

5.3.4 Liquid Environment Test. With electrical power disconnected, a coarse water spray shall be directed to all electrical components including switches and wiring enclosure, located on the drain, penetrant, remover, rinse, developer, and dryer stations from all possible angles of attack for a minimum of 30 minutes. Afterward, all possible electrical components shall be opened to be inspected for accumulation of water. The government inspector shall designate the locations to be inspected for water accumulation. Any accumulation of water in an electrical enclosure is cause for rejection. Power shall be reapplied, and all electrical equipment shall be operated during this test. Failure of any equipment to operate satisfactorily, including switches and wiring, shall be cause for rejection.

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5.3.5 Delivery rate of liquid flow nozzles. The delivery rate of the liquid in the pre-rinse and remove-rinse stations shall be determined by measuring the amount of water passing through the nozzle for a period of one minute. The nozzles shall be opened to maximum. The delivery rate of the liquid in the rinse stations shall be determined by measuring the amount of water at 40 PSI passing through the spray nozzle in one minute. A coarse spray type with a flow rate of less than 3 gallons per minute, or greater than 6 gallons per minute, shall be cause for rejection.

5.3.6 Roller Top Grilles

5.3.6.1 Load Test. Each roller top grille shall be load tested with the grille assembly supported in its usual manner. Place a load of at least 300 pounds at one end of the grille uniformly distributed over four rollers (two axles). All rollers shall roll freely under this load traveling at a rate not to exceed six inches per second. Evidence of failure or damage to the grille assembly or rollers not rolling freely under load shall be cause for rejection.

5.3.6.2 Roll Test. The following roll test shall be performed after the load test and on each roller top grille. The grille shall be supported so that the top line of the rollers is at an angle not to exceed seven degrees with respect to the horizontal. A 50 pound load, uniformly distributed over four rollers (two axles) on the raised end of the grille, should move freely and smoothly to the lower end with an initial external force to start it. Failure of the load to move freely and smoothly to the lower end shall be cause for rejection.

5.3.7. Black light test. The test for light intensity shall be measured with an ultraviolet intensity meter and shall measure at least 2000 microwatts per square centimeter at a distance of 15 inches from the light with peak frequency at 365 nanometers. Initial intensities less than 2000 microwatts per square centimeter shall be cause for rejection.

6. PRESERVATION, PACKAGING, PACKING, LABELING, AND MARKING. Preservation, packaging, packing, labeling, and marking shall be as specified in the contract or order. Drain valves shall be left open.

7. NOTES.

7.1 This is a complete revision of CID A-A-58050. It incorporates information from cancelled Military Specification MIL-F-38762, dated 26 Apr 66.

7.2 Part or Identification Number (PIN). The following PIN is for government purposes and does not constitute a requirement for the contractor.

AA58050 – Type X Size X
CID No. Type and Size

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7.3 Part nomenclature is changed to reflect the frame size.

- a. Type I Size 1, designation PT-18, formerly MA-1
- b. Type II Size 2, designation PT-24
- c. Type II Size 3, designation PT-36
- d. Type II Size 4, designation PT-48S (Short)
- e. Type II Size 5, designation PT-48, formerly MA-2
- f. Type II Size 6, designation PT-72, formerly MA-3

7.4 Source of Documents:

SAE AMS 2644, *Inspection Material - Penetrant*, dated August 1996
Society of Automotive Engineers
400 Commonwealth Drive
Warrendale, PA 15096-0001

ASTM E1-98, *Standard Specification for ASTM Thermometers*
ASTM E1417, *Standard Practice for Liquid Penetrant Examination*
American Society for Testing and Materials
100 Barr Harbor Drive
West Conshohocken, PA 19428

NFPA 70, *National Electric Code*
National Fire Protection Association
1 Batterymarch Park
Quincy, MA 02269-9101

MIL-PRF-20696F, *Cloth, Waterproof, Weather Resistant*
Federal Standard No. 376, *Preferred Metric Units for General use by the Federal Government*
Standardization Documents Order Desk
700 Robbins Ave.
Bldg. 4D
Philadelphia, PA 19111-5094

7.5 Ordering Data.

- a. Title, number, and date of this description.
- b. Applicable CID based part number (see paragraph 7.2).
- c. Specify special materials or configuration (see paragraph 3.4.1.1 and 3.9).
- d. Specify special electrical power requirements. (see paragraph 3.5).
- e. Specify special packaging requirements (see paragraph 6).
- f. Contracting officer may request proof of certification of commercial item prior to first contract delivery.
- g. Requirements for first article testing. See paragraphs 3.1 and 5.2.

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7.6 Known sources of supply.

Magnaflux
Division of Illinois Tool Works
7301 W. Ainslie Avenue
Harwood Heights, IL 60656
POC: Keith Turner - 972-686-4275

Gould-Bass
1431 W. Second Street
Pomona, CA 91766
POC: Jim Borucki - 909-623-6793

MILITARY INTEREST:

CUSTODIANS:

Air Force - 99
Navy - AS
Army - GL
DLA - GS

CIVIL AGENCY COORDINATING ACTIVITY
GSA-FSS

PREPARING ACTIVITY:

Air Force - 71

AGENT:

Air Force - 99

PROJECT NUMBER: 6635-0196