

**MINIMUM OPERATIONAL AND PERFORMANCE SPECIFICATIONS FOR FDNY  
CONTINUOUS AIR RESOURCE TRANSPORT SUPPLY SYSTEM FOR RESPIRATORY  
PROTECTION AND PNEUMATIC TOOL SUPPLY (FDNY AIR C.A.R.T.S.)**

**SECTION A.  
OVERALL DESIGN CHARACTERISTICS**

- 1) The complete system shall be designed to be a lightweight, durable, mobile, and multi functional source of breathing quality air for both respiratory protection supply, and pneumatic tool supply.
- 2) System must be designed to securely hold two D O T approved standard Self Contained Breathing Apparatus cylinders of any size or pressure rating.
- 3) System shall be designed to utilize the two mounted supply cylinders in a primary single supply cylinder and secondary reserve / backup single supply cylinder configuration. The cylinder valves shall not be utilized to accomplish this primary / reserve system due to safety considerations.
- 4) System shall incorporate a manual style diverter valve to accomplish this primary / reserve system so that the operator can visually acknowledge the source of air supply.
- 5) System shall be designed to permit the shut down and pressure release of the expended supply cylinder to allow the exchanging of the depleted supply cylinder with a fully charged supply cylinder after the system has been transferred to the reserve system.
- 6) System shall be designed to allow the operator by his actions to utilize either cylinder as the primary or reserve cylinder, thereby permitting a continuous supply of air to the unit by exchanging depleted cylinders with fully charged cylinders. An automatic transfer system is not permissible, due to the dangers associated with simultaneously draining of the air supply.
- 7) System shall be designed to utilize the purchasers currently available inventory of air supply cylinders.
- 8) System shall be equipped with an automatically activated low air pressure warning alarm system that shall have both audible and visual systems for user safety.
- 9) Low air pressure warning alarm shall be non adjustable and factory preset to alarm at 500 PSI.
- 10) System shall incorporate a detachable wheeled frame assembly to facilitate a smaller profile for entry into small areas.
- 11) System shall incorporate an integral lifting system to facilitate the raising and lowering of the entire system, excluding the wheeled frame unit, when detached.
- 12) System shall utilize a color code system to distinguish between high pressure air manifold, low pressure respirator air supply manifold and low pressure air tool supply manifold.
- 13) Overall system shall not weigh more than 49 lbs. without cylinders.

## **MAJOR ASSEMBLIES**

- 1) System shall be designed and constructed utilizing the following major assemblies.
  - a.) Wheeled frame assembly.
  - b.) Main frame assembly.
  - c.) Pneumatics assembly.
  - d.) Electrical and electronics assembly.

## **SECTION C. MATERIAL SPECIFICATIONS**

- 1) Only new materials and components shall be utilized in the construction and manufacture of this unit.
- 2) All materials and components shall meet all of the minimum specifications as outlined.
- 3) All high pressure components shall be designed to be utilized with 5000 psi air pressure.
- 4) All welded components shall be performed by an ASME certified welder, in an ASME approved facility.
- 5) The use of reclaimed, used, or previously welded material is prohibited.
- 6) Manufacturer of the unit shall provide documentation, acceptable to the purchaser, as to the origin and compliance of all materials used in the manufacturing of the unit upon demand of the purchaser.
- 7) All construction, preparation, and finishing shall be done in a workmanship like manner, utilizing industry wide acceptable standards, practices, and principles.

## **SECTION D. MATERIALS AND CONSTRUCTION OF SUB ASSEMBLIES**

### **1) WHEELED FRAME ASSEMBLY.**

- A) Wheeled frame unit shall be constructed of a pan assembly constructed from a single sheet of 5052-T5 .125" thick aluminum. Pan section shall be bent to form a 18.5" long X 8.725" wide pan. Front of pan section to have a front depth of 1.875" and a rear depth of 4.5", with rear outside corners to have 1" 45 degree chamfer towards the sides of the pan.
- B) b.) Sides of pan to be bent from same sheet of aluminum stock. Sides to be tapered 11" X 1.875" (front) by 4.5" high at interface with rear pan member. Sides shall form a 2.375" X 4.5" rear wing assembly from pans rear side wall that shall be used to mount axle assembly.

### **1) WHEELED FRAME ASSEMBLY (CONTINUED)**

- C) Bottom of rear wing assembly must have a 45 degree bevel from rear panel interface to rear of wing to allow tilting of wheeled frame assembly. A 1.5" gusset of .125" aluminum must be welded on the inside of the wing assembly between the wing and the rear upright for strength. After bending, all corners must be fill-it MIG welded for strength and appearance. Welds shall not interfere or obstruct any interfacing member.
- D) Wheeled frame pan assembly shall have (2) .0315" diameter drain holes one in each lower rear corner for proper drainage.
- E) Wheeled frame assembly must have a 28.75" long 1.5" square aluminum 6061-T6 X .125" thick wall tubing upright assembly MIG fill-it welded to the outside of the wall of the rear pan panel. Weld to run entire length of interface of both sides. Rear mounted upright to have a 45 degree bevel cut running from interface of pan to rear of upright to allow unrestricted tilting of the unit.
- F) Rear upright to have a torsion spring loaded rear mounted .1875" thick 6061-T6 aluminum rectangular kick stand attached via .25" stainless steel bolt 6.5" down from top of upright to facilitate laying unit down on uneven surfaces. Bottom of upright to have a 21 degree bevel cut surface on bottom to maximize surface contact to ground level when operated. When deployed, kick stand will keep bottom of unit at a 5 degree downward angle to prevent cylinder movement.
- G) Side panels shall be tapered between front and rear panels with corners having a .125" fill-it MIG weld for strength and good appearance.
- H) Kick stand to be attached to wheeled frame upright via a .25" diameter X 3" long stainless steel hex head bolt, with stainless steel flat washers both sides and .25" stainless steel nylon insert lock nut.
- I) Kick stand shall incorporate a 3/8" diameter 2.7" long stainless steel hitch pin assembly to keep the kick stand in the closed and fully opened position.
- J) Hitch pin shall be attached to the 1.5" square upright via a 6" X .0625" vinyl coated stainless steel aircraft type cable assembly with mounting tab.
- K) Wheeled frame unit shall have a 22.5" long X .5" diameter stainless steel round axle assembly. Axle to be mounted through rear side wing assemblies, and attached to the rear upright via a #10 X 1.25" long stainless steel pan head screw.
- L) Axle assembly shall protrude 1.375" out from each wing assembly to allow mounting of hub and wheel assemblies..
- M) Two 8" diameter X 1.75" diamond tread semi pneumatic tires with single piece drawn steel wheels and .5" ball bearings hubs and a minimum load rating of 90 lbs each shall be mounted, one each side.

- N) Rear upright to have (2) .25" X 1.5" wide X 3.5" long 6061-T6 aluminum horizontal pieces welded to protrude over pan assembly 1.5" down from top of upright tube, shimmed .0625" from upright to act as a receiver for interfacing main frame unit. Structural receiver to have a .4056 diameter hole located 2.75" from rear of upright 2.25" down from top of tube. Hole must be aligned with matching main frame receiver hole.
- O) Wheeled frame must have a 5" wide X 9" high heavy duty cast aluminum "D" Grip handle that is detachable from the 1.5" square aluminum upright assembly. This "D" handle shall be made of 6061-T6 aluminum. Detachable handle shall be configured to be either in the upright (tall) position or completely out of the frame assembly. A stainless steel handle retention bolt with locking nut that shall act as a "bottoming" bolt to aide in the alignment of the 3/8" hitch pin. The detachable handle shall be tethered to the wheeled frame assembly by the use of two (2) 12" long coated stainless steel cables, that prevents the handle from being lost while out of the frame assembly. When installed into the frame assembly, unit shall have an overall height of 41" when measured from the ground level.

## **2) MAIN FRAME ASSEMBLY**

- A) Main frame shall have a bottom primary receiver pan 8.25" long X 18.25" wide X 1.25" deep. Pan shall be designed and constructed to properly interface with wheeled frame assembly pan without restriction or interference. Pan shall be constructed of a single piece of .125" thick 5052-T5 aluminum sheet stock.
- B) Main frame unit shall have two structural upright members constructed of .125" wall 6062-T6 1.5" aluminum square tubing connected at the top with 1.5" square tubing to form a superstructure for mounting cylinder mounting plate assemblies, pneumatics unit, and electronics assembly.
- C) Main frame superstructure shall contain four .250" thick X 1.5" X 7.5" 6061-T6 aluminum struts weld across both uprights (2) each side 5.25" from interior pan to bottom of first strut, 14.25" from interior of pan to bottom of upper strut. Each strut shall contain (2) .25" national coarse threaded holes 1.75" apart on center of pan width to allow mounting of cylinder mounting plate assemblies.
- D) Main frame to have a 16 gauge 4" X 7" formed frame welded to interior surfaces of uprights for mounting of warning horn. Formed channel section to have a center 3.5" diameter hole with (3) .3125" mounting holes equally spaced on 4.0" diameter.
- E) Front main frame section shall have a .250" thick 2.5" wide X 3" high 6061-T6 aluminum flat stock pneumatics mounting plate, welded to front frame strut. Plate shall have (4) .250" National coarse tapped holes 2" square on center to facilitate mounting of the pneumatics unit.
- F) Top of 1.5" square aluminum structural member to contain a 3/8" diameter stainless steel eyebolt with shoulder, and nylon insert lock nut to allow lifting of the main frame with all components attached to be lifted and/or hoisted.

- G) Eyebolt shall be located in a position that allows the concentric lifting of the main frame unit with all accessories and cylinders in position, without undue strain or undesirable angles.
- H) Main frame shall be drilled through top welded structural member, in a position to interface with mating mounting brackets on wheeled frame assembly, with out undue strain or stress.
- I) All welds on main frame unit shall encompass all available weld able surface areas for strength.
- J) Bottom of main frame pan area shall contain two .3125" diameter drain holes under structural members to allow draining of unwanted water or condensation.
- K) Both rear corners of main frame pan section shall contain a .3125" diameter drain hole to allow drainage of pan section.

### **3.) PNEUMATICS ASSEMBLY**

- A) All components must be designed, and manufactured to safely withstand 5000 psi air pressure on all high pressure assemblies, and a minimum 250 psi air pressure on all low pressure fittings.
- B) The entire pneumatics section shall be custom designed for the purpose intended. All components utilized must conform to industry accepted standards and principles.
- C) Unit shall have (2) CGA 347 stainless steel hand tight nut and nipple connections to facilitate connection of supply cylinders.
- D) Each CGA 347 nut and nipple shall be connected into a 21" long 3/16" I.D. reinforced thermoplastic hose assembly rated at an operational pressure of 5000 psi (20,000 psi minimum burst pressure).
- E) Each high pressure hose shall be connected into a .25" stainless steel bleed valve. Bleed valve to have a 6" stainless steel cable to prevent loss of knob. Bleed valve shall permit the bleeding down of residual air pressure after cylinder shutdown.
- F) Each bleed valve shall be affixed to the inlet ports of a stainless steel 3 way diverter valve rated for 6000 psi air pressure service. Valve shall be constructed of all stainless steel body, ball, stem, and handle. Use of plastic handles is not permitted due to the likelihood of breakage due to the intended service of the unit.
- G) Diverter valve shall be connected to a high pressure manifold assembly constructed from a solid block of 6061-T6 structural aluminum. Manifold shall be 2.5" wide X 6" high X 1.5" deep, and properly ported to allow unrestricted flow of air supply to all ports. Manifold shall be drilled and tapped to accepted standard .25" tapered iron pipe thread fittings. Manifold shall be deburred, cleaned, and free of all debris, prior to anodizing. Manifold shall be anodized gold to designate it's pressure rating. Prior to assembling, manifold shall be cleaned and purged of all debris.

- H) High pressure manifold must have a 6000 psi, 2.5" stainless steel high pressure gauge to properly indicate supply pressure of manifold. Gauge must be conveniently located to permit an unobstructed view from the front of the unit, and positioned to protect it from damage.
- I) High Pressure manifold shall be equipped with one high pressure inlet, and one high pressure outlet option which shall be located on the right hand side of the high pressure manifold. These options shall consist of a quarter turn, stainless steel ball valve rated for 6000 psi service, a CGA 346 stainless steel male inlet connector with stainless steel protective cap and cable.
- J) Manifold shall have additional ports to permit connection of a pressure reducing device and pressure switch for monitoring low air pressure.
- K) Pneumatic system shall be equipped with two independent pressure reducers rated for inlet pressures of 6000 PSI. Pressure reducers must be capable of outlet pressures between 0 and 400 PSI. Regulators must be capable of delivering sufficient liter flow to perform the intended purposes.
- L) Low pressure manifolds must be directly connected to the pressure reducers with out the use of rubber hoses, internal or external tubing, or flexible connections.
- M) Low pressure manifolds must be made from a 1.75" X 9.5" long single piece of 6061-T6 aluminum round stock. Low pressure manifold must have a minimum bore of .70" to facilitate proper air flow. Low pressure manifolds must contain at least four low pressure connection ports equipped with Schrader style quick disconnect sockets on respirator supply side, and European standard (Paratech/Vetter) style quick disconnect fittings, to utilize existing tool and respirator supply hose connections.
- H) Low pressure respirator supply manifold shall be equipped with a 2" diameter 160 psi pressure gauge to monitor pressure in respirator supply manifold. Low pressure tool supply manifold shall be equipped with a 2" diameter 600 psi pressure gauge to monitor pressure in tool supply manifold. Gauges shall be conveniently placed to permit unobstructed view from the front of the unit, and positioned to be protected from damage.
- I) Low pressure respirator supply manifold shall be equipped with a pressure relief device preset to 125 psi. Low pressure tool supply manifold shall be equipped with a pressure relief device preset to 350 psi. Both shall be capable of venting excessive pressure from system should an inadvertent pressure increase occur.
- J) Low pressure manifolds shall have a .25" X 1.5" X 4.75" 6061-T6 aluminum support bracket welded into a machined flat on round stock and attached to main frame upright to prevent excessive stress on unit.
- K) Respirator Supply manifold shall be anodized red, and tool supply manifold shall be anodized midnight blue, utilizing current Military Specification anodization methods.
- L) Both Manifolds shall be clearly identified with clear Mylar labels. Labels shall be vertical style with black 1/2" letters and a white background. Respirator supply manifold shall be marked "MASK SUPPLY" and tool supply manifold shall be marked "TOOL SUPPLY".

- H) Primary tool manifold pressure shall be between 325 psi and 375 psi. Tool manifold shall be designed and constructed as follows: TOP OUTLET (#1) - The top outlet shall be equipped with a miniature pressure reducer reducing the outlet pressure to a preset 116 psi. This outlet shall be equipped with a quarter turn steel on/off valve and a Vetter/Paratech style plug to be used with current high pressure air bag controllers. Second and third outlets (#2 and #3) shall be equipped with miniature pressure reducers that shall be operator adjustable. Outlets shall be capable of an outlet pressure of between 0 and 250 PSI. The fourth outlet (#4) shall be equipped with a steel quarter turn on/off valve and Vetter/Paratech style socket. This outlet shall be operated at the primary tool supply pressure as indicated, for use with air shoring equipment.

#### **4) ELECTRICAL AND ELECTRONIC CONTROL ASSEMBLY**

- A) High pressure manifold shall be equipped with a double throw, double pole pressure switch rated for use with 5000 psi air pressure. Pressure switch shall be factory preset to prevent adjustment or tampering.
- B) Pressure switch shall have the capability of sensing increasing and decreasing pressures in the pneumatic system.
- C) Pressure switch shall be directly connected to a 2" X 4" weatherproof electrical box via a .5" tapered iron pipe thread connection.
- D) Pressure switch shall be directly connected to an Electronic Control Module designed to arm and activate the low pressure warning device.
- E) Electronic control module shall be battery powered via a lithium battery pack designed for such service with a minimum 7 amp hour capacity.
- F) Electronic Control Module shall have the capability of sensing pressurization of the high pressure manifold and arming itself without any manual switches or manual devices. Upon sensing an armed condition, the Electronic Control Module shall sound the warning horn giving audible confirmation of an armed condition, and activate a green LED giving visual confirmation of an armed warning alarm system. Green LED shall continuously blink until unit has been manually shutdown by a sequence of events by the operator.
- G) Electronic Control Module shall be able to sense decreasing pressure in the high pressure manifold, and at 500 PSI automatically go into an alarm condition. In the alarm mode, the unit shall sound the warning horn intermittently and flash a red LED giving the operator both audible and visual indication of an alarm condition. Alarm condition shall continuously operate until pressure in system has been increased in the high pressure manifold above preset alarm point, or the system has been disarmed by the operator by following a sequence of deliberate actions designed to disarm system.
- H) Electronic Control Module shall be equipped with a safety interconnect system to prevent accidental or inadvertent disarming of the system while in operation.

#### **4) ELECTRICAL AND ELECTRONIC CONTROL ASSEMBLY (CONTINUED)**

- I) Electronic Control Module shall be equipped with a battery voltage monitoring circuit that shall activate the warning horn and Yellow LED giving both visual and audible confirmation of a low battery voltage condition. Low battery alarm shall sound until battery has been replaced or battery has been totally depleted.
- J) Electronic Control Module shall be mounted to a machined 6061-T6 .75" thick aluminum plate designed for that use. Mounting plate shall permit all LED's and buttons to be recessed mounted to prevent damage.
- K) Electronic Control Module shall be equipped with a single system reset and test switch (push-button style) that shall be recessed mounted into the Electronic Control Module face plate.
- L) Electronic Control Module face plate shall come equipped with a decal that shall indicate all LED's and switch functions.
- M) System shall be equipped with a transducer powered alarm horn that shall be located in the main frame to protective it from damage. Warning horn shall have a minimum rating of 90 db. when measured 3 feet from horn assembly.

**SECTION E.  
GENERAL REQUIREMENTS**

**1) HARDWARE**

- A) All screws, bolts, nuts, cotter pins, flat washers, lock nuts, hitch pins, cables and any other fasteners shall be made of stainless steel for maximum corrosion resistance.
- B) All fasteners shall be resistant to vibration through locking style nuts or Loctite liquid sealant.

**2) MATERIAL FIT AND FINISH**

- A) Wheeled frame, main frame, kick stand, and axle assembly shall be cleaned, deburred, rinsed, etched, phosphate, and prepared for finish coating.
- B) All welds shall be splatter free, and prepared for finishing prior to finish preparation.
- C) Unit shall be dry powder coated with Morton # 10-1013 Epoxy Dry Powder electrostatic coating in accordance to manufacturers recommended procedures, practices, and equipment.
- D) All unpainted aluminum surfaces shall be anodized to protect them from corrosion and/or oxidation.
- E) All pressure manifolds and equipment shall be color coded to indicate high pressure or low pressure operation for safety and ease of use.
- F) Prior to delivery, successful vendor shall submit a standard production model of the quoted unit for purchaser's inspection and approval prior to issuance of a purchase order.

**2) MATERIAL FIT AND FINISH (CONTINUED)**



- G) The manufacturer shall hold harmless the purchaser in the event of any claim, suit, or action against the purchaser, which alleges that the equipment furnished here under infringes upon or violates any United States patent, copyright, trade secret, or any other proprietary right of any third party, the purchaser shall notify the manufacturer in writing, and the manufacturer shall defend such claim, suit, or action in the purchaser's name.

**SECTION G.  
MANUFACTURER'S WARRANTY**

- 1) The unit, accessories, options, and components shall be warranted for a period of one (1) year from the date of delivery for defects in material or workmanship. This warranty shall be limited to repair or replacement of defective components upon inspection of the unit at the factory or authorized designated manufacturer's representative.
- 2) The manufacturer shall indemnify the purchaser for any claims, lawsuits, litigation, or expenses incurred including but not limited to legal fees, cost, and or expenses resulting from any patent infringement claim arising from the construction, manufacture, sale, or distribution of this product.