



SAN JOSE FIRE DEPARTMENT
Firefighter Breathing Air Replenishment System (FBARS)
Effective Date: *January 01, 2017*

In accordance with the City of San Jose Ordinance Number 29807, the Fire Chief hereby adopts this Administrative Regulation for the installation, testing and maintenance of a firefighter breathing air replenishment system.

1.0 Scope

This administrative regulation covers the minimum requirements for the installation, testing and maintenance of a firefighter breathing air replenishment system.

2.0 Required Installation

2.1 Any of the following conditions shall require the project be equipped with a FBARS throughout, as approved by the Fire Code Official:

- a) Any building having floors used for human occupancy located more than seventy five feet (75') above the lowest level of the fire department vehicular or personnel access, whichever access is more restrictive, as determined by the Fire Chief;
- b) Any building with two (2) or more stories underground.
- c) Any tunnel over five hundred feet (500') in length.
- d) Any building where the fire apparatus access point is located more than one hundred fifty feet (150') from the nearest entrance to the building.

Note: Where provided, the FBARS shall provide an adequate pressurized air supply through a permanent piping system with access stations for replenishment of portable breathing air equipment used by Fire Department personnel.

2.2 The constructability provisions of Ordinance 29807 are explained as policy by this document.

NOTE: *No Variance will be considered to relinquish the requirement to install FBARS.*

3.0 Plans & Application for Permit

3.1 Plan Submittal - Prior to the installation of a firefighter breathing air replenishment system, plans shall be submitted to the Fire Department for review and permit approval. The submittal shall include:

- A) Three sets of shop quality drawings and support documentation including:
 - a) Manufacturers' cut sheets for each component and material used in the system.
 - b) Calculations prepared by a registered professional mechanical engineer that demonstrate compliance with this administrative regulation.

3.2 Designer of Record - The designer of record shall be a registered mechanical professional engineer and shall be responsible for the entire system design and installation.

3.3 Application - Complete the **Fire Protection and Special Systems Permit Application** form and submit the form and plans to the Fire Departments' Permit Specialist at City Hall for processing. On the form under "**TYPE OF PROJECT/SYSTEM (Select One)**" check the box as " Other (**FBARS**)".

4.0 Fees

Initial Fees will be - Plan Check: Hourly rate (base hours = 2 hours per system plus hourly rate if review exceeds 2 hours). Inspection: Hourly rate (base hours = 4 hours per system plus hourly rate if inspection exceeds 4 hours). Total fees required at the time of permit application submittal will be the current hourly rate for 6 hours of time plus the record retention fee of 5%. Additional fees will be required on an hourly as needed basis should complexity/complications require additional time to assess.

5.0 Installing Contractor

A California licensed (C-36) contractor knowledgeable in high-pressure systems shall install the firefighter breathing air replenishment system. The installing contractor shall also have a valid Worker's Compensation Certificate and a San Jose Business License.

6.0 System Components

The firefighter breathing air replenishment system shall contain the following components:

- a) Exterior Fire Department Connection Panel
- b) Interior Fire Department Air Fill or Station
- c) Interconnected Piping Distribution System
- d) Pressure Monitoring Switch
- e) Electrical Supply System

Note: **Interior air-fill stations (chamber) only.** Interior air-fill panels (Rapid refilling of SCBA air cylinders done while they are still on the firefighter's back) are not permitted in San Jose. If the Chamber includes a quick-fill connection, it shall be disabled.

7.0 Performance and Design Criteria

- 7.1 Performance - The firefighter breathing air replenishment system shall be designed to simultaneously fill, at the most remote filling station of each system, a minimum of two (2) 45 cubic feet compressed breathing air cylinders to 4,500 PSIG within three (3) minutes.
- 7.2 All pressurized components shall be compatible for use with high pressure breathing air equipment and self-contained breathing apparatus (SCBA).
- 7.3 Operating Pressure - All pressurized components of the firefighter breathing air replenishment system shall be rated to operate at a minimum working pressure of 5,000 PSIG at 700 °F.

8.0 Exterior Fire Department Connection Panel

- 8.1 Purpose - The exterior fire department connection panel (FDCP) shall provide the fire department mobile air operator an access to the firefighter breathing air replenishment system. The connection panel fittings shall be compatible with that of the fire department mobile air unit.
- 8.2 Location - The location of the FDCP shall be approved by the fire department. As a rule, the FDCP shall:
 - a) Be attached to the building or shall be on a remote monument at the exterior of the building.
 - b) Have a minimum of six (6) feet – 180-degree clear and unobstructed space to access the front of the panel.
 - c) Secured within a weather-resistant enclosure that is visible and accessible upon approach to the building.
 - d) Be within one hundred (100') feet of the closest fire apparatus access point.
 - e) Shall be located at the exterior of the building where no frangible or glazing materials are located above or within six (6) feet on either side of the FDCP.

8.3 Components –

- a) The FDACP shall contain all of the necessary gages, control valves, pressure regulating valves, pressure relief valves, check valves, tube or pipe, connectors, fittings, adapters, supports and other components required to allow the fire department to connect and augment the system with a constant source of breathing air.
- b) An electrical supply system shall be installed in the Exterior Mobile Air Connection and Fill Stations. Connection types shall be approved by the fire code official. As a minimum the cord shall be on a cord reel for easy dispersal and retrieval. The cord shall be listed for Outdoor “Rugged/Heavy” (600-volt insulation) use, designed for maximum flexibility and durability. The cord shall also be oil resistant and kink free.

8.4 Marking

- a) The FDACP enclosure shall be marked “SJFD BREATHING AIR SYSTEM” on a securely attached stainless steel or other Weather and Sunlight resistant engraved or painted plate. The letters shall be a minimum of two inches high with a 3/8-inch stroke and shall be in a color that contrasts with the enclosure.
- b) All gages and valves shall be labeled, indicating their function. Operating instructions shall be posted on the interior side of the enclosure’s access door.

8.5 Security

- a) The FDACP enclosure shall be maintained locked by an approved means.
- b) When the FDACP is located in an area subject to vehicle traffic, impact protection shall be provided in an approved manner.

8.6 Fire Department Key Box

A fire department key box containing a key to the fire department connection panels shall be provided adjacent to the exterior fire department connection panel(s). Additional marked keys shall be provided with each firefighter phone. When firefighter phones are not provided, additional marked keys shall be provided in the fire control room in an approved manner.

9.0 Interior Fire Department Air Fill Stations (Access Stations)

9.1 Purpose - Each Interior Fire Department Air Fill Station (AFS) shall allow the responding firefighters to replenish two (2) 45 cubic feet compressed breathing air cylinders to 4,500 PSIG within three (3) minutes. The AFS shall be designed to place two compressed breathing air cylinders in compartments with fragmentation protection to assure safe placement and filling of cylinders. The AFS fittings shall be compatible with the fire department SCBA.

9.2 Location - The location of the AFS shall be approved by the fire department. As a rule, the top of the AFS panel shall be located a minimum of 36 inches but not more than 60 inches above the finished floor. AFS shall be installed in a secured enclosure, closet, or room approved by the fire department. The AFS shall be provided with a minimum of six (6) feet by six (6) feet clear and unobstructed space to access the front of the AFS.

- a) All AFS shall be located no more than one hundred fifty feet (150') apart.

Exception: *A Variance request to exceed the 150' requirement may be allowed by SJFD on a case-by-case basis. The goal is to have these stations nearby FD access points (almost always, Stairs). If this is best suited by elongating our prescribed travel distance, we may allow it, with the intent being the station access is unimpeded and intuitive without excessive remoteness. They have to be accessible during an emergency that has escalated to catastrophe.*

- b) High-rise Buildings - Any building having floors used for human occupancy located more than seventy five feet (75') above the lowest level of the fire department vehicular or personnel access, whichever access is more restrictive, as determined by the Fire Chief. The AFS's shall be installed commencing on the third floor above the lowest level of fire department access and every third floor thereafter until the uppermost AFS is on the roof. Firefighter access of all AFSs shall be located outside the exit stair enclosure but within direct view and not more than ten feet away from the exit stair enclosure door.

Exception: *If direct view and/or not more than ten feet away from the exit stair enclosure door is not possible, a Variance request may be allowed by SJFD on a case-by-case basis. The goal is to easily identify the location of the station(s) during an emergency that has escalated to catastrophe. At a minimum floor-level signs and path marking will be required (Refer to CFC 1013.7 & 8 as example).*

- c) Underground Structures – In any building with two (2) or more stories underground, the AFS shall be installed commencing on the second floor below the level of fire department access. Thereafter, every two floors below until the lowermost station is within one floor of the lowest floor. Firefighter access of the AFS's shall be located outside the exit stair enclosure but within direct view and not more than ten feet away from the exit stair enclosure door.
- d) Any tunnel over five hundred feet (500') in length – the AFS shall be installed every one hundred fifty feet (150'). Actual locations shall be approved by the fire department on a case-by-case basis. In no case shall the tunnel be constructed of less than Exit Passageway standards.
- e) Any building where the fire apparatus access point is located more than one hundred fifty feet (150') from the nearest entrance to the building – If allowed, the AFS locations shall be documented by Variance approved by the fire department on a case-by-case basis.

9.3 Components - Each AFS shall include the following:

- a) Fragmentation protected compartment
- b) Connectors, fittings and adapters
- c) Gages
- d) Isolation valve to shut off the flow of air to the AFS when exposed to hazardous conditions, thereby keeping the rest of the system operable.
- e) Pressure-regulating valve(s)
- f) Pressure relief valve(s)
- g) Tubing, supports and other necessary components

9.4 Marking

- a) The AFS access door shall be marked "SJFD BREATHING AIR SYSTEM" on a securely attached stainless steel or plastic engraved or painted plate. The letters shall be a minimum of two inches high with a 3/8-inch stroke and shall be in a color that contrasts with the enclosure.
- b) All gages and valves shall be labeled, indicating their function. Operating instructions shall be posted on the interior side of the enclosure's access door.

9.5 Security - The AFS enclosure, closet or room shall be maintained locked by an approved means.

10.0 Distribution System

10.1 Purpose - Tubes or pipes and related fittings that connect the FDCCP to the different AFS in the system to allow the mobile air unit to supply air to any AFS via the FDCCP.

10.2 Material

- a) Tubing, piping and their related fittings shall be non-Ferris stainless steel compatible for use with high-pressure air systems.
- b) The use of non-metallic materials, carbon steel, iron pipe, malleable iron, high strength gray iron, or alloy steel is prohibited.

10.3 Installation Requirements

- a) Tube or pipe shall be supported at maximum intervals of five feet (5'). Individual tube/pipe clamps and mounting components shall be mechanically secured to the building support members in accordance with manufacturer specifications and the California Mechanical Code.
- b) The distribution system shall be a welded system, except where tube/pipe joints are readily accessible and at the point of connection to the individual AFS.

- c) Welding procedures shall follow nationally recognized standards. Prior to and during the welding of sections of tube/pipe, a continuous, regulated dry nitrogen purge at 3 PSIG shall be maintained to eliminate contamination with products of the oxidation or welding flux. The purge shall commence a minimum of two minutes prior to welding operations and continue until the welded joint is at ambient temperature (72° F).
 - d) When tube/pipe passes through a fire rated or solid material, a sleeve at least three times the tube/pipe outside diameter shall protect it. Both ends of the sleeve shall be filled with an approved fire stop material.
 - e) A system isolation valve shall be installed downstream of each air fill station and shall be located in the panel or within 3 feet of the panel in an SJFD approved accessible location.
- 10.4 Marking – Tube/pipe shall be marked “HIGH PRESSURE FIREFIGHTER BREATHING AIR SYSTEM” using signs or self-adhesive labels. If signs are used, they shall be made of stainless steel or plastic and engraved with 3/8-inch letters with 1/16 inch stroke lettering. The signs or self-adhesive labels shall be placed at a minimum of 20 feet intervals and at each fitting, whether the tube/pipe is concealed or in plain view. All tube/pipe shall have a sign or label at any accessible point.
- 10.5 Contamination Prevention - The installing contractor shall ensure that, at all times, the system components are not exposed to contaminants, including but not limited to oils, solvents, dirt and construction materials. When known or suspected contamination of system components has occurred, the affected component shall not be installed in the system.
- 10.6 Moisture and CO Monitor. An electronic moisture and carbon monoxide monitor shall be installed to monitor the system’s air quality. The monitor shall transmit a supervisory signal to the central alarm monitoring station when the levels of moisture or carbon monoxide exceed acceptable levels for breathing air standards. Activation of the moisture and carbon monoxide monitor shall also activate an audible alarm located at the building annunciator panel or main entrance. A weather resistant sign shall be provided in conjunction with the audible alarm stating “FIREFIGHTER AIR SYSTEM – MOISTURE AND CO ALARM.” Where not part of a building annunciator panel, the lettering shall be in a contrasting color and the letters shall be a minimum of 2 inches high with 3/8-inch brush stroke.

11.0 Pressure Monitoring Switch

- 11.1 Pressure Monitoring Switch - The system air pressure shall be maintained at 5,000 PSIG at all times. An electric low-pressure switch that is connected to the building’s fire alarm system shall be installed to monitor the air pressure. The pressure switch shall transmit a supervisory signal to the fire alarm supervising station when the pressure of the system dips to 4,000 PSIG.
- 11.2 Pressure Loss Notification - The building owner or authorized agent shall notify the fire department and test contractor of any alarm indicating loss of pressure. Repair of system shall be performed immediately.

12.0 Final Inspection and Tests

The system shall be subjected to and must pass the following tests which shall be witnessed by the fire department:

- 12.1 Pneumatic test of the entire system at 5,000 PSIG for a period of twenty-four (24) hours using oil-free, clean dry air or nitrogen. At this time, a visual inspection of the whole system will be conducted. All fittings, joints and system components will be inspected for leaks.
- 12.2 After completion of the twenty-four hour pressure test, pneumatic test of the entire system at 7,500 PSIG for a period of one (1) hour, using oil-free, clean dry air or nitrogen.
- 12.3 Pressure monitoring switch test to verify that a supervisory signal is transmitted to the fire alarm supervising station when the air pressure dips to 4,000 PSIG.
- 12.4 Moisture and CO Monitor to verify the supervisory signal, the audible alarm and signage (see 10.6 above).
- 12.5 Compatibility of the FDPCP to the fire department mobile air unit and the AFS to the fire department air cylinders shall be verified.

12.6 Laboratory test of two (2) samples taken from separate filling stations shall be submitted to an independent certified gas analyst laboratory to verify the systems cleanliness. The independent laboratory has to certify that the samples meet the quality for breathing air.

NOTE: *During the air quality analysis, the AFS shall be secured and provided with signs stating "AIR QUALITY ANALYSIS IN PROGRESS, DO NOT FILL OR USE ANY AIR FROM THIS SYSTEM". This sign shall be a minimum of 8-1/2 by 11 inches with minimum one-inch letters.*

12.7 Upon successful completion of all tests, all valves shall be placed in their normal operating positions and the system shall be filled to the normal operating pressure of 5,000 PSIG. All access doors and panels shall be secured and locked.

13.0 Training and Acceptance

13.1 Training - The installing contractor shall provide training for the fire department upon successful completion of inspections and tests. Each fire department shift (three shifts) shall receive adequate training to obtain working knowledge of the system. Training sessions shall be scheduled for not more than three hours per session.

13.2 Acceptance - The following are required for the fire department's final acceptance of the project:

- a) Successful completion of all tests and inspections delineated in section 12.0.
- b) Receipt of the designer of record's written statement that the entire Firefighter Breathing Air Replenishment System has been installed, tested and commissioned in accordance with the approved plans and requirements. The designer of record shall sign and affix his professional engineering stamp on the certification.
- c) Completion of the fire department training sessions.
- d) A copy of the maintenance contract including the performance standards.
- e) Five (5) sets of the system keys.

14.0 Maintenance

14.1 The Firefighters Breathing Air Replenishment System shall be tested at least annually or when requested by the fire department. The following tests shall be performed:

- a) The fire department shall witness the pneumatic testing of the entire system at 7,500 PSIG for a period of one (1) hour using oil-free, clean dry air or nitrogen. Any defects or leaks noted in the system shall be repaired immediately.
- b) Laboratory test of at least two (2) samples taken from separate filling stations shall be submitted to an independent certified gas analyst laboratory to verify the systems cleanliness. The laboratory test results shall be in writing and shall be maintained for fire department review.

15.0 Special Circumstances

15.1 Fire Department approval is required before commencing any modification or work to the system. This section does not prohibit emergency repairs; however, the contractor is required to immediately submit a written report to the fire department.

16.0 Document Revisions

16.1 This document is subject to revisions. For general information and to verify that you have the most current document, please call (408) 535-7750, and request the current version date.