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|  <b>BELL</b><br><b>HELICOPTER COMPANY</b><br><small>INCORPORATED IN TEXAS</small> | <b>FIRE AND ACCIDENT<br/>PREVENTION STANDARD<br/>DEPARTMENT INSTRUCTION</b> |                                                             | <b>INSTRUCTION NO. 20 A</b><br><b>Supercedes 20</b><br><b>dated 3/23/70</b><br><b>DATE 26 March, 1981</b> |
|                                                                                                                                                                    | <b>SUBJECT</b><br><b>RESPIRATORY PROTECTION</b>                             | <b>APPROVED:</b><br><i>[Signature]</i> / <i>[Signature]</i> | <b>APPROVED:</b><br><i>[Signature]</i>                                                                    |
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**BELL HELICOPTER TEXTRON****Respirator Program****I. Respirator Program****A. Purpose**

The purpose of the BHT Respirator Program is to establish Standard procedures and practices for the use of respiratory protective equipment to control possible health hazards to the respiratory system. This operating standard establishes the respirator program for use at all Fort Worth, Bell Helicopter Textron facilities. The standard includes training and fitting, exclusive employee use of respirators, cleaning and disinfecting, storage, inspection and maintenance, work area surveillance, evaluation of the program, medical examinations and selection of approved respirators. The regulation requiring this program is 29CFR 1910.134 - Respiratory Protection, while guidelines for the administration of the program are found in the OSHA Industrial Hygiene Manual, Chapter III, OSHA Standard Method for Determination of Respiratory Protection Program Acceptability. Respirator selection guidelines are found in the above Industrial Hygiene Manual and the NIOSH/OSHA Pocket Guide to Chemical Hazards. Respiratory equipment used at BHT will have the approval of NIOSH and MSHA (Mine Safety and Health Administration). This Standard is not meant to nullify BHT's efforts to control the hazard either through engineering methods or administrative methods, but rather augments the safety program in providing protection wherein no engineering or administrative controls are feasible, during the interim of implementation of such controls or during emergencies when respiratory protective equipment is required.

**B. Procedure****1. Health Hazards**

- a. Approved respiratory equipment shall be worn by employees whenever they are required to work in areas where health hazards may exist as determined by industrial hygiene monitoring or in areas due to operations performed and/or environmental conditions that are suspect to be hazardous to the employee's respiratory system.
- b. Whenever there is any doubt as to whether respiratory protection is needed, or as to the material which is causing the hazard, contact the Safety Department.

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- c. Whenever existing engineering or administrative controls are suspect for not adequately maintaining safe and healthy working conditions, contact the Safety Department for evaluation.

2. Enforcement

- a. Departmental supervision will assure compliance with this program to effect the protection of employees from airborne health hazards.
- b. Ultimately each employee is also responsible for the protection of his or her health and safety in this compliance program.
- c. Since the program follows mandatory regulations as set forth by OSHA and BHT, noncompliance or non-participation in this program can result in disciplinary action.

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## II. Respirator Selection

### A. Approved Respirators

1. The selection of proper respiratory equipment is made by the Industrial Hygienist on the following criteria:
  - a. Physical State (s) and Chemical Properties of the substance (Appendix A).
    - i) Particulate dust, mist, fume, smoke or fog).
    - ii) Gas or vapor.
    - iii) Combination of (i) and (ii).
  - b. Industrial hygiene data on the substance.
    - i) Permissible Exposure Limits (PEL) 29 CFR 1910, Subpart Z.
    - ii) Exposure measurements.
    - iii) Oxygen deficiency.
  - c. Evaluation of the selected respirator for the substance (Appendices B and C).
  - d. Maximum Use Concentration (MUC).
    - i) Protection Factor (PF) for particulate filter respirators (Appendix D) and/or gases or vapor respirators (Appendix E) must be known. The protection factor is the ratio of the ambient airborne concentration of the contaminant to the concentration of that contaminant inside the facepiece.
    - ii) The MUC is found from the product of the PF and the PEL.
  - e. Specific requirements may limit or restrict respirator selection for individually regulated contaminants such as asbestos, vinyl chloride, etc., as found in 29CFR 1910.1000 Subpart Z.
  - f. Approved respirators shall display the applicable approval number and labels (Appendices F, G, H and I).
2. The selection of respirators is made considering the capabilities and limitations of respirators (Appendix J).
3. The warning properties of different contaminants must be considered in respiratory selection (Appendix K).
  - a. Some gases or vapors, i.e. carbon monoxide, exhibit poor warning properties and may necessitate the use of end-of-service life indicators.

- b. Warning properties dependent upon human senses are not foolproof though they do provide some indication to the employee of possible sorbent exhaustion, poor facepiece fit or other respirator malfunction.
  - i) Warning properties include odor, eye irritation (full facepiece respirators) and respiratory irritation. These warning properties are adequate when they are detectable below the PEL, though some substances cause olfactory fatigue and therefore cannot be considered to have adequate warning properties.
  - ii) An odor or irritation threshold above the PEL but less than three times the PEL and for which there is no ceiling limit is considered to have adequate warning properties if no serious or irreversible health effects can occur at these levels.
  - iii) Poor warning properties are ascribed where the odor or irritation threshold is many times the PEL.
  - iv) Quarter or half-mask chemical cartridge respirators will not be used to protect against any material present at concentrations that may be highly irritating to the eyes.
- 4. High toxicity or carcinogenic potential of a substance may invalidate the use of chemical cartridge respirators or gas masks unless there is a specific OSHA standard allowing their use.
- 5. Supplied air respirators are to be used where there are no chemical cartridge respirators or gas masks available which satisfy (3.)(b)(iii) and (4) above.

B. Unapproved Respirators

- 1. Respirators that do not have the NIOSH/MSHA approval are unapproved and will not be used.
- 2. Chemical cartridge respirators or gas masks shall be considered "unacceptable" or "unapproved" for gaseous contaminants which have either inadequate warning properties or such a toxicity as described in (A)(3)(b)(iii) and/or (A)(4) above. These respirators will not be used to protect the employees where they are so considered "unacceptable" or "unapproved".

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3. NIOSH/MSHA approved respirators are considered unapproved when any component is missing or damaged and shall not be worn until they have been repaired. If the repair does not allow the respirator to pass the fit test, they shall not be worn and shall be properly disposed if they cannot be properly repaired.
4. NIOSH/MSHA approved respirators are considered unapproved when the respirator is improperly worn, i.e. the respirator will not pass the fit test due to improper wear or interfering facial hair or the respirator is worn without both head straps properly in place or where one headstrap is missing.
5. NIOSH/MSHA approved respirators shall not be used with components from more than one manufacturer. Respirators that have parts from more than one manufacturer do not meet approval specifications and are therefore "unapproved." For example a Norton facepiece fitted with MSA valve seals would be an "unapproved" respirator.

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### III. Training and Fit Testing

#### A. Education of Respirator Selection

Employees using respirators shall be instructed in respirator selection based on the nature of the hazard and the resulting health effect from overexposure to the hazardous materials.

#### B. Pressure Fit Testing - Instructors

Employees are to be instructed in the proper wearing of respirators.

1. Each employee, when required, shall be shown how to don the respirator, as originally intended, by the instructor.
2. All functional parts including straps must be in place and worn in the appropriate positions and secured.
3. The employee will be instructed that the respirator shall not be modified.
  - a. Respirator straps will not be replaced with strings or rubber bands since this voids the respirator approval.
  - b. Facelets or a knitted coverings over the rubber face seal voids the approval of the respirator also.
4. The instructor will demonstrate both positive pressure and negative pressure tests for fit with the respirator.

#### C. Pressure Fit Testing - Employees

Employees shall properly don and wear the respirator so as to demonstrate familiarity with the respirator and to determine that the fitting has been performed properly.

1. The employee will demonstrate to the instructor that he is able to verify that all functional parts of the respirator are intact and in good repair.
2. The employee will wear the respirator with the straps in the proper position and secured.
3. The employee will perform a positive pressure test for fit by closing or covering the exhalation valve and by gently exhaling into the facepiece. The facepiece fit is considered satisfactory if a slight positive pressure can be built up inside the facepiece without any evidence of outward leakage of air at the seal. For most

respirators, this method of leak testing requires that the wearer first remove the exhalation valve cover and then carefully replace it after the test.

4. The employee will perform a negative pressure test for fit by closing off the inlet opening of the canister or cartridge(s) by covering it (them) with the palm(s). By the employee gently inhaling the facepiece will collapse slightly. The inhaled breath should be held for approximately 10 seconds. If the respirator remains slightly collapsed, the fit of the respirator is considered satisfactory.
5. Approved, disposable respirators are to be checked by the employee objectively assessing good respirator/face seal. By inhaling and then exhaling into a properly worn respirator, the positive and negative pressure tests may be performed until a satisfactory pressure test fit is attained. If the test is not satisfactory, the respirator should be readjusted and the pressure tests should be again repeated. This procedure is to be repeated until a satisfactory fit is attained.
6. The employees are instructed to assure that the above items are done each time before the respirator is worn to work.

D. Qualitative Fit Testing

Instructors or supervisors are to qualitatively check the respirator fit for each employee by exposing the employee to a "test atmosphere", while his respirator is on and after the positive and negative pressure tests performed by the employee indicate a satisfactory fit.

1. Isoamyl acetate, supplied in ampoules designed for respirator fit tests, is used as the test atmosphere for checking the fit of respirators equipped with organic vapor cartridges or gas masks with organic vapor canisters.
  - a. If the odor of isoamyl acetate is not detected by the employee the qualitative test is satisfactory and the test is complete.
  - b. If the odor of isoamyl acetate is detected by the employee the qualitative test is not satisfactory and the employee must readjust the respirator and perform satisfactory positive and negative pressure tests again. The test atmosphere is applied again and the above procedures repeated if necessary until the employee is able to achieve a good qualitative fit test.

2. Isoamyl acetate will be the test atmosphere to use with supplied air respirators and combination type respirator cartridges or gas mask cannisters where one of the approved filtration sections is for organic vapors. An example is a combination of organic vapor and acid gas filter sections.
  - a. Same as (1)(a) above
  - b. Same as (1)(b) above
3. The 3M Brand 9912 Qualitative Face Fit Kit is to be used to provide the test atmosphere for checking the fit of respirators equipped with high-efficiency particulate cartridges or gas masks with high-efficiency particulate cannisters and the 3M Brand 8710 Dust Respirator.
  - a. The test solution is atomized by the instructor/supervisor using the kit's nebulizer. If the sweet taste of the test atmosphere is not detected by the employee the qualitative test is satisfactory and the test is complete.
  - b. If a sweet taste is noted by the employee the qualitative test is not satisfactory and the employee must readjust the respirator and perform the test again. This procedure must be repeated until a satisfactory test is attained.
  - c. Caution is to be exercised by the instructor/supervisor so as not to create an excessive test atmosphere so as to cause eye irritation to the employee.
- E. The Industrial Hygienist will examine during the training selected employees wearing the respirators to determine proper fitting.

IV. Exclusive Employee Use of Respirators

- A. Cartridge respirators and single use dust respirators (i.e. 8710 Respirators made by 3M Co., Inc.) will be used by individual employees exclusively. Drawing of the respirators from the proper tool crib by the employee will be considered assignment of the respirators on an individual basis.
- B. Gas masks and supplied air respirators where periods of use alternate with periods of storage or where this equipment is stored for emergency use are not assigned to individuals, except during the actual time of useage. This equipment will be cleaned and disinfected before another employee will use the same equipment or before the equipment is returned to storage.

V. Respirator Cleaning and Disinfecting

- A. Respirators or infrequently assigned respirators, i.e. as noted in Exclusive Employee Use (IV)(B) above, issued for the exclusive use of one worker for a period of time should be cleaned after each day's use, or more often if necessary. This applies to respirators routinely used throughout the day, though cleaning at a frequency less than one day is acceptable, if proper protection is still afforded to the employee.
- B. Gas masks and supplied air respirators that will be used by other employees or that will be returned to storage after use are to be cleaned and disinfected before the respirator is used by another employee or before it is returned to storage.
- C. The 8710 Dust Respirator, a single use respirator, does not require cleaning, however it should instead be discarded when necessary and replaced with a clean one. Replacement may be done as often as necessary during a single day, however the respirator should be discarded after each day's use regardless of the respirator's condition.
- D. Routinely used respirators shall be cleaned and disinfected as frequently as necessary to insure that proper protection is provided for the employee. Each employee is to be briefed on the cleaning procedure and be assured that he will always receive a clean and disinfected respirator.
- E. Respirators and their component parts, except for chemical cartridges or cannisters, filters, or any other part that may be damaged by aqueous cleaning solutions, should be cleaned in a warm water solution that has mild detergent added. Parts should be thoroughly rinsed in warm, clean water then dried. Before parts are reassembled assure that there is no soap residue left on the components, especially checking the valve seats and diaphragms which may stick or not seal properly with accumulated soap residue. During the assembly of the component parts, each part should be inspected for damage and repaired or replaced as necessary. The cleaned and dry respirator may then be returned to service or properly stored.
- F. Clean respirators may be disinfected by wiping the respirator with isopropyl alcohol. After the respirators are dry they may be returned to service or properly stored.

VI. Respirator Storage

- A. Respirators shall be stored in a convenient, clean, and sanitary location. After inspection, cleaning, and necessary repair, respirators shall be stored to protect them against dust, sunlight, heat, extreme cold, excessive moisture or damaging chemicals.
- B. Routinely used respirators, such as organic vapor respirators used for spray painting operations, may be placed in plastic bags. Respirators should not be stored in such places as lockers or tool boxes unless they are in carrying cases or cartons.
- C. Respirators placed at stations and work areas for emergency use should be quickly accessible at all times and should be stored in compartments built for the purpose. The compartments should be clearly marked.
- D. Respirators should be packed or stored so that the face-piece or exhalation valve will rest in a normal position and function will not be impaired by the elastomer setting in an abnormal position.
- E. Instructions for proper storage of emergency respirators, such as gas masks and self-contained breathing apparatus, are found in "use" and "care" instructions usually mounted inside the carrying case lid.

VII. Respirator Inspection and Maintenance

- A. Respirators used routinely shall be inspected before and after each use and during cleaning. Worn or deteriorated parts shall be replaced.
- B. Emergency self-contained breathing apparatus used for Fire Protection will be checked visually on a daily basis. Monthly the masks are physically inspected, donned and then cleaned and disinfected before being stored. Cylinders are fully charged according to the manufacturers instructions. The regulators and warning devices are checked for proper operating function. (Appendices L and M).
- C. Emergency self-contained breathing apparatus stored in maintenance areas at Plants 1 and 5A will be inspected by Fire Protection personnel using Appendices L and M for operation instructions and checklist guide. However, instead of daily visual checks, the equipment will be checked on a weekly basis with a monthly operational check. Gas masks maintained throughout the facilities will be inspected on a monthly basis by the using department.
- D. Respirator inspection shall include a check of the tightness of connections and the condition of the facepiece, headbands, valves, connecting tube and cartridges, cannisters or tanks as applicable. Rubber or elastomer parts shall be inspected for pliability and signs of deterioration. Stretching and manipulating rubber or elastomer parts with a massaging action will keep them pliable and flexible and prevent them from taking a set during storage.
- E. A record shall be kept of inspection dates and findings for respirators maintained for emergency use. (Appendix N).
- F. Replacement of parts or repairs shall be done only by experienced persons with parts designed for the respirator. No attempt shall be made to replace components or to make adjustment or repairs beyond the manufacturer's recommendations. Reducing or admission valves or regulators shall be returned to the manufacturer or to a trained technician for adjustment or repair.
- G. After inspection the respirator shall be properly stored.

VIII. Work Area Surveillance

- A. Appropriate surveillance of work area conditions and degree of employee exposure or stress shall be maintained.
- B. Work area surveillance will include identification of the contaminant (s), nature of the hazard, concentration at the breathing zone and, if appropriate, biological monitoring to be performed by First Aid. The Industrial Hygienist will carefully and fully document this hazard.

IX. Inspection and Evaluation of the Program

- A. Regular inspections by the Industrial Hygienist of the various requirements of the program will be performed and evaluated to determine the continued effectiveness of the program.
- B. Numerous factors affecting employee acceptance of respirators must be evaluated. The factors include comfort, ability to breath without objectionable effort, adequate visibility under all conditions, provisions for wearing prescription glasses, if necessary, ability to communicate, ability to perform all tasks without undue interference and confidence in the facepiece fit. To this end employees will be observed while wearing respirators during normal activities. Employee comments are to be solicited.
- C. Regular inspections by the Industrial Hygienist will be performed to ensure that respirators are properly selected, used, cleaned and maintained.

X. Medical Examinations

- A. Persons shall not be assigned to tasks requiring use of respirators unless it has been determined that they are physically able to perform the work and use the equipment. The Chief of Medical Services, a physician, shall determine what health conditions are pertinent. The respirator user's medical status should be reviewed periodically and at least on an annual basis.
- B. More specific medical surveillance programs are found in OSHA 1910, Subpart Z under specific air contaminant sections, such as 1910.1001 - Asbestos.
- C. Medical examinations are to include pulmonary lung function testing and X-rays as determined by the Chief of Medical Services or as specified in a specific standard in Subpart Z.

XI. Appendices and References

Please refer to the complete BHT Respirator Program if information is needed concerning either the appendices or the references. The complete program has been distributed to all Directors and Managers.