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# Implementing Respiratory Protection Programs in Hospitals

**A GUIDE FOR RESPIRATOR  
PROGRAM ADMINISTRATORS**

**August 2015**



## **Occupational Health Branch California Department of Public Health**

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# Table of Contents

## Guide

<a href="#">Purpose of This Guide</a> .....	1
<a href="#">Why Do Hospitals Need a Respiratory Protection Program?</a> .....	2
<a href="#">Controlling Respiratory Hazards in the Health Care Setting</a> .....	2
<a href="#">The Cal/OSHA Respiratory Protection Standard</a> .....	4
<a href="#">The Cal/OSHA Aerosol Transmissible Diseases Standard</a> .....	5
<a href="#">Understanding Respiratory Protection</a> .....	6
<a href="#">Air-Purifying Respirators</a> .....	7
<a href="#">Air-Supplying Respirators</a> .....	9
<a href="#">Developing a Respiratory Protection Program</a> .....	10
<a href="#">Assigning Responsibility</a> .....	10
<a href="#">Performing a Hazard Evaluation</a> .....	10
<a href="#">Developing Policies and Procedures</a> .....	15
<a href="#">Respirator Selection</a> .....	15
<a href="#">Respirator Use</a> .....	21
<a href="#">Storage/Maintenance/Repair/Disposal</a> .....	22
<a href="#">Medical Evaluations</a> .....	23
<a href="#">Fit Testing</a> .....	25
<a href="#">Training</a> .....	28
<a href="#">Recordkeeping</a> .....	29
<a href="#">Program Evaluation</a> .....	30
<a href="#">Summary</a> .....	31
<a href="#">Abbreviations</a> .....	32
<a href="#">Glossary</a> .....	33

## References, Resources, and Tools

<a href="#">Regulatory Standards and Interpretations</a> .....	37
<a href="#">Healthcare Resources and Guidelines</a> .....	37
<a href="#">General Respiratory Protection Resources</a> .....	39
<a href="#">Medical and Industrial Hygiene Services</a> .....	40
<a href="#">Administrative Resources</a> .....	40
<a href="#">Training and Educational Resources</a> .....	40

**BOXES**

[Examples of Methods for Controlling Exposure to Aerosol Transmissible Disease Pathogens](#) . . . . . 3

[Key Requirements of the Cal/OSHA Respiratory Protection Standard](#) . . . . . 4

[Key Requirements of the Cal/OSHA Aerosol Transmissible Diseases \(ATD\) Standard](#) . . . 5

[NIOSH Filter Classes](#). . . . . 8

[More Information on Respirators](#) . . . . . 9

[Resources for Training for Respirator Program Administrators](#) . . . . . 10

[Cal/OSHA ATD Standard—Diseases/Pathogens Requiring Airborne Infection Isolation](#) . . 11

[Cal/OSHA ATD Standard—Diseases/Pathogens Requiring Droplet Precautions](#). . . . . 12

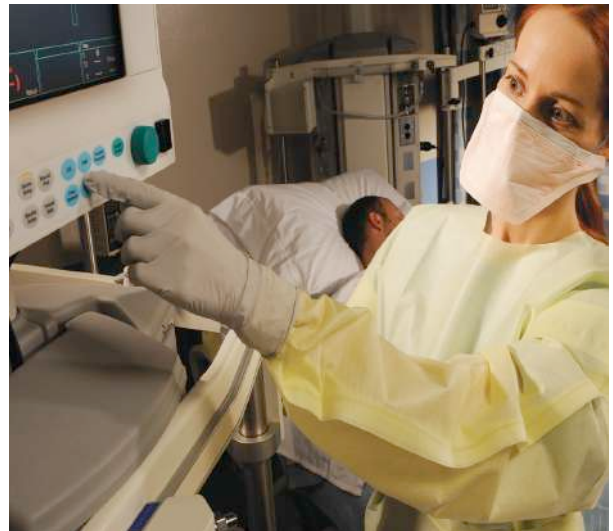
[Cal/OSHA ATD Standard—High Hazard Procedures Definition](#) . . . . .13

[Establish Policies Regarding Non-employees](#) . . . . . 14

[Respirator Selection Guide for Aerosol Transmissible Diseases](#). . . . .19

[Summary of Respirator Selection Considerations](#). . . . . 21

[Summary of Fit Test Requirements](#) . . . . . 28



## Purpose of This Guide

This guide was developed to provide hospitals in California with a useful tool for developing and implementing effective respiratory protection programs, with an emphasis on protecting health care workers from aerosol transmissible diseases. It was prepared by the [Occupational Health Branch \(OHB\) of the California Department of Public Health \(CDPH\)](#) with funding from the [National Institute for Occupational Safety and Health \(NIOSH\) National Personal Protective Technology Laboratory \(NPPTL\)](#).

Hospitals are unique work environments with challenging occupational health and safety issues. Some large hospitals have health and safety personnel who are highly qualified to develop and implement appropriate policies and procedures to control workplace exposures. However, in many smaller facilities with more limited resources, the role of the health and safety professional might be taken on as an added responsibility by someone in the nursing, employee health, or infection control department. This guide is written as a practical, step-by-step manual that can be used by anyone who is charged with the task of setting up and maintaining a respiratory protection program.

This guide includes links ([indicated by underlining](#)) to electronic resources such as templates, sample forms, and educational materials. Some of the tools were developed by the authors of this document; others were produced by other organizations and are available on the internet.

# Why Do Hospitals Need a Respiratory Protection Program?

## Controlling Respiratory Hazards in the Health Care Setting

The hospital environment contains hazards such as bacteria, viruses, and chemicals that may be inhaled by workers and cause illness. Where there are chemical exposures, which can be measured, the standard approach to controlling exposure is to use a hierarchy of controls starting with substitution of less hazardous chemicals or products. Engineering controls (e.g., laboratory hood), administrative controls (e.g., triaging chemical emergency patients), and work practices (e.g., keeping chemical containers capped) are used to reduce concentrations of chemicals in the air and to reduce the number of employees and amount of time exposed. Respirators are used as a last resort when chemical exposures cannot be reduced to an acceptable level using these other methods.

In addition to chemical hazards, hospital employees may be exposed to aerosol transmissible diseases (ATDs), which are diseases or pathogens defined by Cal/OSHA as requiring airborne or droplet precautions. ATD hazards cannot be eliminated or substituted out of the hospital setting, cannot routinely be measured in the air, and have no established occupational exposure limits. In order to protect employees from ATDs, health care facilities must always implement a combination of engineering, administrative, and work practice

controls, as well as providing for vaccination of employees and the use of personal protective equipment, including respirators.

Health care workers who care for patients with ATDs must work in close proximity to the source of the hazard, so even if the room has enhanced ventilation, they are likely to have a higher risk of inhaling infectious aerosols (droplets and particles) than the general public. Exposure of



*Photo enhanced to make airborne droplets visible*

these employees, and others with a higher risk of exposure related to the tasks they perform, can be reduced further by the proper use of respirators. See the box below for some examples of methods used for controlling exposures to ATDs in the health care setting.

Vaccination of health care workers is another key component in preventing disease transmission in hospitals, and employers in California are required to make certain vaccinations available to health care workers free of charge and at a time and place that is reasonable to employees. Hospital vaccination programs must include effective education about the benefits and risks of vaccination, but under Cal/OSHA regulations employees have the right to decline vaccination.

#### EXAMPLES OF METHODS FOR CONTROLLING EXPOSURE TO AEROSOL TRANSMISSIBLE DISEASE PATHOGENS

Minimize the number of employees exposed	Minimize the amount of infectious aerosol in the air	Protect employees who must be exposed
<p>Isolate patients suspected or confirmed with tuberculosis in negative pressure rooms, to separate the source from all employees not providing direct patient care.</p> <p>Use partitions, barriers, or ventilated enclosures to separate employees from the source of the hazard.</p>	<p>Place a surgical mask on patients with a suspected or confirmed ATD.</p> <p>Use closed suctioning systems to minimize the dispersion of aerosol.</p>	<p>Provide vaccinations.</p> <p>Use personal protective equipment (PPE) including respirators when caring for patients with measles (rubeola)</p>

## The Cal/OSHA Respiratory Protection Standard

In California, one of 25 states with a state-run OSHA program, employers must comply with the standards set by Cal/OSHA (Division of Occupational Safety and Health, California Department of Industrial Relations). State standards must be at least as effective as the analogous federal standard. [Cal/OSHA's respiratory protection standard, Title 8 CCR Section 5144](#), is equivalent to the federal standard ([29 CFR 1910.134](#)). All California employers, including hospitals, who have workers who must use respiratory protection to control exposures to airborne contaminants, must comply with

Section 5144. Federal workplaces in California are covered under the federal standard. See the box on the left for a summary of the key requirements of the standard.

The respiratory protection standard requires that all employers who must use respirators to control hazardous exposures have a comprehensive and effective respiratory protection program (RPP). The program must be in writing and is intended to specify the policies and procedures for the use of respiratory protection in the facility. Cal/OSHA requires each respiratory protection program to include several specific elements, but leaves the specifics of these policies and procedures up to individual employers. See the section "Developing a Respiratory Protection Program" for more information.

### KEY REQUIREMENTS OF THE CAL/OSHA RESPIRATORY PROTECTION STANDARD

- ✓ Written respiratory protection program with policies and procedures
- ✓ Designation of a Program Administrator
- ✓ Procedures for hazard evaluation and respirator selection
- ✓ Medical evaluation of respirator wearers
- ✓ Fit testing procedures for tight-fitting respirators (including filtering facepiece respirators)
- ✓ Procedures for proper use, storage, maintenance, repair, and disposal of respirators
- ✓ Training
- ✓ Program evaluation including consultation with employees
- ✓ Recordkeeping

## The Cal/OSHA Aerosol Transmissible Diseases Standard

The [Cal/OSHA Aerosol Transmissible Diseases \(ATD\) Standard \(Title 8 CCR Section 5199\)](#) applies to a variety of facilities, operations, and services where employees have the potential for occupational exposure to aerosol transmissible infectious diseases or pathogens. The ATD standard requires that respiratory protection be used to protect certain workers performing specific tasks and that the use of respirators comply with the respiratory protection standard. The ATD standard includes some exceptions to the fit testing and medical clearance sections of the respiratory protection standard, explained later in this guide. See the box below for a summary of the key requirements of the standard.

### KEY REQUIREMENTS OF THE CAL/OSHA AEROSOL TRANSMISSIBLE DISEASES (ATD) STANDARD

- ✓ Written ATD Exposure Control Plan, including biosafety plan for laboratory operations
- ✓ Designation of a Plan Administrator
- ✓ Hazard evaluation and identification of occupationally exposed employees
- ✓ Exposure control procedures including respiratory protection
- ✓ Medical services
- ✓ Procedures for exposure incidents
- ✓ Surge procedures
- ✓ Training
- ✓ Plan evaluation and procedures for employee participation in review of plan
- ✓ Recordkeeping

# Understanding Respiratory Protection

In order to understand how respirators can be used to protect health care workers, it is important to understand what a respirator is and what it is not. One important distinction that must be made when discussing respirator use in healthcare settings is the difference between respirators and facemasks. Facemasks include surgical masks, which are fluid resistant, and procedure or isolation masks which are not fluid resistant. While some people may call both respirators and facemasks “masks,” this is incorrect as they are very different in their design, performance, and purpose.



**The purpose of a facemask** is to reduce infectious particles being introduced into the room air by the person who is wearing the mask. The facemask is designed to catch droplets that are expelled by the wearer when he/she talks, sneezes, or coughs. This is extremely important in environments where a sterile field must be maintained, such as operating rooms, or when working with potentially immune-compromised patients. Facemasks are also used as part of “droplet precautions” to prevent large droplets from entering the nose and mouth. However, facemasks by design do not seal tightly to the wearer’s face and do NOT prevent inhalation of small particles that may be transmitted from a patient by exhalation, coughs, or certain medical procedures. In addition, the filtration efficiency of facemasks varies greatly between models.



**The purpose of a respirator** is to protect the wearer by reducing the concentration of inhaled contaminants. In a hospital setting, these contaminants may come from processes using hazardous chemicals (e.g., sterilization or laboratory procedures), cleaning and maintenance activities, or from infectious patients who are exhaling, talking, sneezing, and/or coughing in the room in which the health care worker is working.

A [two-page factsheet](#) and a short video, in [English](#) and [Spanish](#), on the differences between facemasks and respirators are available from OSHA as training resources.

Different types of respirators are designed to protect against different hazards. The type of airborne contaminant, its concentration, and its potential to cause a health effect in exposed workers dictate the type of respirator that must be worn. Respirators are available in many types, models, and sizes from several manufacturers for a variety of applications. All respirators used in the workplace must be tested by the manufacturer and approved by the National Institute for Occupational Safety and Health (NIOSH).



Described below are two major types of respirators: air-purifying respirators and air-supplying respirators.

## Air-Purifying Respirators

Air-purifying respirators (APRs) work by removing gases, vapors, aerosols (droplets and solid particles), or a combination of contaminants from the air through the use of filters, cartridges, or canisters. APRs with filters will remove particles (also called aerosols) from the inhaled air, while those with cartridges or canisters are designed to remove gases and vapors. To help employers select the right protection for a specific contaminant, all filters, cartridges, and canisters must carry a label approved by NIOSH.





## TYPES OF AIR-PURIFYING RESPIRATORS:

**Non-powered, or negative-pressure, respirators** have a tight-fitting facepiece, which can be either a half mask that covers the nose and mouth or a full facepiece (covers the nose, mouth, and eyes). They may be disposable (or “single-use,” meaning the filter is not replaceable and the respirator cannot be cleaned) filtering facepiece respirators where the entire facepiece is made of filtering material, or elastomeric respirators that have replaceable filters or cartridges. “N95 respirator” is a term used to refer to a filtering facepiece APR with an approved N95 filter. Approved N95 respirators are also available with surgical mask material on the outside to protect the wearer from splashes (sometimes referred to as “surgical N95 respirators”). See the box below for more information on different classes of NIOSH-approved filters.

### NIOSH FILTER CLASSES

Class	Description
N95	Filters at least 95% of airborne particles. Not resistant to oil.
N99	Filters at least 99% of airborne particles. Not resistant to oil.
N100	Filters at least 99.97% of airborne particles. Not resistant to oil.
R95	Filters at least 95% of airborne particles. Resistant to oil.
P95	Filters at least 95% of airborne particles. Oil proof (strongly resistant to oil).
P99	Filters at least 99% of airborne particles. Oil proof (strongly resistant to oil).
P100	Filters at least 99.97% of airborne particles. Oil proof (strongly resistant to oil).
HE (high efficiency)	Filters at least 99.97% of airborne particles. For use on PAPRs only.

**Powered air-purifying respirators (PAPRs)** can have a tight-fitting facepiece or a hood, helmet, or other type of loose-fitting facepiece. PAPRs have a battery-powered blower that pulls the air in the room through filters (for particles) or cartridges (for gases/vapors) to clean it before delivering it to the breathing zone of the wearer.



## Air-Supplying Respirators

Air-supplying respirators work by providing clean breathing air from an uncontaminated source. These respirators consist of a tight-fitting facepiece, a hood, a helmet, or other type of loose-fitting facepiece, and breathing air which is supplied by a compressor or a pressurized cylinder. They do not require filters or cartridges and will protect the wearer from all types of contaminants present (particles or gases/vapors). These respirators are less likely to be used in a hospital setting except, perhaps, by emergency responders or construction contractors.



See the box below for more information sources on respiratory protection.

### MORE INFORMATION ON RESPIRATORS

#### CDPH-OHB Respirator Topic Page

[www.cdph.ca.gov/programs/ohb/Pages/Resp.aspx](http://www.cdph.ca.gov/programs/ohb/Pages/Resp.aspx)

#### NIOSH National Personal Protective Technology Laboratory

[www.cdc.gov/niosh/npptl](http://www.cdc.gov/niosh/npptl)

#### NIOSH Respirator Topic Page

[www.cdc.gov/niosh/topics/respirators/](http://www.cdc.gov/niosh/topics/respirators/)

#### NIOSH Respirator Trusted-Source Page

[www.cdc.gov/niosh/npptl/topics/respirators/dispart/RespSource.html](http://www.cdc.gov/niosh/npptl/topics/respirators/dispart/RespSource.html)

#### NIOSH Science Blog: N95 Respirators and Surgical Masks

[blogs.cdc.gov/niosh-science-blog/2009/10/n95/](http://blogs.cdc.gov/niosh-science-blog/2009/10/n95/)

#### Federal OSHA Respiratory Protection Topic Page

[www.osha.gov/SLTC/respiratoryprotection/index.html](http://www.osha.gov/SLTC/respiratoryprotection/index.html)

#### Federal OSHA Respiratory Protection e-Tool

[www.osha.gov/SLTC/etools/respiratory/respirator\\_selection.html](http://www.osha.gov/SLTC/etools/respiratory/respirator_selection.html)

#### Cal/OSHA Guide to Respiratory Protection in the Workplace

[www.dir.ca.gov/dosh/dosh\\_publications/respiratory.pdf](http://www.dir.ca.gov/dosh/dosh_publications/respiratory.pdf)

# Developing a Respiratory Protection Program

## Assigning Responsibility

A key component to a successful respiratory protection program (RPP) is the assignment of responsibilities for the implementation and administration of the program. Cal/OSHA requires that “the program be administered by a suitably trained program administrator.” Although the program administrator does not have to be a health and safety professional, he/she must have expertise in the principles of respiratory protection. See the box below for a list of training resources.

## Performing a Hazard Evaluation

The purpose of the hazard evaluation is to identify potential exposures in the workplace that might require the use of respiratory protection so that these hazards can be quantified to the extent feasible and appropriate respiratory protection can be selected.

The hazard evaluation must be completed for all respiratory hazards, including chemical exposures as well as exposure to infectious diseases. In the case of infectious diseases, it is not generally feasible to quantify

### RESOURCES FOR TRAINING FOR RESPIRATOR PROGRAM ADMINISTRATORS

**Respiratory Protection Course provided by the OSHA Training Institute at the UC San Diego Extension**

[osha.ucsd.edu/index.cfm?vAction=singleCourse&vCourse=FPM-40303](https://osha.ucsd.edu/index.cfm?vAction=singleCourse&vCourse=FPM-40303)

**Center for Occupational and Environmental Health (COEH) at Berkeley—joint program involving UC Berkeley, UCSF, and UC Davis**

[www.coehce.org](http://www.coehce.org)

**Southern CA Education and Research Center—Continuing education at UCLA and UC Irvine**

[www.ph.ucla.edu/erc/ced.php](http://www.ph.ucla.edu/erc/ced.php)

**CAL/OSHA ATD STANDARD—DISEASES/PATHOGENS  
REQUIRING AIRBORNE INFECTION ISOLATION** (designated in  
the standard as “airborne infectious diseases” or AirIDs)

Aerosolizable spore-containing powders such as Anthrax/Bacillus anthracis	Severe acute respiratory syndrome (SARS)
Avian influenza/Avian influenza A (strains capable of causing serious disease in humans)	Smallpox (variola)/Variola virus
Varicella disease (chickenpox, disseminated shingles)	Tuberculosis (TB)/Mycobacterium tuberculosis
Measles (rubeola)/ Measles virus	Novel or unknown pathogens as defined by the standard
Monkeypox/Monkeypox virus	Any other disease for which public health guidelines recommend airborne infection isolation

the level of exposure, nor is it known what level of exposure will cause infection in a specific individual. Therefore, selection of respirators for infectious diseases must be done according to anticipated exposure by task according to public health guidance and, in California, following the requirements of the Cal/OSHA ATD standard.

When conducting a hazard evaluation in the patient care setting, it is useful to start with the requirements of the ATD standard and systematically consider all of the activities in your units.

First, think about who will be in contact with patients who may have aerosol transmissible diseases, such as tuberculosis or influenza. These diseases are divided by Cal/OSHA into two categories: 1) airborne infectious diseases (AirIDs), which require airborne precautions; and 2) diseases requiring droplet precautions. See the boxes below and on the next page for complete lists of diseases covered under the ATD standard. Note that for laboratory operations, the ATD standard includes a separate list of pathogens that are transmitted by laboratory aerosols, and from which lab workers must be protected.

The following questions should help to guide your thinking about who in your facility may be reasonably anticipated to be exposed to patients or other sources of aerosol transmissible pathogens. You may refer

## CAL/OSHA ATD STANDARD—DISEASES/PATHOGENS REQUIRING DROPLET PRECAUTIONS

Diphtheria pharyngeal	Pneumonia
Epiglottitis, due to <i>Haemophilus influenzae</i> type b	Adenovirus
<i>Haemophilus influenzae</i> Serotype b (Hib) disease/ <i>Haemophilus influenzae</i> serotype b—Infants and children	<i>Haemophilus influenzae</i> Serotype b, infants and children
Influenza, human (typical seasonal variations)/influenza viruses*	Meningococcal
Meningitis	<i>Mycoplasma</i> , primary atypical
<i>Haemophilus influenzae</i> , type b known or suspected	<i>Streptococcus</i> Group A
<i>Neisseria meningitidis</i> (meningococcal) known or suspected	Pneumonic plague/ <i>Yersinia pestis</i>
Meningococcal disease sepsis, pneumonia (see also meningitis)	Rubella virus infection (German measles)/Rubella virus
Mumps (infectious parotitis)/Mumps virus	Severe acute respiratory syndrome (SARS)
Mycoplasmal pneumonia	Streptococcal disease (group A streptococcus)
Parvovirus B19 infection (erythema infectiosum)	Skin, wound or burn, Major
Pertussis (whooping cough)	Pharyngitis in infants and young children
Pharyngitis in infants and young children/Adenovirus, Orthomyxoviridae, Epstein-Barr virus, Herpes simplex virus,	Pneumonia
	Scarlet fever in infants and young children
	Serious invasive disease
	Viral hemorrhagic fevers due to Lassa, Ebola, Marburg, Crimean-Congo fever viruses (airborne infection isolation and respirator use may be required for aerosol-generating procedures)
	Any other disease for which public health guidelines recommend droplet precautions

\* Note: Seasonal influenza and Ebola virus disease are the only diseases requiring droplet precautions for which Cal/OSHA currently requires respirator use under certain circumstances. See the box on page 19 and the “Stay Informed” discussion starting on page 18.

to the [ATD standard](#) for a more complete definition of “occupational exposure” as it is used in the regulation.

- Who is exposed to suspected or confirmed cases of ATDs?
  - Who will greet and triage patients?
  - Who will provide care for ATD patients?
- Who will be performing **high hazard procedures** on these patients, on cadavers, or in laboratories? See the box below for a definition of high hazard (also known as “aerosol-generating”) procedures.
- Who will be cleaning the patient rooms?
- Do you have students or contractors (e.g., those who service ventilation systems), or temporary workers in your facility who are reasonably anticipated to be exposed to patients or equipment that may be a source of aerosol transmissible pathogens?
- Who will be designated as a first receiver of victims exposed to unknown biological or chemical agents?
- Will physicians or others who are not hospital employees be included in your respirator program?

#### CAL/OSHA ATD STANDARD— HIGH HAZARD PROCEDURES DEFINITION

High hazard procedures are “procedures performed on a person who is a case or suspected case of an aerosol transmissible disease (or on a specimen suspected of containing an aerosol transmissible pathogen in a laboratory), in which the potential for being exposed to aerosol transmissible pathogens is increased due to the reasonably anticipated generation of aerosolized pathogens.”

Such procedures include, but are not limited to:

- ✓ Sputum induction
- ✓ Bronchoscopy
- ✓ Aerosolized administration of pentamidine or other medications
- ✓ Pulmonary function testing
- ✓ Autopsy, clinical, surgical, and laboratory procedures that may aerosolize pathogens.

Based on an assessment of the potential exposure hazards, you will then make a determination regarding the minimum level of respiratory protection required for these exposures. Will you require N95s? Will you require PAPRs? This topic will be discussed further in the section on “Respirator Selection.”

Next, think about other hospital employees who may have exposure to respiratory hazards other than ATDs.

### ESTABLISH POLICIES REGARDING NON-EMPLOYEES

Because hospitals often have many people working in them who are not direct employees of the hospital, you must also consider what your policy will be regarding employees of other employers, such as physicians, students, contractors, and registries or other agencies. Although they may not be employed directly by the hospital, your facility will likely share some responsibility for ensuring their protection. Generally, all people working in the hospital should be required to follow your policies regarding infection control, including respirator use. There should be a clear agreement about who is responsible for implementing all elements of the respirator program for these people (specify this in your written policy).

See the following web sites for Cal/ OSHA policies and procedures for dual employer and multi-employer sites.

- ✓ [www.dir.ca.gov/doshpol/p&pc-1c.htm](http://www.dir.ca.gov/doshpol/p&pc-1c.htm)
- ✓ [www.dir.ca.gov/doshpol/p&pc-1d.htm](http://www.dir.ca.gov/doshpol/p&pc-1d.htm)

- Are there housekeeping or maintenance personnel who are exposed to chemicals used in cleaning, repairs, or facility maintenance?
- Is anyone in Central Supply exposed to hazardous chemicals used in disinfection or sterilization?
- Are there research or clinical laboratories with staff who will need respiratory protection?

If you have employees with exposures to hazards other than infectious diseases, you must determine whether or not to have one umbrella RPP covering all respirator use, or whether you might want two different programs—one for chemical exposures and the other for ATD exposures that can be incorporated into your ATD Exposure Control Plan. Either choice is acceptable. You may want to administer a program for personnel with exposures other than ATDs out of your Health and Safety Office, but designate the responsibility of ATD exposure control, including an RPP for ATDs, to the Infection Control Department.

The next part of the hazard

assessment is the measurement of air concentrations of hazards to which employees are exposed. We do not currently make direct measurements of concentrations of infectious aerosols in air as we do with many hazardous substances. Instead, we estimate levels of exposure based on the task or procedure being performed, as well as on the suspected disease risk. For chemical exposures, airborne concentrations should be measured in order to determine the level of respiratory protection that will be needed to reduce the exposure to acceptable levels. If you have employees exposed to hazards other than infectious diseases and do not have the expertise in-house to do the appropriate air sampling, an industrial hygiene consultant can be used.

American Industrial Hygiene Association (AIHA) List of Consultants

<https://www.aiha.org/about-ih/Pages/Find-an-Industrial-Hygienist.aspx>

You may also ask for help with air sampling for exposures other than ATDs from your workers' compensation insurance carrier or from the Cal/OSHA Consultation Service (1-800-963-9424).

## Developing Policies and Procedures

Once you have determined who will administer the program and which employees will be included, you are ready to develop the written policies and procedures that will make up your written RPP. The RPP must have a section that addresses each of the elements described below. A [template for a written RPP](#) specifically designed for hospitals is available for your use. You may find that customizing this template is the easiest way to develop your written program. If you choose to do this, it is best to use this guide and the template together. The following sections go through the process of developing each of the required elements of your written program.

### Respirator Selection

In this section of your written RPP, you should document the results of your hazard evaluation and determine which types of respirators will be used by specific staff or job titles, and for specific tasks or procedures. You may want to put all of this information into a table or spreadsheet either in the body of your written program, or as an appendix. The ATD standard establishes minimum respirator requirements for certain tasks and infectious agents. However, employers are always responsible to assess respiratory hazards, and the requirements in the ATD standard are only minimum requirements.

## ***Minimum Respirator Requirements in the ATD Standard***

Employees who perform any of the following activities must wear **at least an N95 respirator**:

- Enters an airborne infection isolation (AII) room or area in use for AII;
- Is present during the performance of procedures or services for an AirID case or suspected case;
- Repairs, replaces, or maintains air systems or equipment that may contain or generate aerosolized pathogens;
- Is working in an area occupied by an AirID case or suspected case, during decontamination procedures, or after the person has left the area and the room air has not yet been adequately ventilated to clear contaminants;
- Is working in a residence where an AirID case or suspected case is known to be present;
- Is present during the performance of aerosol generating procedures on cadavers that are suspected of, or confirmed as, being infected with aerosol transmissible pathogens;
- Is performing a task for which the Biosafety Plan or Exposure Control Plan requires the use of respirators; or
- Transports an AirID case or suspected case within the facility or in an enclosed vehicle (e.g., van, car, ambulance or helicopter) when the patient is not masked.



N95 filtering facepiece respirators are approved by NIOSH to reduce exposures to airborne contaminants to one tenth of the concentration that is in the air, which is considered the recommended level of protection for routine patient care.

Any employee performing a **high hazard procedure on a confirmed or suspected AirID case**, or who is in the area where the procedure is being performed, can be exposed to much higher concentrations of aerosol. These employees must wear a respirator providing at least as much protection as a **powered air purifying respirator (PAPR) with a high efficiency particulate air (HEPA) filter**, unless the employer has determined that this would interfere with the successful performance of the task (must be documented in ATD Plan) or the procedure is performed with the patient in a ventilated enclosure. A PAPR with a loose-fitting hood and a high efficiency (HE) filter is

expected to reduce exposure to airborne contaminants to 1/25th of the concentration in the room. Some PAPRs are approved for a higher protection level, reducing exposure to 1/1000th of room concentration; check with your manufacturer.

Any employee performing a high hazard procedure on a patient with confirmed or suspected seasonal influenza must wear at least an N95 respirator even though influenza has previously been considered a disease requiring only droplet precautions (surgical mask). See the [CDC](#), [CDPH](#), and [Cal/OSHA](#) flu guidance documents.



### **The Respirator Selection Guide for Aerosol Transmissible Diseases**

in the box on page 19 will be useful in making appropriate respirator selections for specific diseases and tasks, and for training your staff on respirator use.

### ***Selecting Respiratory Protection in the Laboratory or Autopsy Setting***

Assessment of exposure risk and selection of respirators and other control measures for hospital laboratory and autopsy workers exposed to ATD pathogens must be based on consideration of different factors than those for workers providing patient care. In the lab, the primary factors include the pathogen that is likely to be present in the material being handled (which may be unknown), and whether the procedures to be performed by the employee are likely to generate aerosols.

Laboratory worker protection policies should be described in a written biosafety plan, developed by the lab biological safety officer and other personnel with knowledge of laboratory procedures as well as worker protection expertise. The primary resource for lab biosafety, including risk assessment, recommended practices, selection of controls, and containment levels, is the CDC's [Biosafety in Microbiological and Biomedical Laboratories \(BMBL\)](#).

Your written RPP should cover laboratory workers and specify the level of respiratory protection required for different pathogens or job tasks, in accordance with the biosafety plan and other written lab operating

procedures.

### ***Stay Informed as Public Health Guidance is Updated***

Keep in mind that Cal/OSHA respirator requirements to protect against infectious diseases are based on guidance from the Centers for Disease Control and Prevention (CDC) and/or CDPH. It is important to stay informed about any changes in public health guidance as new pathogens emerge or relevant new scientific information becomes available. You will then need to consider how your facility's policies and practices may need to change.

For example, the CDC issued new guidance in 2014 for [Ebola virus disease](#) recommending at least an N95 respirator for all patient care and support. CDPH recommended and Cal/OSHA required more protective PAPRs for high hazard procedures.

As another example, [CDC](#) issued updated guidance on infection control for the 2010-11 seasonal influenza, which was followed by guidance from [CDPH](#) and [Cal/OSHA](#). CDC recommended that health care workers don a facemask during patient care involving suspected or confirmed influenza, rather than N95 respirators as were used for 2009 H1N1 influenza.

Recognizing that the use of a facemask instead of a fit tested N95 respirator may increase the risk of influenza transmission to health care workers, both CDPH and Cal/OSHA have encouraged health care facilities to continue to include all employees who have direct contact with influenza patients in their respiratory protection program, and to provide fitted respirators to employees who may request to use them in place of facemasks. This is particularly important for employees who may be immunologically compromised or have other reasons to want to minimize their risk of contracting influenza. A respirator policy such as this will both make respirators available to employees who wish to protect themselves against influenza and help to ensure that preparedness is maintained against other infectious disease threats that may arise.

CDC also recommended the use of respiratory protection at least as effective as fit tested N95 respirators, as well as airborne infection isolation, when high hazard (aerosol-generating) procedures are performed on patients with suspected or confirmed influenza. CDPH concurred with this new recommendation, and Cal/OSHA stated it would enforce these recommendations. This recommendation raises

the issue of whether respirator use during high hazard procedures should also be considered for other infectious diseases (e.g., pertussis, meningococcal disease) that currently call for droplet precautions.

## RESPIRATOR SELECTION GUIDE FOR AEROSOL TRANSMISSIBLE DISEASES

The employer is responsible for selecting PPE, including but not limited to respiratory protection, appropriate for the hazard and the environment. The employer can always choose to select a higher level of respiratory protection than the minimum required.

Disease	Job Task	Respirator
Airborne infectious disease* (suspected or confirmed)	Routine patient care & support operations	At least N95
	High hazard procedures**	At least PAPR
Seasonal influenza (suspected or confirmed)	Routine patient care & support operations	In accordance with facility policy; CDPH recommends at least permitting optional N95 use
	High hazard procedures**	At least N95
Other diseases requiring droplet precautions***	In accordance with facility policy	

\* See list on page 11

\*\* See definition on page 13

\*\*\* See list on page 12



### ***PAPRs Used by First Receivers***

You may also have employees who have been designated First Receivers for emergency response purposes. These employees are expected to decontaminate or provide initial care for victims of a biological or chemical emergency. Because their exposures may be to unknown substances, hospital First Receivers are required to use the most protective type of PAPR equipped with a filter and chemical cartridge. These PAPRs have a full facepiece, or a hood or helmet, and a combination HE filter and chemical cartridge approved for biological, radiological, and nuclear (CBRN) exposures. They must be a type that will reduce the exposure of the wearer to 1/1000th of the concentration that is in the air.

### ***Use of Respirators and Maintaining a Sterile Field***

Yet another consideration is which respirators to use for high hazard or other procedures conducted in operating rooms or other settings that involve maintaining a “sterile field” free of microorganisms. There is some concern that exhaled air from wearers of PAPRs or APRs with exhalation valves) can flow into the sterile field. Local exhaust ventilation and adequate dilution ventilation should be used where possible at the source of aerosol generation to reduce the need for respiratory protection. Surgical respirators (without exhalation valves) should be selected for use in environments where a sterile field must be maintained. Currently, there is insufficient evidence to support the safe use of PAPRs in these environments.

### ***Respirators for Chemical Gas or Vapor Hazards***

It is important to note that N95 filtering facepiece respirators and PAPRs with only HE filters should not be used to protect the wearer from gas or vapor exposures. N95 and HE filters are designed to remove particles from the air, but will do nothing to remove glutaraldehyde, formaldehyde, ethylene oxide, or other gases or vapors.

If you need help selecting respirators for exposures to hazards other than infectious agents, the following resources will be helpful in making your selection.

NIOSH Respirator Trusted-Source Information Page:

[www.cdc.gov/niosh/npptl/topics/respirators/disp\\_part/RespSource.html](http://www.cdc.gov/niosh/npptl/topics/respirators/disp_part/RespSource.html)

Federal OSHA Respirator e-Tool:

[www.osha.gov/SLTC/etools/respiratory/index.html](http://www.osha.gov/SLTC/etools/respiratory/index.html)

Learn how to select appropriate respirators and develop a change schedule for cartridges.

## Respirator Use

In this section of your written RPP, describe your facility's policies regarding the use of respirators. Include detailed procedures for the routine use of respirators. For example, describe proper inspection and donning procedures and state that users will always perform a user seal check whenever they don a tight-fitting respirator. Describe proper doffing procedures, including the importance of the sequence of removal of the respirator with other PPE so as to avoid self-contamination (see the [CDC slide show](#)).

In order to clearly state your policies for respirator use, it might be helpful to answer the following question. What will your policy be for employees with facial hair or other conditions that prevent a good seal to the face? Employees who use tight-fitting respirators are not permitted to have facial hair that interferes with the facepiece seal. Hospitals may also provide PAPRs to employees who have facial hair, or for whom other respirators available at the facility do not provide an acceptable fit. This is acceptable as long as they consistently use the PAPR when required, have been trained in its use, and the PAPR provides adequate protection for the specific hazard.

## SUMMARY OF RESPIRATOR SELECTION CONSIDERATIONS

- ✓ Determine who has potential occupational exposure to ATDs.
- ✓ Use the ATD Standard requirements and public health guidelines in choosing the appropriate level of protection for each task.
- ✓ Make sure the respirators you have selected are NIOSH-approved and provide the appropriate level of protection from all types of contaminants as needed. Consult an industrial hygienist if you have questions.
- ✓ Make sure that the chosen respirator is not putting the patient at risk and that use is consistent with other infection prevention policies.
- ✓ Stay aware of changes in respirator selection guidance.



List the reasons for which an employee might leave a contaminated area to adjust or replace their respirator. These should include problems with the use of the respirator such as difficulty breathing, loss of face seal, gross contamination or saturation of the filter material, etc. This list should include a policy that wearers of reusable respirators with chemical cartridges must leave the contaminated area to replace the cartridges when they detect breakthrough of the contaminant or because the usable service life has been reached.

## **Storage, Maintenance, Repair, and Disposal**

This section should have very detailed and specific procedures that apply to N95s, PAPRs, and any other type of respirator used.

- Where are the respirators stored?
- Who maintains them?
- Who makes sure there are enough of them?

Most hospitals keep carts of N95s on the floor of each unit, or at least outside the isolation rooms, while PAPRs are often kept in Central Supply and are ordered when needed for high hazard procedures (see one hospital's example of a [PAPR procurement procedure](#)). Some hospitals have decided that since most high hazard procedures will be done by the respiratory therapy department, the PAPRs will be stored there. Some hospitals issue PAPR hoods to individuals, who are responsible for maintaining them, while Central Supply or Materials Management is responsible for decontaminating PAPR pumps and charging batteries. Whatever you decide works best for your facility should be described here.

Filtering facepiece respirators are designed to be worn by one individual (i.e., not shared) and disposed of after use. Users should discard respirators when they become unsuitable for further use due to excessive breathing resistance (e.g., particulates clogging the filter), unacceptable contamination/soiling, or physical damage. Filtering facepiece respirators should be removed with minimal handling and disposed of properly. Hand hygiene should always be performed after removing a respirator.

From the standpoint of the wearer's protection, filtering facepiece respirators may be taken off and put on again as long as they are not damaged or soiled, or contaminated inside the facepiece. However, a respirator used in the care of an infectious patient should be considered potentially contaminated with infectious material on the

outside and a source of contact transmission for healthcare personnel or patients. Therefore, the risk of contaminating the inside of the respirator through improper handling and the risk of infecting the patient must be weighed when making decisions about redonning filtering facepiece respirators. Tuberculosis is not transmitted via contact and, therefore, reuse by the same wearer is acceptable as long as the filtering facepiece respirator is not damaged or soiled.

[NIOSH has issued guidance](#) on extended use and limited reuse of N95 filtering facepiece respirators in healthcare settings.

Describe your facility's policies regarding use and disposal of filtering facepiece respirators in the written RPP, including policies, procedures, and training to reduce the potential for contact transmission. If different policies on reuse may be implemented in the event of a respirator shortage, the RPP should address those policies (or be updated to document changes in policies).

You should also describe procedures to follow when users discover problems with respirators.

- To whom do they report the problem?
- Who does the repairs?
- Who decides when to discard a reusable respirator and replace it rather than trying to repair it?
- What are the procedures for disposal of used or damaged N95s?



## Medical Evaluations

The respirator standard requires that employees be medically evaluated and cleared for respirator use prior to wearing a respirator or being fit tested. Respirators cause an increased resistance to breathing and there can be a build-up of carbon dioxide inside the facepiece. This can lead to medical complications in some individuals for whom it may not be safe to wear a respirator. It may also be unsafe for someone with moderate to severe claustrophobia to wear a respirator. Medical evaluations must be provided by the employer during work time and at no cost to the employee.

The standard requires medical clearance prior to initial respirator use and when there is a change in health status, and otherwise allows



the employer's health care provider to determine if more frequent medical evaluations are necessary. Many hospitals, however, elect to do medical clearance annually as part of an annual occupational medicine evaluation.

Employers must provide the medical professional evaluating the employee with a description of the type and weight of respirator to be used, the duration and frequency of use, the expected physical work effort, additional protective clothing

and equipment to be worn, and temperature and humidity extremes that may be encountered. This information is critical to the medical professional's determination regarding the employee's ability to use a respirator.

**Appendix C of the respirator standard** is a questionnaire that includes information that must be reviewed by a physician or other licensed health care professional (PLHCP) either in questionnaire format, or in person during a visit to the PLHCP. The PLHCP might be within the hospital, but may be a contracted provider for hospitals that do not have internal occupational health services. The best outside sources for such evaluations are occupational medicine providers or clinics such as members of the Association of Occupational and Environmental Clinics (AOEC). A membership roster is available at [www.aoec.org/directory.htm](http://www.aoec.org/directory.htm). These clinics provide medical clearance for respirator use, may provide fit testing services, and meet certain criteria for quality patient care.

The ATD standard has an alternative medical evaluation questionnaire (**Appendix B to the standard**) that can be used by health care workers using respirators only for protection against ATDs. It is shorter than the one in the respirator standard.

Make sure you are clear which questionnaire will be used and where it will be sent for evaluation, and describe these procedures in your written RPP. The completed questionnaires are considered personal health information, so there must be a procedure by which they are confidentially provided to the PLHCP. Completed questionnaires should be maintained as confidential medical records (see Recordkeeping section).

Based on the answers to the questionnaire, as well as on a physical exam or any other tests the PLHCP deems necessary, the PLHCP must make a determination as to whether the individual can safely wear the respirator. The PLHCP must inform the employer (respirator program administrator or supervisor) in writing whether the individual is cleared for respirator use, cleared with certain conditions or restrictions (e.g., only for PAPR use, only for limited duration, etc.), or not cleared for respirator use, and whether there is a need for a follow-up medical evaluation. The details of the medical evaluation, including specific medical diagnoses or test results should not be shared with the employer.

Your program should include a clear policy as to what will be done if someone is not cleared for respirator use. Employees who are not cleared cannot be exposed to situations in which a respirator is necessary to protect them. If the PLHCP specifies that a person designated to use an N95 or other non-powered air purifying respirator must use a PAPR due to a health risk, the employer must provide a PAPR to that person.

## Fit Testing

Fit testing is one of the most important parts of the respirator program because it is the only recognized tool to assess the fit of a specific respirator model and size to the face of the user.

Fit testing is required for all users of respirators with tight-fitting facepieces. The fit test ensures that, when donned properly, the selected brand and size of respirator fits adequately to protect the wearer from excessive inward leakage of contaminant through the face seal. The fit test must be repeated annually and whenever there are any changes such as weight gain or weight loss that would alter the fit of the facepiece. The fit test must always be completed if there are potential changes in fit, or if requested by the employee.

Describe your procedures for coordinating fit testing for your staff, as well as the specific, detailed fit testing protocol that will be used. [The Cal/OSHA Respiratory Protection Standard Appendix A](#) has specific protocols which must be followed exactly in fit testing employees for respirators, and it



is acceptable to copy and paste one or more of these into your RPP. First, there are general requirements that pertain to selecting an appropriately sized respirator, some basic training on donning the respirator and performing a user seal check, and descriptions of the specific exercises that are to be performed during the fit test to verify an adequate seal during several routine work activities.

Second, there are detailed protocols for four different qualitative (i.e., wearer indicates fit based on detection of a chemical) fit tests and three quantitative (i.e., provides a numerical test result) fit tests from which you may choose.

**Qualitative Tests:** Two of the qualitative fit test protocols specified in the respiratory protection standard—the saccharin and Bitrex® tests—may be used for fit testing N95 respirators. In the saccharin and Bitrex® tests, the user is exposed to a saccharin (sweet-tasting) or Bitrex® (bitter-tasting) aerosol. It is up to the respirator user to let the tester know if he/she tastes the test aerosol at any time. Because these tests rely on the user's subjective detection of leakage when challenged with a test agent, the protocols require pre-screening to determine each user's ability to detect the specific test agent.



**Quantitative Tests:** There are three approved quantitative fit tests and all require an investment in relatively expensive equipment. The most common quantitative protocol used in hospitals is the ambient aerosol condensation nuclei counter (CNC) test. With the correct equipment, this test can be used for all types of respirators and provides an automated calculation of the effectiveness fit (fit factor) by consecutively measuring and comparing the concentration of

airborne particles inside and outside the facepiece.

It is critical that the person conducting the fit testing follows the protocol as written in the standard. Most hospitals do qualitative fit testing using either the saccharin or Bitrex® protocol. There may be some, however, who do quantitative fit testing.

It is the Program Administrator's responsibility to ensure that the person conducting the fit tests is competent. There is no licensing or certification required for someone to do fit testing. Anyone can do it as

long as they understand how to follow the protocol and are skilled at training people on how to don and doff their respirator and perform a user seal check. In some hospitals, the Employee Health Department or an occupational health clinic is responsible for both medical evaluations and fit testing, and they can be done in one visit. In other hospitals, the Infection Preventionist is responsible for fit testing the employees with N95s. Still others train each of the unit managers to fit test their own staff so that one person is not charged with fit testing hundreds of employees. Some hospitals do all of their fit testing and training in one month. Others spread it out so that each employee is tested during their anniversary month. You should decide which approaches work best for you and your facility.

Once employees have been fit tested, it is a good idea to implement a mechanism to help them to remember which respirator they are supposed to wear. Some hospitals issue [wallet-sized cards](#), while others provide stickers for the back of employee badges.

Fit testing takes time, but it is critical to ensure the safety of the employees relying on their respirators for the expected degree of protection. Again, if this is too much time and effort for hospital personnel, there are [consultants who provide fit testing services](#). In addition to the industrial hygiene consultants who do this, some of the respirator manufacturers will provide train-the-trainer services so you can have multiple in-house staff with these skills. There are also some workers' compensation insurance companies who may provide similar assistance to their customers.

A summary of fit testing requirements appears in the box on the following page.

## SUMMARY OF FIT TEST REQUIREMENTS

- ✓ All employees required to wear tight-fitting respirators must be fit tested after receiving medical clearance, prior to respirator use, and annually thereafter.
- ✓ An approved fit test protocol must be used. This may be a qualitative test using Bitrex® or saccharin, or a quantitative test using a condensation nuclei counter.
- ✓ The protocol must be followed exactly as it is written in the standard, but may be performed by any individual qualified to follow the protocol and to train the employee in the proper donning and doffing of the respirator.
- ✓ Records of fit tests must be kept on file until the next annual test is performed, and you must make sure that employees use only the respirators for which they have passed a fit test.
- ✓ There is no fit test requirement for PAPRs with loose-fitting facepieces, hoods, or helmets. A PAPR with a tight-fitting facepiece requires fit testing (with the blower off).

## Training

Employee training is a critical component of an effective RPP. It requires significant time and resources and must be conducted prior to respirator use, at least annually thereafter, and whenever necessary due to changes in the workplace or identified inadequacies in the employee's knowledge. The annual fit test provides an opportunity for hands-on learning and serves to reinforce some of the topics covered in training. Some hospitals include respirator training as part of a skills day for their employees and require them to pass a competency test.

This section of your written program must include both the mechanism for getting everyone trained in a way that they can understand and a description of the curriculum, including all of the topics that are required by the standard to be covered. These are:

- Why the respirator is necessary (including when it must be worn);
- Why proper fit, usage, and maintenance is crucial to its effectiveness;
- What the limitations and capabilities of the respirator are;
- How to use the respirator in emergencies if appropriate;

- How to inspect, put on, remove, use, and check the seal of the respirator;
- What the procedures are for storage and maintenance;
- How to recognize medical signs or symptoms that limit or prevent the safe, effective use of respirators;
- The general requirements of the respirator standard;
- How to identify and react to respirator malfunctions; and
- How to use the respirator in emergencies (e.g., chemical release) if appropriate.

There are a number of [educational tools](#) (including slide presentations, posters, and flyers) in the References, Resources, and Tools section of this document. You may use these materials during your annual training and as needed year round to make sure that employees are up-to-date on their knowledge of respiratory protection and its proper use. However, you must ensure that respirator users are fully trained on the specific risks and programs and procedures at your hospital.

## Recordkeeping

The respirator standard requires that several types of records be maintained. The written RPP must be maintained in a location that is accessible to all program participants, and it must be made available to Cal/OSHA on request. We recommend documenting the changes that are made to the RPP along with any evaluation checklists that are completed during program evaluation (see next section). The current program, however, can be kept online for access by participants.

You must also keep a record of the employee medical evaluations. The questionnaires and any notes from physical exams are medically confidential, so these are often maintained by the PLHCP who does the medical clearance evaluations. They must be maintained for 30 years after termination of employment. The medical clearance letters that are provided by the PLHCP should be kept on file by the Respirator Program Administrator (RPA) as evidence that the employee has been cleared. It would make sense to keep these with the fit test records.

Fit test records must be kept on file until a new fit test is completed, so there should always be a record for each employee indicating that they have passed a fit test, or have been screened for the need to be fit tested, within the last 12 months. The respirator standard requires the following information to be kept in the fit test record:

- Name or employee ID;
- Type of fit test performed;
- Specific make, model, style, and size of respirator tested;
- Date of test; and
- Pass/fail result from qualitative test or printout from quantitative test.

A [sample fit test record form](#) and a [printable fit test verification card](#) are available for your use.



## Program Evaluation

Regular program evaluation is required by the standard and critical to successful implementation. There should be a section in your written program that describes how you will accomplish evaluating the implementation and effectiveness of your program. The standard does not require this to be done at specific intervals (i.e., annually). It requires that the workplace be evaluated as necessary to ensure that the provisions of the written program are being implemented effectively. It also requires

that the employer regularly consult employees to assess their views on the effectiveness of the program.

This means that the respirator program administrator, or whoever has been designated to evaluate the program, has to go out into the units and observe practices and talk to the staff. The systems in place to manage respirator use should be evaluated to ensure that they support the behaviors you expect to observe among employees. If someone is not using a respirator when they are supposed to, consider all the possibilities why this may be happening. Some hospitals use a labor-management health and safety committee to tap into the knowledge and experience of employees and obtain feedback and suggestions for improvements.

Any deficiencies in the implementation of policies and procedures that are discovered as a result of evaluation must be corrected immediately. In some cases, this might mean revising the written program to conform to actual practices as long as the procedures being followed comply with the standard. In other cases, it might mean re-training

personnel on some aspect of the program, or assigning a PAPR to someone who had been using an N95, but has since grown a beard.

An [evaluation checklist](#), with instructions on how to use it, has been provided to make the process of evaluation a bit easier as well as more standardized and comprehensive. You are not required to use a checklist, but it would be a great way to make sure you do the evaluations and to track any improvements you make. Although the respiratory protection standard does not establish a specific interval for program review, the ATD standard requires that the ATD exposure control program be reviewed annually, and requires the participation of employees in that review. Therefore, when employees use respiratory protection for infectious agents, the RPP should be reviewed annually as part of the ATD program review.

## Summary

Healthcare personnel are at increased risk for exposure to ATD pathogens and, when other controls have been considered and implemented as appropriate, may be required to use respiratory protection. In order for respirators to provide effective protection they must be properly selected, used, and maintained

as part of a written program, which describes how employers will provide employees adequate medical evaluations, training, and fit testing. The program must be evaluated regularly through observation and obtaining input from all respirator users and persons involved in implementing the program. Public health guidance and regulations must be regularly reviewed for changes and utilized to identify tasks and pathogens requiring the use of respiratory protection.



# Abbreviations Used in the Toolkit

<b>AIHA</b>	American Industrial Hygiene Association	<b>NPPTL</b>	National Personal Protective Technology Laboratory
<b>AII</b>	airborne infection isolation	<b>OSHA</b>	Occupational Safety and Health Administration
<b>AIIR</b>	airborne infection isolation room	<b>PAPR</b>	powered air-purifying respirator
<b>APF</b>	assigned protection factor	<b>PLHCP</b>	physician or other licensed health care professional
<b>APR</b>	air-purifying respirator	<b>PPE</b>	personal protective equipment
<b>ATD</b>	aerosol transmissible disease	<b>RPA</b>	respirator program administrator
<b>BMBL</b>	Biosafety in Microbiological and Biomedical Laboratories	<b>RPP</b>	respiratory protection program
<b>Cal/OSHA</b>	California Department of Industrial Relations, Division of Occupational Safety and Health	<b>SARS</b>	severe acute respiratory syndrome
<b>CBRN</b>	chemical, biological, radiological, and nuclear	<b>SARS-CoV</b>	SARS-associated coronavirus
<b>CDC</b>	Centers for Disease Control and Prevention	<b>SCBA</b>	self-contained breathing apparatus
<b>CNC</b>	condensation nuclei counter	<b>TB</b>	tuberculosis
<b>FDA</b>	Food and Drug Administration	<b>VHF</b>	viral hemorrhagic fever
<b>HCW</b>	health care worker		
<b>HE</b>	high-efficiency		
<b>HEPA</b>	high-efficiency particulate air		
<b>HICPAC</b>	Healthcare Infection Control Practices Advisory Committee		
<b>MERS-CoV</b>	Middle East Respiratory Syndrome coronavirus		
<b>MRSA</b>	methicillin-resistant Staphylococcus aureus		
<b>MSSA</b>	methicillin-susceptible Staphylococcus aureus		
<b>NIOSH</b>	National Institute for Occupational Safety and Health		

# Glossary

**Aerosol-generating procedures**—Procedures that may increase potential exposure to aerosol transmissible disease pathogens due to the reasonably anticipated aerosolization of pathogens. Aerosol-generating procedures may also be known as high hazard or cough-inducing procedures. See page 11 for a detailed explanation.

**Aerosol transmissible disease (ATD)**—Includes both airborne infectious diseases (AirIDs) and diseases requiring droplet precautions.

**Airborne infection isolation (AII) or airborne infection isolation room (AIIR)**—A single-occupancy patient-care room designed to isolate persons with suspected or confirmed airborne infectious diseases. Environmental factors are controlled in AIIRs to minimize the transmission of infectious agents that can be spread from person-to-person by the airborne route. AIIRs should maintain negative pressure relative to adjacent rooms and halls (so that air flows under the door gap into the room), an air flow rate of 6–12 air changes per hour, and direct exhaust of air from the room to the outside of the building or recirculation of air through a HEPA filter.

**Airborne Infectious Disease (AirID)**—As defined in the Cal/OSHA ATD standard: Either: 1) an aerosol transmissible disease transmitted through dissemination of airborne droplet nuclei, small particle aerosols, or dust particles containing the disease agent for which AII is recommended by the CDC or CDPH, as listed in Appendix A of the ATD standard, or 2) the disease process caused by a novel or unknown pathogen for which there is no evidence to rule out with reasonable certainty the possibility that the pathogen is transmissible through dissemination of airborne droplet nuclei, small particle aerosols, or dust particles containing the novel or unknown pathogen.

**Airborne Precautions**—A category of Transmission-Based Precautions that CDC and HICPAC may recommend when Standard Precautions alone are not sufficient to prevent the transmission of disease. When Airborne Precautions are required patients should be placed in airborne infection isolation rooms and healthcare personnel sharing patients' airspaces should wear respirators.

**Air-purifying respirator (APR)**—A respirator with an air-purifying filter, cartridge, or canister that removes specific air contaminants by passing ambient air through an air-purifying element. See page 14 for a detailed explanation.

**Assigned protection factor (APF)**—The workplace level of respiratory protection that a respirator or class of respirators is expected to provide to employees when the employer implements a continuing, effective respiratory protection program as specified in the Federal OSHA respiratory protection standard (29 CFR 1910.134).

**Droplet Precautions**—A category of Transmission-Based Precautions that CDC and HICPAC may recommend when Standard Precautions alone are not sufficient to prevent the transmission of disease. When Droplet Precautions are required, patients should be spatially separated, preferably in separate rooms with closed doors. Healthcare personnel should wear surgical masks for close contact and, if substantial spraying of body fluids is anticipated, gloves and gown as well as goggles (or face shield in place of goggles). Patients should be masked during transport.

**Facemask**—A loose-fitting, disposable device that creates a physical barrier between the mouth and nose of the wearer and potential contaminants in the immediate environment. Facemasks may be labeled as surgical, laser, isolation, dental, or medical procedure masks and are cleared by the FDA for marketing. They may come with or without a face shield. Facemasks do not seal tightly to the wearer's face, do not provide the wearer with a reliable level of protection from inhaling smaller airborne particles, and are not considered respiratory protection.

**Facepiece**—The part of a respirator that covers the nose and mouth of the wearer. Respirators may have half facepieces covering just the nose and mouth, or they may have full facepieces covering the nose, mouth, and eyes. They are designed to form a seal with the face.

**Filtering facepiece respirator**—A type of disposable (single-use), negative-pressure, air-purifying respirator where an integral part of the facepiece or the entire facepiece is made of filtering material.

**Fit factor**—A quantitative estimate of the fit of a particular respirator to a specific individual; typically estimates the ratio of the concentration of a substance in ambient air to its concentration inside the respirator when worn.

**Fit test**—The use of a protocol to qualitatively or quantitatively evaluate the fit of a respirator on an individual.

**Food and Drug Administration (FDA)**—An agency within the U.S. Department of Health and Human Services. The FDA is responsible for, among other things, protecting the public health by assuring drugs, vaccines, and other biological products and medical devices intended for human use are safe and effective.

#### **Healthcare Infection Control Practices**

**Advisory Committee (HICPAC)**—A federal advisory committee assembled to provide advice and guidance to the CDC and the U.S. Department of Health and Human Services regarding the practice of infection control and strategies for surveillance, prevention, and control of healthcare-associated infections and antimicrobial resistance in United States healthcare settings. CDC and HICPAC authored the 2007 Guideline for Isolation Precautions: Preventing Transmission of Infectious Agents in Healthcare Settings, which describes Standard and Transmission-Based Precautions used for infection control.

**Health care worker**—Paid and unpaid persons who provide patient care in a healthcare setting or support the delivery of healthcare by providing clerical, dietary, housekeeping, engineering, security, or maintenance services.

**High-efficiency (HE) or high-efficiency particulate air (HEPA) filter**—The NIOSH classification for a filter that is at least 99.97% efficient in removing particles and is used in powered air-purifying respirators (PAPRs). When high-efficiency filters are required for non-powered respirators, N100, R100, or P100 may be used.

**High hazard procedures**—Procedures that may increase potential exposure to aerosol transmissible disease pathogens due to the reasonably anticipated aerosolization of pathogens. High hazard procedures may also be known as aerosol-generating or cough-inducing procedures. See page 11 for a detailed explanation.

**Hood**—The portion of a respirator that completely covers the head and neck, and may also cover portions of the shoulders and torso, and through which clean air is distributed to the breathing zone.

**Loose-fitting facepiece**—The portion of a respirator that forms a partial seal with the face but leaves the back of the neck exposed, is designed to form a partial seal with the face, and through which clean air is distributed to the breathing zone.

**N95 filter**—A type of NIOSH-approved filter or filter material, which captures at least 95% of airborne particles and is not resistant to oil.

**N95 respirator**—A generally used term for a half mask air-purifying respirator with NIOSH-approved N95 particulate filters or filter material (i.e., includes N95 filtering facepiece respirator or equivalent protection).

**Negative-pressure respirator**—A tight-fitting respirator in which air is inhaled through an air-purifying filter, cartridge, or canister during inhalational efforts, generating negative pressure inside the facepiece relative to ambient air pressure outside the respirator.

**Personal protective equipment (PPE)**—Specialized clothing or equipment worn by an employee to protect the respiratory tract, mucous membranes, skin, and clothing from infectious agents or other hazards. Examples of PPE include gloves, respirators, goggles, facemasks, surgical masks, faceshields, footwear, and gowns.

**Physician or other licensed healthcare professional (PLHCP)**—An individual whose legally permitted scope of practice (i.e., license, registration, or certification), as defined by the state where he or she practices, allows him or her to independently provide, or be delegated the responsibility to provide, some or all of the healthcare services required to provide a medical evaluation as described in OSHA's respiratory protection standard.

**Powered air-purifying respirator (PAPR)**—An air-purifying respirator that uses a blower to force air through filters or cartridges and into the breathing zone of the wearer. This creates a positive pressure inside the facepiece or hood, providing more protection than a non-powered or negative-pressure half mask APR.

**Qualitative fit testing (QLFT)**—A pass/fail fit test to assess the adequacy of respirator fit that relies on the individual's response to the test agent.

**Quantitative fit testing (QNFT)**—An assessment of the adequacy of respirator fit by numerically measuring the amount of leakage into the respirator.

**Respirator**—A device worn over the nose and mouth to protect the wearer from hazardous materials in the breathing zone. Respirators must be certified by the National Institute for Occupational Safety and Health (NIOSH) for the purpose for which they are used.

**Respirator program administrator (RPA)**—Individual designated to oversee a facility's respiratory protection program (RPP).

**Respiratory protection program (RPP)**—Program required by Cal/OSHA under the respiratory protection standard that includes development and implementation of detailed policies and worksite-specific procedures for respirator use for control of respiratory hazards.

**Surgical mask**—A loose-fitting, disposable type of facemask that creates a physical barrier between the mouth and nose of the wearer and potential contaminants in the immediate environment. Surgical masks are fluid resistant and provide protection from splashes, sprays, and splatter. Surgical masks do not seal tightly to the wearer's face, do not provide the wearer with a reliable level of protection from inhaling smaller airborne particles, and are not considered respiratory protection.

**Surgical N95 respirator**—A filtering facepiece respirator with spray- or splash-resistant facemask material on the outside to protect the wearer from splashes. Also known as a surgical N95 respirator.

**User seal check**—An action conducted by the respirator user to determine if the respirator is properly seated to the face. For all tight-fitting respirators, the employer shall ensure that employees perform a user seal check each time they put on the respirator using the procedures in Appendix B-1 of OSHA's respiratory protection standard or equally effective procedures recommended by the respirator manufacturer. User seal checks are not substitutes for qualitative or quantitative fit tests.

# References, Resources, and Tools

## Regulatory Standards and Interpretations

### California Division of Occupational Safety and Health (Cal/OSHA)

[Cal/OSHA Respiratory Protection Standard \(Title 8 CCR; Section 5144\)](#)—CDPH webpage with the standard and its appendices

[Cal/OSHA Aerosol Transmissible Diseases \(ATD\) Standard \(Title 8 CCR; Section 5199\)](#)—CDPH webpage with the standard and its appendices

[Cal/OSHA Policy and Procedures—Multi-Employer Sites](#)

[Cal/OSHA Policy and Procedures—Dual Employer Sites](#)

### Federal Occupational Safety and Health Administration (OSHA)

[Respiratory Protection Standard \(29 CFR 1910.134\)](#)

Interpretations of the OSHA [Respiratory Protection Standard, Appendix A—Fit Testing Procedures](#) and [Appendix C—Medical Evaluation](#)

[OSHA's Multi-Employer Citation Policy \(CPL 2-0.124\)](#)

[Interpretation of the Bloodborne Pathogen Standard at a Multi-employer Worksite](#)

[State Occupational Safety and Health Plans](#)

## Health Care Resources and Guidelines

### California Department of Public Health

[Respirator Use in Health Care Workplaces](#)—CDPH website topic page

[Respirator Use in Health Care Workplaces—a Toolkit for Respirator Program Administrators](#)

CDPH website where this guide and other resources are posted

[Respirator Selection Guide for Aerosol Transmissible Diseases](#)—two-page quick reference by CDPH

[Ebola Virus Information Page](#)

[Middle East Respiratory Syndrome Coronavirus \(MERS-CoV\) Information Webpage](#)

[CDPH Guidance for Influenza Prevention in Health Care Settings](#)

### California Division of Occupational Safety and Health (Cal/OSHA)

[Ebola Virus Information](#)

[Cal/OSHA Guidance for the 2010-2011 Influenza Season regarding the Application of the Aerosol Transmissible Diseases Standard](#)

### Federal Occupational Safety and Health Administration (OSHA)

[Safety and Health Topics: Healthcare—Infectious Diseases](#)

[Safety and Health Topics: Ebola](#)

[Pandemic Influenza Preparedness and Response Guidance for Healthcare Workers and Healthcare Employers, 2007](#)

[Guidance on Preparing Workplaces for an Influenza Pandemic, 2009](#)

[Precautions For Healthcare Workers during Flu Season](#)

[Safety and Health Management Systems and Joint Commission Standards](#) (PDF)

[Hospital eTool](#)

## **Centers for Disease Control and Prevention (CDC)**

[Healthcare Infection Control Practices Advisory Committee \(HICPAC\)—2007 Guideline for Isolation Precautions: Preventing Transmission of Infectious Agents in Healthcare Settings](#)

[Biosafety in Microbiological and Biomedical Laboratories \(BMBL\) 5th Edition](#)

[Prevention Strategies for Seasonal Influenza in Healthcare Settings](#)

[Interim Guidance for Infection Control Within Healthcare Settings When Caring for Confirmed Cases, Probable Cases, and Cases Under Investigation for Infection with Novel Influenza A Viruses Associated with Severe Disease](#)

[Interim Infection Prevention and Control Recommendations for Hospitalized Patients with Middle East Respiratory Syndrome Coronavirus \(MERS-CoV\)](#)

[Ebola \(Ebola virus disease\)](#)

[Infection Prevention and Control Recommendations for Hospitalized Patients Under Investigation \(PUIs\) for Ebola Virus Disease \(EVD\) in U.S. Hospitals](#)

[Guidance on Personal Protective Equipment To Be Used by Healthcare Workers During Management of Patients with Ebola Virus Disease in U.S. Hospitals, Including Procedures for Putting On \(Donning\) and Removing \(Doffing\)](#)

[CDC \(Centers for Disease Control and Prevention\). 2011. Immunization of Health-Care Personnel: Recommendations of the Advisory Committee on Immunization Practices \(ACIP\). Morbidity and Mortality Weekly Report 60\(RR07\);1-45.](#)

## **National Institute for Occupational Safety and Health (NIOSH)**

[Workplace Safety and Health Topic Page—Healthcare Workers](#)

[Workplace Safety and Health Topic Page—Ebola](#)

[Workplace Safety and Health Topic Page—Emerging Infectious Diseases](#)

[Workplace Safety and Health Topic Page—Hazardous Drug Exposures in Health Care](#)

[Workplace Safety and Health Topic Page—Seasonal Influenza \(flu\) in the Workplace](#)

[Workplace Safety and Health Topic Page—Severe Acute Respiratory Syndrome \(SARS\)](#)

[Workplace Safety and Health Topic Page—Tuberculosis](#)

[TB Respiratory Protection Program In Healthcare Facilities—Administrator’s Guide, 1999](#)

[Recommended Guidance for Extended Use and Limited Reuse of N95 Filtering Facepiece Respirators in Healthcare Workers](#)

[Revised, Updated Resources Are Announced To Help Prevent Exposures Of Emergency Response Employees To Infectious Diseases During Duty](#)

## **Institute of Medicine (IOM)**

[IOM Preventing Transmission of Pandemic Influenza and Other Viral Respiratory Diseases: Personal Protective Equipment for Healthcare Personnel Update 2010](#)

[The Use and Effectiveness of Powered Air Purifying Respirators in Health Care: Workshop Summary](#)

## **World Health Organization (WHO)**

[Epidemic- and Pandemic-prone Acute Respiratory Diseases—Infection Prevention and Control in Health Care. Infection Control Aide-Memoire, World Health Organization, 2008.](#)

[Epidemic- and Pandemic-prone Acute Respiratory Diseases—Infection prevention and control in health Care. Summary Guidance, World Health Organization, 2007](#)

## **The Joint Commission**

[Implementing Hospital Respiratory Protection Programs: Strategies from the Field](#)

## **Association of periOperative Registered Nurses**

[Guidelines for Perioperative Practice](#)

# **General Respiratory Protection Resources**

## **California Division of Occupational Safety and Health (Cal/OSHA)**

[Respiratory Protection in the Workplace: A practical guide for small business employers](#)

## **National Institute for Occupational Safety and Health (NIOSH)**

[Workplace Safety and Health Topics—Respirators](#)

[National Personal Protective Technology Laboratory](#)

[Respirator Trusted-Source Information Page](#)

[Respirator Selection Logic, 2004](#)

[Certified Equipment List Search](#)—search for NIOSH-approved respirators by facepiece type, manufacturer and hazard

[Getting optimal performance from a powered air-purifying respirator \(PAPR\) depends on the condition of its battery!](#)

## **Federal Occupational Safety and Health Administration (OSHA)**

[Safety and Health Topics: Respiratory Protection](#)

[Assigned Protection Factors for the Revised Respiratory Protection Standard, 2009](#)

[Respirator eTool](#)—learn how to select appropriate respirators and develop a change schedule for cartridges

[Small Entity Compliance Guide for the Respiratory Protection Standard, 2011 \(6MB\)](#)

[Questions and Answers on the Respiratory Protection Standard, OSHA memorandum, 1998](#)

## **American National Standards Institute (ANSI)**

[ANSI/ASSE Z88.2-2015 Practices for Respiratory Protection](#)

[ANSI/AIHA Z88.6-2006 Respiratory Protection—Respirator Use—Physical Qualifications for Personnel](#)

[ANSI/AIHA Z88.7-2010 Color Coding of Air-Purifying Respirator Canisters, Cartridges, and Filters](#)

[ANSI/AIHA Z88.10-2010 Respirator Fit Testing Methods](#)

## **Medical and Industrial Hygiene Services**

[American Industrial Hygiene Association \(AIHA\) Consultants List](#)—search by specialty for help with respiratory protection programs and fit testing.

[Cal/OSHA Consultation Service](#)—offers free onsite visits and technical information to employers and employees in California.

[Federal OSHA On-Site Consultation Program](#)—offers free and confidential advice to small and medium-sized businesses in all states across the country, with priority given to high-hazard worksites.

[The Association of Occupational and Environmental Clinics directory of member clinics](#)—These clinics provide medical clearance for respirator use, may provide fit testing services, and meet certain criteria for quality patient care.

## **Administrative Resources**

[Respiratory Protection Program Evaluation Checklist & Instructions for Use](#)

[Written Respiratory Protection Program Template](#)

[Sample Respirator Fit Test and Training Verification Card](#)—developed by the Association of Occupational Health Professionals in Healthcare

[Sample Respirator Fit Test Record](#)—customizable for your respirator program (developed by the California Department of Public Health)

## **Training and Educational Resources**

### **Federal Occupational Safety and Health Administration (OSHA)**

[OSHA Training Institute \(OTI\)](#)—searchable schedule of courses offered by the OTI Education Centers

[Fact Sheet: Respiratory Infection Control: Respirators Versus Surgical Masks](#)—two-page explanation of when to use respirators and surgical masks

[Respiratory Protection Videos](#)—website with 13 videos in English and Spanish

[The Difference Between Respirators and Surgical Masks](#)—English and Spanish videos

[Respiratory Protection for Health Care Workers](#)—download video or watch on YouTube

Respirator Safety: Donning and Doffing—[English](#) and [Spanish](#) videos

[Quick Card on types of respirators](#)—one page reference on the different types of respirators

[OSHA Best Practices for Hospital-Based First Receivers of Victims from Mass Casualty Incidents Involving the Release of Hazardous Substances, 2005](#)

[Susan Harwood Grantee Produced Training Materials](#)

## **National Institute for Occupational Safety and Health (NIOSH)**

[NIOSH Science Blog: N95 Respirators and Surgical Masks](#)—discussion of respirator and surgical mask history, fit and filter performance

[NIOSH Science Blog: Do We Need to Challenge Respirator Filters With Biological Aerosols?](#)—discussion of particle filtration as it relates to viruses and bacteria

[Debunking the Myths Regarding N95 Respirator Use](#)—N95 Day Webinar

[Respirator Awareness: Your Health May Depend On It](#)—Personal Protective Equipment for Healthcare Workers (2.5 MB)

[Listing of Approved Surgical N95 Filtering Facepiece Respirators with Donning/Doffing Instructions](#)

[How to Properly Put on and Take off a Disposable Respirator](#)—NIOSH factsheet in English and Spanish

[Educational Resource Centers for Occupational Safety and Health](#)—courses, seminars, and workshops for occupational health and safety professionals

## **Centers for Disease Control and Prevention (CDC)**

[CDC Tools for Protecting Healthcare Personnel](#)—guidelines, slideshow, and resources on selecting and using personal protective equipment

[Guidance for the Selection and Use of PPE \(1.5MB\)](#)

[Sequence for Donning and Removing Personal Protective Equipment poster](#)—English and Spanish

[AAOHN Respiratory Protection Education & Resources Webkit](#)—a 10-module Respiratory Protection Course and accompanying resources

[University of Wisconsin PAPR Training Workshop Presentation](#)—training on powered air-purifying respirators (PAPRs)

[APIC-MDH PAPR Donning and Doffing Poster](#)—produced by the Association for Professionals in Infection Control and Epidemiology and the Minnesota Department of Health

[Washington State Department of Labor and Industries Respirator Training Kit](#)—training presentations for filtering facepiece, cartridge, and supplied-air respirators