

Guide to Protest PPE

version 2020-08-25

This guide covers PPE designed to protect from chemical irritants and projectiles or other threats of bodily harm that occur at protests, particularly from the state.

Table of Contents

[Table of Contents](#)

[Respirators](#)

[Full Face](#)

[Advantages](#)

[Disadvantages](#)

[Recommendations](#)

[Half Face + Goggles](#)

[Advantages](#)

[Disadvantages](#)

[Recommendations](#)

[Notes](#)

[Ear Protection](#)

[Over-the-ear \(earmuffs\)](#)

[Advantages](#)

[Disadvantages](#)

[In-ear \(earplugs\)](#)

[Advantages](#)

[Disadvantages](#)

[Armoring Up: Protecting from Impacts](#)

[Helmets](#)

[Hard hats](#)

[Advantages](#)

[Disadvantages](#)

[Bicycle helmets](#)

[Advantages](#)

[Disadvantages](#)

[Skate helmets](#)

[Advantages](#)

[Disadvantages](#)

[Bump and Ballistic Helmets](#)

[Advantages](#)

[Disadvantages](#)

[Riot Helmets](#)

[Knee/Elbow Pads](#)

[Soft Armor](#)

[Other Useful Gear](#)

[Wrist guards, shin guards](#)

[Groin cups](#)

[Mouthguards](#)

[Other concerns](#)

[Showering and Makeup: Care Before the Event](#)

[General Clothing Tips](#)

[Changelog](#)

[2020-08-03](#)

[2020-08-02](#)

[2020-07-21](#)

Respirators

For street actions there are two broad categories of safety hazards to be concerned about for respirators—exposure to Riot Control Agents (RCAs) and non-ballistic projectiles such as bean bag rounds, gas grenades etc. There are two methods to do this; a full face respirator which covers the entirety of the face, or a half face respirator which covers the lower half of the face, and goggles to protect the eyes.

Keep in mind any respirator will greatly limit your ability to speak, either in person or over a radio. You'll likely have to rely on hand signals to communicate over distances of more than a couple feet.

Full Face

Full face respirators are a combination of face shield and respirator. They protect the eyes from projectiles and protect the airway from aerosols and vapors. They are much more cumbersome than ballistic goggles and far more attention drawing. Note that half face and full face respirators are incompatible with glasses, as the arms of glasses break the seal of the respirator.



Full face respirator face shields are impact rated, but use a different standard than goggles.

Advantages

- Fairly hard to dislodge
- No gaps in the facial area for chemical irritants to adhere to
- Can be put on in a single step

Disadvantages

- Can interfere with over ear protection
- Impact rating of face shields is generally offers less protection that goggles
- Can't be put on as quickly as a half-face respirator

Recommendations

- [Honeywell North 5400 Series](#)
- [Respirator Cartridge. AG/OV P100](#)

Half Face + Goggles

Ballistic goggles are similar to snow gear goggles but are made of materials that won't break when impacted with any projectile you'd expect to see at a protest. Ballistic goggles need to have a *cavity seal* to effectively protect against pepper gas, CS gas, and other aerosolized agents. These goggles are generally incompatible with glasses (which won't fit under the goggle lens) but can accept corrective lens inserts.

Any goggles should be rated ANSI Z87.1 at the minimum, and ideally MIL-PRF-32432.

Advantages

- Some goggles support swappable lens which allow you to switch from clear to tinted to adapted to lighting conditions
- Goggles generally have better impact ratings than full face respirators
- Can be put in a "ready" position
 - Goggles strapped around a helmet
 - Half-face respirator hung around your neck
- Can be somewhat cheaper than a full face respirator
- Rx inserts simplify the use of corrective lens

Disadvantages

- Goggles can be dislodged far more easily than a full face respirator
- Goggles might form a poor gas seal
- Requires multiple steps to put on
- More points of failure

Recommendations

- [Uvex Stealth OTG Safety Goggles](#) (cheap and effective goggles with integral lenses)
- [Wiley-X Spear](#) (more expensive goggles but support swappable lenses and a good cavity seal)
- [Wiley-X Gravity](#) sunglasses style instead of ski goggle. Comes with an optional elastic headband for helping seal. Good for Rx up to +/-6.00.
- [3M Half Mask Respirator](#)
- [3M Combination Cartridge](#)

Notes

- Regardless of the type of respirator you use you'll want P100 Organic Vapor / Acid Gas (usually denoted P100 OV/AG) or "multi-gas" filters. Multi-gas filters tend to be a bit more expensive since they protect against a broader range of chemicals, which isn't relevant for street actions.
 - P100 denotes a particle filter rating whereas OV/AG is a chemical filter rating

- Filter cartridges don't last forever--the particle filter and/or the chemical filter in the cartridge wear out, and may wear out at different times
 - If you're having trouble inhaling, the particle filter is worn out and the cartridge needs to be replaced
 - If you can smell any chemicals the filter is rated to absorb the chemical filter is worn out and the cartridge needs to be replaced
 - You can test the chemical filter using a rag dampened with a strong organic solvent (acetone, MEK etc)--if you can smell solvent the cartridge needs to be replaced
- Test fit a respirator to ensure a snug fit **before** you need to use things under stress
- No goggles or face shield will protect against a direct hit from a projectile, however they will **not** shatter when impacted and may protect against ricocheting projectiles or debris

Ear Protection

Events with police presence may involve flashbangs, LRAD (Long Range Acoustic Device, which can be used as a sonic weapon), and proximity to other loud speakers that can cause damage to hearing over time. Stun grenades can produce sounds at 160 dB to 180 dB. Ear protection counters that damage by attenuating harmful sound waves.

Ear protection comes in over-the-ear and in-ear (earplug) forms, and it's possible to "double up" by wearing both at the same time for extra sound attenuation.

Protection is measured by the **Noise Reduction Ratio**, listed in the amount of decibels (dB) that the protection potentially reduces. The actual reduction of decibel exposure is not literally the NRR of the ear protection device; exposure reduction can be approximately [calculated with a formula](#), and the amount changes when you wear multiple forms of ear protection at once. An NRR of *at least* 20 dB is a good starting point for protests where flash bangs, blast balls, or other loud riot control munitions are being used.

Over-the-ear (earmuffs)

Acoustic earmuffs are generally noise-cancelling foam in oval cups attached to the head with a thermoplastic or metal headband.

Most earmuffs use some noise-canceling materials and structure to **passively** reduce noise, but some earmuffs are **active**, usually meaning that they include electronic components (such as microphones, a circuit, and speakers) to pass through some background noise while reducing harmful noise.



Advantages

- Easy to fit
- Can fit over a radio earpiece (or, in the case of some active listening headsets, the radio can be plugged into the headset with an aux cable and compatible speaker input)

Disadvantages

- Yet Another PPE Device to put on and manage during an event
- Possibly difficult to fit underneath a helmet or around a full-face respirator
- Looks more imposing than in-ear protection
- (for active hearing protection) may require batteries
 - When active ear protection batteries are depleted they will still offer passive hearing protection but any external sound amplification and audio source inputs, like a radio, will cease to function.

In-ear (earplugs)

This guide limits earplug discussion to memory foam earplugs commonly used to protect against hearing loss and tinnitus.

Earplugs are harder to wear correctly than earmuffs, and it's worth learning the correct process. Earplugs are inserted with a "roll, pull, and hold" process: roll the earplug into a thin rod, pull the ear back, and hold the earplug in the ear while the foam expands (usually 20-30 seconds is recommended).



Earplugs should be treated as disposable. Use them for one event, but don't share or reuse them.

Advantages

- Generally offer better protection as they rest directly in the ear canal
- Looks more inconspicuous
- Easier to wear with helmets or gas masks

Disadvantages

- Harder to insert than over-the-ear protection
- Requires proper fitting for best protection.
- Harder to carry; easier to lose.
- Conflicts with radio earpieces.
 - Acoustic tube microphones cannot be used simultaneously with in-ear protection
 - Tend to greatly damp the sound of over-ear microphones

Armoring Up: Protecting from Impacts

Chemical irritants and noises aren't the only threats. Bean bag rounds, rubber bullets, and other projectiles are often fired into groups of protesters, medics, and journalists alike. Tear gas canisters are sometimes lobbed high over the front line into groups, hitting people in the head.

In the worst case scenarios, you may want ballistic-level protection, and note that police also occasionally set their so-called "less than lethal" equipment [to higher impact settings](#), increasing the lethality and potentially calling for more resilient gear.

Helmets

Protect your noggin! While many so-called "less than lethal" projectiles are intended to be fired to bounce off the ground or hit less sensitive areas, police will *and absolutely do* aim for the head. Not to mention lobbed gas canisters and flash bangs that cannot be easily aimed.

Hard hats

Hard hats are commonly made from high density polyethylene (HDPE) and have a suspension strap that distributes the weight and impact on the helmet. Ridges on the top of the hard hat help funnel rainwater towards and over the front brim, instead of having the water drip down the wearer's neck.



Under OSHA standards, hard hats are specified by both a **type** and **class**. Type implies a hard hat meets one of American National Standards Institute (ANSI) requirements for durability against penetration and vertical or *vertical* and lateral forces. Class refers to the dielectric protection of the hard hat against a certain number of volts.

Hard hats are [criticized by some protesters in Hong Kong](#) who note that hard hats are too flimsy for, say, sustained baton strikes, and are often distributed in bright colors that can be targets among a dark-clad bloc. However, a hard hat is likely sufficient for threat models that factor in occasional projectiles.

Advantages

- Fits well over gas masks and other PPE. May work well with ear muffs.
- Very light. Much easier to face a long event with a hard hat than a heavier helmet.
- Often designed to draw rain away from running down the wearer's back

Disadvantages

- A little flimsier than helmets made for sports or ballistic threats.

Bicycle helmets

Bicycle helmets are designed to be light while still giving cyclists visibility. Because they're used specifically for aerobic activity, bike helmets are usually ventilated, which is good for regulating body temperature.



Bike helmets are designed for high-speed crashes, and must be replaced after being impacted in one accident. Most bike helmets are not designed to take impact from the back, because bike crashes where the cyclist falls off backwards are rare. However, there are bikes rated for impact from the back; they tend to look more like skate helmets.

It's worth getting bike helmets fitted by an expert, as many people buy incorrectly sized helmets for their heads.

Safe helmets for biking are CPSC (US Consumer Product Safety Commission) certified. You can also find dual-certified CPSC and ASTM (the latter certification is for skate helmets) which offer the best protection.

Advantages

- Light
- Good ventilation for body temperature regulation (BMX helmets are an exception and have a limited number of vents)
- Looks less suspicious on ingress and egress to actions

Disadvantages

- Strap is harder to put on than hard hat support and can be a strangulation risk
- Vents can expose scalp to chemical irritants
- Only rated for one big impact

Skate helmets

In contrast with bike helmets, skate helmets are rated to take multiple small impacts common among skateboarding incidents. Skateboarders are also more likely to fall backwards so skate helmets account for this.

Skate helmets can be certified through the ASTM International standard 1492 for the activities of skateboarding and trick roller skating. Some skate helmets, however, are only certified through the CPSC (for bike activities). However,



ASTM-only certified helmets use softer foam, making them less appropriate for large impacts.

Some skate helmets are certified for both; these are the best skate helmets to get.

Advantages

- Light
- Good all-around protection, even from backwards falls
- Can take multiple impacts before needing to be replaced
- Looks less suspicious on ingress and egress to actions

Disadvantages

- Limited ventilation
- Harder to put on strap than a hard hat
- Softer foam, if not dual-rated for CPSC

Bump and Ballistic Helmets

Ballistic helmets are the most tactical looking helmets available, but provide the most protection. They come in various shapes: Personnel Armor System for Ground Troops (PASGT), the successors to PASGT: Modular Integrated Communications Helmet/Lightweight Helmet/Enhanced Combat Helmet (MICH/LWH/ECH), and High-cut/Above the ear.



PASGT, MICH, high-cut

High-cut helmets sometimes come with rails that support attachments, such as lights or NODs (night optical/observation devices), goggles, and hearing protection / communication equipment. These are some of the lightest and most modern designs among ballistic helmets.

Bump helmets are much like ballistic helmets in appearance, but without the strong protection (and associated cost). In the [words of Portland's Robert Evans](#), "Bump helmets will keep you alive if a fed grenade or baton round hits your skull. Ballistic helmets will ensure you are able to keep working through the impact."

Bump helmets, however, are much more expensive than skate helmets or hard hats, and some of that cost is the benefit of modularity and attachments.

Ballistic ratings are set by the National Institute of Justice (NIJ). Ballistic helmets are commonly rated NIJ IIIa, meaning they protect for common pistol calibers like 9mm, 357, and .44 mag.

Other helmet performance standards to watch for include backface deformation, fragmentation performance, and blunt impact performance.

Advantages

- Superior protection, maybe even from bullets (pistol calibers)
- Able to attach ear protection, goggles, and communication equipment to the helmet which allows multiple pieces of PPE to be put on in one step

Disadvantages

- Looks very suspicious coming to and from actions
- Expensive. Full ballistics helmets can set you back a grand.
- Can make you a target of police at an action

Riot Helmets

Good protection, but you'll look like a cop which can put others in a crowd on edge. Main advantage is the potential for a screen or polycarbonate window on the front that protects from projectiles, spray, and debris.



Knee/Elbow Pads

Knee pads are considered essential gear, particularly for medics, who will need to kneel often while providing treatment. However, consider getting knee and elbow pads on the basis that they can protect your joints from projectiles.



Foam knee pads are cheap, but offer the least amount of protection against projectiles and won't last forever. These are often used in home improvement projects.

More tactically-minded knee pads can have foam in combination with nylon, polyethylene, or other harder surfaces and are meant to protect from both kneeling on hard surfaces, and suffering some impacts.

Keep in mind that you can also get knee pad inserts meant to attach inside of specially-designed pants. Tactical companies

such as Crye Precision offer this, and companies like Carhartt also make foam knee pad inserts for more working-class functions with their double-front pants.

Soft Armor

Soft armor protects the center mass, covering the organs. The main threat model at protests is projectiles fired for so-called “crowd control” in which something like a BMX- or other-athletic- chest pad could be sufficient; many people opt for soft armor ballistic vests that are meant to provide protection against multiple threats and are designed for concealability.



Ballistic protection usually comes in NIJ Level II (9mm and 357) and NIJ IIIa (up to .44 mag and some shotgun rounds). Ballistics vests are not rated for multiple hits in the same area and must be discarded after stopping a ballistic projectile. However, armor is *probably* fine to keep using after multiple hits with LTL projectiles. Note that the NIJ standards only cover “standard” loadings of cartridges--if armor is rated to stop a particular cartridge that doesn’t mean it can stop every possible version of that cartridge.

Armor that protects against bullets does not generally protect against stabbing or piercing weapons like knives and shivs. The NIJ also publishes a standard for stab resistant armor which ranges from 1 to 3 in order of increasing protection. In practical terms armor that is NIJ stab rated at all (Stab Level 1, 2, or 3) should provide fairly good protection against stabbing weapons. Armor can be both ballistic and stab rated simultaneously; this type of armor is usually labeled “multi-threat” followed by the NIJ ballistic and spike ratings.

It’s also possible to buy soft armor plates for plate carriers. Concealability is a concern, but softer plates help with weight, and if you aren’t concerned about the overt tactical look, plate carriers can be useful for attaching bags and supplies. However, a vest can provide more protection on the sides than some plate carriers.

You can even buy [NIJ-IIIa hoodies](#).

Other Useful Gear

Wrist guards, shin guards

Wrist guards and shin guards are useful to protect areas that might be targeted with projectiles.

Tactically-minded companies offer shin guards that strap around the leg, often combined with knee pads. You can also get soccer shin guards that insert into sleeves that will protect a significant enough area between the knee pad and top of a boot.

Wrist guards can help with incidental impacts, but are notably useful to protect the wrists in the event of a fall.

Groin cups

Police have been known to target below the belt, so protecting that area can be a good idea for those with vulnerable parts.

Most common are strap-on cups, which offer protection but can quickly go out of position. A good option to try is compression shorts with pockets to insert a groin cup, which better ensure that the cup is in position.

Mouthguards

Respirators should provide protection in this area. If not wearing a respirator, you want to consider getting a mouthguard, especially if you intend to be so close to the police that they might try to hit you with a baton or bike without warning.

Mouthguards are made with thermoplastic materials that you boil and shape to your teeth, in order to grip and absorb the shock of an impact. Nicer mouthguards include channels that aid in breathing.

Naturally, mouthguards are hard to speak through. If you opt to wear a mouthguard, you may want to practice with the mouthguard to get used to breathing and speaking with them.

Other concerns

Showering and Makeup: Care Before the Event

Consider avoiding oil/mineral-based makeups and moisturizers, which can bind with chemical agents used by the police.

Wash yourself before the event with a pH-neutral soap. Be aware that detergent soaps can bind with chemical agents.

General Clothing Tips

- Shirts should have long sleeves to protect from chemical exposure
- Pants should be full length and tucked into boots to prevent chemical exposure
- Pants should not require a belt (or, prepare to have your belt taken if you are arrested)
- Tuck boot laces into the boots so you don't trip at the event
- Consider carrying an extra set of clothes as to not bring contaminants into vehicles
- Wash contaminated clothes separately in cold water.

Changelog

2020-08-25

- Expanded goggle recommendations

2020-08-03

- Copy editing and proofreading pending public release

2020-08-02

- Added sections for ear protection, “Armoring up,” and other concerns
- Added “version” number and changelog

2020-07-21

- Initial version, respirator section added