



Protective Eye and Facewear Standard: Selection, Use, and Care

At the University, flying particles, dusts, vapours, chemicals, or intense light sources can create a potential for eye or face injury. Whenever practicable, these hazards shall be eliminated or minimized through the use of substitution or engineering controls. To protect against those hazards that continue to exist after all such control measures have been implemented, appropriate protective eyewear or facewear must be used. This standard is based on the Canadian Standards Association (CSA) Standard Z94.3.1-16 (hereinafter referred to as "Z94.3.1").

SCOPE:

This standard applies to any individuals (e.g., faculty, staff, students and visitors) who may be exposed to eye or face injuries during University-sanctioned activities and/or on University premises.

RESPONSIBILITIES:

Principal investigators/supervisors and all others in authority shall:

- Identify situations where eye or face protectors are required;
- Determine (using this standard or in conjunction with Environmental Health and Safety) the type of protective eyewear or facewear required for the specific eye or face hazard;
- Provide individuals exposed to eye or face hazards with appropriate protective eyewear and/or facewear;
 - Provide individuals with an appropriate selection of eyewear and/or facewear to try on and select from;
- Ensure that individuals are informed and provided instruction if necessary on the proper use, care, and maintenance of protective eye and facewear; and
- Ensure that individuals wear appropriate protective eyewear and facewear at all times in eye hazard areas.

Faculty, staff, students, and visitors shall:

- Wear appropriate eye and face protection at all times in eye and face hazard areas;
- Inspect equipment to ensure that it is in good condition prior to and after use;
- Notify their PI/supervisor when their eye or face protector is damaged and needs repair or replacement;
- Ensure that eye and face protectors worn fits properly and does not interfere with body movement;
- Do not share eye and face protectors;
- Must not alter or modify eye or face protectors; and
- Store and maintain equipment in good condition between use.

PROTECTIVE EYEWEAR:

Eye and face injuries may be prevented by using the appropriate protective eyewear and facewear for the job. Appropriate protective eyewear and facewear must protect against the specific hazard presented, provide a comfortable and secure fit, and be certified to CSA Standard Z94.3:20, "Eye and Face Protectors." (hereinafter referred to as CSA Z94.3) or ANSI/ISEA Z87.1-2020 (hereinafter referred to as ANSI/ISEA Z87.1).

For individuals who work in laboratories, please review the [University of Toronto General Laboratory PPE Assessment Tool](#) for determining protective eyewear, facewear, and other PPE needs.

Appendix A outlines the recommended protectors to be worn when exposed to specific eye and face hazards. **Appendix B** lists the classification of eye and face protectors according to CSA Z94.3.1.

The following outlines the general categories of protective eyewear and facewear:

1. Spectacle-Type Safety Glasses

Safety glasses have lenses that are impact resistant and frames that are stronger than those of regular eyeglasses. “Plano” (non-prescription) or prescription safety glasses (for those who need corrective lenses) with permanently attached side shields must be worn by those who require protection against flying particles. Safety glasses must comply with CSA Standard Z94.3 or ANSI/ISEA Z87.1.

Safety glasses come in a variety of lens materials, colours, and coatings. Lens materials include Hi-Vex, polycarbonate, plastic (CR39), and Trivex. It should be noted that current glass material lenses do not meet the impact criteria of CSA Z94.3 and are not recommended for use in safety spectacles. Safety glasses intended for protection where a reduction of visible radiation or a moderate reduction of optical radiation are required must be opaque or have side protection with a shade number equal to or greater than that of the filter lens. Prescription lenses must meet minimum thicknesses requirements to meet the criteria for impact resistance in CSA Z94.3.

Lens colours include clear, tinted (coloured), photochromic (lights/darkens depending on lighting conditions), and polarized (blocks reflected glare). Filters designed to block out UV and IR radiation and other specialty lenses are also available. Coating types for lens materials include anti-scratch, anti-fog, anti-reflective, and ultraviolet (UV) protection. Coatings can be incorporated into the lens material, factory applied, or applied afterwards.

Use of prescription eyewear is recommended practice for individuals who require corrective lenses and are exposed to eye hazards on a regular basis. “Over-the-glasses” protectors (oversized protectors designed to be worn over non-safety spectacles) should only be used for individuals who require protection occasionally and must be certified to CSA Z94.3 or ANSI/ISEA Z87.1.

2. Safety Goggles

Safety goggles are devices contoured for full facial contact and are held in place by a headband or another suitable means and therefore offer greater eye protection than safety glasses.

Safety goggles are impact resistant and must meet the minimum requirements of CSA Z94.3 or ANSI/ISEA Z87.1. Like safety glasses, they are available in a variety of tints and shades.

Safety goggles may have direct or indirect ventilation to protect against fogging. Goggles with direct ventilation allow heat and humidity to dissipate, but do not protect against splash hazards. Goggles with indirect ventilation are designed to protect against dust and splash hazards.

3. Welding Protection

Welding helmets and hand shields are designed to protect the face and eyes from non-ionizing radiation (e.g., heat, light, UV) and impact (weld spatter) when welding or working with molten materials. ***Welding helmets must be used in conjunction with primary eye protectors, such as safety glasses or goggles.***

4. Face Shields

Face shields are built to provide general protection to the face and front of the neck against flying particles and sprays of hazardous liquids. Face shields may also have crown protectors and/or

chin protectors. **Face shields do not fully enclose the eyes and are to be used only in conjunction with primary eye protectors, such as safety glasses or goggles.**

5. Laser Protective Eyewear

When working around laser beams or laser devices, protective eyewear equipped with appropriate filter lenses must be used to protect against harmful light (e.g., infrared, ultraviolet, visible light). Refer to UofT's Laser Safety Program for information about laser protection (<https://ehs.utoronto.ca/our-services/laser-safety/laser-safety-program/>).

When choosing laser safety eyewear, the following factors should be considered:

- O.D. (Optical Density) at the wavelength of the laser must be sufficient to reduce the laser beam power density below the maximum permissible exposure levels;
- For pulsed lasers, verify with the manufacturer/vendor that the goggles are suitable for the energy (joules), pulse duration (seconds), and pulse repetition frequency (hertz) of the laser if the information is not written on the goggles;
- Visual Light Transmission (VLT); and
- Comfort and fit.

6. Arc Flash Protectors

Eye and face protectors certified to CSA Z94.3 or ANSI/ISEA Z87.1 are not designed to provide primary protection for exposure to an electric arc and should not be used on their own in circumstances where electric arc exposure is present. Instead, primary eye protectors (safety glasses or goggles) must be worn under a face shield that meets the requirements of ASTM F2178. The electric arc protector should be selected in accordance with CSA Z462.

Refer to [UofT's Electrical Safety Standard](#) for further information about arc flash eye and facewear protection.

CSA OR ANSI CERTIFIED EYE AND FACEWEAR:

Only eye or facewear products that are certified to CSA Z94.3 or ANSI/ISEA Z87.1 should be purchased and used.

An eye or facewear product that is CSA Certified will be labelled with the CSA certification mark on at least one component of the equipment (frame, temple, or sideshield) and on packaging or declaration by the manufacturer's label. This means that the product has been tested and meets the requirements of the CSA 94.3 standard and have been approved by the CSA Group.



Eye and face protectors that are certified to the ANSI/ISEA Z87.1 standard will bear the "Z87" or "Z87+" ANSI markings along with additional codes.

CONTACT LENSES IN LAB/RESEARCH AND INDUSTRIAL WORK ENVIRONMENTS:

Be aware that contact lenses and prescription glasses do not provide eye protection in hazardous environments; appropriate protective eyewear must be used in areas and during activities where eye protection is required. For typical laboratory activities in UofT spaces, contact lenses worn under safety glasses may suffice.

For greater protection, consider wearing your personal prescription eyeglasses instead of contact lenses with the additional applicable eye protection on top (e.g., safety glasses or safety goggles). There are styles of safety eyewear that are designed for use over-the-glasses (OTG). Please use the OTG type as wearing regular (non-OTG) safety glasses over personal prescription glasses will not provide sufficient protection.

For higher eye-hazard activities, contact lenses should not be worn under safety eyewear. In these situations, prescription safety glasses or prescription goggles are best. Staff should consult with their departments regarding purchasing of prescription safety eyewear.

If you receive a splash behind your safety glasses or safety goggles while wearing contact lenses, **do not stop to remove the contacts**. Proceed immediately to the eyewash and flush as you would normally.

For support with hazard assessments in the laboratory environment, contact EHS at ehs.office@utoronto.ca. If there is a medical concern about using eye protection, please contact the occupational health nurse at ehs.occhealth@utoronto.ca.

PROTECTIVE EYEWEAR FIT:

The wearer should assess for proper eyewear fit by considering the following:

- Eye must be fully covered by eye protector;
- Minimal gaps between eye protector and eye area;
- No obstructions to field of view;
- If applicable, adjust temple length/angle and nose pad to ensure comfortable and correct fit on ears and nose and lens is centered on the pupils.
- Temples secured to the head (i.e., eye protector does not slip or fall when moving the head);
- Should not interfere with other PPE (e.g., respirators); and
- Comfortable to wear.

Prescription safety eyewear should be selected to ensure proper fit on the wearer's face. A qualified eye care professional should be consulted during selection and fitting of frames.

CARE AND MAINTENANCE:

Eye and face protectors must be properly cared for and maintained. Keep lenses clean by washing with water or an appropriate lens cleaning fluid specific to the lens type. Ensure not to scratch the lens during cleaning. Replace damaged or worn parts immediately, including pitted or scratched lenses and filters, as it can impair vision and reduce impact resistance. Store eye and face protectors properly in a suitable case or container in between periods of use to prolong the life of the equipment.

It is important to check with the manufacturer/vendor to verify the appropriate cleaning procedures. Some protective eyewear (e.g., laser safety goggles) have thin coatings (i.e., anti-reflection, high-reflectance, etc.) which can be easily scratched even with the softest cloth. Some cleaning chemicals can also damage the coating.

REFERENCES:

ANSI/ISEA Z87.1-2020 American National Standard for Occupational and Education Personal Eye and Face Protection Devices: <https://webstore.ansi.org/standards/isea/ansiiseaz872020>

ASTM F2178/F2178M-22 Standard Specification for Arc Rated Eye or Face Protective Products: https://www.astm.org/f2178_f2178m-22.html

Canadian Centre for Occupational Health and Safety: Prevention and Control of Hazards – Contact Lenses at Work: https://www.ccohs.ca/oshanswers/prevention/contact_len.html

Canadian Centre for Occupational Health and Safety: Personal Protective Equipment - Eye and Face Protectors: <https://www.ccohs.ca/oshanswers/prevention/ppe/glasses.html>

CSA Z94.3.1-16 Guideline for Selection, Use, and Care of Eye and Face Protectors: <https://www.csagroup.org/store/product/Z94.3.1-16/>

CSA Z94.3:20: Eye and Face Protectors: <https://www.csagroup.org/store/product/CSA%20Z94.3:20/>

CSA Z462:21: Workplace Electrical Safety: <https://www.csagroup.org/store/product/CSA%20Z462:21/>

University of Toronto: Electrical Safety Program: <https://ehs.utoronto.ca/wp-content/uploads/2023/01/University-of-Toronto-Electrical-Safety-Program.pdf>

University of Toronto: General Laboratory PPE Assessment Tool: <https://ehs.utoronto.ca/wp-content/uploads/2016/06/Laboratory-PPE-Assessment-Tool.pdf-Updated.pdf>

APPENDIX A

CLASSIFICATION OF HAZARDS AND RECOMMENDED PROTECTORS

Check marked areas indicate recommended protectors based on the nature of the hazard. Unchecked areas are considered to be unsuitable protection for the given hazard.

Class 1 and 2 protectors are to be used in conjunction with recommendations for Class 3, 4, 5, and 6 protectors.

Nature of Hazard	Hazardous activities involving but not limited to	Spectacles Class 1		Goggles Class 2					And	Welding Helmet Class 3	Welding Hand Shield Class 4	Hoods Class 5					Face Shields Class 6			
		A	B	A	B	C	D	E				A	B	C	D	E	A	B	C	D
Flying objects	Chipping, drilling; grinding, buffing, polishing; crushing; heavy sawing, planing; hammering, nailing; punch press, lathe work.	✓		✓	✓				One of the following			✓	✓				✓			
Flying particles, dust, wind, etc.	Woodworking, sanding; light metal working and machining; painting; concrete work; plastering; materials batching and mixing.	✓		✓	✓							✓	✓					✓		

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		A	B	A	B	C	D	E				A	B	C	D	E	A	B	C	D	
Heat, sparks, and splash from molten materials	Casting, pouring molten metal; soldering; spot welding, stud welding.		✓			✓			One of the following									✓	✓	✓	
Acid splash; chemical burns	Acid and alkali handling, degreasing; glass breakage; chemical spray.				✓														✓		
Abrasive blasting materials	Sand blasting; shot blasting.				✓														✓		

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		A	B	A	B	C	D	E				A	B	C	D	E	A	B	C	D
Glare, stray light, (where slight reduction of visible radiation is required)	Reflection, bright sun, and lights; reflected welding flash.	✓		✓	✓				One of the following			✓	✓				✓			
Injurious optical radiation (where moderate reduction of optical radiation is required)	Torch cutting, welding, furnace work; spot welding, metal pouring, spot welding.		✓			✓									✓				✓	

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		A	B	A	B	C	D	E				A	B	C	D	E	A	B	C	D	
Electric arc flash	Electrical installation; electrical maintenance; troubleshooting of electrical systems; disconnecting live electrical systems.							✓	One of the following							✓					✓

Note: In each particular situation, consideration should be given to the severity of all hazards when selecting the appropriate protector or combination of protectors. Reference: CSA Z94.3.1-16

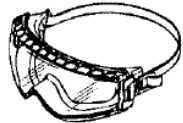
**APPENDIX B
CLASSIFICATION OF EYE AND FACE PROTECTORS**



Class 1A
Spectacles with side protection



Class 1B
Spectacles with side and non-ionizing radiation protection



Class 2A
Direct ventilated goggles



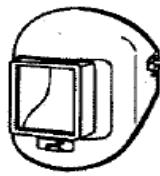
Class 2B
Indirect ventilated goggles



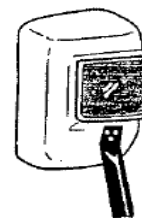
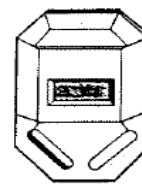
Class 2C
Direct/non-ventilated goggles with non-ionizing radiation protection



Class 2D and 2E
Laser-protective goggles



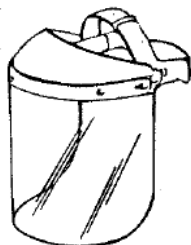
Class 3
Welding Helmets



Class 4
Welding Hand Shields



- Class 5A** Hood with impact-resistant window
- Class 5B** Hood for dust, splash, and abrasive materials protection
- Class 5C** Hood with non-ionizing radiation protection
- Class 5D** Hood for high-heat applications
- Class 5E** Hood for electric arc protection



- Class 6A** Face shield for impact and splash protection
- Class 6B** Face shield for non-ionizing radiation protection
- Class 6C** Face shield for high-heat applications
- Class 6D** Face shield for electric arc protection

Reference: CSA Z94.3.1-16