

EYE AND FACE PROTECTION

SELECTION TOOL



INTERNATIONAL
SAFETY EQUIPMENT
ASSOCIATION



ANSI/ISEA Z87.1-2020

Eye and Face Protector Selection Guide

This guide is not intended to be the sole reference in selecting the proper eye and face protector. A copy of this selection guide is also available for download from ISEA's website, www.safetyequipment.org.

This information is intended to aid in identifying and selecting the types of eye and face protectors that are available, their capabilities and limitations for the hazards listed. Care should be taken to recognize the possibility of multiple and simultaneous hazard exposures and the chosen protector(s) should be able to protect against the highest level of each hazard. Some protectors may not be compatible with other personal protective equipment when worn together. The end user needs to carefully match protectors with other personal protective equipment to provide the protection intended. Protectors are generally available in a variety of styles and sizes and care should be taken to ensure that the right size is selected for a particular person ensuring comfort and proper fit. Protectors that fit poorly will not afford the protection for which they were designed.

Hazard	Protectors	Limitations	Marking ¹
IMPACT - Chipping, grinding, machining, masonry work, riveting, and sanding			
Flying fragments, objects, large chips, particles, sand, dirt, etc.	<ul style="list-style-type: none"> • Spectacles with side protection • Goggles with direct or indirect ventilation • Faceshield worn over spectacles or goggles • Welding helmet worn over spectacles or goggles • Loose-fitting respirator worn over spectacles or goggles • Full-facepiece respirators 	<p>Caution should be exercised in the use of metal frame protective devices in electrical hazard areas. Metal frame protective devices could potentially cause electrical shock and electrical burn through contact with, or thermal burns from exposure to the hazards of electrical energy, which include radiation from accidental arcs.</p> <p>To provide adequate protection, ensure goggles fit tightly to the face.</p> <p>Atmospheric conditions and the restricted ventilation of a protector can cause lenses to fog. Frequent cleaning may be required.</p>	<p>Impact rated: + (spectacle lens) Z87+ (all other lens) Z87+ (plano frame) Z87-2+ (Rx frame)</p>
HEAT - Furnace operations - pouring, casting, hot dipping, gas cutting, and welding			
Hot sparks	<ul style="list-style-type: none"> • Spectacles with side protection • Goggles with direct or indirect ventilation • Faceshield worn over spectacles or goggles • Loose-fitting respirator worn over spectacles • Full-facepiece respirator 	<p>Spectacles, cup and cover type goggles do not provide unlimited facial protection.</p> <p>Operations involving heat may also involve optical radiation. Protection from both hazards shall be provided.</p>	<p>NOTE: There are currently no marking designations for eye protection to heat or high-temperature exposure in the ANSI/ISEA Z87.1-2020 standard.</p>
Splash from molten metal	<ul style="list-style-type: none"> • Faceshield worn over goggles • Loose-fitting respirator worn over spectacles or goggles • Full-facepiece respirator 		

Hazard	Protectors	Limitations	Marking ¹
High temperature exposure	<ul style="list-style-type: none"> • Screen faceshield over spectacles or goggles • Reflective faceshield over spectacles or goggles 		
CHEMICAL – Liquids, acid and chemical handling, degreasing, plating.			
Splash, droplets and sprays	<ul style="list-style-type: none"> • Goggles with indirect ventilation (eyecup or cover type) • Faceshield worn over goggles) • Loose-fitting respirator worn over spectacles or goggles • Full-facepiece respirator 	<p>Atmospheric conditions and the restricted ventilation of a protector can cause lenses to fog. Frequent cleaning may be required.</p> <p>To provide adequate protection, ensure goggles fit tightly to the face.</p>	Splash/droplet: D3
Irritating Mist	<ul style="list-style-type: none"> • Goggle with no ventilation (cover type) • Faceshield worn over goggles • Loose-fitting respirator worn over spectacles or goggles • Full-facepiece respirator 	<p>Atmospheric conditions and the restricted ventilation of a protector can cause lenses to fog. Frequent cleaning may be required.</p> <p>To provide adequate protection, ensure goggles fit tightly to the face.</p>	NOTE: There are currently no marking designations for eye protection to Irritating mists exposure in the ANSI/ISEA Z87.1-2020 standard.
DUST - Woodworking, buffing, general dusty conditions			
Nuisance dust	<ul style="list-style-type: none"> • Goggles with direct or indirect ventilation (eyecup or cover type) • Full-facepiece respirator 	<p>Atmospheric conditions and the restricted ventilation of a protector can cause lenses to fog. Frequent cleaning may be required.</p> <p>To provide adequate protection, ensure goggles fit tightly to the face.</p>	Dust: D4
Fine dust	<ul style="list-style-type: none"> • Goggles with indirect ventilation or no ventilation • Full-facepiece respirator 	To provide adequate protection, ensure goggles fit tightly to the face.	Fine dust: D5
OPTICAL RADIATION			
Infrared Radiation (IR)	<ul style="list-style-type: none"> • Spectacles with side protection • Goggles with direct or indirect ventilation • Faceshield worn over spectacles or goggles • Welding helmet worn over spectacles or goggles • Loose-fitting respirator worn over spectacles or goggles • Full-facepiece respirators 	<p>For proper fit of protector; there shall be no penetration of direct infrared spectra light in all non-lens areas.</p> <p>Side shields shall have filtering capability equal to or greater than the front lenses.</p>	IR: R and scale number

Hazard	Protectors	Limitations	Marking ¹
Visible Light (Glare)	<ul style="list-style-type: none"> • Spectacles with side protection • Goggles with direct or indirect ventilation • Faceshield worn over spectacles or goggles • Welding helmet worn over spectacles or goggles • Loose-fitting respirator worn over spectacles or goggles • Full-facepiece respirators 	<p>For proper fit of protector; there shall be no penetration of direct visible light in all non-lens areas.</p> <p>Sideshields shall have filtering capability equal to or greater than the front lenses.</p>	Visible: L and <i>scale number</i>
Ultraviolet Radiation (UV)	<ul style="list-style-type: none"> • Spectacles with side protection • Goggles with direct or indirect ventilation • Faceshield worn over spectacles or goggles • Welding helmet worn over spectacles or goggles • Loose-fitting respirator worn over spectacles or goggles • Full-facepiece respirators 	<p>For proper fit of protector; there shall be no penetration of direct ultraviolet light in all non-lens areas</p> <p>Sideshields shall have filtering capability equal to or greater than the front lenses.</p>	UV: U and scale number
Lasers	Refer to ANSI Z136.1-2014 “Safe Use of Lasers”, for guidance in choosing the correct protective eyewear when working with lasers.		NOTE: There are currently no marking designations for eye protection to Lasers in the ANSI/ISEA Z87.1-2020 standard.
Electric Arcs	Refer to NFPA 70E-2018 “Standard for Electrical Safety in the Workplace”, for guidance in choosing the correct protective eyewear when working on electrical equipment.	Only faceshields provide compliant eye and face protection, worn over protective spectacles.	NOTE: There are currently no marking designations for eye protection to electrical arcs in the ANSI/ISEA Z87.1-2020 standard.

Hazard	Protectors	Limitations	Marking ¹
<p>Arc Welding: Arc</p> <p>Process Examples: Shielded Metal Arc Welding (SMAW)</p> <p>Gas Metal Arc Welding (GMAW)</p> <p>Gas Tungsten Arc Welding (GTAW)</p> <p>Air Carbon Arc Welding (CAC-A)</p> <p>Carbon Arc Welding (CAW)</p> <p>Plasma Arc Welding (PAW)</p> <p>Plasma Arc Cutting (PAC)</p> <p>Viewing electric arc furnaces and boilers.</p>	<ul style="list-style-type: none"> • Welding helmet over spectacles or goggles • Handshield over spectacles or goggles • Welding Respirator • TYPICAL FILTER LENS SHADE: 10-14 	<p>Protection from optical radiation is directly related to filter lens density. Select the darkest shade that allows adequate task performance.</p> <p>For proper fit of protector; there shall be no penetration of direct visible light in all non-lens areas.</p> <p>Sideshields shall have filtering capability equal to or greater than the front lenses. Welding helmets are intended to shield the eyes and face from optical radiation, heat, and impact. Welding helmets should not be used as stand-alone protective devices and should be worn in conjunction with goggles or spectacles.</p> <p>Filter lens shade selection is to be made based on the welding process, arc current, electrode size and/or plate thickness. Use ANSI Z49.1:2012, Table 1, Guide for Shade Numbers, to select the proper filter lens shade for both protection and comfort (reduction in visible glare).</p> <p>Note: Filter lenses shall meet the requirements for shade designations in table 7 of ANSI/ISEA Z87.1-2020.</p>	<p>Welding: W shade number</p> <p>UV: U scale number</p> <p>Visible: L scale number</p> <p>IR: R scale number</p> <p>Variable tint: V</p> <p>Special purpose: S</p>

Hazard	Protectors	Limitations	Marking ¹
<p>Oxyfuel Gas Welding:</p> <p>Process Examples: Oxyfuel Gas Welding (OFW)</p> <p>Viewing gas-fired furnaces and boilers</p>	<ul style="list-style-type: none"> • Welding goggles • Welding helmet over spectacles or goggles • Welding faceshield over spectacles or goggles <p>TYPICAL FILTER LENS SHADE: 6 -8</p>	<p>Protection from optical radiation is directly related to filter lens density. Select the darkest shade that allows adequate task performance.</p> <p>For proper fit of protector; there shall be no penetration of direct visible light in all non-lens areas.</p> <p>Sideshields shall have filtering capability equal to or greater than the front lenses.</p> <p>Welding helmets are intended to shield the eyes and face from optical radiation, heat, and impact. Welding helmets should not be used as stand-alone protective devices and should be worn in conjunction with goggles or spectacles</p> <p>Filter lens shade selection is to be made based on the welding process, arc current, electrode size and/or plate thickness. Use ANSI Z49.1:2012, Table 1, Guide for Shade Numbers, to select the proper filter lens shade for both protection and comfort (reduction in visible glare).</p>	<p>Welding: W shade number</p> <p>UV: U scale number</p> <p>Visible: L scale number</p> <p>IR: R scale number</p> <p>Variable tint: V</p> <p>Special purpose: S</p>
<p>Oxyfuel or Oxygen Cutting</p>	<ul style="list-style-type: none"> • Welding goggles • Welding helmet over spectacles or goggles • Welding faceshield over spectacles or goggles <p>TYPICAL FILTER LENS SHADE:3-6</p>	<p>Note: Filter lenses shall meet the requirements for shade designations in table 7 of ANSI/ISEA Z87.1-2020.</p>	
<p>Torch brazing</p>	<ul style="list-style-type: none"> • Welding goggles • Welding helmet over spectacles or goggles • Welding faceshield over spectacles or goggles <p>TYPICAL FILTER LENS SHADE: 3-4</p>		
<p>Torch soldering</p>	<ul style="list-style-type: none"> • Spectacles • Welding faceshield over spectacles <p>TYPICAL FILTER LENS SHADE: 2</p>	<p>Shade or special purpose lenses, as suitable.</p> <p>Note: Refer to definition of special purpose lenses in ANSI/ISEA Z87.1-2020.</p>	
<p>Glare</p>	<ul style="list-style-type: none"> • Spectacles with or without side protection • Faceshield over spectacles or goggles. 		

1. Refer to ANSI/ISEA Z87.1-2020 Table 3 for complete marking requirements.

2. Refer to ANSI Z49.1: 2012: "Safety in Welding, Cutting, and Allied Processes", Table 1, Guide for Shade Numbers, to select the proper lens filter protective shade based on welding process, arc current (in amperes), Electrode Size (arc welding only) and metal plate thickness (for oxyfuel and oxygen cutting only).

3. Refer to ANSI Z136.1-2014 "Safe Use of Lasers", for guidance on choosing the correct protective eyewear when working with lasers.