



ThermoFisher
S C I E N T I F I C

Lab Safety ~ A Culture of Continuous Improvement

The world leader in serving science

A Mission We Are Proud Of

A young girl with curly hair is blowing bubbles in a field. The bubbles are large and colorful, floating in the air. The background is a soft-focus field of tall grass under a bright sky.

We enable our customers to make the world healthier, cleaner and safer.

To Be Our
Customer's
Trusted
Safety Resource

Fisher Scientific
Safety

Capabilities | Products | Experience

The Importance of Safety

- Safety protects:
 - People
 - Property
 - Public Trust
 - Reputations
 - Profits
- Regulatory requirements
- Enable improvements through technology and innovation



Potential Financial Impacts to Your Business

Protecting employees is always the first consideration but you cannot ignore the potential impact to your profitability from an injury or incident.

- **Sales Equivalent Dollars (SED)**

- SED = Total Cost x 100% / % Profit Margin

- **Example: Widget Company XYZ**

- \$500 Direct Cost of a single Injury
- Indirect Cost is 2 x Direct Cost or \$1,000
- **Wages of injured/others, admin cost, property or product damages**
- Sample Profit Margin of Company is 5%

$$SED = \$1500 \times 100\% / 5\% = \$30,000$$

- **A \$500 Dollar Injury Could Cost....**

- 6000 cups of premium coffee
- A baker to sell 60,000 donuts
- A concrete company to deliver 20 truckloads of concrete.
- 300,000 exam gloves



Top 10 Serious Violations of 2016

A "serious" violation is defined by OSHA as:

- There is substantial probability that death or serious physical harm could result
- Employer knew or should have known of the hazard

	STANDARD	TOTAL VIOLATIONS
1	Fall Protection (1926.501)	5,635
2	Hazard Communication (1926.1200)	3,544
3	Scaffolding (1910.451)	3,535
4	Lockout/Tagout (1910.147)	3,414
5	Respiratory Protection (1910.134)	2,421
6	Ladders (1926.1053)	2,365
7	Machine Guarding (1910.212)	2,147
8	Powered Industrial Trucks (1910.178)	2,043
9	Electrical – Wiring Methods (1910.305)	1,424
10	Fall Protection Training (1926.503)	1,285

Source: Safety & Health Magazine

Top 10 "Willful" violations of 2016

OSHA defines a "willful" violation as one "committed with an intentional disregard of or plain indifference to the requirements of OSHA"

	STANDARD	TOTAL VIOLATIONS
1	Fall Protection (1926.501)	173
2	Lockout/Tagout (1910.147)	114
3	Lead (1910.1025)	52
4	Excavations (1926.652)	49
5	Mechanical Power Presses (1910.217)	44
6	Scaffolding (1926.451)	40
7	Machine Guarding (1910.212)	19
8	Specific Excavation Requirements (1926.651)	19
9	General Duty Clause 5(a)(1)	16
10	Grain Handling (1910.272), Welding, Cutting and Heating (1915.53)	14

Source: Safety & Health Magazine

OSHA is Raising Maximum Penalties

- In 2015, Congress enacted legislation requiring federal agencies to adjust their civil penalties to account for inflation, including OSHA
- OSHA's maximum penalties **will increase by 78%**
 - The agency will continue to adjust its penalties for inflation each year based on the CPI.
- New penalties took effect after August 1, 2016

Daily cost to our customers for a comprehensive safety program



Vs.

Cost of a serious one time workplace Injury or Death



Name some of the impacts that unsafe practices and programs can have on your lab or your organization?

Answer

- Possible injuries or death
- Potential facility damages
- Environmental impact
- Low productivity
- Employee morale
- Bad publicity
- Reduced profits
- Higher insurance rates





ThermoFisher
SCIENTIFIC

Hazcom Compliance and Your Lab

The world leader in serving science

The 4 Pillars of Safety

Prepare



Services ▪ Training
Audits

Prevent



Signs ▪ Hazard storage Office
supplies ▪ Labeling Sanitizers
▪ Disinfectants Wipers ▪
Disposal Janitorial ▪ Waste
disposal

Protect



Eye ▪ Hand ▪ Body ▪
Face Hearing ▪ Head
Respiratory ▪ Matting
Ergonomics ▪ Monitoring

Respond



Spill Control ▪ Eyewash
Emergency Lighting
Tools ▪ First Aid ▪ Fire
Extinguishers

What Are Your Lab Hazards?

- **Chemical hazards:** Pure and mixtures
- **Biological hazards:** Viruses, bacteria, fungi/mold, plants, animals
- **Thermal hazards:** Fire and arc flash, cryogenic
- **Physical hazards:** Noise, heat, cold, radiation, etc.
- **Safety hazards:** Slippery and/or uneven surfaces, moving or unstable surfaces, rough surfaces, sharps, power sources (electric, hydraulic, pneumatic, etc.)



Evaluating the Hazards

- Get to **KNOW THE PROCESS**
- Observe the **work practices**
- Determine the **level, duration** and **frequency** of exposures
- Determine engineering and administrative **controls** being utilized
- Determine and evaluate the **effectiveness** of PPE being used



***Chemical Hygiene Plans OSHA 1910.1450
are living programs.***

A complete and thorough hazard assessment is required for the entire complex, including administrative, laboratory, common areas, production, and maintenance areas.

Substitution

- Reduce or eliminate the hazard

Engineering

- Technical solutions to make equipment safer

Work Practices

- Proper tools and procedures

Personal Protective Equipment

- The last line of defense

Hazard Communications

Ensures that dangers of all hazardous chemicals used are known by all affected employees:

- **Container Labeling – Revise & Train**
- **Material Safety Data Sheets SDS/MSDS – *Obtain Revisions & Train***
- **Employee Training and Information – *Update***
- **Hazardous Non-routine Tasks**
- **List of Hazardous Chemicals – *Update Your Inventory***
- **Chemicals in Unlabeled Pipes**



SGH 01
Explosives



SGH 02
Inflammables



SGH 03
Oxidising materials



SGH 04
Gases under pressure



SGH 05
Corrosives



SGH 06
Acute toxicity



SGH 05
Warning



SGH 05
Health hazard



SGH 06
Hazardous to
the aquatic environment

Content Provided by Brady Corporation

A copy of this program will be made available, upon request, to employees and their representatives

PRIMARY Shipped Container Labels

- “Shipped Container” = “Any container leaving the workplace”
- Six required elements
- Picto’s with red diamonds
- Chemical, signal word, hazard & precautionary statements, supplier info

Workplace (Secondary Container) Label

- Match primary label (*best practice*)
(or)
- Chemical, words, pictures, symbols or in combination with other information conveys all physical and health hazards of the chemical

Acetone
ACETONE

ENGLISH: H200: Unstable explosives. - H221: Flammable gas. - H260: In contact with water releases flammable gases which may ignite spontaneously.
P101: If medical advice is needed, have product container or label at hand. - P220: Keep away from combustible materials. - P223: Keep away from any possible contact with water, because of violent reaction and possible flash fire.

FRANCAIS: H200: Explosif instable. - H221: Gaz inflammable. - H260: Dégage au contact de l'eau des gaz inflammables qui peuvent s'enflammer spontanément.
P101: En cas de consultation d'un médecin, garder à disposition le récipient ou l'étiquette. - P220: Tenir à l'écart des matières combustibles. - P223: Éviter tout contact avec l'eau, à cause du risque de réaction violente et d'inflammation spontanée.

DANGER 222222-22-2 333-333-33-3
DANGER 111-111-1 Reach Authorization #

Brady Corporation
6555 West Good Hope Road
Milwaukee, WI 53223
414-444-4444

Insert Comment here: ...

250L



Where are Companies at regarding GHS Compliance?

Industries Included

Manufacturing

Biotech

Agriculture

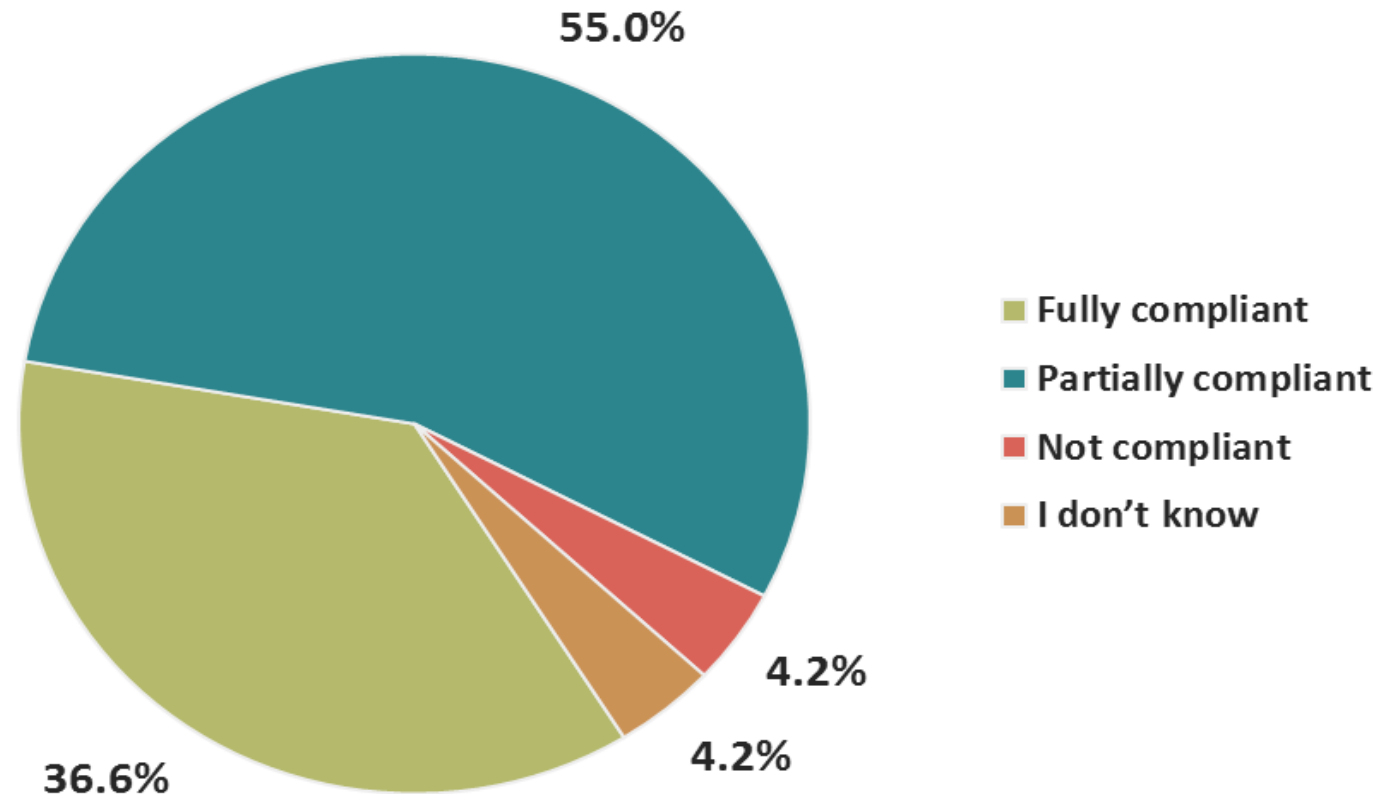
Chemical Production

Healthcare

Oil & Gas

Energy

How would you assess your company's progress in complying with GHS?

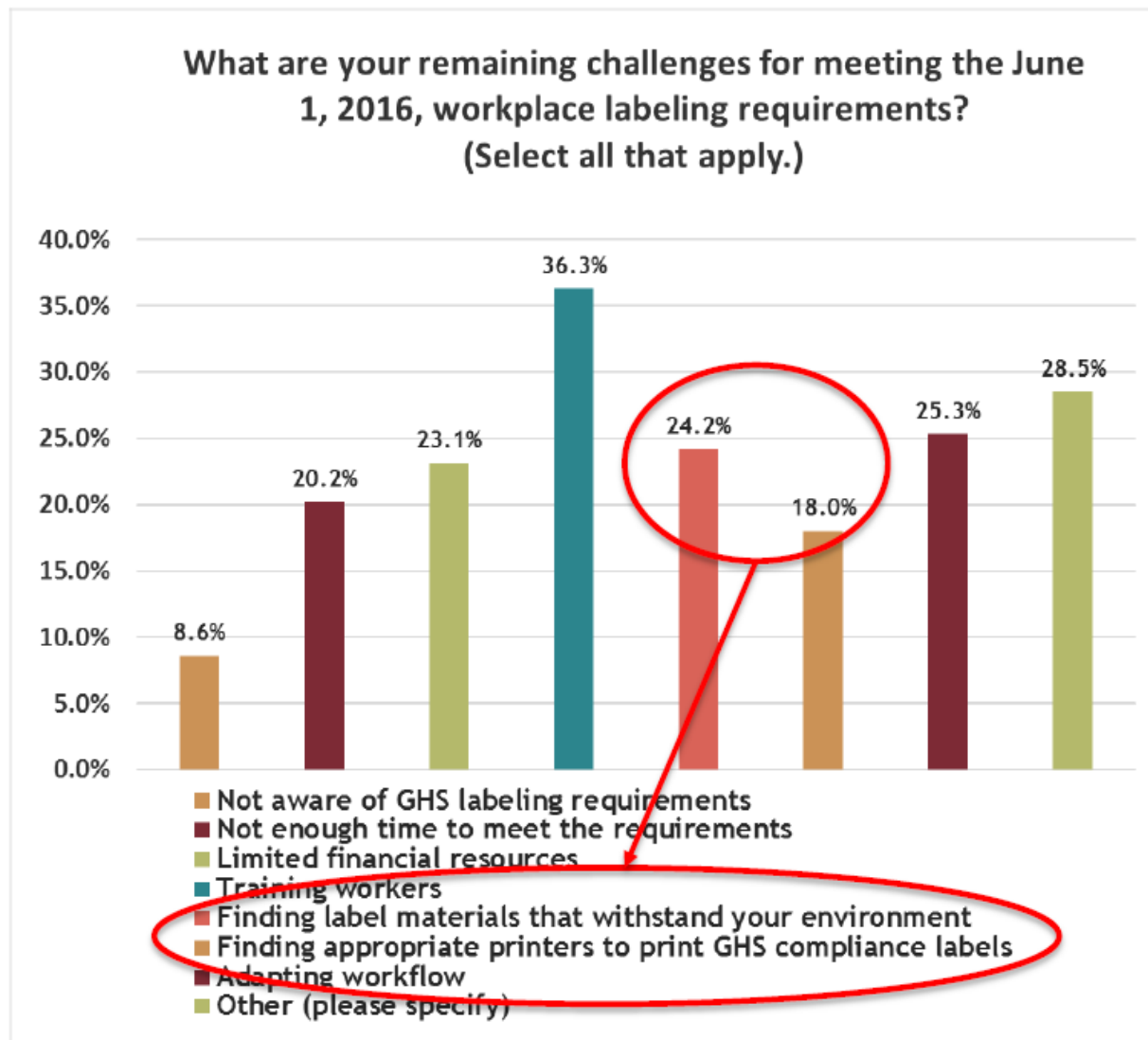


EHS Daily Advisor

Practical EHS Tips, News & Advice. Updated Daily.

Powered by
FBLR

Labeling Solutions Available and Best Practices



Preprinted Labels
External Survey Services
Printers/SDS Stations and Binders

Purpose of Internal Audits

Protect People

Protect Property

Improve Compliance

Improve Safety Practices

Reduce Risk



Questions You Should Consider

What is my current level of compliance?

What is my overall risk?

What is my greatest Risk?

How frequently do I audit?

What is my audit method? (Pen & Paper)

How many work areas do I have to audit?

Do I need to hire outside resources?



There are automated solutions available that can provide expedited and more frequent auditing

- Pre-loaded regulatory content
- Custom Loaded with state, local, or company polices and protocol
- Can be completed by Non EH&S staff members
- Automated reporting capabilities and tracking of corrections

heidolph
research made easy

Mobile Safety Software to keep your Campus on top of Compliance Regulations

AuditPro combines smart protocols with actionable determinations and corrective recommendations, all contained within an easy to use, mobile platform.

In the quest to maintain compliance with EPA and OSHA regulations, your organization needs a real time, professionally guided solution to keep overhead costs down and instill a culture of compliance.

- ✓ Perform comprehensive audits with little or no compliance expertise
- ✓ Utilize as an EMS or work alongside an existing EMS

Features	AuditPRO	Other Software
Includes regulatory citations	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Regulations continuously updated	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Calculates fine avoidance value	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Built in corrective and preventative recommendations	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Self-guided, interactive help content	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Mobile platform linked to database	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Assign corrective actions	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> (Some)
Hosted Service	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> (Some)
No capital costs	<input checked="" type="checkbox"/>	<input type="checkbox"/>
No IT support required	<input checked="" type="checkbox"/>	<input type="checkbox"/>

Universities & Pharmaceutical Accounts are saving up to 50% a year on program costs without needing to hire expensive consultants.

No FTE EHS, Lab Safety Specialist
Base Salary of \$44,000

Fisher Scientific

EN0706154

Common Safety Misses in the Lab

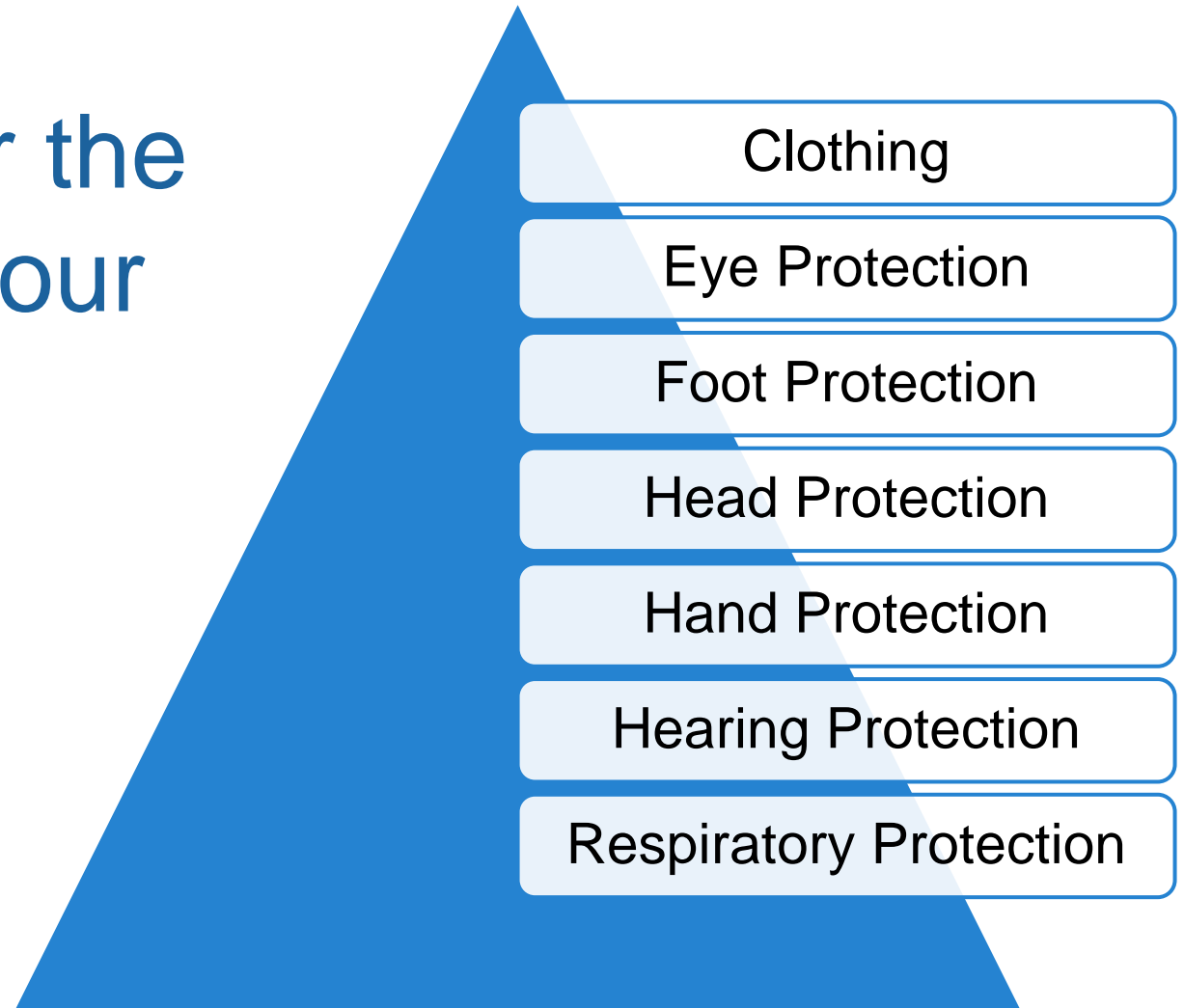


What's Missing?

Safety Lab Checklist

- First Aid Kit
- Emergency Shower/Eyewash
- HAZCOM Signage
- Spill Response Kits, Bench Pads, Spill Trays
- Fire Extinguisher/Blankets
- Cylinder Brackets and Dolly
- Floor Mats
- Chemical Storage Cabinets
- Chemical Storage Cans
- Glass Disposal Boxes

When should PPE enter the process of protecting your employees?



When the hazard cannot be controlled by engineering, administrative, or other controls.



Personal Protective Equipment Best Practices

Eye, Hand, and Body

Primary Protective Equipment

- The hazard is active and exposure to the hazard is imminent
- Example: Firefighter Turnout Gear



Secondary Protective Equipment

- The potential hazard exist and may cause serious injury, death or damage if it becomes active
- Arc Flash garments or a lab coat



Eye Injuries in the Workplace

- 2012 Bureau of Labor Eye Injury Statistics
 - 23,800 eye injuries across private, state, and local government.
 - Average cost of an eye injury is \$1486 (source OSHA)
 - Resulted in 2-3 days on average away from work
- Average cost of vision loss of an employee (source OSHA)
 - Direct and Indirect Cost can be \$56K to \$118K depending on insurance
 - SED in this case could total approximately \$1.7M (based on 7% margin)



You Only Have One Set of Eyes

OSHA Eyewear Selection Table is a Best Practice

Operation	Hazards	Recommended Protector Category	Eye/Face Wear Description
Acetylene – Burning, Acetylene – Cutting Acetylene - Welding	Sparks, Harmful Rays, Molten Metal, Flying Debris	7, 8, 9	Welding Goggles, Tinted, Clear, or Tinted Plate Lens
Chemical Handling	Splash, Acid Burns, Fumes	2, 10 (For sever exposure add 10 over 2)	Goggles Flexible Fitting hooded ventilation with Face Shield
Chipping	Flying particles	1, 3, 4, 5, 6, 7A, 8A	Goggles, Spectacles, Chipping or Welding Goggles
Electric Arc Welding	Sparks, intense rays, molten metal	9, 11,(11 in combination with 4, 5, 6, in tinted lenses advisable	Welding Goggles, Spectacles and Face Shields
Furnace Operations	Glare, Heat, Molten Metal	7,8,9 and for severe 10	Welding or Chipping Goggles w/ Face Shield
Grinding – Light	Flying Particles	1, 3, 4, 5, 6, 10	Goggles, Spectacles, Face Shield
Grinding – Heavy	Flying Particles	1, 3, 7A, 8A (For severe exposure add 10)	Goggles, Spectacles, Face Shield
Laboratory	Chemical Splash, Glass Breakage	2 (10 when in combination with 4, 5, 6)	Goggles, Spectacles, Face Shield
Machining	Flying Particles	1, 3, 4, 5, 6, 10	Goggles, Spectacles, Face Shield
Molten Metals	Heat, Glare, Sparks, Splash	7, 8, (10 in combination with 4,5, 6 in tinted lenses	Goggles, Spectacles, Face Shield
Spot Welding	Flying particles, sparks	1, 3, 4, 5, 6, 10	Goggles, Spectacles, Face Shield

Eye Injuries Happen Not Only Because of Lack of Eyewear but Incorrect Eyewear Protection

- **Spectacles and Goggles**

- Need to meet the hazard requirements (ANSI Z87-1)
- Should be selected on comfort and performance, and Not Style
- Vented and Non vented goggles

- **Common Complaints or Concerns**

- Lack of Ladies Sizes or Fit
- Poor fit of certain spectacles on workers with wider noses or smaller faces.
- Depth Perception
- Headaches or Dizziness



- **Safety Faceshields**

- Made in varying degrees of thickness and from different materials including wire, and heat reflective materials

- **Common Complaints or Concerns**

- Scratched Lens
- Comfort or Secure Fit

- **Considered secondary protectors**

- Used in addition to primary protection such as safety glasses or goggles



- **Common Complaints or Concerns**
 - Lack of ladies sizes or fit
 - Poor fit of on workers with wider noses or smaller faces
 - Depth Perception, headaches, nausea



RX options can eliminate depth perception, dizziness, and improve comfort and fit

Hand Protection

- **Hazard Identification**
 - Exposure to Biologicals
 - Cut Hazards
 - Chemical
 - Extreme Temperatures
- **Types**
 - Disposable / Exam
 - Chemical Resistant
 - Cut Resistant
 - Industrial (canvas, leather, coated)
 - Heat / Cold Resistant
- **Additional Considerations**
 - Thickness (mill size), Length, Cuff, & Hand Cleansing Requirements



- A Safety Data Sheet (SDS) is the first and usually best place to find a suggestion for which glove material is appropriate
- Prior to selecting any glove, always check the manufacturer's data and the glove thickness
- Gloves should be inspected before each use



Make Sure You are Properly Protected

Permeation/Degradation Resistance Guide for Ansell Gloves

The first square in each column for each glove type is color coded. This is an easy-to-read indication of how we rate this type of glove in relation to its applicability for each chemical listed. The color represents an overall rating for both degradation and permeation. The letter in each square is for Degradation alone...

GREEN: The glove is very well suited for application with that chemical.

YELLOW: The glove is suitable for that application under careful control of its use.

RED: Avoid use of the glove with this chemical.



CHEMICAL	LAMINATE FILM			NITRILE			UNSUPPORTED NEOPRENE			SUPPORTED POLYVINYL ALCOHOL			POLYVINYL CHLORIDE (Vinyl)			NATURAL RUBBER			NEOPRENE/NATURAL RUBBER BLEND		
	BARRIER			SOL-VEX			29-865			PVA			SNORKEL			CANNERS AND HANDLERS*			CHEMI-PRO*		
	Degradation Rating	Permeation Breakthrough	Permeation Rate	Degradation Rating	Permeation Breakthrough	Permeation Rate	Degradation Rating	Permeation Breakthrough	Permeation Rate	Degradation Rating	Permeation Breakthrough	Permeation Rate	Degradation Rating	Permeation Breakthrough	Permeation Rate	Degradation Rating	Permeation Breakthrough	Permeation Rate	Degradation Rating	Permeation Breakthrough	Permeation Rate
1. Acetaldehyde	■	380	E	■	—	—	■	10	F	■	—	—	■	—	—	■	7	F	■	10	F
2. Acetic Acid	■	150	—	■	270	—	■	60	—	■	—	—	■	180	—	■	110	—	■	260	—
3. Acetone	▲	>480	E	■	—	—	■	10	F	■	—	—	■	—	—	■	10	F	■	10	G
4. Acetonitrile	▲	>480	E	■	30	F	■	20	G	■	150	G	■	—	—	■	4	VG	■	10	VG
5. Acrylic Acid	—	—	—	■	120	—	■	390	—	■	—	—	■	—	—	■	80	—	■	65	—
6. Acrylonitrile	■	>480	E	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
7. Allyl Alcohol	▲	>480	E	■	140	F	■	140	VG	■	—	—	■	60	G	■	>10	VG	■	20	VG

Use the Manufacture Permeation Degradation Resistance Guides and Data

**Permeation
Breakthrough
Degradations**

Always validate your glove's protection relevant to the hazard or application

FDA determined powdered patient and surgeon's gloves pose an unreasonable risk of illness or injury

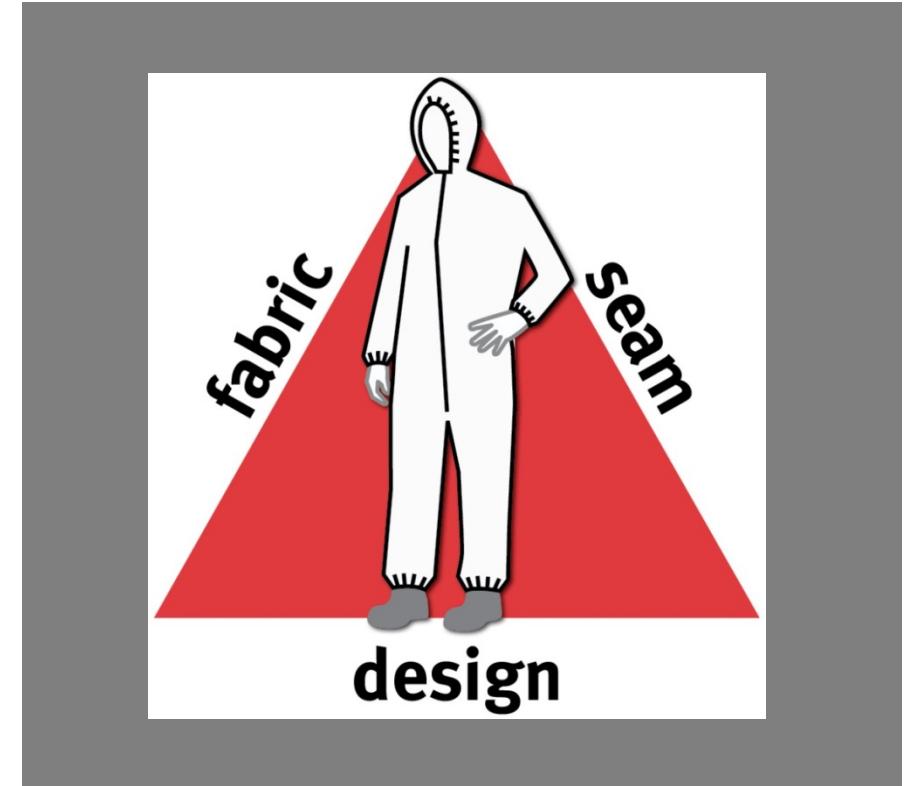
- During the evaluation of potential solutions it was discovered that the existing risk could not be controlled simply by labeling, package changes, or other methods
- Change applies specifically to medical exam gloves, surgeon's gloves, and any substance that would be used to assist in the donning of gloves
- Standard does allow for the use of powdered gloves outside of the healthcare industry in industrial environments



Fisher Scientific in the best interest of our customers health and safety, will not supply any of our examine gloves in a powdered choice beyond the 18th of January, 2017.

Chemical Protective Apparel Considerations

- **Chemical Protective Garments – Levels of Protection Performance**
 - Repellency – nuisance only
 - Penetration – particles, nuisance liquids
 - Permeation – hazardous/toxic liquids and gases
- **Which chemicals are of interest?**
 - CAS #; concentration
 - Incidental contact or splash?
 - Volume / duration of exposure
 - Direction of contact
- **Combined Protection (CP/FR) Considerations**
 - Primary vs. secondary flame resistance protection
 - Nuisance vs hazardous/toxic chemical protection
 - Disposable vs. limited-used vs. reusable garments
 - Layering – pros and cons



Biological Protective Apparel for Biohazard

- Biological agents include:
 - Bacteria, viruses, fungi,
 - Other microorganisms and their associated toxins
- Can adversely affect human health in a variety of ways, ranging from relatively mild, allergic reactions to serious medical conditions, even death
- If a lab is following **Biosafety Levels (BSL)** protocols, PPE will be written into their processes, which will include training procedures
- E.coli example

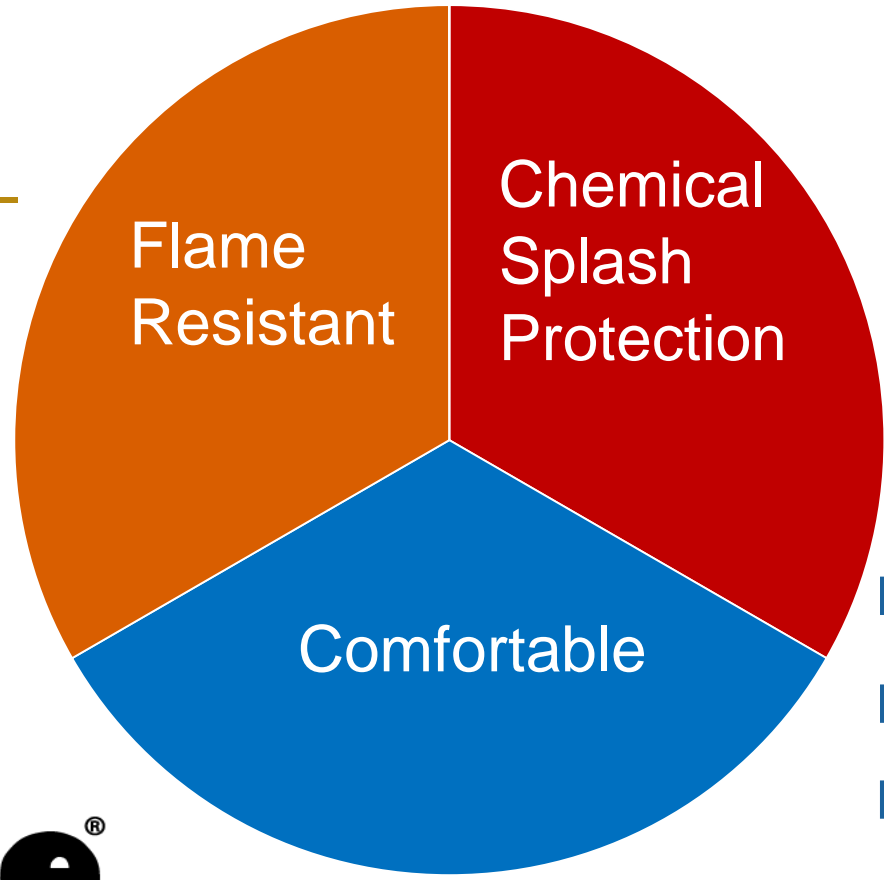


6.6.1 – The provisions of 6.6.2 through 6.6.5 shall apply to all new and existing laboratories:

- 6.6.2 – Fire retardant lab coats shall be worn where pyrophoric reagents are used outside the inert atmosphere of a glove box
- A6.6.2 Fire retardant lab coats should be considered when handling flammable liquids and other hazardous materials that are easily ignited
- 6.6.3 – Fire retardant gloves shall be worn whenever possible where pyrophoric reagents are used outside the inert atmosphere of a glove box
- 6.6.4 – Natural fiber clothing shall be worn under fire retardant lab coats and on the legs and feet where pyrophoric reagents are used outside the inert atmosphere of a glove box
- 6.6.5 – Fire retardant clothing shall meet the requirements of NFPA 2112



Flame Resistant –
Nomex IIIA



**Chemical Splash Protection -
ShieldCXP**

Lightweight – 4.5 oz.

Feel – Soft/Supple

Breathable – 197 cfm air permeability

Fit - Designed for lab workers

Can be laundered repeatedly



What's Wrong with this Picture?





Considerations When Choosing a Safety Provider

Safety Portfolio ~ How to Effectively Choose a Safety Provider

Understands your
processes
& **solutions**

Actively works to help
you to maintain
safe work places

Protects what
matters most your
employees



Realizes Importance
of
efficiency

Delivers
compliant
Products and services

Knowledgeable
team of safety
specialists

Safety Supplier Relationships to Provide Products and Services for the Entire Facility



3M

Ansell

BRADY

Bradley

fisherbrand

Honeywell

JUSTRITE

MICROFLEX
THE MOST TRUSTED NAME IN GLOVES®

MSA

PIP

PYRAMEX

Medique®

SHOWA BEST
GLOVE
Two Powerful Companies. One Powerhouse in Protection.

SCOTT
SAFETY

Services and Solutions Beyond the Product

- Safety training
- Lab and facility safety audits
- GHS compliance and Hazcom programs
- Hand protection evaluations
- Chemical/flammable storage assessments
- Recycling of gloves & garments



Our strategic partners lead the industry in compliance and we can make them your resources

The Safest Workplaces Include:

- A Top Down Safety Culture
- Hazard and Process Assessments
- Strong Employee Safety Training
- Proper PPE Selection
- Frequent Safety Auditing
- Continuous Process Improvements
- Enforcement of Compliance Standards





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thermoscientific

f fisher scientific

unity lab services

Thank You

Please join me in the
Fisher Scientific
section of our booth where I'll
address comments and questions.