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***Indian Standard***

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**बांह और हाथों की सुरक्षा के लिए औद्योगिक सुरक्षा उपकरणों के चयन के लिए गाइड**

(*पहला पुनरीक्षण* )

**Guide for Selection of Industrial Safety Equipment for Protection of Arms and Hands**

*( First Revision )*

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**भारतीय मानक ब्यूरो

BUREAU OF INDIAN STANDARDS

मानक भवन, 9 बहादुर शाह ज़फर मार्ग, नई दिल्ली –110002

MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARGNEW DELHI - 110002

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FOREWORD

This Indian Standard (First Revision) was adopted by the Bureau of Indian Standards, after the draft finalized by the Occupational Safety and Health Sectional Committee had been approved by the Chemical Division Council.

This standard is intended to guide workers and those in charge of their safety in industrial operations in selecting· such protective equipment for hands and arms that will give the required protection against hazards likely to be encountered.

This standard was first published in 1978. In this first revision, the following modifications have been incorporated.

1. Classification of hazards and selection of equipment related to protection of arms and hands have been updated.
2. Clauses on the following topics have been added:
3. When to use protective gloves
4. Training, procedures, and written program; and
5. Proper use.
6. References have been updated and other editorial changes have been done to bring the standard in latest style and format of Indian Standards.

The composition of the Committee responsible for the formulation of this standard is given at Annex B.

*Indian Standard*

GUIDE FOR SELECTION OF INDUSTRIAL SAFETY EQUIPMENT FOR PROTECTION OF ARMS AND HANDS

*(First Revision)*

**1 SCOPE**

This standard describes the various types of safety equipment for hand and arm protection. It helps to understand the hazards and offers a selection guide to select the right equipment for application for which the protection is required.

The standards address proper use of gloves, sizing, cleaning, disinfection, decontamination, inspection and storage.

**2 REFERENCES**

The Indian standards given in Annex A contain provisions which through reference in this text, constitute provisions of this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this Indian standard are encouraged to investigate the possibility of applying the most recent editions of the standards.

**3 CLASSIFICATION OF HAZARDS RELATED TO PROTECTION OF ARMS AND HANDS**

Hazards against which arms and hands protection equipment is used are given in Table 1 address the hazard, potential damage, material of construction selection criteria and relevant Indian standards.

**Table 1 Hazards Related to Protection of Arms and Hands**

(*Clauses*3, *and* 5)

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Hazard Code No.** | **Hazard category** | **Hazard Description** | **Typical application** | **Potential Damage** | **Typical material of constructions** | **Selection Criteria (Conditions to consider** | **Relevant Indian Standard** |
| H1 | Heat | Heat, but where no irritant substance present and the risk of wear is not serious | Furnace work drop stamping, casting and forging, handling hot tyres and similar operations | Temperature Burns, | Para aramid  Heat resistant fibers  Aluminized Fabric | Dexterity  Size  Temperature to be handled  Fire-resistant capacity  grip  Duration of exposure | IS 16874 |
| H2 | Heat | Heat, when irritant substance is present and risk of wear is Serious | Stoking gas retorts, riveting, holding up, hot chipping | Temperature Burns, molten splash, | Para aramid  Heat resistant fibers  Aluminized Fabric | Dexterity  Size  Temperature to be handled  Fire-resistant capacity  grip  Duration of exposure | IS 16874 |
| H3 | Heat | Heat, when fair degree of sensitivity is required and splashes or spatter of molten metal may occur | Welding, case hardening in cyanide bath | Temperature Burns, molten splash,  Material that isn’t flame resistant melts into the skin which often can never be completely removed | Para aramid  Heat resistant fibers  Aluminized Fabric | Dexterity  Size  Temperature to be handled  Fire-resistant capacity  grip  Duration of exposure | IS 16874  IS 2573 |
| H4 | Heat | Heat, when caused by steam | Generated in Boilers, furnace etc. | Steam burns | Para aramid  Heat resistant fibers | Dexterity  Size  Temperature to be handled  Fire-resistant capacity  grip  Duration of exposure | IS 16874 |
| H5 | Heat | Cryogenic | Handling Cryogenic liquids and cryogenic containers | Cold burns |  | Dexterity  Size  Grip  Cryogenic temperature expected | IS 5866 |
| H6 | Cut | Sharp Materials or Objects | Sharp metal after guillotining, blanking or machining | Cuts  Lacerations | Polyester, High performance Polyethylene(HPPE)  Para aramid  Nitrile  Leather | Dexterity  Size  Penetration  Permeability  Degradation  grip | IS 2573  IS 6994 (Part 9)  IS 6994 (Part 10) |
| H7 | Cut | Glass or timber with splintered Edges | Handling wooden chips ,glass moulding, glass handling, pottery | Cuts  Lacerations | Polyester, High performance polyethylene(HPPE)  Para aramid  Nitrile  Leather | Dexterity  Size  Penetration  Permeability  Degradation  grip | IS 2573  IS 6994 (Part 9)  IS 6994 (Part 10) |
| H8 | Cut | Abrasions | Handling cold castings or forgings, precast concrete, bags of cement or bricks | Cuts  Lacerations | Polyester, High performance polyethylene(HPPE)  Para aramid  Nitrile  Leather | Dexterity required to perform the operation  Level of abrasion expected during operation  Level of cut expected  Puncture  Level of Damping  Shock absorption capacity  Size  Grip | IS 2573  IS 6994 (Part 9)  IS 6994 (Part 10) |
| H9 | Cut | Gross Abrasion | Shot blasting | Cuts  Lacerations | Polyester, High performance polyethylene(HPPE)  Para aramid  Nitrile  Leather | Dexterity required to perform the operation  Level of abrasion expected during operation  Level of cut expected  Puncture  Level of Damping  Shock absorption capacity  Size  Grip | IS 2573  IS 6994 (Part 9)  IS 6994 (Part 10) |
| H10 | Cut | Light Abrasion | Light handling operations | Cuts  Lacerations | Polyester, High performance polyethylene(HPPE)  Para aramid  Nitrile  Leather | Dexterity required to perform the operation  Level of abrasion expected during operation  Level of cut expected  Puncture  Level of Damping  Shock absorption capacity  Size  Grip | IS 2573  IS 6994 (Part 9)  IS 6994 (Part 10)  IS 5450 |
| H11 | Cut / Chemicals | Sharp materials or objects in alkaline degreasing bath | Electro plating ,Chemical handling | Skin Irritation, Chemical Burns, Skin Diseases & skin allergies  Etching | Polyester, High performance polyethylene(HPPE)  Para aramid  Nitrile  Leather  Latex rubber  Poly urethane | Dexterity  Size  Penetration  Permeability  Degradation  Grip  Level of abrasion expected during operation  Level of cut expected | IS 2573  IS 6994 (Part 9)  IS 6994 (Part 10)  IS 6994 (Part 1) : 2021 |
| H12 | Mechanical | Impact | Mechanical operations like hammering, power press, using heavy duty hand tools etc. | Cuts  Broken bones  Finger or hand amputations |  | Dexterity  Size  Grip  Level of abrasion expected during operation  Level of cut expected  Amount of Impact expected | IS 6994 (Part 6) |
| H13 | Mechanical | Vibration | Mechanical operations like hammer drilling, Concrete vibrators, power press. | Cuts  swelling of Tendon  Carpel tunnel syndrome (Numbness)  Back disorders |  | Dexterity  Size  Grip  Level of abrasion expected during operation  Level of cut expected  Amount of Impact expected | IS 6994 (Part 6) |
| H14 | Chemicals | Chemicals | Handling or contact with acids, alkalis, dyes, and general chemicals, ,but not involving contact with solvents or oils | Skin Irritation, skin allergies  Skin absorption of life-threatening toxins  Severe chemical burns  skin diseases that last for a long time | Nitrile  Latex rubber  Poly urethane  Cotton/polyester lining | Dexterity  Size  Penetration  Permeability  Degradation  grip | IS 6994 (Part 1),  IS 6994 (Part 8)  IS 16390 |
| H15 | Chemicals | Solvents, Oil & Grease | Handling or contact with solvents) oils or grease | Skin Irritation, Chemical Burns, Skin Diseases & skin allergies  Etching | Nitrile  Latex rubber  Polyurethane  Cotton/polyester lining | Dexterity  Size  Penetration  Permeability  Degradation  grip | IS 6994 (Part 1)  IS 6994 (Part 8) |
| H16 | Chemicals | Electrolytic deposition | Plating and subsequent operations | Skin Irritation, Chemical Burns, Skin Diseases & skin allergies  Etching | Nitrile  Latex rubber  Polyurethane  Cotton/polyester lining | Dexterity  Size  Penetration  Permeability  Degradation  grip | IS 6994 (Part 1) |
| H17 | Chemicals | Hot Alkaline Cleaning Bath | Chemical Handling | Skin Irritation, Chemical Burns, Skin Diseases & skin allergies  Etching | Nitrile  Latex rubber  Poly urethane  Cotton/polyester lining | Dexterity  Size  Penetration  Permeability  Degradation  grip | IS 6994 (Part 1) |
| H18 | Chemicals | Spraying Paint or Cellulose lacquers | Painting , surface coating | Skin Irritation, Chemical Burns, Skin Diseases & skin allergies  Etching | Nitrile  Latex rubber  Poly urethane  Cotton/polyester lining | Dexterity  Size  Penetration  Permeability  Degradation  grip | IS 6994 (Part 1) |
| H19 | Chemicals | Special Hazards: lead tetraethyl; mercury and lead and other salts | Chemical Handling | Skin Irritation, Chemical Burns, Skin Diseases & skin allergies  Etching | Nitrile  Latex rubber  Poly urethane  Cotton/polyester lining | Dexterity  Size  Penetration  Permeability  Degradation  grip | IS 6994 (Part 1) |
| H20 | Radioactive | X-Ray and other Radioactive Radiations & Radioactive waste | Work on X-ray, radio isotopes, etc. |  | Lead | Type of Radiation  Intensity of Radiation  Duration of exposure  grip |  |
| H21 | Electrical | Electric Shock | Electric current carrying equipment | Electric Burns | Rubber/Latex Cotton /polyester Lining | Dexterity  Size  Voltage  ATPV (Arc Thermal Performance Value)  grip | IS 13774 |
| H22 | Electrical | Electric Arc | Working on high voltage equipment | Electric Burns | Rubber/Latex Cotton /polyester Lining | Dexterity  Size  Voltage  ATPV (Arc Thermal Performance Value)  grip | IS 13774 |
| H23 | Electrical | Anti-Static | Working on low voltage electronic components | Cuts  Lacerations | Polyurethane | Dexterity  Size  Grip  Level of abrasion expected during operation  Level of cut expected  Level of Antistatic Charge developed | IS 13774 |
| H24 | Medical | Food Handling | Restaurants , canteens | Skin Irritation, Skin Diseases & skin allergies  Etching | Rubber/Latex  Poly urethane | Type of Virus / Bacteria  Intensity of Virus / Bacteria  Penetration  Permeation  Degradation  grip | IS 6994 (Part 5) |
| H25 | Medical | Micro-organisms | Working in hospitals , Chemical laboratories | Skin Irritation, Skin Diseases & skin allergies\  Etching | Nitrile  Latex rubber  Poly urethane  PVC | Type of Virus / Bacteria  Intensity of Virus / Bacteria  Penetration  Permeation  Degradation  grip | IS 6994 (Part 5)  IS 4148  IS 15354 (Part 1) |
| H26 | Medical | Solid Waste Handling | Handling garbage and waste | Skin Irritation, Skin Diseases & skin allergies  Etching | Nitrile  Latex rubber  Poly urethane  Cotton/polyester lining  PVC | Type of Virus / Bacteria  Intensity of Virus / Bacteria  Penetration  Permeation  Degradation  grip | IS 4148  IS 15354 (Part 1) |
| H27 | Medical | Medical Waste Handling | Handling hospital waste | Skin Irritation, Skin Diseases & skin allergies  Etching | Nitrile  Latex rubber  Poly urethane | Type of Virus / Bacteria  Intensity of Virus / Bacteria  Penetration  Permeation  Degradation  grip | IS 4148  IS 15354 (Part 1) |

**4 TYPES OF PROTECTIVE EQUIPMENT FOR ARMS AND HANDS**

**4.1** The various types of protective equipment for arms and hands and the various hazards against which the equipment is used are given in Table 2.

**Table 2 Protective Equipment for Arms and Hands and their Use**

(*Claus*e 4.1)

|  |  |  |  |
| --- | --- | --- | --- |
| **Code No** | **Type of Equipment** | **Recommended For Use Against Hazards** | **Material of Construction** |
| E1 | Cut resistant gloves | H1, H2, H3, H4, H5, H6, H7, H8, H9, H10, H11, H12, H13 | Polyester,  High performance polyethylene (HPPE)  Para aramid  Nitrile  Leather  Cotton  Latex  Polyurethanes  neoprene |
| E2 | Abrasion Resistant Gloves |
| E3 | Tear Resistant gloves |
| E4 | Gloves against protection from cuts and stabs by knives |
| E5 | Impact resistant gloves |
| E6 | Chrome leather gloves |
| E7 | Vibration resistant gloves |
| E8 | Gloves for protection while using chain saws |
| E9 | Chrome leather inseam mitts and one-finger mitts |
| E10 | Chrome leather -gauntlet |
| E11 | Chrome leather inseam gauntlet with canvas or leather cuffs, with or without reinforcement between thumb and forefinger |
| E12 | Chrome leather stapled double palm Gloves |
| E13 | Chrome leather inseam gauntlet with vein patches and aprons covering palm to first joint of fingers |
| E14 | Chrome leather inseam gauntlet with vein patches and aprons covering palm to first joint of fingers |
| E15 | Chrome leather back and palm inseam gloves |
| E16 | Chrome leather, felt lined ( thumb only), mitts with canvas or leather faced palms |
| E17 | Chrome leather hand guards/pads |
| E18 | Leather elbow pads |
| E19 | Cotton drill gloves |
| E20 | Cotton drill gloves with chrome leather 'palms |
| E21 | Treated canvas sleeve |
| E22 | Chemical resistant gloves. | H14, H15, H16, H17, H18, H19 | Nitrile  Latex rubber  Polyurethane  Cotton/polyester lining  Poly urethane  Neoprene |
| E23 | Natural rubber gloves |
| E24 | Lined polyvinyl chloride gloves and gauntlet |
| E25 | Unlined polyvinyl chloride gloves and gauntlet |
| E26 | Unlined light weight rubber gloves and gauntlet |
| E27 | Unlined medium weight rubber gloves and gauntlet |
| E28 | Unlined heavy weight rubber gloves and gauntlet |
| E29 | PVC sleeve |
| E30 | Rubber sleeve |
| E31 | Rubber elbow pads |
| E32 | Lined light weight rubber gloves and gauntlet |
| E33 | Lined medium weight rubber gloves and gauntlet |
| E34 | Lined heavy weight rubber gloves and gauntlet |
| E35 | Surgical gloves | H24, H25, H26, H27 | Nitrile  Latex rubber  Neoprene  Polyurethane  Cotton/polyester lining  PVC |
| E36 | Post mortem gloves |
| E37 | Gloves for Protection against Microorganisms. |
| E38 | Gloves for protection from pesticides |
| E39 | Electrical Resistant Gloves | H21, H22, H23 | Rubber/Latex  Cotton /polyester Lining  Poly urethane |
| E40 | Arc Flash Resistant Gloves |
| E41 | Heat Resistant Gloves | H1, H2, H3, H4, H5 | Para aramid  Heat resistant fibers  Aluminized Fabric |
| E42 | Flame resistant Gloves |
| E43 | Asbestos gloves and gauntlet |
| E44 | Asbestos gloves and gauntlets reinforced with -leather |
| E45 | Asbestos sleeve |
| E46 | Aluminized fabric gauntlets |
| E47 | Cold protection gloves |
| E48 | Cryogenic gloves |
| E49 | Lead rubber gauntlets | H20 | Lead |
| E50 | Lead plastics gauntlets |
| E51 | Lead leather gauntlets |

**4.2** The physical characteristics of protective material used in the manufacture of gloves are demonstrated in Table 3.

**Table 3 Physical Characteristics of Protective Materials of Gloves**

(*Clause* 4.2)

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Sl. No.** | **Material (designation in matrices)** | **Abrasion resistance** | **Cut resistance** | **Flexibility** | **Heat resistance** | **Ozone resistance** | **Puncture resistance** | **Tear resistance** |
| (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) |
|  | Butyl rubber | F | G | G | E | E | G | G |
|  | Chlorinated polyethylene | E | G | G | G | E | G | G |
|  | Natural rubber | E | E | E | F | P | E | E |
|  | Neoprene | E | E | G | G | E | G | G |
|  | Nitrile-butadiene rubber | E | E | E | G | F | E | G |
|  | Nitrile rubber | E | E | E | G | F | E | G |
|  | Nitrile rubber + PVC | G | G | G | F | E | G | G |
|  | Polyethylene | F | F | G | F | F | P | F |
|  | Polyurethane | E | G | E | G | G | G | G |
|  | PVA | F | F | P | G | E | F | G |
|  | PVC | G | P | F | P | E | G | G |
|  | Styrene–butadiene rubber | E | G | G | G | F | F | F |
|  | Non-woven breathable fabric resistant to abrasion and bacterial penetration. | P | P | E | P | G | G | E |

Ratings are subject to variation depending on formulation, thickness, and whether the material is supported by fabric.

E—excellent; G—good; F—fair; P—poor

**5 WHEN TO USE PROTECTIVE GLOVES**

Protective gloves should be used in the following situations:

1. To prevent potential exposure to Physical, mechanical, electrical, chemical and Biological hazards. Examples of Industrial Hazards which present potential health hazards are mentioned in Table 1.
2. To augment engineering and administrative controls (for example, protection from sharp edges, mechanical impacts, vibration, chemical exposure , contaminated equipment, and hazardous waste handling)
3. For extra safety with chemicals that are hazardous on contact (for example, agents that are corrosive or toxic to the skin or eyes)
4. To prevent contamination of other areas on-site and off-site from contaminants resulting from job tasks (for example, hazardous waste or Municipal waste management)
5. For emergency response and spill cleanup.

**6 FACTORS TO CONSIDER WHEN SELECTING PROTECTIVE GLOVES**

**6.1 Dexterity**

Select unsupported (unlined) gloves for extra dexterity and sense of touch. If cut, snag, puncture, or abrasion-resistance is important, match the application's critical factors to the glove's physical characteristics whether supported or unsupported

**6.2 Grip**

**6.2.1** Select a grip pattern that provides grip needed for the job. Common patterns are;

1. Diamond embossed,
2. Pebble,
3. Patterned,
4. Dipped, or
5. Smooth

**6.2.2** Not all single material of construction offers adequate protection against all chemical, Physical, mechanical and biological hazards; therefore, Protective gloves shall be selected from material that offers sufficient Hazard resistance for each situation.

**6.2.3**For Chemicalsthe proper selection of materials involves considering how the chemical might permeate, penetrate, and degrade the gloves.

**6.3 Break Through**

**6.3.1** The time it takes for the glove to break down and for chemicals to seep through. Ensure that the glove's permeation and degradation levels match the application. Permeation testing is conducted at 74 degrees Fahrenheit (24 ⁰C) and with each 18 degrees Fahrenheit temperature increase, the permeation rate roughly doubles and breakthrough time significantly decreases

**6.3.2** *Factors Affecting Break Through Time*

1. Ageing
2. Flexing and stretching
3. Poor maintenance
4. Mechanical damage
5. Abrasion
6. High temperature

**6.3.3** Chemical permeation of protective gloves leading to breakthrough is dependent on the glove material, the chemical and its physical properties, and environmental factors (for example. humidity, temperature, and pressure). Some chemicals break through some materials almost instantaneously. The protective characteristics of any Protective gloves must be matched to the hazard.

**6.4 Sizing**

1. Select glove length by the depth to which the arm will be immersed or exposed to chemical splash.
2. Correct size will ensure optimum wear comfort, dexterity, and employee satisfaction.

**6.5 Cut Resistance, Impact Resistance and Shock Resistance**

**6.5.1** To avoid cuts due to sharp objects in different industrial application, it is necessary to assess the intensity of the cut hazard and then a glove should be selected produced from materials that are resistant to the cut intensity. For example for high risks of cut an inner lining of HPPE or a glove made from Para aramids may be selected. Nitrile suitable for oil resistance and avoids slippage during handling of material with oil on its surface.

**6.5.2** Shock absorbing material on fingers should be selected for industrial hazards of Impact on hands.

**6.5.3** Anti-Vibration material should be selected in activities involving vibrations.

**6.6 Electrical Resistance**

The electric current varies in intensity in different applications, for example workers may be working on 220 volts or on a 33 kva line. The material of the gloves should be able to offer dielectric strength to handle the current the user is exposed to.

**6.7 Heat Resistance**

1. For extremely hot conditions, the glove material should be able to withstand extreme heat for example use of Para aramid.
2. For extreme cold conditions such as cryogenic temperatures, proper insulated glove shall be used. The insulation should withstand the low temperatures.

**6.8 Proper Fit, Sizing and Wearer Comfort**

Proper sizing is important for optimum use and protection. Gloves that are too large or with reduced dexterity may interfere with delicate work, and variety of sizes should be available from which wearers can select. The best approach to wearer comfort is to have personnel try several different sizes, materials, and products to determine their acceptability to the wearer and the adequacy of their protection.

**6.9****Some Other****Factors for Chemical Protective Gloves**

**6.9.1** *Breakthrough, Permeation, and Penetration Resistance to the Chemical(s).*

**6.9.1.1** Characteristics are measured by breakthrough times and permeation rates of chemicals.Table 4 shows a number of common glove protection material types and protection recommendations.

**Table 4 Common Protective Materials for Gloves and Protection Recommendations**

(*Clause* 6.9.1)

|  |  |  |  |
| --- | --- | --- | --- |
| **Sl. No.** | **Protective material** | **Generally recommended for:** | **Not recommended for:** |
| (1) | (2) | (3) | (4) |
|  | Natural rubber | Coating on gloves for protection against Alcohols, caustics, ketones, many acids | Aromatics, hydrocarbons, many solvents (especially chlorinated or aromatic).  Users having latex allergy |
|  | Nitrile-butadiene rubber | Coating on gloves for protection against Many acids, alcohols, caustics, hydrocarbons | Ketones, chlorinated hydrocarbons, strong acids |
|  | Neoprene | Coating on gloves for protection against Organic acids, caustics, alcohols, petroleum solvents, ketones ,oil and grease | Aromatic and chlorinated solvents |
|  | PVC | Coating on gloves for protection against Alcohols, caustics, hydrocarbons | Aromatic and chlorinated solvents, aldehydes |
|  | Butyl rubber | Coating on gloves for protection against Acids, ketones, esters, bases, alcohols, aldehydes | Hydrocarbons and halogenated or aromatic hydrocarbons |
|  | Poly urethane | Handling food and for anti-static application |  |
|  | Cotton | Lining in gloves for additional comfort | Cut resistance |
|  | Polyester | Lining in gloves for cut resistance | Heavy cut resistance |
|  | Para Aramid | For high cut resistance and heat resistance |  |
|  | HPPE | Lining in gloves for high Cut resistance |  |
|  | Leather | For high abrasion resistance |  |
| This table is a reference guideline and should be used only after consultation with Qualified Safety Professionals or Industrial hygienist. | | | |

**6.9.1.2** The only way to be sure about the performance of a material is to avail test claims or technical data of the protective gloves lining and coating against the Physical, chemical or biological hazards shall be obtained from the manufacturer before selection of the glove material.

**6.9.1.3** Environmental temperature and pressure effects may enhance permeation and reduce the breakthrough time for chemical protective clothing. Chemical mixtures can also complicate the selection process; and so the most hazardous component of the mixture should be determined. Permeation can occur without any visible changes in the protective materials.

**6.9.2 Type and duration of exposure.**

Typical categories of exposure are immersion, splash, spray, mist, vapor, and surface contact. When a task includes immersion in a chemical, a more-protective glove should be used than for a task where contact is limited to an accidental splash. Wear time shall not exceed breakthrough time unless the permeation rate or type of exposure is insignificant.

**6.9.3 List of Common Industrial Chemicals**

List of common industrial chemicals

1. Methanol
2. Acetone
3. Aceto nitrile
4. Dichloromethane
5. Carbon Disulfide
6. Toluene
7. Diethylamine
8. Tetra hydrafurane
9. EthlAcetate
10. n-Heptane
11. Sodium Hydroxide 40%
12. Sulphuric Acid 96%
13. Nitric Acid 65%
14. Acetic Acid 99%
15. Ammonium Hydroxide 25%
16. Hydrogen Per Oxide 30 %
17. Hydrofluoric Acid 40%
18. Formaldehyde 37%

**6.10 Other considerations, such as**

1. The ability of the gloves to withstand repetitive exposure & address multiple hazards.
2. Shelf life and special storage conditions (for example, avoiding sunlight, ozone, or moisture). A long shelf life is not the same as a high chemical resistance. Different components of a protective garment may have different shelf lives.
3. The ability of a gloves to be cleaned and decontaminated, if it is to be reused.

**6.11** After evaluating all of the factors above, the type of material best suited for the intended use and the proper apparel ensemble can be determined.

**7 TRAINING, PROCEDURES, AND WRITTEN PROGRAM**

**7.1** Training must be provided to help ensure that all employees who use Protective gloves have a full understanding of the specific Protective gloves required when performing specific tasks; and the proper use, maintenance, and storage. Training shall be done prior to the first use .Periodic refresher training should be done annually or as a result of the Management of Change of operations where the protective gloves is being used.

**7.2** The following topics should be included in training:

1. Workplace hazards and locations where protective gloves is used
2. Type of protective gloves specified (for example, gloves and material of construction)
3. Pre-use inspection of the protective gloves for defects
4. How to properly select right size , adjust, wear, and remove the protective gloves
5. Limitations of protective gloves
6. How to recognize and manage protective gloves failure
7. Proper protective gloves care, including decontamination, cleaning, storage, maintenance, and disposal

**8 PROPER USE**

Protective gloves must be worn for each required task and must be worn properly. Protective gloves must not be tampered with or modified in any manner that adversely affects the proper functioning of the gloves. It shall be used and maintained in sanitary and reliable condition. Protective gloves that is damaged or defective shall not be used.

**8.1 Wearing the Gloves**

1. The user shall inspect the gloves immediately before wearing. The gloves should be donned according to the manufacturer’s instructions.
2. A glove should be free of hazardous chemicals before it is removed. After decontaminating, gloves must be removed carefully. External areas must not be touched with unprotected body parts. The wearer can reach inside the glove cuff to avoid touching contaminated areas. Hands must be washed after removing the gloves.

**8.2 Decontaminating, Cleaning, Inspecting, Repairing, and Storing Protective Gloves**

Glovesmust be decontaminated, cleaned, inspected, repaired (or discarded, as appropriate), and properly stored between uses. It shall be used and maintained in sanitary and reliable condition. Gloves that are damaged or defective shall be repaired before use or discarded. Personnel who use gloves and their supervisors should help ensure that it is maintained and used properly.

**8.2.1** *Decontamination*

1. Gloves must be thoroughly decontaminated or discarded after it is used. The toxicity of the chemical against which the gloves were used may influence the decision to decontaminate or discard. If it is difficult to remove the material and trace quantities can cause health problems, gross contamination should be removed from the gloves and it should be discarded. The effectiveness of decontamination is also affected by the nature of the glove’s material of construction.
2. Initial decontamination of gloves usually consists of a wash. The waste water must flow to a wastewater treatment system. The gloves may be scrubbed with a soft brush and detergent followed by flushing under a safety shower.
3. Soap and water are effective in removing water-soluble contaminants. Water-insoluble organic contaminants may be Decontaminated with solvents .however it may adversely affect the gloves permeation properties.

**8.2.2** *Cleaning*

1. Gloves that are reused shall be kept clean and rinsed off after use (except for polyvinyl alcohol [PVA], which is damaged by water. Manufacturer’s cleaning instructions must be followed. The person who cleans the gloves must be made aware of the contamination risk and must be protected.
2. Employees shall not take gloves that has been used for protection against hazardous materials home for cleaning.

**8.2.3** *Inspection*

Glovesshall be inspected visually for cuts, tears, contamination, and evidence of degradation (for example, cuts, stiffness, softness, swelling, or discoloration). Manufacturer or vendor information and directions relative to testing and inspection should be reviewed and followed as appropriate.

**8.2.4** *Prior to Use*

The gloves shall be visually inspected prior to use. They shall not be used if evidence of chemical or physical damage or contamination is found. Contaminated gloves should be cleaned or properly discarded.

**8.2.5** *Periodic Inspection and Testing*

Gloves shall be inspected and tested periodically. If service is severe, then inspection and testing after every use may be appropriate.

**8.2.6** *Storage, Use and disposal*

1. Gloves shall be stored properly to prevent damage from dust, moisture, sunlight, chemical exposure, temperature extremes, impact, and friction. They shall not be stored with tools. Clean gloves should be segregated from dirty ones. They should be stored in lockers assigned to individuals.
2. Gloves must not be tampered with or modified in any manner that adversely affects its proper functioning. It shall be used and maintained in sanitary and reliable condition. Gloves that are damaged or defective shall not be used.
3. Gloves that cannot be decontaminated (for example, disposable or single use gloves) must be discarded appropriately. They shall be properly discarded with adherence to local state specific PCB (Pollution control board) norms.

**ANNEX A**

(*Clause* 2)

**LIST OF REFEREED INDIAN STANDARDS**

|  |  |
| --- | --- |
| *IS No.* | *Title* |
| IS 2573 : 2023 | Leather gauntlets and mittens — Specification |
| IS 4148 : 1989 | Surgical rubber gloves — Specification (*first revision*) |
| IS 5450 : 2023 | Textiles gloves wool knitted — Specification |
| IS 5866 : 1979 | Specification for chrome leather for high altitude gloves (*first revision*) |
| IS 6994 (Part 1) : 2021 ISO 374-1 : 2016 | Protection of Arms and Hands Part 1 Protective Gloves against Dangerous Chemicals and Micro-organisms-Terminology and performance requirements for chemical risks (*first revision*) |
| IS 6994 (Part 5) : 2021 ISO 374-5 : 2016 | Protection of Arms and Hands Part 5 Protective Gloves against Dangerous Chemicals and Micro-organisms - Terminology and performance requirements for micro-organisms risks |
| [IS 6994 (Part 6) : 2021 ISO 23388 : 2018](https://www.services.bis.gov.in/php/BIS_2.0/bisconnect/standard_review/Standard_review/Isdetails?ID=) | Protection of Arms and Hands Part 6 Protective gloves against mechanical risks |
| IS 6994 (Part 8) : 2021 ISO 18889 : 2019 | Protection of Arms and Hands Part 8 Protective Gloves for Pesticide Operators and Re-entry Workers — Performance Requirements |
| IS 6994 (Part 9) : 2021 | Protection of Arms and Hands Part 9 Protective clothing - Gloves and arm guards protecting against cuts and stabs by hand knives — Chain-mail gloves and arm guards |
| IS 6994 (Part 10) : 2021 ISO 13999-2 : 2003 | Protection of Arms and Hands Part 10 Protective clothing- Gloves and arm guards protecting against cuts and stabs by hand knives - Gloves and arm guards made of material other than chain mail |
| IS 13774 : 2021 IEC 60903 : 2014 | Live Working Gloves of Insulating Material (Second Revision) |
| IS 15354 (Part 1) : 2023 ISO 11193-1:2020 | Single-use medical examination gloves Part 1 Specification for gloves made from rubber latex or rubber solution (second revision) |
| IS 16390 : 2015 | Agro textiles - Nylon knitted seamless gloves for tobacco harvesters — Specification |
| IS 16874 : 2018 | Textiles — Protective gloves for firefighters - Specification |

**ANNEX B**

**(***Foreword***)**

**COMMITTEE COMPOSITION**

Occupational Safety and Health Sectional Committee, CHD 08

| *Organization* | *Representative(s)* |
| --- | --- |
| National Safety Council, Navi Mumbai | Shri Lalit R. Gabhane **(*Chairperson*)** |
| 3M India Limited, Bengaluru | Shri Giridhar M.  Shri Rishi Raj Arya (*Alternate I*)  Shri Bidyut Chetia (*Alternate* II) |
| Atomic Energy Regulatory Board, Mumbai | Shri Diptendu Das  Srimati Pammy Goswami (*Alternate* I)  Srimati Ankita Govindrao Choudhari (*Alternate* II) |
| Bhabha Atomic Research Centre, Mumbai | Shri G. Nagaraju  Shri Praveen Dubey (*Alternate*) |
| Bureau of Indian Standards (BIS), New Delhi | Shri Barun Das |
| Cement Manufacturers Association, New Delhi | Shri Sujeet Kumar Singh  Shri Ashutosh Shrivastava (*Alternate I*)  Shri Shubho Chakravarty (*Alternate* II) |
| Centre for Fire and Explosive Environment Safety, Defence Institute of Fire Research, Delhi | Dr Arti Bhatt  Dr S. Marry Celin (*Alternate*) |
| Defence Research Development Organization, Ministry of Defence, New Delhi | Shri Amit Pasi  Shri Ajay Kumar Shaw (*Alternate*) |
| Directorate General Factory Advice Service and Labour Institutes, Mumbai | Shri Sumit Roy  Shri Kunal Sharma (*Alternate*) |
| Directorate General of Mines Safety, Dhanbad | Shri Md. Niyazi  Shri Deepak Prabhakar (*Alternate*) |
| Draeger India Pvt. Ltd, Mumbai | Shri Hirendar Chaterjee  Shri Ganesan Murugesan (*Alternate*) |
| Intech Safety Private Limited, Kolkata | Shri Subrata Mukherjee  Shri Gautam Banerjee (*Alternate*) |
| Honeywell International India Private Limited, Bengaluru | Shri Samit Vasant Chaudhari  Shri Alok Singh (*Alternate* I)  Shrimati Pooja Chetri (*Alternate* II) |
| Joseph Leslie Dynamics Manufacturer Private Limited, Nehru Place, New Delhi | Shri Dean Leslie Roy  Shri Cyril Pereira (*Alternate*)  Shri Sachin Patil |
| Karam Industries, Noida | Shri Rajesh Nigam  Shri Mohammad (*Alternate*) |
| Larsen and Toubro Limited, Mumbai | Shri P. V. Balaramakrishna  Shri Pranav B. Baxi |
| National Safety Council, Navi Mumbai | Shri A. Y. Sundkar  Shri K. D. Patil (*Alternate*) |
| Nuclear Power Corporation of India Limited, Mumbai | Shri Alok Varshney  Shri M. U. Vincy (*Alternate*) |
| Reliance India Limited, Mumbai | Dr Prasad Tipnis  Shri Neeraj Sharma (*Alternate*) |
| Unicare Emergency Equipment Private Limited, Mumbai | Shri Clint Leslie Pereira  Shri Shirish Sathe (*Alternate* I)  Shri Rajasekharan M. K. (*Alternate* II) |
| Venus Safety and Health Private Limited, Navi Mumbai | Shri Harshal Patil  Shri Mahesh Kudav  Shri Sanjeev Minhas (*Alternate*) |
| In Personal Capacity (*T02/103 and 104 Plot No. 64 & 65, Mayuresh Trinity Opp. Poonam Tower Sector 16A Nerul, Navi Mumbai-400706)* | Shri S. D. Bharambe |
| BIS Directorate General | Shri Ajay Kumar Lal, Scientist ‘F’/Senior Director and Head (Chemical) [Representing Director General (*Ex-officio*)] |

*Member Secretary*

SUSHANT KUMAR

Scientist ‘D’/Joint Director

(Chemical), BIS