



Dubai Municipality Health and Safety Department

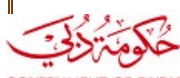

Technical Guidelines for Personal Protective Equipment – Protective Clothing

DM-HSD-GU61-PPEPC2

 GOVERNMENT OF DUBAI	Organization Unit: Health & Safety Department		الوحدة التنظيمية:	 بلدية دبي DUBAI MUNICIPALITY
	Document title:	Technical Guidelines for Personal Protective Equipment – Protective Clothing	عنوان الوثيقة:	
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1. INTRODUCTION

The skin is one of the largest organs of the human body wherein one of its principal functions is to provide external protection against hazardous exposure from workplaces and environmental elements that may harm and cause injury to the underlying muscles, bones, ligaments and even internal organs. Thus, in order to further provide health and safety protection for workers from occupational hazards, Dubai Municipality developed this technical guideline for employers to ensure compliance with Local Order 61/1991, Article 38.4 to *“Take every precaution necessary for the protection of the worker and ensure his safety from occupational illness or potential work accident”*.

It is essential that employers properly conduct hazard identification and be proactive in ensuring that safe systems of work are properly implemented, reviewed and revised as needed to reduce the occupational risks. Provision of protective clothing provides the last line of defence in protecting workers from workplace hazards such as chemical exposures, excessive heat or cold, electricity, ionizing radiation, impacts and environmental conditions.

Appropriate selection of the type of protective clothing should be considered based on nature of work, level of protection afforded, duration of work activity, etc. Selected protective clothing shall conform to UAE and international standards and be comfortable for use. Workers are required by Article 39.1 of Local Order 61/1991 to diligently use or wear protective clothing and other protective equipment while at work as required by the employer.

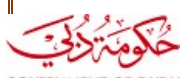

2. PURPOSE

This document provides guidelines and information on proper selection, general performance requirements, use, training, care, maintenance and replacement of protective clothing.

3. SCOPE

This technical guideline, shall apply to all commercial and industrial establishments, public or government institutions, including construction-related project sites in the emirate of Dubai.

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This technical guideline does not cover the following types of clothing:

- regular clothing used at work (e.g. shirts, pants, etc.);
- uniforms provided by the employer whose main purpose is to present corporate image;
- protective clothing in the food industry sector for food safety purposes;
- protective clothing used by civil defence, police and military;
- protective clothing used during radioactive contamination.

4. DEFINITION

Unless the context otherwise requires, the following terms shall be deemed to mean the definitions hereby assigned to them.

Closure

A device used to close openings when wearing protective clothing such as zippers, touch and close fasteners, etc.

Fluorescent Material

Material that emits visible light due to absorbed light or electromagnetic radiation.

High Visibility Clothing

Personal protective clothing designed to provide improved visibility due to the garments' highly reflective parts or color that is easily noticeable against any background.

Protective Clothing

Type of Personal Protective Equipment (PPE) intended to provide protection to the wearer's body from workplace hazards such as chemicals, heat, cold, electricity, ionizing radiation, impacts and environmental conditions.



Retroreflective Materials

Material that increases conspicuity of high visibility clothing by reflecting the light to its source.

Torso

The part of the body wherein the head, neck, arms and legs are attached.

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5. GUIDELINES

A. Hazard Identification and Risk Assessment

The employer shall perform hazard identification in the workplace to assess the risk of skin exposure from workplace hazards, including those which may be encountered during emergency situations taking into account the adequacy of any existing controls.

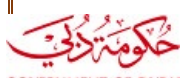

Workers are exposed to various occupational hazards that may cause bodily and limb injuries and the employer should be aware of the possibility of multiple and simultaneous hazard exposures. The following are the examples of hazards which could necessitate the use of protective clothing:

- Chemical hazards – depending on the hazard classification of the chemical being handled in the workplace and its duration of use, the skin may suffer irritation, burns and/or sensitization. Chemicals may also penetrate the skin to cause injury to the underlying parts of the body such as muscles, bones, ligaments and internal organs.
- Cutting hazards while performing activities with the use of tools or machineries containing sharp edges, fans, rotary valves, augers, etc.
- Electrical hazards – skin contact with electricity at work may cause temporary, permanent or even life threatening effects such as burns, ventricular fibrillation, neurological damage, etc.
- Electrostatic hazards – protective clothing made of materials known to resist static electricity build up should be used in potentially explosive atmospheres.
- Working in cold environments and/or cold/freezer areas.
- Working in wet conditions such as work while raining or using water sprays for cleaning.
- Heat hazards – working in hot environment during summer, flame from welding, foundries, metalworking, etc.

Having identified the hazards, completed the risk assessment and having taken account of existing controls, the organization should be able to determine whether existing controls are adequate or needs improvement, or if new controls are required.

If new or improved controls are required, selection should be determined by the principle of the hierarchy of hazard controls which includes elimination or minimization through engineering, administrative and personal protective equipment controls.

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Hazard identification shall be undertaken by individual(s) who have the necessary capability and competence in relevant hazard identification methodologies and techniques and have suitable knowledge of the work being conducted.

B. Protective Clothing Selection Criteria and Procedures

If the identified risks are still not eliminated or reduced to an acceptable level, the next step is to ensure that suitable protective clothing is provided by the employer to the employees to further reduce the risks. Employers shall develop procedures in selecting appropriate protective clothing that will offer the desired protection and comfort and not to create additional safety problems. Throughout the process of selection the following factors are needed to be accounted:

Anticipated potential hazards

In order to select the appropriate protective clothing providing the necessary level of protection, the employer shall identify the potential workplace hazards and its potential or probability of exposure to a worker.

Nature of job/Type of chemical handled

Specific job function being performed by the worker or type of chemical being handled greatly influences the selection and features of protective clothing. Protective clothing selected for the workplace should be suitable for the actual work being carried out while providing the necessary protection, visibility and will not hinder the wearer's range of motion.



Duration of Exposure

The length of time that the protective clothing will be worn shall be considered wherein the protective clothing should provide the necessary level of protection during the whole duration it is being worn.

Comfort and Fitness

When in use, selected protective clothing shall be comfortable as possible since the wearer may use it for long periods of time. Type of garment or the features of the protective clothing to regulate amount of heat and perspiration generated while worn shall be considered especially during hot and humid working conditions.

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Protective clothing should be fit by taking the body dimensions of the wearer and conducting fit testing to ensure that it will not restrict bodily movement, deep breathing or blood circulation or will create additional hazards such as entanglement from moving parts, chemical exposure from gaps between the Personal Protective Equipment (PPE) ensemble, etc.

C. Safe Systems of Work

Employers are required to implement safe systems of work in every work site which includes information, training, instruction and supervision. Safe systems of work must be properly communicated to all stakeholders detailing potential hazards, duties and responsibilities, procedures and guidelines. Ensure that workers are properly supervised in the proper and diligent use of protective clothing.

Safety management systems shall be properly reviewed and revised to assess effectiveness and suitability of existing control measures and use of protective clothing.

D. Protective Clothing General Requirements

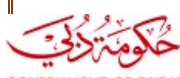

Employers must ensure to provide adequate and appropriate protective clothing to workers involved in processes and activities or work areas wherein there is a reasonably foreseeable risk of bodily injury.

Employers should purchase protective clothing from manufacturers or traders which has a valid conformity certificate for personal protective equipment products from Emirates Authority for Standardization and Metrology (ESMA) and/or conforms to international standards such as BS, EN, ISO, ANSI, ASTM, etc.

Protective clothing shall be made from materials that will not adversely affect the health and hygiene of the wearer. When used under foreseen normal conditions, the material shall not decompose or degrade and release allergenic, carcinogenic, mutagenic, teratogenic, toxic or other harmful substances.

The design features (e.g. arm holes, crotch) of the protective clothing shall be appropriately proportioned and positioned to facilitate correct wearing and correct placement ensuring that no part of the wearers' body will be unprotected while implementing certain movements such as lifting of hands, bending or flexing of elbows or knees, etc.

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Maximum possible level of wearer comfort shall be provided by the protective clothing considering the level of protection needed, work environmental conditions, physical movements of the wearer and expected duration of use.

Worn protective clothing shall properly fit the wearer and shall not be too tight to restrict movement, deep breathing or blood circulation, shall not be too long to interfere movement and shall not be too loose that it flaps and cause entanglement to moving equipment or machines.

Inner and other surface of the protective clothing shall be free from any coarse, sharp or hard surfaces that may cause irritation or injury to the wearer.

Selected protective clothing shall be compatible with other personal protective equipment to form a complete PPE ensemble while meeting the desired level of protection for each of the respective protective equipment applicable standard(s).



Closure systems, adjusters, touch and close fasteners, label accessories, retroreflective materials and other attached materials to the protective clothing shall be designed to withstand the forces wherein these are likely to be exposed during use and not adversely affect the clothing's performance.

When tested in accordance with the below standards, each layer of protective clothing shall meet the following requirements:

- quantity of chromium VI in leather garments shall not exceed 3.0 mg/kg according to test method described in ISO 17075;
- pH value of the protective clothing shall be greater than 3.5 and less than 9.5 in accordance with ISO 3071 (textile materials) and ISO 4045 (leather components):
- metallic materials in contact with the wearers' skin (e.g. zippers, buttons, pins) shall have nickel emission of less than 0.5 µg/cm² per week according to EN 1811.
- azoic pigments or dyestuff releasing carcinogenic amines shall not be detected according to EN 14362-1 standard.

When conducting work in areas wherein static electricity hazard is present, worn electrostatic dissipative protective clothing shall ensure that conductive parts (buttons, zippers, etc.) are fully covered by the outermost material.

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In cases where high visibility clothing is required, the garment of the protective clothing shall be made of high visibility materials on all sides wherein the horizontal retroreflective bands and fluorescent materials encircle the sleeves, torso and trouser legs.

E. Safety Instructions and Markings

All protective clothing shall be provided with manufacturer's instructions indicating intended usage, method of fitting and adjustment, donning and doffing, limitations of use, storage and maintenance, cleaning, etc.

Employer must ensure that every user must be informed of the instructions and that employees must adhere to the specified manufacturer's instructions on the use, fitting, care, maintenance and other guidelines for protective clothing.

Furthermore, protective clothing claimed to comply with the related international and UAE standards specific for its intended use shall bear respective pictograms or markings and the following information:

- reference safety standard such as EN ISO 13688, EN ISO 20471, etc.;
- the manufacturers' or its authorized representatives' name and address;
- size designation;
- mode of use;
- test to be carried out by the user prior use if necessary;
- precautions to be observed, etc.



F. Training

Employers are required to provide PPE training for employees and even visitors. Records of any training including induction and tool box talks shall be properly kept for at least five (5) years and be made readily available to Dubai Municipality OHS inspectors and other regulatory agencies for review and demonstrate compliance with pertinent UAE and DM regulations.

Scope of training may include workplace risks, preventive measures, legal obligations, when to use protective clothing, proper use, fitting and care, safe practices and replacement, etc.

Trainers must inform users that the use of personal protective equipment such as protective clothing are not to be relied upon in providing unlimited protection against hazards and are not substitutes for sound

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risk control measures but should be used in conjunction with engineering controls and sound safety practices.

G. Safe Use Provisions

Wearers of protective clothing should thoroughly inspect prior use. Garments shall be checked for cuts, punctures, tears, sharp edges, discoloration or stiffness, etc. Damaged protective clothing shall be reported to a responsible person for appropriate action which includes disposal and replacement.

Employee shall report to the management if the issued protective clothing is not properly fitting, uncomfortable or limits/hinders breathing and movement prior start of work.

Persons wearing protective clothing should have proper understanding of its proper use, its limitation, fitting, care, etc.

Proper cleaning and washing in accordance with manufacturers' instructions prior usage of protective clothing shall be observed.

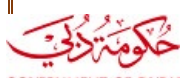

Persons shall properly and diligently use protective clothing while at work, during the presence of occupational hazards that may cause bodily and limb injuries and as directed by work supervisor/manager.

While conducting work activity, worker shall periodically check worn protective clothing for damages such as punctures, tears, closure failure or seam discontinuities. Other changes in protective clothing due to chemical attack such as stiffening, swelling or softening should be noted since permeation can occur even without any visible effects on the protective garment.

Any protective clothing which has been observed to be damaged or degraded shall be removed and replaced as safe as possible.

Employees shall ensure that chemically or biologically contaminated protective clothing shall be properly removed, cleaned and stored as per manufacturers' instructions to avoid spread of contamination.

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H. Care, Maintenance and Replacement

Protective clothing shall be properly stored in well ventilated areas, separated from personal clothes and not exposed to direct sunlight, excessive heat, humidity and hazardous chemicals (e.g. acids, toxic substances). Depending on the protective clothing's garment, long term exposure to harsh environmental conditions can cause deterioration that will adversely affect the degree of protection provided.

Periodically inspect protective clothing for cuts, faulty closures, imperfect seams, uneven coatings, pinholes, tears, etc. Flexible materials of some garments may stiffen during extended periods of storage. Protective clothing shall be flexed to check for cracks and other signs of deterioration.

Washing and cleaning shall be done in accordance with manufacturers' instructions. If the number of washing cycles is not specified, carry out five washing cycles.

Persons conducting washing or cleaning of chemically contaminated protective clothing must be informed on safety procedures to be observed.

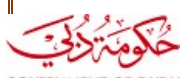

If during the application of washing/cleaning procedures that there is an observed significant reduction of the garments' performance properties or dimensional change greater than the supplied information by the manufacturer/supplier, the protective clothing shall be marked and be reported to a responsible person for appropriate action which includes disposal and replacement.

Chemically contaminated protective clothing shall be washed separately from other clothing or garments and thoroughly dry before storage.

Protective clothing that have been soaked or heavily contaminated with hazardous chemicals such as toxic substances shall be discarded, not re-used and be stored in a container or in a secured area with appropriate safety signage.

Contaminated protective clothing that cannot be properly cleaned shall be disposed in accordance with Dubai Municipality regulations.

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6. REFERENCES

American Conference on Governmental Industrial Hygienists (ACGIH): Guidelines for the Selection of Chemical Protective Clothing, Third Edition.

American National Standard Institute/International Safety Equipment Association (ANSI/ISEA): American National Standard for Classification and Performance Requirements for Chemical Protective Clothing (ANSI/ISEA 103).

European Standard/International Organization for Standardization: High visibility Clothing – Test Methods and Requirements (EN ISO 20471:2013).


European Standard/International Organization for Standardization: Protective Clothing – General Requirements (EN ISO 13688:2013).

European Standard: Protective Clothing - Electrostatic Properties - Part 5: Material Performance and Design Requirements (EN 1149-5:2008).

Health and Safety Executive, United Kingdom: Personal Protective Equipment at Work Regulations 1992.

International Organization for Standardization: Protective Clothing for Protection Against Chemicals – Classification, Labelling and Performance Requirements (ISO 16602:2007).













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ANNEX A: PROTECTIVE CLOTHING PICTOGRAMS

Protective clothing which claims to comply with BS, EN and ISO standards shall have the following pictograms indicating its assigned protection and intended use. Pictograms referenced from BS EN ISO 13688:2013

PICTOGRAM	ASSIGNED PROTECTION	PICTOGRAM	ASSIGNED PROTECTION
	Protection from moving parts EN 510		Protection from cold hazard EN 342
	Protection from foul weather EN 343		Protection from chemicals EN 943-1 EN 943-2 EN 13034 EN 14605 EN 13982-1
	Protection from static electricity EN 1149		Protection when working with chainsaw EN 381
	Protection from heat and flame EN ISO 11612 EN ISO 14116		Protection from cuts and stabs EN ISO 13998
	Protection from welding hazards EN ISO 11611		Protection from microbiological hazards
	High visibility protective clothing EN ISO 20471		Protective clothing (equipment) for abrasive blasting operators EN ISO 14877

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ANNEX B: CHEMICAL PROTECTIVE CLOTHING GLOBAL CLASSIFICATION SYSTEMS


American National Standard for Classification and Performance Requirements for Chemical Protective Clothing (ANSI/ISEA 103), International Organization for Standardization (ISO 16602) and Committee for European Normalization (CEN) are implementing a similar six level classification system which considers the nature of chemical hazards in the workplace, work activity and the environment wherein the work activity is carried out. The classification systems cover a range of protection from Category/Type 1 – Total isolation against chemical vapors and toxic particles to the least protection Category/Type 6 – Limited or partial body protection against chemical mist or spray (aprons)

CHEMICAL PROTECTIVE CLOTHING CLASSIFICATION LEVELS			
ANSI/ISEA 103		ISO 16602 & CEN	
Category	Description and Level of Protection	Type	Description and Level of Protection
1	Encapsulating, vapour protective clothing with breathing apparatus worn inside or supplied with airline. Provides protection from hazardous aerosols, gases, liquids and solid particles.	1	Encapsulating, gas tight protective clothing providing highest level of protection against chemical hazards. Provides protection from hazardous aerosols, gases, liquids and solid particles.
		Subtypes	
		1a	Gas tight protective clothing with breathing apparatus worn inside.
		1b	Gas tight protective clothing with breathing apparatus worn outside.
1c		Gas tight protective clothing with supplied air (no breathing apparatus).	
2	Vapour protective clothing with breathing apparatus worn outside. Provides protection from hazardous aerosols, gases, liquids and solid particles.	2	Non-gas tight protective clothing with supplied air. Provides protection from hazardous aerosols, gases, liquids and solid particles.
3	Liquid protective clothing. Provides protection from pressurized liquids.	3	Liquid tight protective clothing. Provides protection from pressurized liquids.
		3PB	Partial body liquid protective clothing.
4	Liquid spray protective clothing. Provides protection from sprayed or small splashes of liquids.	4	Liquid spray tight protective clothing. Provides protection from sprayed or small splashes of liquids.
		4PB	Partial body spray protective clothing.
5	Solid particles protective clothing. Provides protection from airborne solid particulate chemicals.	5	Solid particles protective clothing. Provides protection from airborne solid particulate chemicals.
6	Limited spray or particle protective clothing. Provides protection from low exposure/risk from minor liquid splashes or solid particles.	6	Limited spray protective clothing. Provides protection from minor splashes of liquids.
		6PB	Partial body limited spray protective clothing.

INCREASING LEVEL OF PROTECTION

* Above classifications levels sets the minimum requirements for chemical protective clothing. The employer shall also consider other specific hazards in the workplace so as to ensure appropriateness of the PPE ensemble.

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ANNEX C: PERFORMANCE CHARACTERISTICS OF CHEMICAL PROTECTIVE CLOTHING

MATERIALS

Specified below are examples of materials commonly used in chemical protective clothing. Table below serves as a guide and ratings are subject to changes depending on the garments formulation, thickness and if the material is provided with fabric or other textile support.

TYPE OF MATERIAL	PERFORMANCE CRITERIA						
	ABRASION RESISTANCE	CUT RESISTANCE	FLEXIBILITY	HEAT RESISTANCE	OZONE RESISTANCE	PUNCTURE RESISTANCE	TEAR RESISTANCE
BUTYL RUBBER (BUTYL)	FAIR	GOOD	GOOD	EXCELLENT	EXCELLENT	GOOD	GOOD
CHLORINATED POLYETHYLENE	EXCELLENT	GOOD	GOOD	GOOD	EXCELLENT	GOOD	GOOD
NATURAL RUBBER	EXCELLENT	EXCELLENT	EXCELLENT	FAIR	POOR	EXCELLENT	EXCELLENT
NITRILE BUTADIENE RUBBER (NBR)	EXCELLENT	EXCELLENT	EXCELLENT	GOOD	FAIR	EXCELLENT	GOOD
NEOPRENE	EXCELLENT	EXCELLENT	GOOD	GOOD	EXCELLENT	GOOD	GOOD
NITRILE RUBBER (NITRILE)	EXCELLENT	EXCELLENT	EXCELLENT	GOOD	FAIR	EXCELLENT	GOOD
NITRILE RUBBER + POLYVINYL	GOOD	GOOD	GOOD	FAIR	EXCELLENT	GOOD	GOOD
POLYETHYLENE	FAIR	FAIR	GOOD	FAIR	FAIR	POOR	FAIR
POLYURETHANE	EXCELLENT	GOOD	EXCELLENT	GOOD	GOOD	GOOD	GOOD
POLYVINYL ALCOHOL (PVA)	FAIR	FAIR	POOR	GOOD	EXCELLENT	FAIR	GOOD
POLYVINYL CHLORIDE (PVC)	GOOD	POOR	FAIR	POOR	EXCELLENT	GOOD	GOOD
STYRENE BUTADIENE RUBBER (SBR)	EXCELLENT	GOOD	GOOD	GOOD	FAIR	FAIR	FAIR
VITON	GOOD	GOOD	GOOD	GOOD	EXCELLENT	GOOD	GOOD

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