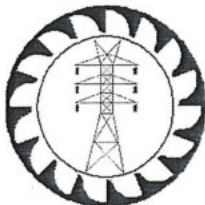

SPECIFICATIONS FOR PERSONAL PROTECTIVE EQUIPMENT

HAND PROTECTION

- PROTECTIVE GLOVES AGAINST CHEMICALS
- PROTECTIVE GLOVES AGAINST MECHANICAL RISKS
- PROTECTIVE GLOVES AGAINST THERMAL RISKS
- PROTECTIVE GLOVES FOR WELDERS



CEYLON ELECTRICITY BOARD
SRI LANKA



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1. SCOPE

This specification specifies the requirements of Ceylon Electricity Board for protection gloves against chemicals & micro-organisms, mechanical risks, thermal risks and manual metal welding risks.

2. SERVICE CONDITIONS

(i)	Annual average ambient temperature	30 °C
(ii)	Maximum ambient temperature	40 °C
(iii)	Maximum relative humidity	90%
(iv)	Environmental conditions	Humid tropical climate

3. APPLICABLE STANDARDS

The equipment and components supplied shall be in accordance with the latest edition of the standards specified below and amendments thereof.

(i)	BS EN 420:2003+A1:2009	Protective gloves. general requirements and test methods
(ii)	EN 374-1: 2003	Protective gloves against chemicals and micro-organisms
(iii)	EN 388: 2003	Protective gloves against mechanical risks
(iv)	EN 407: 2004	Protective gloves against thermal risks
(v)	EN 12477: 2001	Protective gloves against manual metal welding risks

4. BASIC FEATURES AND TECHNICAL REQUIREMENTS

A glove is an item of personal protective equipment which protects the hand or any part of the hand from hazards. It may also cover part of the forearm and arm.

Glove design shall be such that the fingers are slightly bent in a position corresponding to the position the hand forms when while holding an object.

All type of gloves shall conform to EN 420 in general requirements for glove design and construction, innocuousness, comfort and efficiency, marking and information.

Gloves have to offer the greatest possible degree of protection in the foreseeable conditions of end use. When seams are included, the strength of these seams shall not reduce the overall performance of the glove.

Innocuousness of the gloves shall be ensured as per EN 420. Innocuousness means that the gloves themselves shall not cause any harm to the user.

If care instructions are provided, the levels of performance shall not be reduced after the maximum recommended number of cleaning cycles.



4.1 Performance Level

Performance level is a number (between 0 to 4 or 0 to 5) which shows how a glove has performed in a specific test, and by which the results of that testing may be graded.

Level 0 shall indicate that the glove is either untested or falls below the minimum performance level. Performance level X shall indicate that the test method is not suitable for the glove sample. Higher numbers shall indicate higher levels of performance.

4.2 Sizing of Gloves

Glove sizes shall be manufactured according the below table except for welding gloves. (For glove sizes for welding gloves, please refer section 5.7)

Glove Size	Fits Hand Size	Hand Circumference/Length (mm)	Minimum Length Of The Glove (mm)
6	6	152/160	220
7	7	178/171	230
8	8	203/182	240
9	9	229/192	250
10	10	254/204	260
11	11	279/215	270

4.3 Marking on the Glove

Each glove which is claimed to comply with the requirements of relevant EN standard shall bear a label and/or marking giving the following information:

- i. Name of the manufacturer
- ii. Glove and size designation
- iii. CE mark if any
- iv. Appropriate pictograms accompanied by the relevant performance levels and the reference of the EN standard

Markings shall be clearly visible and legible without additional magnification.

In addition, the marking shall be legible throughout the life of the glove. Where marking of the glove is not possible in view of the characteristics of the glove, it shall be mentioned on the first packaging enclosure.

4.4 Protective Gloves against Chemicals and Micro-Organisms

Protective gloves for use against chemicals shall be manufactured conforming to EN 374 standard.

The minimum liquid-proof section of the glove shall be at least equal to the minimum length of the gloves specified in EN 420.



4.4.1 Penetration

A glove shall not leak when tested with an air and water leak test as per EN 374-2.

4.4.2 Permeation

Each chemical tested is classified in terms of breakthrough time (performance level 0 to 6).

Measured Breakthrough Time	Permeation Performance Level
> 10 minutes	1
> 30 minutes	2
> 60 minutes	3
> 120 minutes	4
> 240 minutes	5
> 480 minutes	6

A glove shall have at least a permeation performance level 2 when tested against three chemicals taken from the list of chemicals in Table 1.

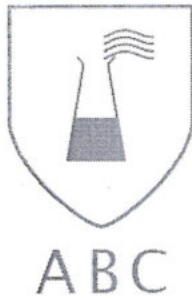
Code Letter	Chemical	CAS Number	Class
A	Methanol	67-56-1	Primary alcohol
B	Acetone	67-64-1	Ketone
C	Acetonitrile	75-05-8	Nitrile compound
D	Dichloromethane	75-09-2	Chlorinated paraffin
E	Carbone Disulphide	75-15-0	Sulphur containing organic compound
F	Toluene	108-88-3	Aromatic hydrocarbon
G	Diethyl amine	109-89-7	Amine
H	Tetrahydrofurane	109-99-9	Heterocyclic and ether compound
I	Ethyl acetate	141-78-6	Ester
J	n-Heptane	142-85-5	Saturated hydrocarbon
K	Sodium hydroxide 40%	1310-73-2	Inorganic base
L	Sulphuric acid 96%	7664-93-9	Inorganic mineral acid

Table 1

4.4.3 Protective Gloves against Chemicals

Protective gloves against chemicals shall comply with the requirements stated in 4.4.1 and 4.4.2 and shall be marked with the following pictogram accompanied by a minimum 3-digit code as shown below. This code refers to the code letters of the chemicals (from Table 1), for which a breakthrough time of at least 30 minutes has been obtained.





4.4.4 Mechanical Characteristics

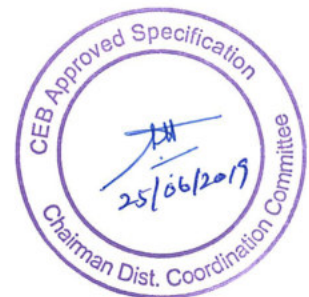
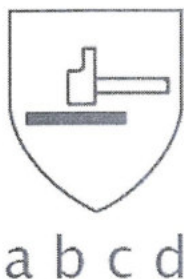
For each glove recommended for use against chemicals, the obtained performance level for following mechanical tests as per EN 388 (Please refer section 4.5) shall also be supplied and marked on the glove using the pictogram depicted under section 4.5.

Abrasion resistance, Blade cut resistance, Tearing resistance, Puncture resistance

4.5 Protective Gloves against Mechanical Risks

Glove that provides protection against at least one of the following mechanical risks; abrasion, blade cut and puncture is considered as a protective glove against mechanical risks. (Tear resistance provides information on the mechanical resistance of the glove, but is not indicative of protection against a specific risk)

Protective gloves against mechanical risks shall be manufactured according to EN 388 standard shall be expressed by a pictogram followed by four numbers (performance levels), each representing test performance against a specific property as specified below.



a) Resistance to Abrasion

Resistance to abrasion is measured by the number of cycles required for breakthrough to occur.

b) Blade Cut Resistance

Based on the number of cycles required to cut through the sample at a constant speed

c) Tear Resistance

Based on the amount of force required to propagate a tear

d) Puncture Resistance

Based on the amount of force required to pierce the sample with a standard-sized point

In all cases, [0] indicates the lowest level of performance and higher numbers shall indicate higher levels of performance.

TEST	Levels of Performance					
	0	1	2	3	4	5
a. Abrasion Resistance (cycles)	< 100	100	500	2,000	8,000	
b. Blade cut Resistance (index)	< 1.2	1.2	2.5	5.0	10.0	20.0
c. Tear resistance (N)	< 10	10	25	50	75	
d. Puncture resistance (N)	< 20	20	60	100	150	

These performance levels must be prominently displayed alongside the pictogram on the gloves and on the packaging which immediately contains the gloves.

4.6 Protective Gloves against Thermal Risks

Thermal performance for protective gloves against heat and/or fire shall be manufactured according to EN 407 standard.

The nature and degree of protection shall be indicated by a pictogram followed by a series of six performance levels, relating to specific protective qualities as follows:



a) Burning Behaviour (performance level 0 - 4)

The Performance Level shall be based on the length of time the material continues to burn and glow after the source of ignition is removed. The seams of the glove shall not come apart after an ignition time of 15 seconds.

After Flame Time shall be time in seconds from the removal of the ignition source until the extinction of the flame.

After Glow Time shall be time in seconds from the extinction of the flame up to the cessation of glowing.

Performance Level	After Flame Time s	After Glow Time s
1	≤ 20	No requirement
2	≤ 10	≤ 120
3	≤ 3	≤ 25
4	≤ 2	≤ 5

b) Contact Heat (performance level 0 - 4)

The Performance Level shall be based on the temperature range (100-500 °C) at which the user will feel no pain for at least 15 seconds. The product shall record at least level 3 in the burning behaviour test; otherwise the maximum contact heat performance that shall be reported is level 2.

Performance Level	Contact Temperature T_c °C	Threshold time t_t s
1	100	≥15
2	250	≥15
3	350	≥15
4	500	≥15

c) Convective heat resistance (performance level 0 - 4)

The Performance Level shall be based on the length of time the glove is able to delay the transfer of heat from a flame. A level of performance shall only be mentioned if a performance level 3 or 4 is obtained in the burning behaviour test.

Performance Level	Heat transfer index HTI s
1	≥4
2	≥7
3	≥10
4	≥18



d) Radiant heat resistance (performance level 0 - 4)

The Performance Level shall be based on the length of time the glove is able to delay the transfer of heat when exposed to a radiant heat source. A performance level shall only be mentioned if a performance level 3 or 4 is obtained in the burning behaviour test.

Performance Level	Heat transfer t_{24} s
1	≥ 7
2	≥ 20
3	≥ 50
4	≥ 95

e) Resistance to small splashes of molten metal (performance level 0 - 4)

The Performance Level shall be based on the number of molten metal drops required to heat the glove sample to a given level. A performance level shall only be mentioned if a performance level 3 or 4 is obtained in the burning behaviour test.

Performance Level	Number of droplets
1	≥ 10
2	≥ 15
3	≥ 25
4	≥ 35

f) Resistance to large quantities of molten metal (performance level 0 - 4)

The Performance Level shall be the weight of molten metal required to cause smoothing or pin holing across a simulated skin placed directly behind the glove sample.

Performance Level	Molten iron g
1	30
2	60
3	120
4	200



Gloves shall achieve at least performance level 1 for abrasion and tear as specified in Section 4.5.

4.7 Protective Gloves against Manual Metal Welding Risks

Protective gloves for use in manual metal welding, cutting and allied processes shall be manufactured conforming to EN 12477 standard. Protective gloves for welders shall protect the hands and the wrists during the process of welding and related tasks.

It is not meant to bring any protection in case of defective or wrong use of the welding equipment. It does not qualify the glove for protection against electrical shock.

4.7.1 Sizing of Gloves against Manual Metal Welding Risks

Glove sizes shall be manufactured according the below table.

Glove Size	Fits Hand Size	Hand Circumference / Length (mm)	Minimum Length Of the Glove (mm)
6	6	152/160	300
7	7	178/171	310
8	8	203/182	320
9	9	229/192	330
10	10	254/204	340
11	11	279/215	350

4.7.2 Minimum Performance Requirement

Protective gloves for welders are classified in to two types according to their performance levels as follows:

Requirements	Minimum Performance Required	
	Type A	Type B
Abrasion Resistance	2	1
Cut Resistance	1	1
Tear Resistance	2	1
Puncture Resistance	2	1
Burning Behaviour Resistance	3	2
Contact Heat Resistance	1	1
Convective Heat Resistance	2	—
Small splashes Resistance	3	2
Dexterity*	1	4

* (Note: Dexterity level varies from 1 to 5, Higher the number higher the flexibility).

Type B gloves are recommended when high dexterity is required as for TIG welding, while Type A gloves are recommended for other welding processes.

Type A or B to be marked on the product, its packaging and in the instructions for use.



4.7.3 Optional Requirements for gloves intended for arc welding in normal conditions of use

Gloves shall be designed without electrical conductive connection between their outside and inside parts e.g. by metal parts as rivets. The electrical vertical resistance for gloves type A and B shall be $> 10^5 \Omega$

4.7.4 Marking of Gloves against Manual Metal Welding Risks

Glove shall be marked with the number of this standard i.e. EN 12477 followed by letter A or B depending on whether it is a type A product or a type B product plus the pictograms for thermal risks (Section 4.6) and mechanical risks (Section 4.5).

5. TESTING

The gloves shall be subjected to the following tests according to the relevant standard. A summary sheet of tests carried out or test reports shall be submitted as specified in 5.5.

5.1 Protective Gloves against Chemicals and Micro-Organisms

- i. Penetration
- ii. Permeation
- iii. Test Chemical
- iv. Breakthrough Time
- v. Minimum Liquid Proof Length
- vi. Mechanical Characteristics (If applicable)

5.2 Protective Gloves against Mechanical Risks

- i. Abrasion Resistance
- ii. Blade Cut Resistance
- iii. Tear Resistance
- iv. Puncture Resistance

5.3 Protective Gloves against Thermal Risks

- i. Abrasion
- ii. Tear Resistance
- iii. Burning Behaviour
- iv. Contact Heat
- v. Convective Heat
- vi. Radiant Heat
- vii. Small Drops of Molten Metal
- viii. Large Quantities of Molten Metal

5.4 Protective Gloves against Manual Metal Welding Risks

- i. Abrasion Resistance
- ii. Blade Cut Resistance
- iii. Tear Resistance



- iv. Puncture Resistance
- v. Burning Behaviour
- vi. Contact Heat
- vii. Convective Heat
- viii. Small Drops of Molten Metal
- ix. Dexterity

5.5 Test Reports

A *summary sheet* of the tests carried out shall be submitted where the summary sheet clearly shows the equipment concerned, the manufacturer's identity, the tests carried out, test results and the standard's requirements against the test results to determine passing or failing of the test.

The summary sheet shall be from the accredited independent testing laboratory where the testing was carried out and this testing laboratory shall be acceptable to the purchaser. Proof of accreditation of the testing laboratory by a national/international authority shall be forwarded if requested by the purchaser.

Submission of individual test reports is not necessary if duly authenticated summary sheet is submitted as described above.

6. QUALITY ASSURANCE

The manufacturer shall possess ISO 9001:2008 or latest Quality Assurance certifications for the plant where the manufacture of gloves is done.

Bidders shall furnish a copy of the ISO certificate certified as true copy of the original by the manufacturer, along with the offer.

7. ADDITIONAL REQUIREMENTS

Packaging and Delivery

Each pair of gloves shall be packaged in an individual container or package of sufficient strength to properly protect the gloves from damage. The outside of the container or package shall be marked as specified in relevant sections.

The type of packaging suitable for transport shall be defined by the manufacturer.

At the request of the customer or according to government specifications any additional or amended instructions shall be included in the package.

8. INFORMATION TO BE SUPPLIED WITH THE OFFER

The selected bidder shall supply all relevant drawings, technical literature, hand books etc. in English.

The bid shall be accompanied with the following also;



- a) English version of catalogues describing the equipment and indicating the type/model number.
- b) Technical literature in English describing the constructional and operational features, relevant drawings etc. of the equipment.
- c) Information on the following:
Instructions for use, information on storage, fitting and adjustment, handling, cleaning, disposal, periodic inspection, periodic testing and useful service life
- d) Packing details.
- e) Completed schedule of particulars as per Annex A.
- f) Test reports or summary sheet conforming to clause 5.

9. Sample Study

One sample of the offered equipment including accessories if any, shall accompany the bid to facilitate analysis and evaluation. Any additional sample may be requested by the purchaser if such deemed necessary.

10. ANNEX

- Annex A- Schedule of Guaranteed Technical Particulars for Protective Gloves against Chemicals
- Annex B- Schedule of Guaranteed Technical Particulars for Protective Gloves against Mechanical Risks
- Annex C- Schedule of Guaranteed Technical Particulars for Protective Gloves against Thermal Risks
- Annex D- Schedule of Guaranteed Technical Particulars for Protective Gloves for Welders



SCHEDULE OF GUARANTEED TECHNICAL PARTICULARS

(CEB Requirements shall be filled by the procurement entity and information of the offer shall be filled by the manufacturer/supplier)

Protective Gloves against Chemicals			
Specific Requirements			
Sr No	Item	CEB Requirement	Offered
1	Size		
2	Chemicals against which protection is required		
3	Permeation Performance Levels for above chemicals	minimum 2	
4	Abrasion Resistance (Performance Level)	minimum 1	
5	Blade Cut Resistance (Performance Level)	minimum 1	
6	Tear Resistance (Performance Level)	minimum 1	
7	Puncture Resistance (Performance Level)	minimum 1	
General Requirements			
Sr No	Item	CEB Requirement	Offered
8	Brand	specify	
9	Model	specify	
10	Country of Manufacture	specify	
11	Applicable Standard	BS EN 374-1 BS EN 374-2	
12	Material	specify	
13	Year and Month/Quarter of Manufacture	Manufactured within two years before the bid closing date	
14	Marking on the equipment	Please refer clause 4.3	
15	Test Reports submitted	Please refer clause 5	
16	Quality Assurance for Manufacturer	Please refer clause 6	
17	Samples submitted	Please refer clause 9	
18	Warranty	specify	
19	Packing details submitted	Please refer clause 8	
20	Product catalogues, technical literature submitted	Please refer clause 8	
21	Information on the following should be submitted Instructions for use, information on storage, shelf life, fitting and adjustment, handling, cleaning, disposal, periodic inspection, periodic testing	Please refer clause 8	

I/We certify that the above data are true and correct

.....
Signature of the Bidder/Manufacturer and Seal

.....
Date



SCHEDULE OF GUARANTEED TECHNICAL PARTICULARS

(CEB Requirements shall be filled by the procurement entity and information of the offer shall be filled by the manufacturer/supplier)

Protective Gloves against Mechanical Risks			
Specific Requirements			
Sr No	Item	CEB Requirement	Offered
1	Size		
2	Abrasion Resistance (Performance Level)	_ or higher	
3	Blade Cut Resistance (Performance Level)	_ or higher	
4	Tear Resistance (Performance Level)	_ or higher	
5	Puncture Resistance (Performance Level)	_ or higher	
6	Special Design (e.g. Coating) to Improve the Grip	<input type="checkbox"/> Required <input type="checkbox"/> Not Required	
General Requirements			
Sr No	Item	CEB Requirement	Offered
7	Brand	specify	
8	Model	specify	
9	Country of Manufacture	specify	
10	Applicable Standard	BS EN 388	
11	Material	specify	
12	Summary Sheet of Tests	Yes, Please refer clause 5	
13	Quality Assurance for Manufacturer	Yes, Please refer clause 6	
14	Year and Month/Quarter of Manufacture	Manufactured within two years before the bid closing date	
15	Marking on the equipment	Please refer clause 4.3	
16	Samples	Yes, Please refer clause 9	
17	Warranty	specify	
18	Packing Details Submitted	Please refer clause 8	
19	Product catalogs, technical literature submitted	Yes, Please refer clause 8	
20	Information on the following should be submitted Instructions for use, information on storage, shelf life, fitting and adjustment, handling, cleaning, disposal, periodic inspection, periodic testing	Please refer clause 8	

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Date



SCHEDULE OF GURANTEED TECHHICAL PARTICULARS

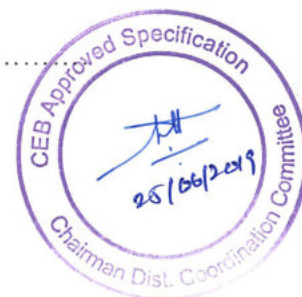
(CEB Requirements shall be filled by the procurement entity and information of the offer shall be filled by the manufacturer/supplier)

Protective Gloves against Thermal Risks			
Specific Requirements			
Sr No	Item	CEB Requirement	Offered
1	Size		
2	Burning Behaviour (Performance Level)	3 or higher	
3	Contact Heat (Performance Level) (Please refer clause 4.6 b)	__ or higher	
4	Convective Heat (Performance Level)	1 or higher	
5	Radiant Heat (Performance Level)	1 or higher	
6	Small Splashes of Molten Metal (Performance Level)	1 or higher	
7	Large quantities of Molten Metal (Performance Level)	1 or higher	
General Requirements			
Sr No	Item	CEB Requirement	Offered
8	Brand	specify	
9	Model	specify	
10	Country of Manufacture	specify	
11	Applicable Standard	BS EN 407	
12	Material	specify	
13	Abrasion Resistance (Performance Level)	1 or higher	
14	Tear Resistance (Performance Level)	1 or higher	
15	Summary Sheet of Tests	Yes, Please refer clause 5	
16	Quality Assurance for Manufacturer	Yes, Please refer clause 6	
17	Year and Month/Quarter of Manufacture	Manufactured within two years before the bid closing date	
18	Marking on the equipment	Please refer clause 4.3	
19	Samples	Yes, Please refer clause 9	
20	Warranty	specify	
21	Packing Details Submitted	Please refer clause 8	
22	Product catalogs, technical literature submitted	Yes, Please refer clause 8	
23	Information on the following should be submitted Instructions for use, information on storage, shelf life, fitting and adjustment, handling, cleaning, disposal, periodic inspection, periodic testing	Please refer clause 8	

I/We certify that the above data are true and correct

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Signature of the Bidder/Manufacture and Seal

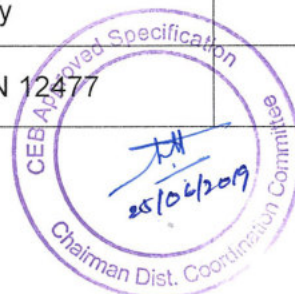
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Date



SCHEDULE OF GURANTEED TECHHNICAL PARTICULARS

(CEB Requirements shall be filled by the procurement entity and information of the offer shall be filled by the manufacturer/supplier)

Protective Gloves for Welders			
Specific Requirements			
Sr No	Item	CEB Requirement	Offered
1	Size		
2	Type (A or B) (Please refer clause 4.7.2)	<input type="checkbox"/> Type A <input type="checkbox"/> Type B	
3	Abrasion Resistance (Performance Level)	1 or higher	
4	Cut Resistance (Performance Level)	1 or higher	
5	Tear Resistance (Performance Level)	1 or higher	
6	Puncture Resistance (Performance Level)	1 or higher	
7	Burning Behaviour (Performance Level) (Please refer clause 4.7.2)	__ or higher	
8	Contact Heat (Performance Level) (Please refer clause 4.7.2)	__ or higher	
9	Convective Heat (Performance Level) (Please refer clause 4.7.2)	__ or higher	
10	Small Splashes of molten Metal (Performance Level)	__ or higher	
11	Dexterity	__ or higher	
12	Electrical Resistance > 100 kΩ (applicable only if the glove is required for arc welding)	<input type="checkbox"/> Required <input type="checkbox"/> Not Required	
General Requirements			
Sr No	Item	CEB Requirement	Offered
13	Brand	specify	
14	Model	specify	
15	Country of Manufacture	specify	
16	Applicable Standard	BS EN 12477	



17	Material	specify	
18	Summary Sheet of Tests	Yes, Please refer clause 5	
19	Quality Assurance for Manufacturer	Yes, Please refer clause 6	
20	Year and Month/Quarter of Manufacture	Manufactured within two years before the bid closing date	
21	Marking on the equipment	Please refer clause 4.3	
22	Samples	Yes, Please refer clause 9	
23	Warranty	specify	
24	Packing Details Submitted	Please refer clause 7	
25	Product catalogs, technical literature submitted	Yes, Please refer clause 8	
26	Information on the following should be submitted Instructions for use, information on storage, shelf life, fitting and adjustment, handling, cleaning, disposal, periodic inspection, periodic testing	Please refer clause 8	

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