



Technical Handbook of Personal Protective Equipment

Section 1.5 Head Protection

1. FOREWORD

HEAD PROTECTION – INDUSTRIAL SAFETY HELMETS

The hand book is intended as a guide to the requirements pertaining to personal protective equipment and apparel and should not be used in place of National Standards or Gazetted Acts or Directives issued by Government Departments or specific additional requirements by other entities. This guide should not be quoted or referred to as a reference document for requirements or conformance to any standards or legislation.

The safety helmet provides limited protection against falling objects and bumps to the wearer's upper head area, a vital part of the human anatomy. If used and maintained in the correct manner, it provides one of the least costly and readily available items of personal protective equipment.

In addition to the functional requirements, the industrial safety helmet shell provides a medium for the display of corporate logos, slogans, individual or team identification. The range of colours further expands on this potential. In addition the shell can also facilitate the attachment of other safety fittings for hearing, eye and face protection and miners cap lamps.

1.1. GENERAL INFORMATION

There are different styles of industrial safety helmets which can be divided into the following categories namely:

Peaked style (Jockey) caps –

Pic shows with added miners cap lamp bracket and cord clip.



Full brim style hats

Material composition and styles of the above broad descriptions can be adapted inter alia to accommodate the following requirements.

- Helmets with shortened peaks used in working at heights. Applications such as overhead, erection and electrical work, etc.



- Helmets fitted with lamp mounted or integrated brackets for underground mining or poor visibility conditions.
- Helmets with electrical conductivity resistance properties.
- Helmets with vents in the shell for additional wearer comfort and ventilation.
- Helmets with slots or adaptors for customized fittings ideally recommended by the helmet manufacturer.
- Helmets with high heat resistant components – for furnace work and other similar applications.
- Helmets offering 'lateral deformation' protection used to lessen the effect of lateral forces.
- Helmets with high visibility colours or reflective strips or glow-in-the-dark qualities used in mining/high traffic/poor visibility conditions.
- Double crown helmets for additional protection to the crown area of the wearer usually the full brim type and are typically used in the mining industry where shaft sinking or development is being carried out.
- Helmets of various colours or fitted with stickers or markings to identify areas/work teams/or designations of wearers.
- Helmets with embossings / decals such as company logo's and other information.

1.2. **A GUIDE TO PRESERVATION AND USE**

- Ensure the headgear is correctly adjusted to retain the safety helmet firmly on the head.
- Wear a chin strap attachment when working at heights or bending over.
- Don't store in direct sunlight or in bright light and in areas where exposed to heat.
- Don't store on the back shelf of a motor vehicle, as this will expose it to bright light and excessive heat, which will result in embrittlement and could become a dangerous projectile in event of sudden braking or accident impact.
- Inspect the helmet shell and headgear frequently. Replace the safety helmet or components immediately where any part shows signs of ageing / cracks / wear / breakage.
- Don't sit on / wash in or strip out the headgear from your safety helmet.
- Don't apply paint, lacquer's solvents, cleaning fluids or chemicals to any surfaces.
- Wear your safety helmet with pride, your life and health could depend on it!!!

1.3. **TYPES OF HELMETS WHICH ARE NOT COVERED BY INDUSTRIAL SAFETY HELMET STANDARDS**

Some of the helmets below are covered by other specific Standards.

- Bump caps
- Mountaineering helmets/short brim
- Fireman's helmets
- Riot helmets



- Foundry helmets

2. STANDARDS

The South African Standards SANS 1397 is a direct adoption of EN 397

This section illustrates the provisions covered in standards related to industrial safety helmets with the intent of ensuring worker safety and comfort. Information contained in this guide has been referred to with permission of the SABS and although this has been done carefully, the information in this section of the guide is not intended to be a faithful reproduction of depth or breadth of all the requirements related to these helmets.

Requirements are included for guidance and illustrative purposes only.

Please note that: Conformity cannot be claimed against this document or any section of the document. For the exact requirements and how these are to be determined users must consult the National Standards i.e. SANS 1397 – Edition 1 and Amendment A1 Industrial Safety Helmets – this Standard is identical to EN 397 Edition 1 and Amendment A1.

2.1. SCOPE OF PROTECTION:

The primary purpose is to provide protection to the wearer against falling objects and bumps which could lead to injury. Additional optional performance requirements offer specialized protection. The protection provided is limited.

2.2. GUIDE TO REQUIREMENTS

Industrial safety helmets should consist of a shell and harness. The materials used for the manufacture should be durable and should not undergo appreciable changes of appearance or performance characteristics when exposed to adverse conditions such as sun, rain, cold, dusts, vibration. The helmet construction should be as light as possible without prejudicing design strength and efficiency.

2.2.1. HELMET SHELLS:

Helmets can be either peaked type with brim over eyes (jockey style) or with brim surrounding the shell (full brim).

The helmet shell can have ridges or smooth dome shaped crown.

Peaked style helmets (caps) can have gutters on sides and back to direct water and liquids off the wearer.

Or full brim helmets with sloping brim all round (hats).

2.2.2. HARNESSSES:

The harness maintains the helmet shell in position on the wearer's head and provides a cushioning effect by absorbing kinetic energy during an impact (headgears).

The harness is composed of:

HEADBAND:

The headband holds the cradle and shell in position above eye level. The circumference size should be from a minimum of



50cm to maximum of 65cm and may include a nape strap as an integral part.



SWEATBAND: (shown above in pics 1 and 2)

The headband should be fitted with a sweatband for enhancement of user comfort and covers at least the front inner surface of the headband and should be of low PH and of washable material.

NAPE STRAP: (shown above in pic 3)

The nape strap facilitates adjustment of the headband which fits behind the head below the plane of the headband fitted with either interlocking or friction grip adjustable bands or ratchet gear mechanism that permits adjustment to suit wearer.

CRADLE: (shown above, and alternative below)



The cradle attaches to the headband and provides adjustment for correct wearer height via anti concussion tapes. The cradle can be manufactured from either material webbing straps with adjustable lugs and or slides, or from polypropylene or nylon. Anti concussion tapes should have a minimum width of 15mm and are there to absorb kinetic energy during an impact.

2.3. CLEARANCES AND TOLERANCES

This should be measured when the helmet is mounted in wearing position on specified head forms under controlled conditions these are specified in SANS1397-2003 Edition 1 Amendment A.

2.3.1. EXTERNAL VERTICAL DISTANCE (Relates to clearance)

From the outer surface of the shell crown to the top of the head form. Vertical distance shall not exceed 80mm.

2.3.2. INTERNAL VERTICAL DISTANCE (Relates to stability)

From the inner surface of the crown of the shell to the top of the head form. Vertical distance shall not exceed 50mm.

2.3.3. INTERNAL VERTICAL CLEARANCE

Will be the same as the internal vertical distance except where a padding has been fitted to the inside of shell crown. This shall not be less than 25mm from the lower surface of the padding to the top of the head form.

2.3.4. HORIZONTAL DISTANCE

From the inner surface of the shell to the sides and front of the head should not be less than 5mm.

2.3.5. WEARER HEIGHTS

The height should not be less than 80mm for the majority of wearers but where small heads are encountered this should not be less than 90mm.

2.4. OPTIONAL ACCESSORIES:

2.4.1. CHIN STRAP

The chin strap maintains the safety helmet in position when head goes through motion or is bent forward.

The chin straps must be adjustable to suite wearer with minimum width of braid of 10mm and attaches to either the helmet shell or headband.

The chin strap should remain intact to a force of 150 N and fail or detach not exceeding 250 N. (at the anchorage point). This reduces the risk of strangulation to wearer.

2.4.2. CHIN STRAP ANCHORAGE:

These are the points at which the chin strap attaches to the helmet shell or headgear and can be provided for on the lower sides of the shell or headband.



2.4.3. VENTILATION:

These are formed penetrations through the shell to allow the flow of fresh air through to the inner area of the shell.

Ventilation should be in the upper third of the shell and the total area of the hole should not exceed 450mm².

2.4.4. FITTINGS & ATTACHMENTS:

The use of fittings and attachments with industrial safety helmets should be in accordance with the manufacturers instructions and should only be fitted where appropriate holes, slots, lugs or fittings are provided for the purpose.

2.4.5. PROTECTIVE PADDING:

This can be fitted to the inside of the shell crown or to the outer sides of the headband, which can improve wearer comfort and reduce effect of impact.

2.4.6. **DOUBLE CROWN HELMETS:**

Double crown helmets offer additional protection to the crown area of the upper head by providing an extra layer of shell material to the crown of the helmet. This is either thermally welded to the inside of the shell or affixed to the outside of the shell with rivets.

The double crown helmets must comply in all respects with the above referred to Standard. These helmets are usually the full brim type and used in shaft sinking developments related to the mining industry.

2.5. **PERFORMANCE REQUIREMENTS**

As specified in SANS1397-2003 Edition 1 Amendment 1A should be referred to in all instances to determine the specific requirements, conditions, sequences of tests and performance which cover the following criteria:

- Shock absorption
- Penetration by sharp objects
- Effects of climate conditions such as hot and cold temperatures
- Ultra violet radiation from sun and bright lights
- Heat and flame resistance

The performance requirements are mandatory for compliance to the above Standard and must be carried out by an Accredited Testing Authority.

2.5.1. Additional optional performance requirements can be claimed to be met provided the necessary verification processes and tests have been carried out in accordance with the above standard by an Accredited Testing Authority.

- Resistance to electrical conductivity
- Very high temperature
- Very low temperature
- Lateral deformation
- Moulton metal splash
- Resistance to flame

3.0 **MARKING / LABELLING**

3.1. The following information should be moulded / pressed into the helmet shell.

- The standard i.e. SANS 1397
- DME – Department of Mineral & Energy approval number issued by the Department of Minerals and Energy. (This is necessary in South Africa if the helmet is intended for use in mining or quarrying). This certification is identified by the letters HH then numbers.
- Name of manufacturer / identification brand mark
- Year and quarter / month of manufacture (Typically a clock with an arrow pointing to the month and the centre bearing the year)
- Type / model of helmet on shell and harness
- Material type of the shell i.e. ABS, HD/PE, PC etc.
- Additional marking can relate to whether the helmet is recyclable

3.2. The following information should be moulded / pressed into the harness (headgear).

- The standard i.e. SANS 1397
- Name of manufacturer / identification brand mark
- Year and quarter / month of manufacture (Typically a clock with an arrow pointing to the month and the centre bearing the year)
- Additional marking can relate to whether the helmet is recyclable

3.3. The following information should be contained on a label attached to the inside of the helmet shell covering the following points:

- "For adequate protection this helmet must fit or be adjusted to the size of the wearer's head"
- The helmet is made to absorb the energy of a blow which may cause partial destruction or damage to the shell and or the harness, and even though such damage may not be apparent, any helmet subjected to severe impact should be replaced.
- Do not modify or remove any of the original component parts unless advised to do so by the manufacturer nor should anything be added without the manufacturer's recommendation.
- Do not apply paints, solvents, adhesives labels unless permitted to do so by the manufacturer.

3.4. The following information should accompany each helmet and is usually contained on the label:-

- Name and address of manufacturer.
- Instructions / recommendations regarding fitting; cleaning; maintenance and storage.
- Suitable accessories / spare parts
- Significance of optional requirements / limits of use.
- Guidance regarding obsolescence.
- Guidance regarding packaging and storage

3.5. Helmet may carry a marking or label stating compliance to optional requirements.

4.0. **LIFESPAN & INSPECTIONS**

This is purely a recommendation by the manufacturer as the lifespan of a helmet revolves around its maintenance; exposure to heat and UV rays; exposure to the elements and abusive conditions etc.

If a helmet is stored correctly (away from sunlight and heat) suitably packed in bag or box in a clean environment where the temperature is controlled then the lifespan of the helmet should begin on its recorded 'Issue' date for use.

Ideally a helmet exposed to varying wear conditions should last for a period 1 – 2 years from date of issue to wearer. Regular visual inspections should be carried out to the helmet shell and headgear assembly by visually inspecting for cracks, tears, discoloration and embrittlement of the shell caused by frequent exposure to UV rays or damage brought about by harsh work conditions or abuse.

The headgear should be inspected in the same manner for wear, damaged or loose fitment and replaced if components are found to be faulty or suspect. This element provides absorption of shock/forces exerted on the shell. The harness assembly should be immediately replaced if there is any sign of degradation / weakening of the component parts or if the harness is not clean or contaminated.

It is recommended to insert the 'Issue' date in a register or onto the helmet label inside the shell of the helmet if this is provided for. The lifespan of the helmet would then start from the issue date and can then be tracked and not confused with

the date of manufacture.

5.0. **CLEANING / PACKAGING**

A helmet assembly should only be cleaned and disinfected by recommended solutions / products from the manufacturer. If in doubt use only mild soapy solutions, rinse well and allow to dry out of direct sunlight.

The helmet should ideally be packaged / transported in cardboard boxes/woven bags. Clear packaging can be used and is ideal for keeping helmets dust free and identification when in storage.

6.0. **APPROVALS BY STATUTORY BODIES**

6.1. **DEPARTMENT OF MINERAL & ENERGY (DME)**

In terms of DME Regulation 5.8.3. in terms of schedule 4 of the Mines Health & Safety Act No. 29 of 1998. All safety helmets used in mining and quarrying operations must have a DME Certificate of compliance and indicated on the helmet identified by prefix HH + Registration Number.

DME recognizes the SANS 1397 compliance as the pre requisite for DME Certification.

6.2. **DEPARTMENT OF LABOUR (DOL) OCCUPATIONAL HEALTH & SAFETY ACT – 1993 & AMENDMENTS**

- **CLAUSE 1:** Deals with definitions contained within the Act.
- **CLAUSE 2:** Deals with the responsibilities for Health & Safety of the employer.
- **CLAUSE 43 & 44:** Deals with the regulations pertaining to Health & Safety with regards to the work areas and refers to incorporation of Health & Safety Standards in the regulation with no specific reference to safety helmets.

The responsibility for the safety of the workplace and employees is that of the employer. Adequate precautions must be taken to eliminate areas of risk. This must be demonstrated by a risk analysis by competent persons and the elimination of such hazards by preventive measures and provisions of appropriate protective equipment.

With reference to the construction regulations the owner has a responsibility to carry out a risk assessment, which the employer/contractor must scrutinize and carry out a risk analysis, which must be completed and accepted by the owner/agent prior to commencement of work.

Provision of adequate and compliant personal protective equipment would form an integral part of these requirements with head protection being one of the most common compliances required.

Note:

Please address any questions or comments to Sapema Technical at email: info@sapema.org

Disclaimer: All the above information is given in good faith from the best resources available to the member companies who compiled this section.