



# **BUSINESS PLAN**

## **ISO/TC 94**

**“Personal Safety – Protective Clothing and Equipment”**

**Version 8.0**

**Date 16 March 2017**

## Version Control

Version	Author	Edits	Date
1	Takashi Ibusuki	The chairman of ISO/TC 94 in consultation with its members developed the first draft of the business plan.	21 <sup>st</sup> Jan 2014
2	Russell Shephard and Eric van-Wely	The second official draft has been prepared by Russell Shephard and Eric van-Wely following the TC 94 meeting held in Lubeck Germany on the 19 <sup>th</sup> and 20 <sup>th</sup> May 2014.	2 <sup>nd</sup> June 2014
3	Dave Matthews	Made comments	19 <sup>th</sup> June 2014
4	Russell Shephard and Eric van-Wely	Final editing and additional information included from SC13	23 <sup>rd</sup> June 2014
5	Olga Pitt	Minor typographical errors corrected	24 <sup>th</sup> June 2014
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7	Ron Pulido	Revised draft. Updated SC3 and SC6 following discussions with Chair/Secretary.	28 <sup>th</sup> October 2016
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## Table of Contents

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1	Executive Summary .....	1
2	Purpose .....	2
3	Background .....	2
4	Objective .....	2
5	Scope.....	3
6	Definitions for PPE .....	3
7	Organisational Summary .....	4
8	Business Environment .....	6
9	Quantitative Indicators of the Business Environment .....	11
10	Benefits and Customers .....	14
11	Participation and Representation .....	15
12	Objectives and Implementation Strategy.....	16
13	Factors affecting Completion and Implementation of ISO Work.....	18

# 1 Executive Summary

The International Organization for Standardization (ISO) TC 94 has the task of standardizing the quality and performance of clothing and personal equipment designed to safeguard people against all known possible hazards. Many countries have put in place legislation to ensure the workplace is safer for its workforce. The key objective of TC 94 is to provide Standards, which ensure that products placed on the market, provide the level of protection that is required to meet the needs of employers and employees and those who require items of PPE while performing activities that require the use of PPE and thus help to safeguard the wearer of personal protective equipment (PPE).

- This TC currently addresses the following areas for the purpose of standardization:
- ISO/TC/94/TG01 Compatibility of PPE items
- ISO/TC 94/CAG\_Chairman advisory group
- ISO/TC 94/SC1 Head protection
- ISO/TC 94/SC3 Foot Protection
- ISO/TC 94/SC4 Personal equipment for protection against falls
- ISO/TC 94/SC 6 Eye and face protection
- ISO/TC 94/SC12 Hearing protection
- ISO/TC 94/SC13 Protective clothing
- ISO/TC 94/SC14 Fire-fighters' personal protective equipment
- ISO/TC 94/SC15 Respiratory protective devices

Benefits from having Standards covering items of PPE have already been realized with the facilitation of international trade, a process for technical communication and consultation by international experts, the promotion of confidence in products and services in that they promote safety, quality, and reliability. PPE is used to protect people from hazards and so confidence in these products and their certification is paramount.

An emerging area of standardization that is now being recognized by this Technical Committee (TC) is the need to ensure compatibility of systems and components for various PPE when used together. The development of ensemble Standards will be the next new step for some of the subcommittees in TC 94. This is one area that TC 94/SC14 "Firefighter's Protective Equipment" have embarked on and have shown that the concept of ensemble Standards is possible and has international support with the publication of a number of Standards in recent months.

New areas requiring standardization have emerged as a result of the following remarkable social, economical and technological changes from the last decade:

1. The attack on New York on September 11 2001, and the war on terror, train bomb attack in Spain and Underground bombings in London
2. Development of innovative technologies such as biotechnology and nanotechnology
3. Global environmental issues such as climate change
4. Shortage of energy and resources with a remarkable increase in their consumption and a change of prices under the present serious economic crisis
5. Infectious diseases including new types of influenza,
6. The use of Chemical, Biological, Radiological and Nuclear weapons

Title:

Filepath: S:\Standards Development\International\SA Secretariats\ISO-TC94\ISO TC 94 Business plan\Final TC94 Business Plan 20170504.docx

Date Approved: 16/03/2017

Page 1

Through the establishment of sub committees, working groups and project groups TC 94 strives to meet the needs of all those who require the use of such Standards to ensure that items of PPE are manufactured, certified to and compliant with the most appropriate performance Standards available. These Standards can be defined as ISO Standards, developed with the support of experts from as many international countries and with outcomes reached on consensus.

Of course with the World Trade Organisation expressing a desire for truly international standards, as opposed to Regional Standards (read Europe and North America), many standards are now being developed under the Vienna Agreement so EN ISO are being introduced more frequently.

## **2 Purpose**

TC 94 has developed this business plan for the purpose of providing an overview of the business of the TC; provide guidance to all SC's that report to TC 94 and to be used as a reference document for the operation of TC 94 and its subcommittees.

## **3 Background**

ISO/TC 94 was established to provide a coordinated approach to the development of International Standards for a range of items of PPE. Through the establishment of sub committees, working groups and project groups TC 94 strives to meet the needs of all those who require the use of such Standards to ensure that items of PPE are manufactured, certified to and compliant with the most appropriate performance Standards available.

TC 94 was tasked with standardizing the quality and performance of protective clothing and personal equipment designed to safeguard people against all known possible hazards. Many countries have put in place legislation to ensure the workplace is safer for its workforce. The key objective of TC 94 is to provide Standards, which ensure that products placed on the market, provide the level of protection that is required to meet the needs of employers and employees and those who require items of PPE while performing activities that have a need for the use of PPE and thus help to safeguard the wearer of PPE.

## **4 Objective**

The foremost aim of international standardization is to ensure the health and safety of the end users through the effectiveness of PPE. This can be achieved by establishing minimum performance requirements for PPE that covers various functions and or duties the end user may be required to perform. Additionally it is desired to facilitate the exchange of goods and services through the elimination of technical barriers to trade.

Three bodies are responsible for the planning, development and adoption of International Standards: ISO is responsible for all sectors excluding Electrotechnical, which is the responsibility of IEC (International Electrotechnical Committee), and most of the Telecommunications Technologies, which are largely the responsibility of ITU (International Telecommunication Union).

ISO is a legal association, the members of which are the National Standards Bodies (NSBs) of some 160 countries (organizations representing social and economic interests at the international level), supported by a Central Secretariat based in Geneva, Switzerland.

The principal deliverable of ISO is the International Standard. For TC 94, the principal deliverable are Standards in the area of personal protective equipment (PPE).

## 5 Scope

The scope of work undertaken by TC 94 and its SC's is one of standardizing the performance of clothing and personal equipment designed to safeguard people against all known possible hazards. The key objective of TC94 is to provide Standards, which ensure that products placed on the market, provide the level of protection that is required to meet the needs of employers and employees and those who require items of PPE while performing activities that require the use of PPE and thus help to safeguard the wearer of PPE.

TC 94 has responsibility for addressing the following areas for the purpose of standardization:

- ISO/TC/94/TG01 Compatibility of PPE items
- ISO/TC 94/CAG Chairman advisory group
- ISO/TC 94/SC1 Head protection;
- ISO/TC 94/SC3 Foot Protection;
- ISO/TC 94/SC4 Personal equipment for protection against falls
- ISO/TC 94/SC 6 Eye and face protection
- ISO/TC 94/SC12 Hearing protection
- ISO/TC 94/SC13 Protective clothing
- ISO/TC 94/SC14 Fire-fighters' personal protective equipment
- ISO/TC 94/SC15 Respiratory protective devices

TC 94 has now asked SC 14 to expand its scope of work to include the hazards of Chemical, Biological, Radiological and Nuclear (CBRN) exposures and consider how best to approach the development of Standards for PPE that will provide a level of protection for firefighter's against possible CBRN exposures. It should be acknowledged that SC 15 has already listed CBRN as a possible hazard and as such it forms part of their risk matrix approach to the development of Standards for Respiratory Protective Devices (RPD). This CBRN scope will be done in coordination with SC 13 which takes into account many of the chemical as well as heat and flame risk.

To achieve the outcomes defined in the scope of TC 94 it is recognised that it may need to consult with other TC's and where necessary recommend the creation of new SC's in the future as and when there is a need identified.

## 6 Definitions for PPE

Personal protective equipment (PPE) means:

- a) equipment intended to be worn or held by a person for protection against one or more risks for his or her health or safety that is placed on the market separately or combined with personal non-protective equipment;

Title:

Filepath: S:\Standards Development\International\SA Secretariats\ISO-TC94\ISO TC 94 Business plan\Final TC94 Business Plan 20170504.docx

Date Approved: 16/03/2017

Page 3

- b) interchangeable components for equipment referred to in point (a) which are essential for its protective function;
- c) connection systems for equipment referred to in point (a) that are not held or worn by a person, that are intended to connect that equipment to an external device or structure, that are removable and not intended to be permanently fixed to a structure;

Personal Protective Ensemble means:

- a) PPE worn from head to toes and can include from skin to outer layer, and all other auxiliary elements of the equipment worn by an individual to protect them from hazards to their health and safety. All other auxiliary elements include (non-exhaustive list) ICT hardware and software, data logging, monitoring sensors, warning systems, localization equipment, used to communicate, accurately monitor and/or warn both the individual wearer and/or the incident management.

As PPE is used both in the professional and consumer (sport & leisure) sectors, a vast amount of products and related services are available on the market, which are continuously being developed. Keeping up with these developments is a crucial challenge for standardization, as without Standards identifying and describing the performance requirements of the PPE it is very difficult for manufacturers to bring new and compliant products to the market, which have been certified to protect the user.

## 7 Organisational Summary

### a) ISO/TC 94, Role and business planning

The role of the TC 94 business planning is to ensure that all members of TC 94 and its SC's have input into the development and maintenance of its business plan through a consultative process that is aimed at achieving consensus on what is its core business. The SC's have a responsibility to ensure that they consult with all members of the SC including each of its established working groups (WG) and provide any feedback obtained to TC 94. In addition to this TC 94 has a responsibility to provide a copy of its business plan to ISO for endorsement.

### b) Structure of ISO/TC 94 and SC's

This section gives an overview of the ISO/TC's structure, scopes of the ISO/TCs and any existing subcommittees and information on existing and planned standardization projects, publication of the ISO/TC and its subcommittees.

#### Structure of the ISO committee

<a href="#">ISO/TC 94/TG 01</a>	Compatibility of PPE items
<a href="#">ISO/TC 94/CAG</a>	Chairman advisory group

<a href="#">ISO/TC 94/SC 1</a>	Head protection
<a href="#">ISO/TC 94/SC 3</a>	Foot protection
<a href="#">ISO/TC 94/SC 4</a>	Personal equipment for protection against falls
<a href="#">ISO/TC 94/SC 6</a>	Eye and face protection

Title:

Filepath: S:\Standards Development\International\SA Secretariats\ISO-TC94\ISO TC 94 Business plan\Final TC94 Business Plan 20170504.docx

Date Approved: 16/03/2017

Page 4

<a href="#">ISO/TC 94/SC 12</a>	Hearing protection
<a href="#">ISO/TC 94/SC 13</a>	Protective clothing
<a href="#">ISO/TC 94/SC 14</a>	Fire-fighters' personal equipment
<a href="#">ISO/TC 94/SC 15</a>	Respiratory protective devices

### c) Current deliverables

#### i. Current projects

ISO/NP TS 20141 Guideline on compatibility of PPE

TC 94's subcommittees have active projects, the details of these can be seen on the ISO/TC 94 website.

At the time of writing this business plan there are a total of 56 active projects.

#### ii. Publications

TC 94 has no published Standards directly under its responsibility but there are 136 related to its SCs.

### d) International Organisations

- i. The foremost aim of international standardization is to facilitate the exchange of goods and services through the elimination of technical barriers to trade, but the use of standards by industry and the social and economic partners is always voluntary.
- ii. Three bodies are responsible for the planning, development and adoption of International Standards: ISO is responsible for all sectors excluding electrotechnical, which is the responsibility of International Electrotechnical Committee (IEC), and most of the telecommunications technologies, which are largely the responsibility of International Telecommunication Union (ITU).
- iii. ISO is a legal association, the members of which are the National Standards Bodies (NSBs) of some 162 countries (organizations representing social and economic interests at international level), supported by a Central Secretariat based in Geneva, Switzerland.

**The principal deliverable of ISO is the International Standard.**

- iv. An International Standard embodies the essential principles of global openness and transparency, consensus and technical coherence. These are safeguarded through its development in an ISO/TC, representative of all interested parties, supported by a public comment phase (the ISO Technical Enquiry). ISO and its Technical Committees are also able to offer the ISO Technical Specification (ISO/TS), the ISO

Public Available Specification (ISO/PAS) and the ISO Technical Report (ISO/TR) as solutions to market needs. These ISO products represent lower levels of consensus and have therefore not the same status as an International Standard.

- v. ISO offers also the Industry Technical Agreement (ITA) as a deliverable which aims to bridge the gap between the activities of consortia and the formal process of standardization represented by ISO and its national members. An important distinction is that the ITA is developed by ISO workshops and comprising only participants with direct interest, and so it is not accorded the status of an International Standard.

**vi. Link to IEC**

Principles for developing ISO and IEC Standards related to or supporting public policy initiatives are found in the ISO Directives. General information about the IEC may be found at:

<http://www.iec.ch/>

**vii. Link to CEN**

The Vienna Agreement on Technical Cooperation between ISO and CEN (the Vienna Agreement) is found at:

[http://isotc.iso.org/livelink/livelink/fetch/2000/2122/4230450/4230458/02\\_Guidelines\\_for\\_the\\_implementation\\_of\\_the\\_Agreement\\_on\\_Technical\\_Cooperation\\_between\\_ISO\\_and\\_CEN\\_%28the\\_Vienna\\_Agreement%29\\_6th\\_ed.\\_Jan\\_2014.pdf?nodeid=4230689&vernum=-2](http://isotc.iso.org/livelink/livelink/fetch/2000/2122/4230450/4230458/02_Guidelines_for_the_implementation_of_the_Agreement_on_Technical_Cooperation_between_ISO_and_CEN_%28the_Vienna_Agreement%29_6th_ed._Jan_2014.pdf?nodeid=4230689&vernum=-2)

## 8 Business Environment

Political, economic, technical, regulatory, legal and social dynamics describe the business environment of the industry sector, products, materials, disciplines or practices related to the scope of this ISO/TC, and they may significantly influence how the relevant Standards development processes are conducted and the content of the resulting Standards.

Like so many products, PPE is supplied through a worldwide market, so to be truly effective Standards need to be developed at the international level. PPE impacts on nearly all professions, specifically sectors such as manufacturing, mining, emergency services and are an ongoing challenge to meet the ever-changing needs of the industries. The need to protect those who are undertaking work where there is a risk to their health and safety is paramount.

There is no doubt that PPE products are sold and used worldwide. Wearers of PPE including industries such as: manufacturing, mining, emergency services sectors, government departments and defence, all of which are major users of PPE. It is important to consider that PPE is not restricted to the work place and therefore people use PPE in a variety of different circumstances such as natural or artificial hazards like flooding, forest firefighting, attacks of terrorism, sporting activities, gardening, or while doing housework and home repairs. If TC 94 was to consider all possible activities this would extend the scope of some SC's tremendously and therefore SC14, SC15 and SC13 have excluded sports and the private environment at this time, though SC13 recently revisited this area for future development. It is important that TC 94 has a watching brief in these areas and where the need arises modify its scope to support its SC's in the development of future work.

Title:

Filepath: S:\Standards Development\International\SA Secretariats\ISO-TC94\ISO TC 94 Business plan\Final TC94 Business Plan 20170504.docx

Date Approved: 16/03/2017

Page 6

Interested parties in the standardization process for PPE includes but is not restricted to manufactures, end users, wearers such as employee and employer groups, public and legal authorities and laboratories. All are interested in having Standards that establish a common language (terminology) that is understood across different sectors, describe test methods and define general requirements for various PPE devices.

Many nations now have laws and regulations in place to ensure the protection of employees and volunteers from such risks. For example the European Union requires all PPE to comply with the PPE Directive, 1989. In Australia and Japan, Occupational Health and Safety Laws require that employers eliminate and minimise risks to the safety and health of their employees and volunteers, which includes the use of PPE. The United States of America also have regulation in place to protect employees. Many purchasers specify national or international Standards in PPE contracts, including proof of compliance with Standards such as independent certification to ensure minimum requirements are met.

Ideally PPE is used as a last resort for the protection of workers when all other measures such as engineering out the risk or eliminating the risk have been exhausted. There are, however, professions where it is recognized that workers must enter and work in hostile or adverse environments, such as a building or house fire in the case of firefighters. In these instances PPE becomes the last line of defence for firefighters.

With significant incidents such as the attack on the world trade towers in the USA and the continual loss of firefighter's around the world while performing high risk activities such as urban and wildland firefighting, the importance of PPE for these sectors has never been as important. Issues with PPE became apparent during and directly following the attack on the world trade towers and continues to be scrutinized following the death of firefighters while fighting large scale wildfires and industrial accidents. Many advances in fire testing methods and procedures have been developed in this area in recent years, in particular the work of SC 14 WG1 "General Requirements" conducted international round robin manikin testing to determine consistency of test results for firefighter's structural protective clothing using the test method of ISO 13506. Based on this round robin, the ISO 13506 is undergoing a complete revision.

### ***Business Environment, by SC:***

#### *ISO/TC 94/SC3, Foot protection:*

SC 3 has been working to develop a range of Standards for foot protection. Identifying some of the accident statistics show that injury to the lower leg and foot account for 15 % of all work related accidents that necessitate time away from work. Injuries resulting from tripping and falling account for a further 20% of the total, but many of those may be to other parts of the body. In total numbers, footwear related injuries account for about 35 % of work related injuries. The cost of such accidents across Europe, as an example, is in excess of 100 M million EURO.

#### *ISO/TC 94/SC4, Personal equipment for protection against falls:*

Personal equipment for protection against falls, has published a series of Standards on fall protective devices. Falls from a height are a major cause of serious and fatal injuries in workplaces throughout the world. The SC resolved at a recent meeting to undertake a change in direction of its work on personal fall

protection and to create new advisory documents rather than specifications. A new work item is being prepared with a draft that has been discussed over sometime in a working group.

*ISO/TC 94/SC6, Eye and face protection:*

This is considered one of the most important items of personal protective equipment. Not only because it provides protection for the wearer against dangerous risks that can lead to injuries causing irreversible damage in an occupational setting, but also because it can protect people in areas such as sport, leisure and domestic activities. In Europe, accidents concerning the eye account for over 4% of all injuries leading to millions of lost working hours.

It is estimated in the USA alone that eye injuries cost \$300 million per year (National Safety Council), and that 90% are preventable. Although industrial injuries are often thought to be the major cause of eye injury, sports injuries alone in the USA are estimated to be in the order of 100,000 per year at a cost \$200 million (NEI). In the UK the Health and Safety Executive estimates that around 2,500 injuries occur in the workplace each year, at a cost to the National Health Service of £16 million.

Sunglasses are the most significant product in consumer eye protection. The Sunglass Association of America reported that the market for sunglasses in the USA was 95.2 million pairs in 2012. But leisure activities also often require eye protection from impact injury, so SC6 is actively pursuing a work programme of sports eye protection devices.

There are many types of eye protection products on the market including spectacles, goggles, face shields and welding helmets amongst others. There are also ranges of products that can be mounted on eye protectors, which allow for the adaptation of eye protectors to protect wearers for a range of different tasks and activities. In Europe alone it is estimated that there are probably several hundred thousand types of products on the shelves, therefore Standards in this field are critical to provide manufactures, suppliers, buyers, employers and users with eye protection which meets requirements necessary to protect people who use these products in any given activity.

*ISO/TC 94/SC13, Protective Clothing:*

To be responsible for establishing international standards for personal protective clothing against hazardous exposures such as heat, chemicals and mechanical action with the exclusion of radioactive materials. These international standards may include requirements for protective items for the head, the hand and the feet when these are an integral part of the protective clothing or, as individual items, they do not fall within the scope of any other TC or SC. Due to the breadth of the SC it maintains liaisons to a number of TCs and SCs within ISO but also with its sister organisation CEN TC162 and as well as with NFPA and ASTM.

In the field of protective clothing there is remarkable international activity in standardization, which has led to close co-operation of CEN/TC 162 with more and more joint standards being produced under the Vienna Agreement.

The actual work program is available on the ISO home page.

[http://www.iso.org/iso/iso\\_catalogue/catalogue\\_tc/catalogue\\_tc\\_browse.htm?commid=50626&development=on](http://www.iso.org/iso/iso_catalogue/catalogue_tc/catalogue_tc_browse.htm?commid=50626&development=on)

Title:

Filepath: S:\Standards Development\International\SA Secretariats\ISO-TC94\ISO TC 94 Business plan\Final TC94 Business Plan 20170504.docx

Date Approved: 16/03/2017

Page 8

ISO/TC 94/SC 13/WG 1 - General properties of protective clothing:

To be responsible for the drafting of international documents on general properties of protective clothing and for the selection of test methods and performance requirements for protective clothing excluding those covered by other WGs of SC 13.

ISO/TC 94/SC 13/WG 2 - Protective clothing against heat and flame:

To be responsible for the drafting of international standards on test methods and performance requirements for protective clothing against heat and flame in its various forms such as radiant heat, convective heat (including flames) and contact with hot materials (e.g. solid surfaces and sparks, drops or splashes of molten materials).

ISO/TC 94/SC 13/WG 3 - Protective clothing against chemicals agents:

To be responsible for the drafting of international standards on test methods, performance requirements, classification, designation and marking for protective clothing against hazardous chemicals (solid, liquid and gaseous).

ISO/TC 94/SC 13/WG 5 - Protective clothing against mechanical action:

To be responsible for the drafting of international standards on test methods and performance requirements for protective clothing against mechanical action, as well as for test methods for assessing the resistance to mechanical action of other types of protective clothing.

ISO/TC 94/SC 13/WG 6 Protective clothing against hazardous biological agents:

To be responsible for the drafting of international standards on test methods, performance requirements, classification, designation and marking for protective clothing against hazardous biological agents (solid, liquid and aerosols).

ISO/TC 94/SC 13/WG 8 - Protective gloves:

To be responsible for the drafting of international standards on test methods and performance requirements for protective gloves against all types of risks unless otherwise specified by ISO/TC 94/SC13.

ISO/TC 94/SC14, *Firefighters' Personal Equipment*:

SC 14 was established prior to the September 11 tragedy, however, this event has seen the committee become highly active in the development of PPE Standards for firefighters.

The approach that this subcommittee has used has been different to other subcommittees. The members of SC14 have developed PPE Standards using a hazard-based approach. That is, they determine the types of hazards that a firefighter will face such as structural firefighting, wildland firefighting, hazardous chemical incidents and rescue operations. Firefighter's physiology needs to be considered in addition to protection by all PPE being worn while they perform their duties. A single PPE product may be acceptable when used on its own, but it may create other problems when worn in conjunction with other items of PPE. Therefore it is imperative that there are PPE Standards that will ensure compatibility between different items of PPE and that they are compatible with the wearer.

Title:

Filepath: S:\Standards Development\International\SA Secretariats\ISO-TC94\ISO TC 94 Business plan\Final TC94 Business Plan 20170504.docx

Date Approved: 16/03/2017

Page 9

In the process of developing these Standards for firefighter's PPE, SC14 has taken a head to foot approach in each of its specific working groups and in doing so ensured that protection for the head; face, eyes, hands, body and feet are considered as integral to the development of PPE Standards for firefighters.

More recent areas of concern to SC14 include incidents where there is a possibility of exposure to Chemical, Biological, Radiological and Nuclear (CBRN) hazards, this includes weapons as a result of first responders being targeted or inadvertently becoming exposed due to attending emergency incidents. In recent times the National Fire Protection Association NFPA have taken a proactive approach to this with developing PPE Standards that provide a level of protection from CBRN.

In the original TC 94 business plan CBRN was referenced as not being included in its scope of work and was therefore not addressed. At the recent TC 94 meeting in Lubeck Germany it was unanimously endorsed that protection from CBRN is now a real risk for emergency service workers such as firefighter's and therefore needs to be considered. As a result of this decision CBRN has been included in the scope of TC 94 and SC 14 have been tasked with considering the best course of action. It should be acknowledged that SC 15 has already listed CBRN as a possible hazard and as such it forms part of their risk matrix approach to the development of Standards for RPD and therefore SC 14 will continue to work with SC 15 as they are currently doing for the development of RPD Standards for firefighters.

#### *ISO/TC 94/SC15, Respiratory Protective Devices (RPD):*

For some industries their work places have air that is polluted by impurities. These impurities often have dangerous properties, which affect the health of humans. RPD offer a means of protection of the respiratory tract against these hazards. There are usually dangerous properties associated with these impurities, which will affect human health. RPD can in most circumstances offer adequate protection against these hazards. Their use and application is therefore often mandatory in some occupational sectors such as for industrial workers, miners, divers and firefighters. ISO/TC 94/SC15 has been highly active in the development of Standards for this area of PPE. SC15 and SC14 have also been working closely to develop Standards for RPD for firefighters.

SC15, as well as other SC's are influenced by various factors such as:

- Political and legal factors,  
The use of RPD is highly regulated worldwide. In many countries there are different regulations for standardization and use of RPD. These different Standards are barriers to worldwide trade and safety of users. The main purpose of the work of ISO/TC 94/ SC 15 shall therefore be the improvement of trade relations and the level of safety of the wearers.

The intention is to ensure a broad international involvement into the development of RPD and to build a framework for a harmonized testing and certification process.

- Social factors,  
The high level of safety of RPD is fundamental. The acceptance of PPE can be increased by ergonomic design and convenient physiological parameters. Herewith the hazards to health are reduced, the social aspects in state and society are optimized and high expenses for the personal protection can be justified. The work of ISO/TC 94/SC 15 can influence the costs in health care

positively. Basic is the awareness of the wearer, that health determines his/her social and economic disposition and that the use of RPD will help to protect his/her health.

- Technical factors,  
New technologies, such as electronics and increased legislations are essential and highly recognized.
- Economical factors,  
The increasing competition and difficult market for RPD induce manufacturers to produce in newly industrialized countries. But on this occasion new market opportunities are opened as the requirements on RPD in those countries are in general, lower than they are in the industrial developed countries and therefore investments have to be made and complementary devices have to be produced. A way to reduce expenses is a standardization of RPD worldwide. All involved parties are asked to join in the harmonization of requirements

#### *ISO/TC 94 Future requirements:*

Protection against laser, ultraviolet radiation, Infrared light, microwave, ionising rays became issues of concern when these technologies emerged and with new areas such as nanotechnology and biotechnology, personal protective equipment will be developed to provide protection for workers. Standards must be developed to ensure that products are suitable for use and provide manufacturers, suppliers and users with requirements to ensure safe and functional products are available.

Many national Standards bodies will adopt most Standards developed and maintained by ISO/TC 94 either directly or with some enhancements modification to allow for local requirements or environmental conditions.

Standards are vehicles of communication for producers and users. They establish a common language, which defines quality and establishes safety criteria. Costs are lower if procedures are standardized. Training is also simplified and consumers accept products more readily when they are judged on intrinsic merit.

## **9 Quantitative Indicators of the Business Environment**

The following list of quantitative indicators describes the business environment in order to provide adequate information to support actions of the ISO/TC, however, the indicators provided are only a snapshot and are not an exhaustive list:

#### *ISO/TC 94/SC3, Foot protection:*

The safety footwear market in Europe is well established and due to high safety Standards and strict legislation on the usage of safety footwear there is a relatively high per capita consumption (in France and the UK, this is rising). The market is growing steadily. The safety footwear market in Europe was previously protected from extra-EU imports, by legislation in each of the member states. In 1989, two European PPE directives were introduced, which standardized legislation within the European Union. The natural progression of the development of ISO Standards is the standardization of products, which will allow for open markets and free trade.

Figure 1: Estimated net flow of safety footwear around the world in 2000.

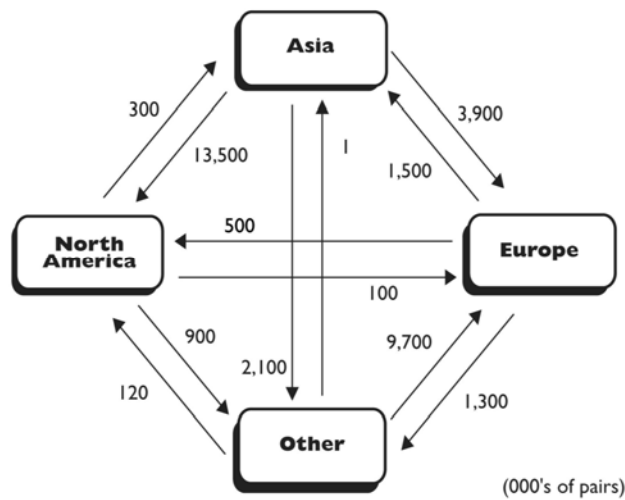


Figure 1 shows the estimated net flow of safety footwear around the world in 2000 and it is expected that these numbers have grown significantly in recent times. It is important to remember that imports and exports within the continents are not included.

The EN ISO 20344 to EN ISO 20347 range of Standards now covers most of the basic items of footwear. The revisions of the previous EN 344 to EN 347 series have provided the opportunity to remove many of the minor problems associated with barriers to trade. Many countries such as Australia have adopted Standards such as EN ISO 20344 to EN ISO 20347 range of Standards including EN15090 Firefighter's footwear; this will ensure that products can be sold on a number of world markets.

Debris and other materials found on site can prove hazardous to the health and safety of workers which makes the wearing of protective footwear imperative in industrial places to safeguard the feet of workers' against injuries. With the safety of workers emerging as a key priority in industrial operations, the industrial footwear market is expected to surge at a compound annual growth rate of 6 % from 2016 to 2020. The market stood at 6.3 billion US dollars in 2013 and is expected to reach 9.4 billion dollars by 2020.

Europe accounted for the largest share of the market in 2013 aided by the presence of numerous shoe manufacturers in Italy, France, Germany, Spain and the UK. The European Industrial Protective Footwear market is expected to reach 2.6 billion US dollars by 2020 owing to the increase in worker accidents.

Tightening industrial safety regulations in the Asia – Pacific region will aid the expansion of the industry in that area.

ISO/TC 94/SC 4, *Personal equipment for protection against falls*:

While many personal fall devices, are used in countries participating in the work of ISO/TC 94 SC 4 is very large, the number of enquiries the ISO subcommittee secretariat has received in recent months from developing countries who are neither P nor O members reflects the interest in fall protection world-wide.

*ISO/TC 94/SC 6, Eye and face protection:*

Eye and face protection products account for 3% of the European safety equipment market (CBI, 2009). In the four years up to 2007, the market was growing at an average rate of 3.9% per annum (BizAcumen, 2009).

Production of eye protection in Europe is concentrated in six member states: Germany, Italy, UK, France, Ireland and Spain (Eurostat). Exports of eye protection from Europe have grown at an average rate of 5% (CBI, 2009)

Sunglass sales have a significant global value. The worldwide sunglass sales were estimated to be USD 14.3 billion in 2015. The European market is estimated to account for 40% of this value (Global Market Insights Inc.). The USA sales value for sunglasses were estimated to be USD 4.13 billion in 2016, up by 3.3% from 2015 (Vision Watch – Vision Council)

Standardization in eye and face protection progressed in 2013 with the publication of four Standards: ISO 12312-1 *Sunglasses for general purpose*, ISO 12311 *Sunglasses - Test methods*, ISO 12609-1 *Intense light sources Pt 1 Specification*, ISO 12609-2 *Intense light sources Pt2 Guidance*. Since then, ISO 12312-2 *Filters for direct observation of the sun* was published in 2015. The general-purpose sunglass standard is of particular interest as there are currently several similar national Standards (for example ANSI and AS-NZ) which have some small but significant differences.

*ISO TC 94 SC 13, Protective Clothing:*

Based on the PPE Market estimates of 1992 of all PPE estimated between \$34 and 35 billion worldwide, protective clothing represents about 59.8% of the global market, of hand protection represents 41.1%. and protective apparel 18.7% based on a Frost and Sullivan analysis. Accident statistics show that more than 50% of all work accidents are to the hand, arm, leg and body area and necessitate absence from work (of at least 1 day). More than 40 % of work disabilities are caused by injuries to the hand, arm, leg and body area. The cost of such accidents across Europe amount to several billion euro.

Industries at European and international level, public authorities, institutes, laboratories, users' representatives and other non-governmental organizations such as trade unions are interested parties in the standardization process, since standardized specifications and test methods facilitate trade and help to reduce costs.

*ISO/TC 94/SC14, Firefighters' Personal Equipment:*

Figures in this area are difficult to estimate but it can be assumed that the cost of supplying firefighting PPE to professional firefighters and volunteers amounts to several billions of dollar around the world, far more

than the cost of any other PPE item alone. This is due to the level of protection required in this sector and the fact that firefighting PPE is viewed as an ensemble in that clothing, footwear, hand, head, eye/face protection and respiratory protection must all be included when looking at the cost of providing PPE to the firefighting sector.

As an example, firefighters in Australia are provided with several sets of PPE, for example they will be issued with 2, pairs of boots, 2 or 3 sets of protective clothing, gloves and flash hoods. Volunteers, which make up many hundreds of thousands in Australia, are also provided with 2 sets of protective clothing and gloves. The need to provide several items of PPE is due to the need to have 1 set of PPE that is ready and safe to use while another set is in being laundered.

ISO/TC 94/SC15 RPD:

RPD are sold and used worldwide. Major customers are fire services, industry and government.

The activities of the manufacturers and suppliers are driven by market needs, customer requirements, changing technology, product innovation, increased performance requirements and costs; all of which impact on market development. Political, social and environmental changes in individual markets also impact on market development.

As far as manufacturers of RPD are concerned, 40 % of the numbers of companies are multinationals and the other 60 % are small and medium companies (with a maximum of 100 employees). The multinational manufacturers produce about 70 % of the annual turnover of RPD.

In 1999 worldwide sales amounted to 4 billion dollars (US) with the major purchasers being fire services, mining, other industries and government. The market potential of RPD amounts to about 10 billion dollars (US) worldwide, with an estimated growth rate of 2% estimated to come from growing markets in Eastern Europe, far eastern and developing countries. As far as manufacturers of RPD are concerned, 60 % of them are multinationals and the other 40 % are small and medium companies (with a maximum of 100 employees). The multinational manufacturers produce about 90% of RPD.

The worldwide annual market volume in 2010 amounted to \$4 billion. The annual growth rate is mentioned to be 3 % from 2001 to 2010. The individual groups of RPD share the overall turnover equally: Filtering RPD quote at about 50 %.

The economic value of the ISO/TC 94/SC 15 Standards is of high importance for the using and manufacturing industry because of the risk minimising effects relating to wearers health and safety. A defect of a device can damage a wearer's health or even life. Consequently, high compensations for the manufacturer or the insurer can arise.

## 10 Benefits and Customers

**The Benefits of Standardization are:**

1. Ensuring the health and safety of users through the effectiveness of PPE by establishing Standards with minimum requirements as well as test methods on PPE for the various functions or duties they perform.

Title:

Filepath: S:\Standards Development\International\SA Secretariats\ISO-TC94\ISO TC 94 Business plan\Final TC94 Business Plan 20170504.docx

Date Approved: 16/03/2017

Page 14

2. Minimising obstacles to international trade.
3. Ensuring as far as practical the appropriateness of product function and performance.
4. Providing guidance on selection, care, use and maintenance of PPE used in different environments.
5. Ensuring as far as practical the safety of persons using PPE.
6. Providing a basis for testing and certification of products.
7. Developing ISO Standards for all the major types of PPE.
8. An opportunity to harmonise different performance requirements from around the world to develop one single performance Standard.

## **11 Participation and Representation**

### **4.1 Countries/ISO members' bodies that are P and O members of the ISO committee**

TC 94 currently has 32 P members and 27 O members.

### **4.2 Analysis of the participation**

There is participation from a cross section of developing and developed countries from all the major regions including Asia, Asia Pacific, the Middle East, Europe and North America to name a few.

### **4.3 Liaisons**

[http://www.iso.org/iso/home/Standards\\_development/list\\_of\\_iso\\_technical\\_committees/iso\\_technical\\_committee.htm?commid=50580](http://www.iso.org/iso/home/Standards_development/list_of_iso_technical_committees/iso_technical_committee.htm?commid=50580)

### **Liaison Committee to ISO/TC 94**

The below committees may see the documents of ISO/TC 94:

***ISO committees in liaison:***

ISO/TC 22, ISO/TC83/SC5, ISO/TC 142, ISO/TC 159/SC 3

***IEC committees in liaison:***

IEC/TC 78

### ***Liaison Committee from ISO/TC 94:***

ISO/TC 94 can access the documents of the below committees:

***ISO committees in liaison:***

ISO/TC 8/SC 1, ISO/TC 21, ISO/TC 22, ISO/TC 44, ISO/TC 120, ISO/TC 120/SC 2, ISO/TC 142, ISO/TC 159/SC 1, ISO/TC 159/SC 3, ISO/TC 178

***Organizations in liaison:***

CIE, EC, ETSA, EURATEX, ILO, IMO, WCO, WHO

## **12 Objectives and Implementation Strategy**

**Objectives of TC 94 are:**

- To move away from prescriptive-based requirements in Standards to a performance-based approach in accordance with the associated risk, in all areas of wearers personal safety.
- To prepare and maintain in a timely and cost effective manner ISO Standards and other ISO deliverables concerned with wearers applications, for which a need has been identified.
- To ensure all subcommittees work co-operatively to ensure compatibility of PPE.
- To consider relevant requirements, test methods or information resulting from experience with testing, certifying and use of PPE.
- To incorporate research results and consider new technologies.
- To review the scope of TC 94 to include PPE for protection against Chemical, Biological, Radiological and Nuclear. This covers a multitude of hazards and risks.

By seeking to fulfil these objectives and considering the benefits already gained from the development of Standards for PPE there will be better co-ordination between subcommittees, which will ensure that the health and safety of wearers is optimised. It will account for new and emerging technologies and areas of concern and will ensure that all those sectors affected by these Standards will be in a position to utilize and support their use via specifying in contracts or in the case of government legislation where these important Standards may be referenced.

***Identified strategies to achieve the ISO/TC's defined objectives***

ISO Standards prepared to achieve the objectives detailed in section 12 will include the following key aspects:

- Terminology
- Performance requirements
- Responsibilities of manufacturers and labelling
- Compatibility
- Test methods
- Selection, use, care and maintenance

ISO Standards will be developed based on the identified needs of wearers, and by the adoption either directly or with modification of Standards prepared by other national standardization organizations. In addition to these, Standards and technical reports will be prepared when the need is identified.

Performance Standards will cover all aspects of PPE intended to provide protection to the wearer for the relevant application.

To achieve these strategies the technical program of work is divided between SC's related to different types of PPE with those SC's forming Working Groups (WG) to deal with different areas of PPE. When necessary,

Title:

Filepath: S:\Standards Development\International\SA Secretariats\ISO-TC94\ISO TC 94 Business plan\Final TC94 Business Plan 20170504.docx

Date Approved: 16/03/2017

Page 16

the WG will further be divided into Project Groups (PG) to deal with specific tasks and or develop performance Standards for specific types of PPE.

Each of the SC's has chosen to break up its working program in different ways depending on the objective. For example most SC's have formed WG's to develop Standards for each type of PPE product e.g. sunglasses and sports protection. SC 14, Firefighters' personal protective equipment, have used a different approach because their objective is to produce ensemble Standards. This is directly related to the hazards that a firefighter faces during normal duties. For example if a firefighter is to fight a fire in a building then the firefighter will require appropriate protective clothing, footwear, gloves, eye protection, head protection and respiratory protection. The firefighter (and their employers) need to be confident that all this equipment will work well together and provide a high level of protection while undertaking their duties. Therefore SC14 have had to approach the structure of their working groups and the Standards they are developing from this perspective.

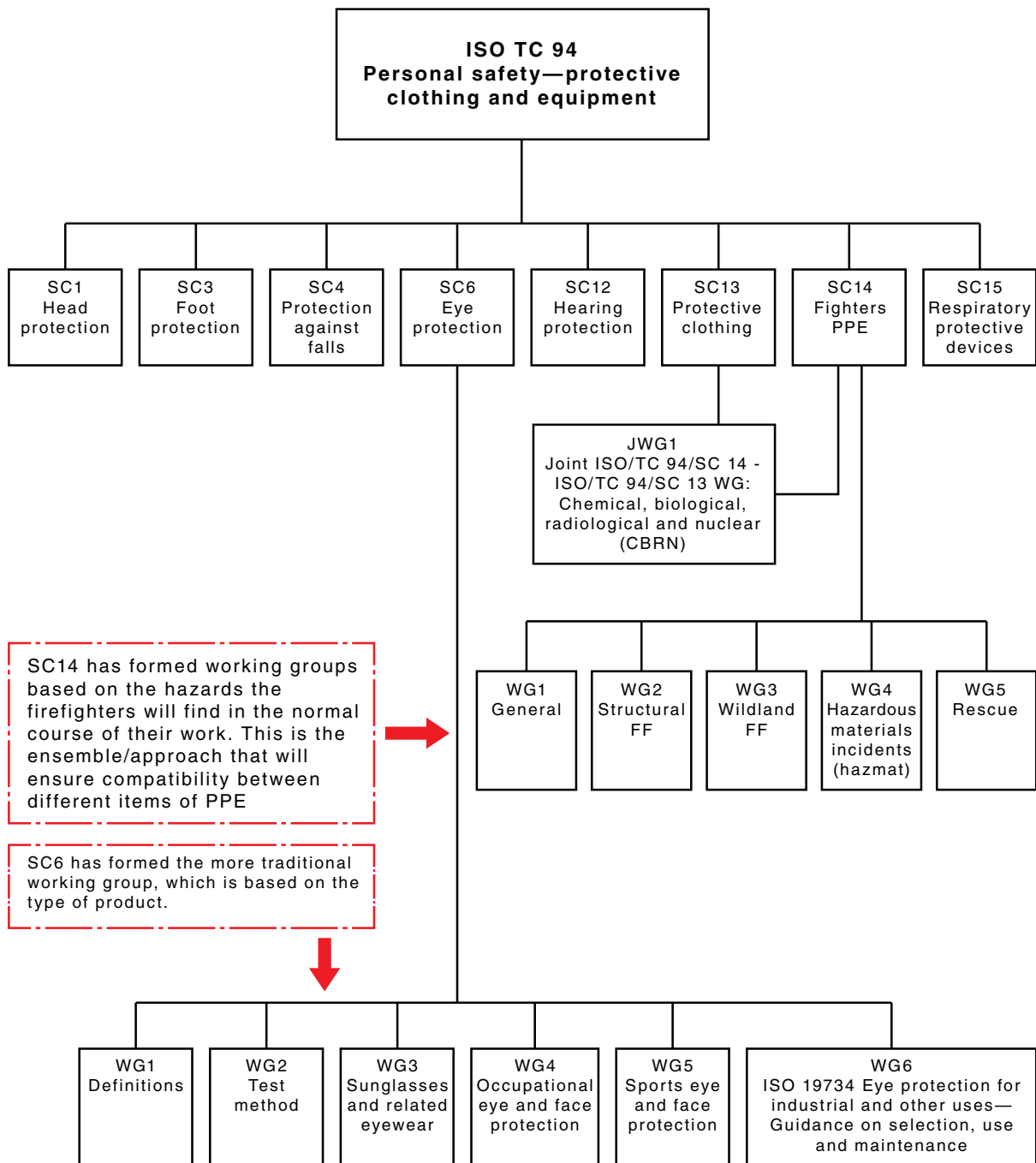


Figure 2: Structure of TC 94 with an example each of the different ways that an SC can form working groups and their technical program.

## 13 Factors affecting Completion and Implementation of ISO Work

### FACTORS AFFECTING COMPLETION AND IMPLEMENTATION OF THE ISO/TC WORK PROGRAMME

Title:

Filepath: S:\Standards Development\International\SA Secretariats\ISO-TC94\ISO TC 94 Business plan\Final TC94 Business Plan 20170504.docx

Date Approved: 16/03/2017

Page 18

This is a highly active technical committee with much interest from the global community. This interest can be directly related to the issues of providing protection for people. Legislations and laws around the globe have also ensured that there is a high level of interest and participation.

All SC's bar three are highly active, SC1 Head protection, has been inactive for over 10 years with its one and only standard being published in 1977. The secretariat and chairs positions are filled.\*

There has been an interest in revitalizing this work and when TC 94 next meets this will be discussed and a decision made.

It is important to note that in the case of SC14 it would like to harmonize its work with those of other committees, so that there is as much consistency as possible for those manufacturing and testing to these Standards. Head protection for this subcommittee is of vital interest but as there is no activity in SC1, SC14 have had to look elsewhere as well as developing their own Standards for this area.

\*Standards Australia took up the secretariat when the USA relinquished it. The then chair, had expressed interest in following this up but no action was taken.

SC4 is also currently inactive there is a secretary but no chair. A call for nominations for a Chairperson of SC4 was initiated from 06/07/2016 – 12/08/2016 however there were no nominations. TC 94 will have to make a decision about what is required at its next meeting.

SC12 is also currently inactive there is a secretary but no chair. A call for nominations for a Chairperson of SC12 was initiated from 06/07/2016 – 12/08/2016 however there were no nominations. Also, there has to date, been no published Standards developed by this Subcommittee. TC 94 will have to make a decision about what is required at its next meeting.

**Note: At its last meeting, SC12 resolved its work would be carried out by ISO/TC 43/SC 1 Noise. This is currently listed as a liaison.**

SC13 is very dependent on validation of test methods. Where there are inadequate or inefficient test methods and performance standards for any safety features needed by users, ISO/TC 94/SC 13 will bring together groups of experts to quantify the need, facilitate the development of test methods and encourage work to establish and improve performance standards. This can be dependent upon funding being available to undertake the necessary co-normative research. In addition the integration of relevant test methods for an improved consideration of ergonomic specifications in future revisions of the TC's standards requires the definition of substantive details concerning the ergonomic aspects of personal protective equipment.

Expert and end user participation in most SC's is of an appropriate level to ensure Standards that will meet the needs of the end user e.g. the person using PPE, the manufacturer, testing houses and certifying bodies. This is however, a concern with respect to SC 14 where there are a limited number of end users due to the cost of participating.

### ***Future challenges:***

At the same time there are no standardised methods available for other PPE related purposes, e.g. evaluating if PPE currently in use remains 'fit for purpose', for evaluating a combination of PPE items as a single ensemble or for estimating the total cost of ownership over the lifecycle of the PPE ("whole life cycle cost"). These are of particular importance to SC 14 and they have indicated a willingness to explore what can be done in this area.