

Footwear Guidance Document

A guide to selecting the
correct footwear for
occupational use

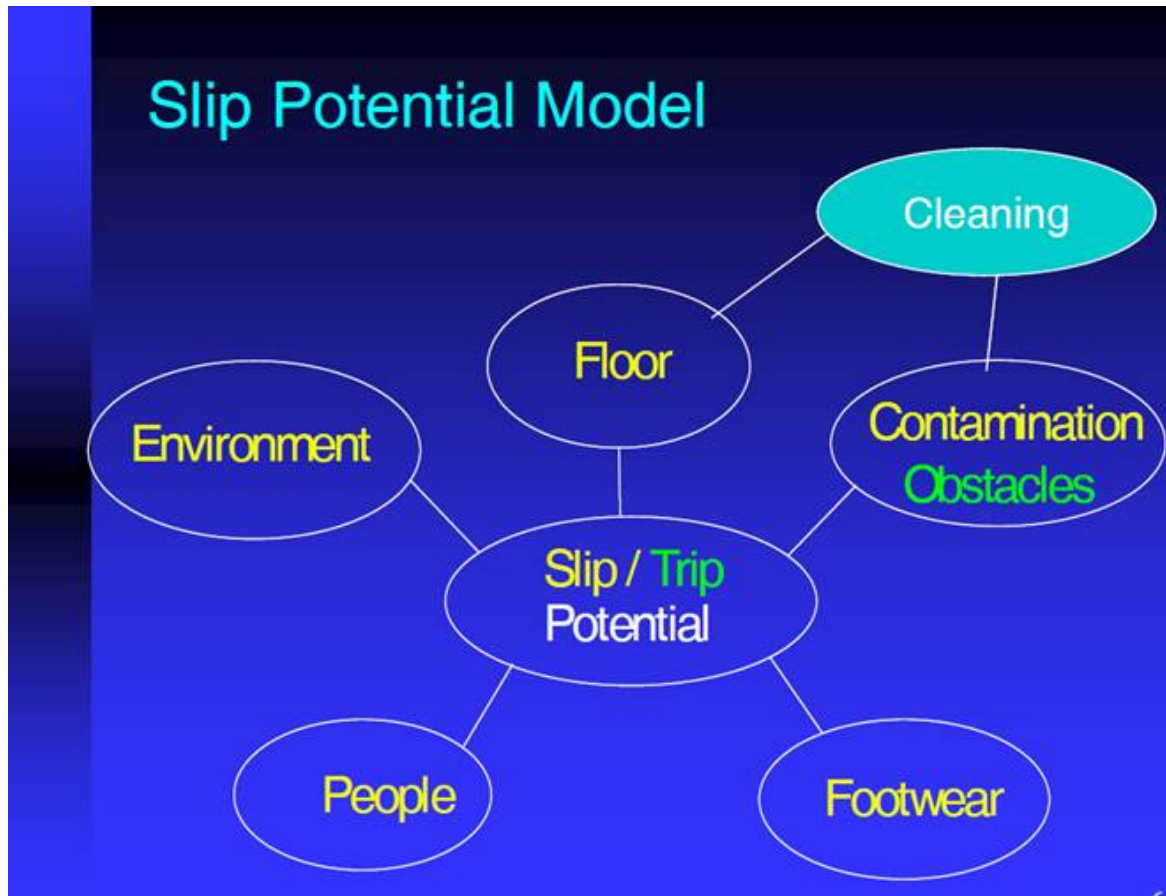
Background

- Safety footwear is generally used where a risk of foot injury has been identified. The emphasis has always been to protect the most vulnerable part of the foot, the toes, by incorporating a steel toecap into a boot. The design of safety footwear has come a long way since the original “Hob Nailed Boot” and a modern safety shoe now resembles a normal everyday shoe. In a similar vein, the typical foot injury has changed with less and less reported toe injuries or crushed feet and a much greater likelihood of a person slipping in the workplace. The emphasis has now shifted to identifying the most appropriate outsole to minimise this risk rather than just providing toe protection. This guide is aimed at all specifiers of occupational footwear, whether safety toe or not, to help them make the best choice of footwear for their workforce to minimise the risk of accidents. With the latest figures from HSE showing that Slips, Trips & Falls account for 29% of non-fatal accidents, the guide pays particular attention to the outsole and its interaction with the floor.

Risk Assessment

- It is a legal requirement to carry out a thorough risk assessment of every work place regularly.
- This will include an assessment of the **risk of slipping**.
- Considerations for a slip risk could include:-
 - Shoe Outsole material and tread design
 - Flooring Materials
 - Contaminants
 - Employee's role
 - Variables (different floor material across the site)
 - Cleaning Regime's
 - Specific foot hazards, Slips, chemical, physical etc.
 - Activities of the work force
 - Mobility of the work force

Slip Potential Model



- All provisions shall be made to eliminate the risks from the environment where possible.
- PPE shall be provided as a LAST RESORT

What is PPE?

- PPE means “Personal Protective Equipment”
- PPE is any device or clothing item worn or held to protect the wearer from injury
- PPE is covered in law by the European regulations (EU) 2016/425
- ANY ITEM MAKING A CLAIM OF PROTECTION IS COVERED BY THIS LAW.
- ANY protection – from the simplest abrasion to ionising radiation.
- Will have to be tested
- Will carry the CE mark

[For example - any product carrying a claim of “Slip resistant” (or similar claims anti slip, skid proof, Anti-skid, Slip proof etc) is Personal protective equipment and is subject to certification under this legislation.]

Key factors in PPE footwear selection

- If the risk assessment identifies a risk that has to be controlled by the issue of PPE footwear and that risk cannot be eliminated by any other means:
- PPE footwear must be provided FREE OF CHARGE to your workforce.
- The PPE footwear MUST carry a CE mark
- The PPE footwear MUST be tested according to one or more harmonized standards.

What footwear do I provide?

- Consider the risks that are identified by the risk assessment.
- Standards exist for the majority of footwear risks
- Examples include:
 - Mechanical protection -to the toes, penetration resistance, cut resistance
 - Chemical resistance
 - Electrical protection
 - Slip risk
 - Heat and cold
 - Chainsaw protection
- Further information on the PPE footwear standards given in this presentation will help you make an informed choice.

General PPE footwear categories

- PPE footwear will be tested and certified in accordance with one of three standards
 - EN ISO 20345:2011 – Safety footwear
 - EN ISO 20346:2014 – Protective footwear
 - EN ISO 20347:2012 – Occupational footwear
- These requirements use a common set of test methods EN ISO 20344:2011
- These requirements are tailored to the risks.
- All three standards include **slip resistance** as a mandatory protective feature.

EN ISO 20345:2011 –

Safety footwear

- Safety footwear includes a toe cap offering protection to the toes.
- Footwear carries at least the basic marking “SB”
- The toe cap offers 200J impact resistance and 15kN compression
- Footwear will be marked with one of the slip resistance classifications SRA, SRB or SRC
- This footwear may offer additional protective features to the wearer as identified in the marking

Safety footwear

Shortcut marking codes

PROPERTIES OFFERED	Classification I footwear			Classification II footwear	
	(upper from material other than all-rubber or all-polymeric)			(upper from all-rubber or all-polymeric material)	
THE MARKING	S1	S2	S3	S4	S5
Toe protection [200J, 15kN]	✓	✓	✓	✓	✓
Closed seat region (upper surrounds heel)	✓	✓	✓	✓	✓
Antistatic	✓	✓	✓	✓	✓
Energy absorption of seat region	✓	✓	✓	✓	✓
Fuel oil resistant outsole	✓	✓	✓	✓	✓
Water resistant upper (materials)	No	✓	✓	No	No
Penetration resistant outsole complex	Optional	No	✓	No	✓
Cleated outsole	Optional	Optional	✓	Optional	✓

EN ISO 20346:2014 –

Protective footwear

- Protective footwear includes a toe cap offering protection to the toes (at a lower level than safety footwear)
- Footwear carries at least the basic marking “PB”
- The toe cap offers 100J impact resistance and 10kN compression
- Footwear will be marked with one of the slip resistance classifications SRA, SRB or SRC
- This footwear may offer additional protective features to the wearer as identified in the marking

Protective footwear – Shortcut marking codes

PROPERTIES OFFERED	Classification I footwear			Classification II footwear	
	(upper from material other than all-rubber or all-polymeric)			(upper from all-rubber or all-polymeric material)	
THE MARKING	P1	P2	P3	P4	P5
Toe protection [100J, 10kN]	✓	✓	✓	✓	✓
Closed seat region (upper surrounds heel)	✓	✓	✓	✓	✓
Antistatic	✓	✓	✓	✓	✓
Energy absorption of seat region	✓	✓	✓	✓	✓
Fuel oil resistant outsole	✓	✓	✓	✓	✓
Water resistant upper (materials)	No	✓	✓	No	No
Penetration resistant outsole complex	Optional	No	✓	No	✓
Cleated outsole	Optional	Optional	✓	Optional	✓

EN ISO 20347:2012 -

Occupational footwear

- Occupational footwear has NO TOE PROTECTION
- Footwear will be marked with one of the slip resistance classifications SRA, SRB or SRC (This may be the ONLY protective feature)
- This footwear MUST offer at least one protective feature to the wearer as identified in the marking.

Occupational footwear – Shortcut marking codes

PROPERTIES OFFERED	Classification I footwear			Classification II footwear	
	(upper from material other than all-rubber or all-polymeric)			(upper from all-rubber or all-polymeric material)	
THE MARKING	O1	O2	O3	O4	O5
Toe protection	No	No	No	No	No
Closed seat region (upper surrounds heel)	✓	✓	✓	✓	✓
Antistatic	✓	✓	✓	✓	✓
Energy absorption of seat region	✓	✓	✓	✓	✓
Fuel oil resistant outsole	Option	Option	Option	Option	Option
Water resistant upper (materials)	No	✓	✓	No	No
Penetration resistant outsole complex	Option	No	✓	No	✓
Cleated outsole	Option	Option	✓	Option	✓

Common forms of accidents

- All workers wear footwear but less than 1% of occupational accidents involve toe or physical foot injuries whereas:-
- More than 29% of non-fatal occupational accidents are slip related (source HSE)
- Approx. 40% of fatal accidents at work involve a slip occurrence, that is 10 deaths p.a.
- **The majority of safety footwear can be bought with anti-slip properties**

I have identified a slip risk – What footwear do I provide?

- Consider the floor surface and contaminant.
- Consider all areas including outdoors
- Consider the slip resistance of the footwear and in particular the sole pattern & material
- Consider fit, comfort and styling (involve the work force in decisions)
- Run a wear trial.
- Enforce wearing the footwear.
- Consider the other protective properties, do you need any?

Why it is so difficult to make the right choice?

EN20345?

SRC?

CE?



Once the Risk assessment has been carried out the next step is to identify the best and most practical solution which means **choosing the right footwear for the job**

Slip testing for footwear certification

- Slip test method EN 13287:2012 is most commonly used to test the footwears slip resistance.
- This is a laboratory based test method designed to challenge the outsole under strict test parameters.
- The result is a measurement of Coefficient of friction (CoF), a comparison of the force resisting the movement and the downward force applied.
- One of the marking classifications SRA, SRB or SRC will be found on the footwear

Test Rig in action



Footwear slip markings

- Footwear marked SRA
 - Tested on ceramic tile wetted with dilute soap solution
 - Achieved a minimum CoF of 0.32 in flat testing mode
 - Achieved a minimum CoF of 0.28 in heel testing mode
- Footwear marked SRB
 - Tested on a steel surface with a glycerol solution
 - Achieved a minimum CoF of 0.18 in flat testing mode
 - Achieved a minimum CoF of 0.13 in heel testing mode
- Footwear marked SRC – Was tested under both conditions above

There is no implications that any one of these classifications is better than the other, they are representative of specific end uses.

HSL Grip Rating Scheme

(Health & Safety Laboratory)

- The UK HSL recently introduced an alternative slip test for footwear based on their existing ramp test method.
- This requires an operator to wear the actual footwear under test.
- The grip rating scheme results in a rating from 1-5 where 5 is the highest level of grip
- A grip rating of 1 to 3 indicates progressive performance on a ceramic tiled surface with running water.
- A grip rating of 4 or 5 indicates a progressive performance on tiles with 75% glycerol solution (having already achieved 3 rating with water)
- This is a private HSL initiative outside the requirements of EU CE marked PPE (Method = wearers on ramp)

Grip Rating Test Rig



Grip rating CoF requirement

		Result	Result	Grip Rating
Test Condition 1	Test Condition 2	Test Condition 1	Test Condition 2	
Water		>0.19	-	1 Star
Water		>0.27	-	2 Star
Water		>0.36	-	3 Star
Water	Glycerol 75%	>0.36	>0.19	4 Star
Water	Glycerol 75%	>0.36	>0.27	5 Star

Further information on slip resistance

- Further information on the slip resistance of the footwear can be obtained using a number of different test methods. These include:
 - The HSL Grip Scheme.
 - Additional testing of different surface and lubricant combination on the European test method EN 13287:2012.
 - Other methods are available.
 - Often the best way to gain additional information about a product is a WEAR TRIAL.

Importance of A wear Trial

- It will give you an idea if the footwear works on your site.
- Does it continue to work as the product wears
- Is it comfortable, stylish, does it fit well
- Does it actually reduce the slips
- Does it introduce additional problems – such as cross contamination
- What is the cost and what is the lifespan of the product

Outsole Design

Outsole designs vary significantly in terms of both tread pattern and the material used. It is crucial to choose the correct outsole for the workplace and many factors need to be considered such as:

- Indoor or outdoor use (or both)
- Manmade or off-road surfaces
- Predominant type of contaminant (e.g. water or oil)
- Risk of clogging (e.g. with food products, mud, stones)
- Will wear significantly alter the surface nature of the tread
- Risk of snagging with gratings etc
- End use specific requirements (e.g. Ladder climbing)
- Multiple end uses?
- Cross contamination?

Consider the analogy

A shoe works just like a car tyre



Wide tread is better suited to rough terrain where large pieces of contaminant such as soil, stones, mud or other large particles may be present. They usually provide better traction than closed treads which can become clogged up in such environments

The correct tread makes a big difference

Finer tread is more suited for smoother surfaces, specially if contaminated. Slips are often a result of aquaplaning where the outsole skids across the surface. Smaller cleated treads are usually better at preventing this as they force the contaminant away like a tyre in the rain.



Cleaning

- It is critical to keep the footwear treads clean and free from debris.
- This will maintain the optimum slip resistance
- Grip is only achieved when outsole is in contact with the floor



Clogging prevents grip

Shoes wear out



Tread worn smooth

Footwear should be regularly checked for signs of wear and tear and replaced appropriately if their performance is compromised. Footwear considered to be still **wearable** may not be still fit for purpose.

Further Car tyre tread analogy

- Regularly examine the footwear tread
- The Rear of the heel is the most critical part of the sole for slip performance
- Would you use a bald tyre?

There is a legal minimum depth requirement on a Tyre, footwear is discretionary!



Worn tread = poor grip

Size Matters

It is important to wear the correct size footwear, sloppy footwear will be uncomfortable and may even cause a slip!



Simple foot gauge



Size conversion chart

A large proportion of people do not know their true shoe size
An even bigger proportion do not know how to convert sizes
from UK to US and EUR

OFFICIAL SIZE CONVERSIONS

Men's

US	6	6.5	7	7.5	8	8.5	9	9.5	10	10.5	11	11.5	12	13	14	15	16
UK	5	5.5	6	6.5	7	7.5	8	8.5	9	9.5	10	10.5	11	12	13	14	15
EUR	38	38.5	39	40	41	41.5	42	42.5	43	43.5	44	45	46	47	48	50	51

Women's

US	3	4	5	5.5	6	6.5	7	7.5	8	8.5	9	9.5	10	10.5	11
UK	1	2	3	3.5	4	4.5	5	5.5	6	6.5	7	7.5	8	8.5	9
EUR	34	35	36	36.5	37	37.5	38	38.5	39	40	41	41.5	42	42.5	43

Slip resistance in Snow and Ice

- Specialist products are available offering high degrees of slip resistance in snow and ice.
- These will often incorporate grit, Ceramics or spikes.
- Products of this type can be tested by a number of methods including:-
<http://www.ratemytreads.com>

Specialist PPE footwear standards

- Standards exist separately for certain specialist properties
- Most rely heavily on the safety footwear standard EN ISO 20345:2011 and methods EN ISO 20344:2011
- These include:
 - EN15090 Firefighter footwear
 - EN ISO 20349-1 footwear for use in foundries
 - EN ISO 20349-2 Footwear for welding
 - EN 13832-1, 2 & 3 Footwear offering resistance to chemicals
 - EN 50321 Footwear protecting against electrical hazards for live working
 - EN 13634 footwear for Motorcycles
 - EN ISO 17249 For users of hand held chainsaws