APPENDIX 1— FEET

Example of environment/hazard	Example of recommended footwear property
Rough terrain fieldwork, construction sites	Ankle support
Wet environments fieldwork, construction sites, plant rooms, wet labs, grounds,	Water/penetration resistance
Penetration of foot sole construction sites, workshops, plant rooms	Steel or composite sole plate
Heavy or sharp objects dropped metal stores, routine manual handling heavy apparatus or materials, workshops, laboratories, plant rooms	Steel or composite toecap, cut resistant uppers
Molten metal welding	Insulating fire-resistant construction
Hot oil kitchens	Insulating heat-resistant construction
Aggressive chemicals laboratories, workshops, plant rooms	Chemical resistance
Cold environments cold stores, working out-	Thermal insulation
Cryogens laboratories, manual handling	Thermal insulation
Slip hazards kitchens, workshops, wet laboratories	Slip resistant soles
Fire or explosion Fire/flammable rated zones	Anti-static
High voltages	Electrical conductive, construction/ demolition areas
Oily environments kitchens, workshops, plant rooms	Oil resistant

GENERAL REQUIREMENTS FOR FOOTWEAR

1. Footwear is notoriously difficult to fit, and discomfort and unfashionable styling can be a barrier to compliance, so the potential wearer must be included in the selection process, with as wide a range of choice as possible and the option to return shoes to the supplier for a different size and style. Once the specification of the footwear has been determined, the wearer should also be offered the option of purchasing their own and reclaiming the cost from the College.
2. The soles of safety footwear usually have excellent slip resistance, and there are additional features, if required such as heat resistance, antistatic or oil resistant. Safety footwear is available in an enormous range of styles, including boots, trainers and court shoes.
3. Shoes which totally enclose the feet are required for all those who work within, or visit a laboratory, workshop, catering, construction or plant area.
4. In addition, any local requirements for specific footwear (ie safety shoes or safety boots), must be met.
5. Specification for such a wide range of hazards and hazardous environments is complicated, particularly because different combinations and gradations of protection will be required.

INFOBOX 3

Footwear in workshops and for routine manual handling
Steel toe caps are offer protection to 100 Joules or 200 Joules. The latter is equivalent to protection against a 20 kg weight being dropped from a height of 1 metre and is the basic footwear for any workshop activity or equivalent.

200 Joules protection, BS EN ISO 20345:2011 (supersedes BS EN 345).
Additional properties (such as cut resistance, sole plate, slip resistance etc may be required depending on the risk assessment.

FOOTWEAR WITH ELECTRICAL PROPERTIES

Wearing footwear with electrical properties (eg those with codes C, A or I), cannot guarantee

100% protection from electric shock, and other risk reduction measures **must** be in place, as failure in use could be fatal. In addition, wearing such footwear, whether conductive, anti-static or electrically insulating, can give a false sense of security, as there are a number of conditions which significantly reduce their effectiveness:

- Flexing in use.
- Damage (wear and tear).
- Contamination (from chemicals and organic matter).
- Moisture from wet or damp environments, sweat etc.
- Wearing of insoles (or anything apart from a normal sock).
- Properties of the flooring itself.

Therefore wearers **must**, in addition to all other responsibilities for PPE, inspect shoes regularly for damage and contamination, and make regular in-house checks that the electrical properties are still effective.

CATERING AREAS AND OTHER HIGH RISK SLIP ENVIRONMENTS

Areas which may be wet or oily are likely to also have easy to clean floors, for example kitchens, "Wet" laboratories, and some workshops. This combination present a higher than usual risk of slipping, and a high risk of injury where there are hot liquids. If there are no reasonable alternatives such as a slip-proof flooring, or if this is installed but the floors are still slippery, then shoes with specific slip-resistant properties must be selected. Whilst ordinary SB, PB or OB (safety, professional or occupational basic) footwear gives excellent anti-slip protection, this is unlikely to be sufficient under such circumstances.

Slip resistance properties	
Ceramic tile with sodium lauryl sulphate	SRA
Steel with glycerol	SRB
Ceramic tile with sodium lauryl sulphate & steel with glycerol	SRC

CHEMICALLY RESISTANT FOOTWEAR

At the College it is unlikely in normal use that special chemically resistant footwear would be needed, and if it was deemed as necessary as part of an emergency procedure, then the Safety Department must be contacted for its inputs.

The minimum standard for those who may be exposed to significant volumes of aggressive chemicals is **BS EN 13832-2:2006**, footwear resistant to chemicals under laboratory conditions; this would be in addition to meeting BS EN 20345. Specific chemical resistance is available, eg: Sodium hydroxide solution (K), Ammonia solution (O), Hydrogen peroxide (P).

Example 4—specification for construction site footwear

A member of a construction team, Project Manager, Safety Officer etc routinely entering a construction site to work or check or inspect, might encounter the following hazards and require the following footwear properties: uneven and moderately slippery floors; sharps that might penetrate the foot, falling objects, water, oil.

The shoe specification might be "EN 20345 SB/SBP/S1P/S1/S2/S3"

- Must meet BS EN ISO 20345; and
- SB = Basic "Safety" shoe/boot with steel toecap to withstand 200 joules.
- SBP = also has steel midsole plate to withstand penetration from beneath.
- S1/ S2/ S3 = water penetration and water absorption resistance, sole penetration resistance, cleated outsole.
- In addition to any local rules for footwear specification (and other PPE), which must be followed by visitors to the site.

TABLE TWO - FOOTWEAR SELECTION

Type of Protection	Code
Safety Footwear—prefix "**S**" (examples below) **BS EN ISO 20345:2011**	
Steel Toecap - "Safety Basic" Impact 200 joules including compression 15,000 newtons	SB
200 joule toecap protection. Closed seat region (fully enclosed heel). Antistatic properties. Energy absorption of seat region.	S1
As S1 plus water penetration and water absorption resistance.	S2
As S1 and S2 + Sole penetration resistance and cleated outsole.	S3
Additional protections	
Heat Resistant Outsole - to hot contact up to 300 °C	HRO
Penetration resistance offered by a steel midsole: 1100 newtons	P
Heel energy absorption: 20 joules	E
Water penetration-resistant uppers	WRU
Ankle protection	AN
Metatarsal protection	M
Electrical resistance	
Conductive: Maximum resistance 100 kΩ	C
Antistatic: Range of 100 kΩ to 1000 MΩ	A
Insulating	I
Hostile environments—Note: the use of ordinary steel toecap footwear in extremes of temperature is inadvisable, unless additional cold or hot insulation (CI or HI) is specified.	
Insulation against cold	CI
Insulation against heat	HI
Cut resistance	CR
Water resistance	WR
Protective Footwear—prefix "**P**" (similar to **Safety** Footwear above except toecap has less impact resistance; all other additional protections are available. Examples below are just to show the use of the Prefix. **BS EN ISO 20346:2004**	
Steel toecap - "Protective Basic" Impact 100 joules	PB
100 joule toecap protection. Closed seat region (fully enclosed heel). Antistatic properties. Energy absorption of seat region.	P1
Occupational Footwear—prefix "**O**" (similar to **Safety** and **Protective** Footwear except **NO** toecap; all other additional protections are available. Examples below are just to show the use of the Prefix. **BS EN ISO 20347:2012**	
"Occupational Basic" – NO steel toecap	OB
as OB plus oil resistant sole, closed and energy absorbing seat region, and antistatic.	O1
as OB and O1 plus water penetration and absorption	O2
as OB, O1, and O2 plus penetration resistance and cleated sole	O3
Foundry and welding boots - **BS EN ISO 20349:2010**	
Foundry boots – resistant to effects of molten metal (iron at 1.400 °C)	Fe
Foundry boots – resistant to effects of molten metal (aluminium)	Al
Welding Boots - resistant to effects of splashes of molten metal	WG
Chainsaw boots and footwear **BS EN ISO 17249:2004**	
Class of protection – 0, 1, 2, 3	