



Handle with care

Hazardous materials have the potential to cause serious ill-health, and present a risk to workers in any construction project. Know how to recognise them, and how to deal with them.

Every construction project involves the transporting, bringing-together and placing of materials. When those materials are hazardous, they can cause serious health problems for those who come into contact with them.

Although it is a contractor's duty to deal with hazardous materials on site, designers have a significant role to play in helping to identify and manage them – or, even better, eliminating them altogether.

All too often, construction workers do not recognise the hazards posed to them by particular materials or construction methods. As a designer, you can provide protection by removing these materials or practices from your design specification, or limiting the risks associated with them. Where risks remain, you can raise awareness of them by liaising with the Principal Designer and Principal Contractor.

Life outside the tick box.



The risks

Hazardous materials have the potential to cause serious ill-health to those who come into contact with them. Their effects can be cumulative (chronic) or immediate (acute).

Some materials, such as asbestos, are hazardous in their natural form. Others only become hazardous as a result of work carried out to them during the construction process, such as dust from concrete-cutting.

Hazardous materials have the potential to cause harm in a number of different ways. Some are poisonous, and others asphyxiating. Some materials are pathogens or irritants, while others are explosive.

Sources of hazardous materials

It is important for designers to identify all potential sources of hazardous material. Some contaminants may already exist on the site, while others may emerge during the construction process.

Pre-existing hazards

Designers should consider whether the previous use of a site presents any contamination risks – for example from wastes, oils, chemicals, asbestos or process by-products. Particular care should be taken where a site was previously used as a commercial or community waste tip.

The nature of a site may give rise to biological hazards such as leptosporidium, HIV, hepatitis and animal droppings.

Existing building components may also present a risk. Although the use of materials such as asbestos and lead-based paint is now strictly controlled, these may have been acceptable at the time of specification. So, there is a chance that they will be present in building components.

Hazards arising from the construction process

Some work processes may transform inert materials into a hazardous form. Examples of this include the cutting of concrete, and hot work on materials that are likely to produce fumes.

Contractors may also be exposed to hazardous materials specified by the designer, where it has not been possible to eliminate these altogether.

Chemicals used or encountered during the construction process pose another risk of harm. These may arise from:

- **Concrete work: cement, accelerators, retarders, air entraining agents, plasticisers, curing membranes, formwork release agents, joint sealants and resin admixtures**
- **Masonry work: cleaners, joint sealants and cavity insulation**
- **Steelwork: paints, primers, undercoats, rustproofers and grouts**
- **Timber work: preservatives, flame retarders**
- **Floor and wall tiling: adhesives**
- **Site clearance: weed killers**



Such chemicals may be:

- **Explosive**
- **Flammable**
- **Toxic**
- **Corrosive**
- **Irritant**
- **Agents for respiratory or skin conditions**

Excavation work can also lead to contact with harmful materials. Further guidance on this is given in GND201 **Excavations**.

Controlling hazards by design

At the detailed design stage, designers should assess which hazards are present or likely to be created during the construction process, and how these might place construction workers at risk.

If possible, any potentially hazardous materials should be eliminated. Where this is not possible, you should take steps to reduce their harmful effects. **Tables 1a** and **1b** provide suggestions on how to do so, while **Tables 2a** and **2b** give some worked examples.

In addition to assessing the materials themselves, designers should ensure that any processes they specify do not have the potential to cause harm. For example, the use of flammable materials close to hot work should be avoided.

In some circumstances, it may be possible to discuss the design and its assumed construction method with the contractor. This will help you identify the contractor's preferred materials and construction methods. Otherwise, you should determine for yourself how you envisage the works being constructed.

Taking care with chemicals

If you specify chemicals within a design, familiarise yourself with their risks by consulting the manufacturers' material data sheets. Advise the contractor of these risks, and take steps to reduce them where possible. For example:

- **Explosive chemicals:** avoid use near ignition sources, for example electrostatic sources or open flames
- **Flammable chemicals:** where possible, specify materials with flashpoints of less than 55°C. Avoid specifying use near ignition sources and hot work
- **Toxic chemicals:** check how easily they vaporise, and do not specify application by spraying
- **Corrosive chemicals:** avoid application by spraying, or use in situations where they are likely to drip



Design hazard-control measures

Table 1a: Pre-existing hazards

Possible sources	Control measures to apply
Contaminants arising from the previous use of the site – for example oil, chemicals and process by-products	<ul style="list-style-type: none"> Identify any hazardous materials on the site, for example by carrying out an early desk study or site investigation (SI). See Table 1 in DEM601 Demolition, dismantling and decommissioning for possible sources of existing information If possible, design around the hazard Inform the contractor about the hazard
Hazardous materials that were acceptable at the time of specification – for example asbestos and lead paint	
Biological hazards present due to the nature of the site – for example leptosporidium, HIV, hepatitis and animal droppings	

Table 1b: Hazards arising from the construction process

Possible sources	Control measures to apply
Work processes that may transform inert materials into a hazardous form – for example the cutting of hard concrete, or hot work on materials that are likely to produce fumes	<ul style="list-style-type: none"> Specify construction details that reduce the exposure of workers to hazardous substances during construction, maintenance and demolition. For example: <ul style="list-style-type: none"> Specify materials that are less hazardous Try to design for construction techniques that eliminate or control exposure to the hazardous materials Do not specify processes that generate hazardous by-products
Materials specified by the designer for use in the project	

Examples of hazard-control measures

Table 2a: Pre-existing hazards

Operation	Health Risk	Possible control measures
Developing contaminated land	Biological hazards and toxic material	<ul style="list-style-type: none"> Where possible, eliminate excavations or other dusty operations Design services in sealed trenches, to avoid future contact Specify driven or displacement piles to reduce spoil Treat land to reduce exposure (remove, or treat in situ)
Restoration/refurbishment	Asbestos	<ul style="list-style-type: none"> Leave untouched, or design to minimise exposure Inform contractor of its exact location (see SIT105 Asbestos survey and management)
	Other – for example lead paint or arsenic	Leave untouched, or inform contractor of the hazard and its location

Life outside the tick box.



Table 2b: Hazards arising from the construction process

Operation	Health Risk	Possible control measures
Cutting and chasing for services	Dust	Design to eliminate the need to cut and chase – for example, by using surface-mounted or cast-in ducting
Scabbling	Vibration, noise and dust	Specify other means of joint formation, for example retarder and washing
Painting	Toxins and solvents	<ul style="list-style-type: none"> • Specify water-based or solvent-free paints • Do not specify use in confined spaces
Grouts/sealants/epoxy	Toxins and irritants	Specify alternative materials

Sharing information about residual risks

A designer should not leave it to a contractor to control all risks on site.

Where your design creates risks, it is essential that you convey information about these to the contractor, to enable them to be managed effectively. Normally, this information will appear on drawings, in the pre-construction information, in the construction phase plan and in the health and safety file.

If you specify hazardous substances, it is helpful to include the COSHH data sheet in the pre-construction information.

Useful resources

HSG 150 Health and Safety in construction 2006
 L143 Control of Asbestos Regulations 2012. Approved code of Practice and guidance
 INDG 315 - Stone Dust and You (HSE)
 HSG 97 - A Step by Step Guide to COSHH Assessment
 CIRIA 670 Site health handbook
 EH40 (include MELS/OELS)

See elsewhere on SID:

SIT105 Asbestos survey and management
SIT106 Lead-based paint survey and management
GND201 Excavations
DEM601 Demolition, dismantling and decommissioning