Designing for health - Guidance for designers

Buildings				Ref No. DfH006_18
Potential health impacts to be considered by the designer:		Concept Stage ☐	Scheme Design Stage ☐	Detailed design Stage ☐
Design Element	Health Hazard	Considerations	Possible Solutions	Linked to Ref No.
Footprint Issues		Various	Position of building may affect access to site, earthworks, access for maintenance and deliveries. Consider hoist locations. Consider sequencing and aperture sizes in floors, walls, roof for installation/replacement of plant etc.	
Build Sequence for access	-	-	Design to allow contractor early use option of permanent stairs	
Access for maintenance	WRULD	Working position occasioned by having to work in basements, service and ceiling voids, service risers, toilet	Consider the likely space available in respect of task to be performed	

		services, undercrofts	Design out by re-sequencing or re-positioning See CIRIA 'Safe access for maintenance and repair' C686 p36 for guidance on space required for typical postures	
Installation or removal of large or awkward items	Weight, shape and manoeuvrability of components Crushing	Handling heavy and/ or awkward shapes exposes workers to poor posture for prolonged periods, such as the need to manually handle items of plant, doors, furniture, dry lining sheets, leading to musculoskeletal injury	Consider the erection sequence in relation to delivery and installation of significant items. Alert tenderers and give suggested methodology Complete design of finishings and fitments to allow early delivery Some items will also need to be replaced during the lifetime of the facility e.g. plant, glass panels	
Piling	-	-	-	DfH004_17 DfH005_18
Foundations		Reinforcement operations	Refer to Design for Health guidance sheets relating to: Concrete & Mortars	DfH004_17
		Excavation work	Refer to Design for Health guidance sheets relating to:	DfH003_18

			Groundworks.	
Internal drainage	-	-	-	DfH011_18
Frame			Refer to Design for Health guidance sheets relating to: Concrete & Mortars; and Steelwork	DfH004_17 DfH005_18
Envelope	Hypothermia, rheumatic complaints	Exposure to low temperatures, wind chill when working on exposed parts of structures, e.g.: roofs, high-level floors	Design external envelope such that early weatherproofing is possible Allow for maximum prefabrication opportunities	
	Skin complaints, inhalation of volatiles	Contact with substances harmful to health, e.g., sealants and other materials when applying surface treatments, Installing services	Generally low risk but obtain details from manufacturers at design stage. Avoid those with significant hazards or allow adequate choice in specification Alert tenderers to any significant residual hazards	
	Weight, shape and manoeuvrability of components	Manually handling heavy and/ or awkward components exposes workers to poor posture for prolonged periods can lead to musculoskeletal injury.	Consider size of components in this regard - consider avoiding by increasing in size, and planning for mechanical aids. Alert tenderers to final assumptions regarding weight, centroid, and erection sequence Remember to consider work activities associated with planned replacement	
Timber	Inhalation of dust	Cutting structural framing, stud wall	Many timbers are used regularly without apparent ill effect, but this	

	(COPD), NIHL	work, fitments (e.g. using MDF)	depends upon the species involved, the concentration and extent of exposure, and the levels of toxic agent within the timber, as well as the sensitivity of the user to the wood Designers need to consult with published guidance, suppliers and contractors. All wood dusts have workplace exposure limits (WELs), which must not be exceeded and where possible reduced as far as possible. Determine the likely types of wood present and whether it needs to be cut or sanded. And if so can it be done in locations where exposure can be reduced to below WELs. See HSE Guidance; Wood Dust: What You Need to Know.	
	Skin contact, inhalation	Applying preservatives fire and retarders	See HSE guidance on biocidal products directive. Pre-treatments generally create no significant residual risk, however site applications involving risk of inhalation	

			and skin contact should be avoided where possible. Some modern products exhibit lower exposure risk. Options can be discussed with manufacturers. Brush application further reduces the chances of exposure.	
		Applying Paint Systems	See Decorative or Protective Painting below	
	Weight, shape and manoeuvrability of components	Manually handling heavy and/ or awkward components exposes workers to poor posture for prolonged periods can lead to musculoskeletal injury.	Consider pre-assembly of components	
Floors	Weight, shape and manoeuvrability of reinforcement.	Handling heavy and/ or awkward shapes exposes workers to poor posture for prolonged periods, such as when manually handling reinforcement during placing and fixing, leading to musculoskeletal injury.	Consider alternatives requiring less reinforcement (integral decking or fibre reinforcement). Review options with industry specialists. Maximise amount of permanent formwork used in works, and Avoid unnecessary changes in level of	DfH004_17

			floors as this prevents ease of access, particularly for wheeled vehicles etc.	
		Concrete placement	-	DfH004_17
		Permanent formwork positioning	Consider likely access for these components to avoid need for excessive manual handling. e.g. temporary omission of adjacent steelwork	
		Repetitive or awkward working actions laying finishes and tiling. Fixing services: plumbing, electrics, etc. Laying timber floors	Allow for power float. Floors without obstructions e.g. service pipe penetrations will allow maximum use of mechanised float finish	
	Prepatellar bursitis, commonly known as: Knee bursitis: or Housemaids' Knee	Working on knees: l Laying finishes and tiling. Fixing services: plumbing, electrics, etc. Laying timber floors	Consider self-levelling compounds Consider the type of work, the space, the stance necessary to undertake it. Consider options that do not generate issues under these heads. Talk to specialists to obtain advice on mechanisation, alternative materials Some short-term risks may need to be balanced against longer term benefits e.g. life to first maintenance	
	Inhalation, skin irritants	Use of adhesives for laying of timber floors	Review market options to avoid harmful compounds e.g. use of water based compounds rather than those	

			based on volatile solvents. Balance risks as noted above	
		Use of Sealants for laying of timber floors	Generally low risk but assess options against manufacturer's data	
Masonry	Weight, shape and manoeuvrability of blocks.	Handling heavy and/ or awkward shapes exposes workers to poor posture for prolonged periods, such as with delivery to, and positioning of, blocks to the workface, leading to musculoskeletal injury	Have careful regard to block weight selection, allowing for wetting Avoid need for heavy blocks e.g. use wind-posts on external walls If large blocks are required alert contractors to their location and weights and explain the reason	
			Consider alternatives such as lightweight construction, framing to achieve structural actions required, dry lining or other blockwork innovations	
		Lintels	Maximise use of proprietary metal lintels	
		Padstones	Consider heavy duty blockwork or pc unit in lieu of in-situ concrete. One lift may be better than several tasks associated with in-situ construction	
	Irritants, inhalation	Exposure to harmful chemicals in mortars and additives to mortars, specifically if likely to be site batched	-	DfH004_17

	HAVs, NIHL, Dust	Using high-powered hand-held tools for cutting	Where possible design to minimise need for cutting	
		Using high-powered hand-held tools for chasing	Avoid need to chase into walls by considering alternative construction, use of conduits, external mounting Alert tenderers if chasing cannot be avoided	
	NIHL	Using high-powered hand-held tools for installation of shot fired ties	Specify alternative systems	
Stud wall construction	Weight, shape and manoeuvrability of panels and elements.	Handling heavy and/ or awkward shapes exposes workers to poor posture for prolonged periods, such as when lifting panels or elements, leading to musculoskeletal injury	Design for mechanical handling. Consider door and other access dimensions. Design panels to break down into smaller units (particularly useful for future removal) Word specification to allow use of half sheets of plasterboard Schedule weights on drawings to assist at tender stage Specify and detail elements early to allow for early component delivery on site thus enabling lifting by crane into close proximity of final location	

	HAVs, Dust, NIHL	Using high-powered hand-held tools for cutting of components, drilling for fixings, holes etc.	Consider specification to allow maximum use of half panels Design-in fixings to allow for off-site drilling	
	Dermatitis, inhalation problems	Exposure to solvents when using adhesives for jointing of components	Ascertain if anticipated type of adhesive is harmful. If so look for alternative methods of jointing or prefabricate to avoid need for site use of adhesives. Consider materials that avoid volatile solvents	
	Irritant	Exposure to fibres from synthetic (mineral fibre) insulation	Not considered hazardous other than as an irritant	
Decorative or protective painting	HAVs, Dust, NIHL	Using high-powered hand-held tools to prepare surfaces	Ensure specification does not over-specify surface treatment (although this needs to be balanced against reduced maintenance cycle) maximise opportunity for factory surface preparation	
	Dermatitis, inhalation problems	Exposure to solvents in the application of paint and thinners, particularly in enclosed spaces	Ensure specification allows adoption of less harmful formulation particularly reduction of isocyanates Use material safety data sheets and supplier advice. Consider hazards associated with future removal. Word specification to allow brush application and maximum application off-site	DfH005_18

M&E services and drainage	-	-	-	DfH011_18
Fittings	Weight, shape and manoeuvrability	Handling heavy and/ or awkward shapes exposes workers to poor posture for prolonged periods, such as when manoeuvring large or unwieldy objects such as plant, doors, control boxes, wall panels, leading to musculoskeletal injury.	Design for mechanical handling Consider door and other access dimensions Design fittings to break down into smaller units (particularly useful for future removal) Schedule weights on drawings to assist at tender stage	
	WRULD	Work in limited space e.g. ceiling voids, behind toilet assemblies, service risers, tanks in lofts	Consider the likely space available in respect of task to be performed and design out by re-sequencing or re-positioning	
	HAVs, NIHL	Using high-powered hand-held tools for drilling for fixings etc.	Design-in fixings to allow for off-site drilling. Use cast-in fixing products in lieu of need for drilling	
	WRULD	Repetitive hand fixing activity	Design-in fixings to maximise opportunity for off-site fixing, or multiple attachment	
	Dermatitis, toxicity	Exposure to chemicals in the use of adhesives or sealants	Ascertain if anticipated type of adhesive or sealant is harmful. If so look for alternative methods of jointing/sealing and prefabricate to	

			avoid need for site use of these materials	
Roofing	Weight, shape and manoeuvrability	Handling heavy and/ or awkward shapes exposes workers to poor posture for prolonged periods, such as when handling large roofing sheets. Installing trusses & trussed rafters, leading to musculoskeletal injury.	Ascertain likely size; consider smaller options if available. Any extra cost may be off-set by ability to work in wider range of conditions	
	Burns, toxicity, carcinogenic	Burning and welding/brazing lead as flashings etc.	Consider alternatives. If hazardous material exists alert tenderers (lead and asphalt are well known, but need to be identified during tender process)	
		Use of asphalt as weatherproofing on flat surfaces and around plinths		
	Irritants, inhalation	Exposure to solvents in the use of roof sealants		
	Irritant	Exposure to fibres from synthetic (mineral fibre) Insulation		
		Timber, and associated preservatives and paint systems	See 'Timber' above	DfH010_18
		General	Consider all aspects identified above and review overall choice of roofing in that light from options available	
Confined Spaces	Asphyxiation (Oxygen deficiency), Heat exhaustion, Poisoning	Toxic fumes, excessive heat in basements, plant spaces, service voids, roofs, undercrofts	Work activities that may be low risk in normal circumstances may become hazardous in confined spaces	

Hard landscape surrounds	Weight, shape and manoeuvrability of paving slabs etc.	Handling heavy and/ or awkward shapes exposes workers to poor posture for prolonged periods, such as when handling, lifting and/ or laying of paving slabs etc., leading to musculoskeletal injury.	Specialist contractors will be able to advise on options for specific design situations. Generally, however, simple continuous areas are best Issues raised in respect of 'Masonry' apply See ICE advice on Designing for Health – Paving Slabs.	DfH004_17
	HAVs, Dust, NIHL	Using high-powered hand-held tools for cutting & chasing	Endeavour to design details in order to minimise quantity of activities such as, cutting and chasing. Wet cutting is generally better than dry	
Information to go to contractor:				
Information to go to H&S File: Use ☐ Maintenance ☐ Demolition ☐				
Further Information:				

Confined spaces guidance (HSE) - http://www.hse.gov.uk/confinedspace/

Creosote and Biocidal Products Directive (HSE Guidance) - http://www.hse.gov.uk/biocides/copr/creosote.htm

What are Lower Limb Disorders (HSE Guidance) - http://www.hse.gov.uk/msd/lld/what-are.htm

Wood Dust: What You Need to Know (HSE Guidance): http://www.hse.gov.uk/woodworking/wooddust.htm

Research - None Known at the time