Designing for health - Guidance for designers

Concrete & Mortar				Ref No. DfH004_17
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.
In-situ concrete	Contact Dermatitis Burns/ Ulcers Dusts	Working with fresh wet concrete exposes workers to wet cement, which is a skin irritant that could lead to contracting irritant contact dermatitis. http://www.hse.gov.uk/skin/employ/dermatitis.htm Wet cement can also cause cement burns. Cement dust is an irritant that could lead to occupational asthma with prolonged exposure.	Consider whether it is possible to use pre-cast elements in your design. The majority of health control measures will involve action at worker level the design can look to specifying alternatives to cement or cements with low chromate levels. Specifying the use of pre-mixed concrete or ready to use mortar will avoid exposure to on site cement or mortar	

		Mortar, being a cement/ sand mix contains respirable crystalline silica.	dust.	
In-situ concrete	Noise Induced Hearing Loss (NIHL) Hand Arm Vibration Syndrome (HAVS)	Compacting wet concrete may expose workers to both noise and vibration levels above statutory thresholds.	The use of self-compacting concrete should remove both these health hazards. http://www.efnarc.org/pdf/SCCGuidelinesMay2005.pdf	
In-situ concrete	Chemical properties of additives, admixtures and sealants	Additives, admixtures, jointing material and sealants, depending upon the specific chemical properties (detailed in product-specific Material Safety Data Sheets (MSDS)) present specific health hazards to the workers. Some jointing materials such as polysulphide or bitumen-based products emit toxic fumes in fires.	Note: Increasing the cover to reinforcing bars or the use of higher strength impermeable concrete could negate need for surface sealants. When specifying be aware that some of the substances are more hazardous than others (e.g. they may contain isocyanates). Check the MSDS and specify the solvent and isocyanate free products. Water-based sealants are available.	
Joint Cutting and/ or scabbling	NIHL HAVS	Use of high-powered saws and/ or grinders expose workers to a range of hazards.	Allow for crack-inducers and formed shrinkage joints in your design. Alternatively; would the design of continuous slabs be advantageous? Do not specify aesthetic scabbled surfaces.	

	Silicosis		Use chemical retarders, joint formers or grit/ ultra-high-pressure water blasting as an alternative scabbling to prepare surface for good concrete bond. In new build specify built-in ducting to avoid need for wall chasing.	
Forming holes/ openings	NIHL HAVS Silicosis	Use of high-powered drills and cutting devices expose workers to a range of hazards.	Limit the need for site drilling by detailing positions and flexibility into service holes and other openings. Encourage early co-ordination with services designer and specialist contractor. Where holes are needed after concrete has been cast design to ensure there is room for jig-mounted diamond core drills with clamped in rig.	
Surface treatment	Work related Upper Limb disorders (WRULD)	Hand finishing floor slabs exposes workers to poor posture for prolonged periods. Mechanical floating introduces additional noise and vibration hazards	Consider the use of self-levelling concrete to final surface. By avoiding specifying unnecessarily high standards of finished surface you can limit the time needed for mechanical floating where self-levelling concrete is not an option.	
Piling	Contaminated spoil from piling operation	A ground condition survey may be required.	Use non-displacement piles.	
Piling	NIHL	Driving piles may expose workers to noise levels above statutory thresholds.	Design to ensure that pile trimming is minimised. Specify the need to use integrated pile trimming methods.	

	HAVS	Using hand-held high-powered tools breaking down on pile heads may expose workers to noise and vibration levels above statutory thresholds.		
Use of reinforcing bars	Weight, shape and manoeuvrability WRULD	Handling heavy and/ or awkward shapes exposes workers to poor posture for prolonged periods. Health issues include: 1. Lifting, carrying and laying steel reinforcing bars 2. Tying reinforcing bar at foot level 3. Repetitive actions (tying reinforcing bars)	• Design standardised cages to encourage use of 'production line' facilities/ prefabricated cages. • Consider detailing to allow split links (see BS8666), couplers, adequate tolerance to allow prefabrication of elements and subsequent mating with others. • Allow spot welding, if possible, or specify roll-out reinforcing bar mats to avoid need for use of tie wire While crane lift designs are the contractors' responsibility designers should be satisfied that there is adequate space and facilities on site to allow for crane lifts.	
Precast concrete	Weight, shape and manoeuvrability	Architectural items, such as lintels.	While this isn't generally an issue in view of significant weight of components but designers should consider using lightweight items where possible e.g. metal lintels For smaller items consider, for example location and installation of lifting points. Remember in refurbishment jobs where the use of a crane may not be possible consider the use of alternatives that can be installed in sections.	
Grouts and mortars	Chemical properties of products	Some products can cause skin irritation or are toxic in nature.	Avoid specifying additives or grout types that have significant health impacts (see MSDS) and/ or require site batching e.g. 2 part epoxies.	

Information to go to contractor: Make contractor aware of specified non-hazardous concrete and mortar related products, such as low chromate cement, and solvent/ isocyanate free sealants. HSE advice on means to avoid/reduce use of vibrating equipment http://www.hse.gov.uk/vibration/hav/campaign/construction/constructiontable1.pdf Alert contractor to any ground condition survey results. https://www.thomastelford.com/books/SampleChapters/ICE%20Specification%20for%20piling%20and%20embedded%20retaining%20walls%202nd%20ed.pdf ICE Specification for Piling and Embedded Retaining Walls				
Information to go to H&S File:		Use ☐	Maintenance ☐	Demolition ☐
Provide structure owner with relevant maintenance information relating to eco-design features and the legal protection position (as appropriate)				