RISK MANAGEMENT MEASURES FOR NANOMATERIALS IN THE CONSTRUCTION SECTOR

Good hygiene practices and housekeeping should be followed at the work place. The following issues should be taken into consideration:

Substitution and technical measures

- Consider using a less hazardous nanomaterial, if the nanomaterial in use is known to be harmful. The form of the used nanomaterial affects the potential exposure; for example a dry powder could be replaced with a paste or slurry.
- Use the same kind of technical measures for nanomaterials as otherwise used for preventing fine dust generation.
- Use properly working ventilation systems equipped with air filters of sufficient efficiency (HEPA-filters).
- In situations with a high release potential of nanomaterial, if possible, use enclosed systems, glove-boxes, fume hoods or local exhaust ventilation.
- When working outdoors, place yourself up-wind according to the activities.

Organisational measures

- Inform and train workers handling nanomaterial-containing products.

Personal protective measures

If it is considered necessary to use respiratory personal protective equipment, the filter should at least be of category P3. Better efficiency is achieved when half or full masks are used. Powered air flow equipment should be used for longer periods of work. The respiratory protective equipment should tightly fit the user. All workers should be trained on the proper use and maintenance of their respiratory protective equipment.

Chemically and mechanically resistant gloves should be used. When selecting gloves, it is important to consider not only nanomaterials but also all other chemicals (for example solvents) present at the same time.

Safety goggles and long sleeved working clothes should be worn.

Remember:

In the construction sector, exposure to different types of dusts, fibres, solvents and other chemicals may be very high. The potential health effects induced by these agents are in most cases likely to cause much higher risks than exposure to nanomaterials. In risk assessment, all possible types of exposure must be taken into account and nanomaterial should thus be considered one exposure component among all the others!

MORE INFORMATION:

Finnish Institute of Occupational Health
http://www.ttl.fi/partner/nanoturvallisuuskeskus/in-english/nanosafetycentre/

EU FP7 Project Scaffold:
Guidance on health surveillance for workers in the construction industry.

http://scaffold.eu-vri.eu/

European Commission:
Guidance on the protection of the health and safety of the workers from the potential risks related to nanomaterials at work.

http://tinyurl.com/osha-nanomaterials

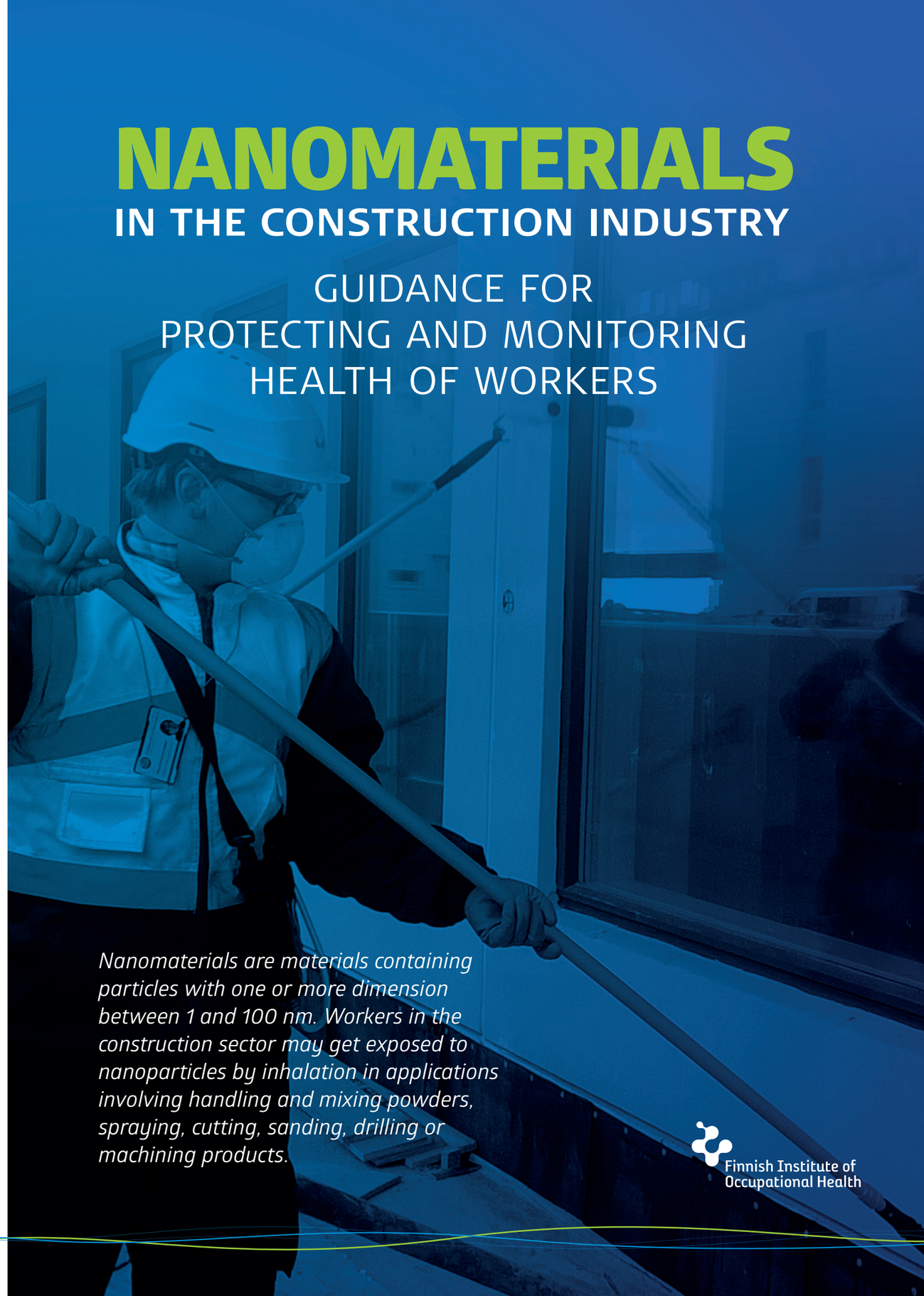
Finnish Institute of Occupational Health

Nanosafety Research Centre

Scaffold

NANOMATERIALS
IN THE CONSTRUCTION INDUSTRY

GUIDANCE FOR PROTECTING AND MONITORING HEALTH OF WORKERS



Nanomaterials are materials containing particles with one or more dimension between 1 and 100 nm. Workers in the construction sector may get exposed to nanoparticles by inhalation in applications involving handling and mixing powders, spraying, cutting, sanding, drilling or machining products.

Finnish Institute of Occupational Health

BENEFITS AND RISKS OF NANOMATERIALS

In the construction industry nanotechnology creates the possibility to produce materials with novel functionalities and improved characteristics. Engineered nanomaterials can be found in many basic and widely used construction materials and products including cement, wet mortar and concrete, paints, coatings, insulation materials, glass and infra-structural materials. They can be used on their own or in combination with other materials to achieve weight reduction or improved functionalities such as higher durability, fire resistance, thermal stability, self-cleaning, and photocatalytic properties.

NANOMATERIAL APPLICATIONS IN THE CONSTRUCTION INDUSTRY

Nanomaterial (particle size 1-100 nm)	Applications
Titanium dioxide (TiO2)	Concrete, cement, mortar, paints, coatings, glass, insulation material
Silica (SiO2)	Concrete, cement, paints, coatings, glass, insulation material,
Nanoclay	Additive in composites
Carbon nanotubes and nanofibres	Paints, mortar, additive in composites
Zinc oxide	Coatings
Nanocellulose	Insulations
Copper oxides	Wood preservative
Silver nanoparticles	Paints, coatings

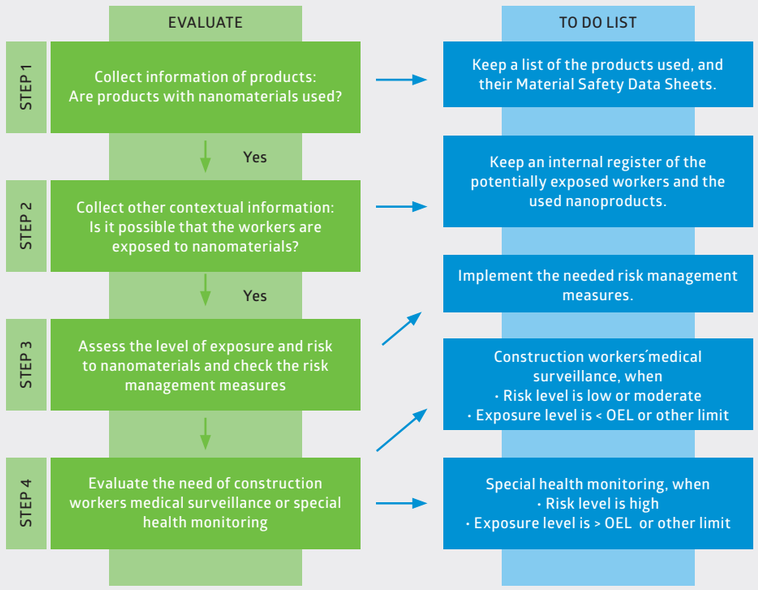
The use of nanomaterials in construction products is increasing. Workers may come into contact with nanomaterials when using such products. Inhalation is the most common route of exposure to nanoparticles at the workplace. In the construction industry, workers' exposure to nanoparticles may occur during activities generating dust (handling and mixing powders, cutting, sanding, drilling, machining or demolishing products, or during different types of maintenance work) and in applications involving spraying, which can result in aerosol formation.

There is some concern that nanomaterials may be more hazardous to humans than the same materials at a macro scale; because of their small size, and also due to their shape, chemical nature and surface characteristics. The majority of nanomaterials are most likely safe, at least at the exposure concentrations that workers or consumers come into contact with them. Some materials (for example certain carbon nanotubes) have been observed to cause local pulmonary inflammation and fibrosis in test animals. Some nanomaterials may also affect the cardiovascular system.

Example of personal protective equipment in a spraying activity. ▶

CONSTRUCTION WORKPLACE USING NANOMATERIALS: FOUR STEPS TO SAFE HANDLING

Flow chart how to proceed when you are suspecting that products contain nanomaterials. ▶



STEP 1:

When assessing hazards and safety characteristics of materials and chemicals, list all the used products and their material safety data sheets (MSDS).

Try to determine whether the used product contains nanomaterials:

- *Read the MSDS of the product.*
- *If the MSDS is not available, request a Technical information sheet from the product's manufacturer or distributor.*
- *You may find information in different product registers.*
- *You may also contact the national authorities or specialist and research institutions.*

STEP 2:

Collect the contextual information: Identify work tasks and processes, and the number of potential exposed workers.

Evaluate the possibility for worker exposure to nanomaterials using, for example, the help of experts or Control Banding tools.

For workers using nanomaterials, establish an internal nanoexposure register (name, used nanomaterial, task/process, duration of the task/process, hours/week).

STEP 3:

When the nanomaterial-containing products are used, and exposure is possible, assess the level of exposure and risks related to nanomaterials with the help of experts.

Implement required engineering controls and other essential risk management measures.

STEP 4:

In case of low or medium risk (for example a nanomaterial of low toxicity is used and exposure is low), continue applying the established medical surveillance approaches for construction workers, meaning periodic health examinations every 1 to 5 years.

In a case of high risk level (for example nanofibres or other nanomaterials of high concern are used and exposure is high), include regular follow-up examinations, focusing on respiratory and cardiovascular systems.