BCF Guidance on the Safe Use of Antifouling Coatings
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Guidance on the Safe Use of Antifouling Coatings

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This guidance was originally prepared by the Marine Coatings Group of the British Coatings Federation in conjunction with the Shipbuilders and Shiprepairers Association and the Health and Safety Executive in the early 2000s. It has now been revised and updated to reflect modern Health and Safety Executive approach to guidance documents.

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1. INTRODUCTION

   a) What products contain antifouling actives/biocides?

   The product label and manufacturer’s safety datasheet should be consulted as to whether the product is an antifouling coating.

   These coatings are those used to keep fouling and marine growth off ships, boats and marine structures by the use of ‘active ingredients’.

   b) Who is this guidance for?

   The guidance is aimed at applicators and managers of applicators who are applying antifouling coatings in dry docks, installations and on site principally by spray-application. It applies to the coating of ships, marine vessels and other substrates/structures that due to their size generally have to be coated outside of spray booths or spray areas. Much of the guidance applies equally to all spray-applied coatings.

   This guidance does not cover amateur or DIY use.

   c) What does it cover?

   Health effects of antifouling coatings (section 2)
   Routes of exposure (section 3)
   What are antifouling coatings (section 4)
   Controls that should be taken when applying antifouling coatings (section 5)
   Precautions in handling and use of antifouling-containing materials (section 5)
   Guidelines on housekeeping and spillages (section 6)
   Training of personnel (section 7)
   Control monitoring (section 8)

   NOTE: This is a best practice document and is no substitute for the shipyard carrying out its own risk assessment. It does not supersedes the material safety datasheet.

2 HEALTH EFFECTS OF ANTIFOULING COATINGS

Spraying of paints containing antifouling active ingredients (biocides) may be a major source of exposure. Spray mists contain air-borne particles that can be inhaled which can be hazardous due to the biocides (active ingredients) that give the paint its antifouling properties. The hazards will vary from one antifouling to another and the manufacturer’s safety data sheet and product labels should be read before the use of these coatings.

Antifouling coatings can be mild skin irritants and in rare cases may cause dermatitis and/or skin sensitisation.
a) What are the hazards of antifouling paints

Antifouling paints contain hazardous chemicals that give the coating its antifouling properties. The specific hazards of these will depend on the actual active (biocide) used and the suppliers’ health and safety information must be read.

Antifouling paints have an HSE approval number and users should not use any product that does not have an approval number as it has not been evaluated by the HSE.

b) Other health effects

Splashes of antifouling containing products onto the skin or into the eyes can cause dermatitis or conjunctivitis.

[The symptoms of dermatitis are: skin redness or soreness; itching; rash; and skin cracking or peeling (or weeping)].

A skin care programme, including routine examination for dermatitis should be set up for people potentially exposed to antifouling coating products. These inspections should involve a responsible person. The skin care programme should include training on how to put on and remove gloves without contaminating the skin.

3 ROUTES OF EXPOSURE

a) Brush and roller application

Application by brush or roller does not normally generate paint mist and therefore inhalation risks are minimised. However aggressive rollering or power-rollering might generate mist and if this is likely RPE should be worn. Disposable (anti-static) overalls and gloves should be worn and normal personal protective equipment could be required especially if solvents are present.

b) Spray application

Application by spray is the main cause of inhalation exposure to antifouling coatings. The only other potentially significant source is spray gun cleaning if it is carried out inappropriately (i.e. in areas without extraction and without suitable RPE). This is because spray gun cleaning can contain a high concentration of antifouling actives.

WARNING: Fine spray mist is invisible.

All spraying produces ‘over-spray’ most of which you cannot see under normal lighting. It is this invisible paint mist that sprayers and others nearby could inhale which could cause possible health concerns.
c) Spray mist

Spray guns powered by compressed air are sufficient to throw paint mist over 12 metres. For external paint application, typically in dry docks, this may be further when carried by the wind; but good dry dock practices can significantly reduce this. Therefore even when applying paint within an area with extraction the spray gun air-jet can overwhelm the air movement within the booth or room and it could rapidly fill with fine paint mist. Do NOT think that the extraction will instantly sweep away the airborne paint overspray; it can’t and it doesn’t.

4 RISK ASSESSMENT

COSHH (Control of Substances Hazardous to Health Regulations) requires that employers make a suitable and sufficient assessment of the risks to health created by work with hazardous substances. When carrying out the risk assessment the following questions should be asked:

- Are significant concentrations of antifouling actives or other hazardous materials likely to be released and will exposure be likely?
- Where and when will they be released?
- Who is likely to be exposed and to what extent?
- Can the exposure be prevented?
- What control measures are needed to reduce exposure?

The assessment should be reviewed regularly, particularly if there are any changes to either materials or the process.

Preventing risk

Exposure to antifouling coatings is completely preventable, but will require the following actions:

- Use of air-fed breathing apparatus when spray applying.
- Follow correct working practices.
- Ensure all personnel involved in handling antifouling coatings are trained and fully aware of the risks.
- Keep all bystanders well away from any spraying operation.
- If applied in an installation, proper design and use of spray rooms with adequate extraction and filtration.

5 CONTROL MEASURES

Engineering controls to avoid contact with antifouling coatings should be the first consideration in control.
The spraying of all paints produces a ‘smoke’ of invisible mist, which may reach all parts of a workplace if not properly controlled. Where possible, spraying should be done in an enclosed, ventilated spray booth or room. These engineering controls should always be the first step in controlling exposure. However this is not possible in spray application on large structures, on-site applications or on most marine vessels and therefore PPE and RPE will be required. Keep all those not actively spraying well away from the area, which should be clearly marked and taped off.

a) Personal Protective Equipment

i) General
All personal protective equipment (PPE) including respiratory protective equipment (RPE) supplied should be selected to meet the requirements of the Control of Substances Hazardous to Health (COSHH) and Personal Protective Equipment at Work Regulations. All new PPE supplied should carry the CE mark.

ii) Respiratory Protective Equipment (RPE)
Air-fed RPE should always be worn when spray applying antifouling coatings. Air-fed visors or half masks are suitable except in very enclosed spaces when a full face mask should be used.

Particular attention should be paid to the face fit (seal) for the wearer (there is a legal requirement that ‘fit testing’ is conducted and guidance on the necessary considerations are given in HSG53); this is not necessary for the flip up visors.

RPE should be thoroughly cleaned and maintained in accordance with the maker’s instructions. In no case should a person use respiratory equipment that has been used by another person until it has been cleaned, disinfected and serviced.
RPE must not be removed if there is a possibility of exposure. Sprayers must be informed that fine spray mist will be present in the air after spraying has finished and the RPE must be kept on until this has cleared or the sprayer has moved well out of the area. Similarly if spraying results in the face panel becoming covered by overspray operators must not remove the mask while spraying or in the spray area; peelable transparent visor covers which can be removed as and when vision becomes impaired are recommended.

Do not lift visor/mask before spray mist has cleared

NOTE: The distance from an unsafe area to a safe area in marine vessels can be long and in these cases air-fed visors are not suitable unless the airline to the safe area is long enough. Fitted RPE has filters which will protect operatives once the airline is removed.

iii) Other protective equipment

Protective clothing should be cleaned or renewed regularly. Protective equipment becoming heavily contaminated with antifouling materials should be removed immediately and replaced. For those spraying antifoulings (or handling thinners) it is best for them to be supplied with disposable coveralls which can be discarded at the end of the day’s work. It is recommended that synthetic anti-static overalls are used. Single use gloves are also preferred.

It may be helpful for the visor of any PPE to have a replaceable or sacrificial face piece to minimise loss of vision through coating accumulation.

In addition to the provision of PPE it is also necessary to provide suitable accommodation for PPE so that it can be stored and kept clean when not in use.

Information covering the following should be provided to employees to whom PPE has been supplied:

• The risks the PPE will reduce
• How to use the PPE
• Any required action for maintaining the PPE.
iv) Skin Protection
Personnel applying coatings should wear suitable overalls made of cotton or cotton/synthetic materials (preferably minimum 60% cotton). Disposable overalls are preferred and these should be disposed of at the end of shifts.

Gloves should be made of suitable solvent-resistant material. Advice should be sought from the glove suppliers on appropriate types. Special care should be taken with regard to gloves as they can easily become contaminated on the inside. Single use gloves are preferred.

NOTE: Barrier creams and liquid gloves do not provide a full barrier and are not alternatives to properly selected gloves.

v) Eye Protection
Whenever there is a risk of paint splashing into the eyes, e.g. opening paint containers, mixing or cleaning up, eye protection should be worn. Goggles are preferred over safety glasses with side shields. Eye protection should be worn if half masks are worn.

vi) Other
Hard hats or other PPE may be worn as required by the employer.

NOTE: It should be ensured that there is compatibility between the various components of PPE, e.g. hard hat, RPE, etc. to ensure that they do not impede the efficiency of each other.

b) Application
The majority of the application of antifouling-containing coatings will take place by the use of spray equipment. Small amounts may be applied by roller or brush application, these have a lower chance of harm and provided precautions taken as identified in this guidance are taken (see also Annex 1), exposure is minimal.

The key messages are:
- Wear the appropriate RPE – air-fed breathing apparatus
- If applying in a spray booth or room know its clearance times (these should be clearly displayed on the booth) and do not enter these without RPE during or after spraying until this time has elapsed
- Paint mist can be invisible, just because you cannot see the paint it does not mean that the air has cleared and it is safe to remove your RPE or lift the visor from masks.
- The application of antifouling-containing paints to most vessels and ships, which cannot be put into a booth or controlled room present additional dangers. It is essential that only those applying the coatings are in the vicinity of the painting and that all other persons are kept well away. If spraying is being conducted outside then it is vital that the wind
conditions are taken into account and that no one (workers or others) are downwind of the applicators. The paint mist is invisible and will not clear as soon as spraying ceases. Guidance contained in: http://www.hse.gov.uk/pubns/web33.pdf (Application of SMART repairs in motor vehicle repair) is useful but it must be realised that the concentrations of paint mists will be greater in ship coating operations due to the much larger areas being coated.

Similar precautions to those outlined in http://www.hse.gov.uk/pubns/web36.pdf should be taken regarding clearance times around the application area. (See also Annex 2.)

(Key points are given in Annex 1.)

6  HOUSEKEEPING AND MAINTENANCE AND SPILLAGES

a)  Housekeeping

High standards of housekeeping should be observed at all premises and sites where antifouling-containing coatings are stored or applied.

Equipment suppliers are legally obliged to provide adequate information about the use for which the article has been designed and tested and any conditions necessary to ensure the equipment is safe and without risks to health at all times through its operating life. If an employer does not have a user manual he or she should ask the supplier for one. This will apply to ventilation equipment, RPE and other equipment.

The air supplied to air-fed RPE must be regularly checked for quality and be free of contamination and oil.

b)  Maintenance

All RPE and PPE equipment should be regularly checked by qualified (trained and competent) personnel to ensure it is still fit for purpose.

Exhaust ventilation systems should be regularly inspected and maintained in good order and thoroughly examined and tested at least every 14 months, as required by the COSHH Regulations.

Regular checks should be carried out on:

- Air supplier – filters and compressors
- Filter replacement
- Clearance times
- Leakage
- Lights

All local exhaust ventilation (LEV) must be working properly and this requires monitoring, which should be logged and the checks recorded – full details are given in HSE Guidance Document INDG 408 ‘Clearing the air’ available from www.hse.gov.uk/pubns/indg408.pdf
Any servicing of LEV and of compressors for air supply should be carried out either by the supplier of the equipment or other suitably qualified persons.

c) **Spillages**

Paint spillages should be contained and collected with non-combustible absorbent materials, e.g. sand, earth, vermiculite or diatomaceous earth.

These require the residue and decontaminant to be left in a non-sealed container for several days. This should then be disposed of in accordance with the waste regulations.

All sources of ignition should be excluded from any area in which a spillage occurred.

All non-essential personnel should also be excluded from a spill area.

(See also: BCF Guidance on Good Housekeeping and Spillage Handling – HS 018)

7 **TRAINING, INSTRUCTION AND INFORMATION**

COSHH requires that employees should be instructed about the risks to health arising from exposure to any hazardous substances and informed of the precautions to be taken to ensure their safe use. Supervisors and operators should be advised of their responsibility to ensure that safe methods of work are used. Employees should report any obvious deficiencies in the control methods.

The Protective Equipment at Work Regulations require employees to be trained in the use of PPE including respiratory equipment (RPE), to ensure that it fits properly; and to be given clear instructions about when it should be used and maintained.

In addition, training ought to provide a general awareness of:

- The possible health effects of antifouling coatings
- The role of health surveillance and the employee’s responsibility to take part
- How to use, and the purpose of, control measures such as local exhaust ventilation and RPE, the methods to test their effectiveness and the action to be taken if any anomaly is detected
- The safe systems of work to be followed, including during routine and emergency maintenance activities
- First aid measures

Inform all workers which products are antifouling coatings and alert them to the possible extra hazards of these products.
8 HEALTH CHECKS

Employees should provide health surveillance for paint sprayers – this normally includes:

- annual lung-function testing and a questionnaire. For new employees this should be carried out on beginning work; after 6 weeks; 12 weeks; and then yearly;

- skin checks for dermatitis.

Further information on health surveillance can be found in the HSE publication: Health surveillance at work – HSG61, available from: www.hse.gov.uk/pubns/priced/hsg61.pdf
ANNEX 1

Application of antifouling-containing coatings – Key points.

1. **Brush and Roller application**

   Provide health and safety training – inform workers that they are working with antifouling coatings and that these can cause dermatitis
   Provide disposable overalls (synthetic anti-static) – discard at end of day
   Provide chemically resistant gloves – single use gloves preferred, throw away every time they are taken off
   Ensure adequate ventilation
   Air-fed respiratory equipment is not normally required, however eye protection may be required
   Avoid application that might cause a mist
   Decontaminate brushes and rollers before disposal as hazardous waste

2. **Spray application – booths and spray rooms**

   Provide health and safety training – inform workers that they are working with antifouling coatings and that these can cause dermatitis
   Check efficiency of booth extraction
   Provide disposable overalls (synthetic anti-static) – discard at end of day
   Provide chemically resistant gloves – single use gloves preferred, throw away every time they are taken off
   Provide air-fed RPE for all applicators
   All unprotected personnel without adequate RPE should be kept away from spray area
   Know the clearance time for the booth/room and do not allow access to unprotected persons until this time has elapsed after spraying ceases

3. **Spray application – on site, dry docks etc.**

   Provide health and safety training – inform workers that they are working with antifouling coatings and that these can cause dermatitis
   Provide disposable overalls (synthetic anti-static) – discard at end of day
   Provide chemically resistant gloves – single use gloves preferred, throw away every time they are taken off
   Provide air-fed RPE for all applicators
   All unprotected personnel without adequate RPE should be kept away from spray area
   Monitor wind direction and ensure no workers or other people are within range of any paint spray mist [spray mist can travel 12 metres even without wind assistance so wide exclusion zone is required]
   Know the clearance time for the spray area and do not allow access to unprotected persons until this time has elapsed after spraying ceases
   Tape off areas to prevent access and inform people to keep away from areas where paint spraying is taking place
REFERENCES AND FURTHER READING

Legislation
Health and Safety at Work etc. Act, 1974
The Management of Health and Safety at Work Regulations, 1999 and amendments
Control of Substances Hazardous to Health Regulations, 2002 and amendments
Personal Protective Equipment at Work Regulations, 1992 and amendments

Guidance
A step by step guide to COSHH assessment, HSG97, (www.hse.gov.uk/pubns/books/hsg97.htm)
Occupational Exposure Limits, EH40 Table 1, www.hse.gov.uk/coshh/table1.pdf
Understanding health surveillance at work: An introduction for employers, INDG304, (www.hse.gov.uk/pubns/indg304.pdf)
Respiratory protective equipment at work. A practical guide, HSG53, (www.hse.gov.uk/pubns/books/hsg53.htm)
Controlling airborne contaminants at work: A guide to local exhaust ventilation (LEV), HSG258, (www.hse.gov.uk/pubns/books/hsg258.htm)
The Spraying of Flammable Liquids, HSG178, (www.hse.gov.uk/pubns/books/hsg178.htm)
Respiratory sensitisers and COSHH – Breathe freely – An employers leaflet on preventing occupational asthma, INDG95 (www.hse.gov.uk/pubns/indg95.pdf)
Clearing the air – A simple guide to buying and using local exhaust ventilation (LEV) (www.hse.gov.uk/pubns/indg408)

BS EN 14387, Respiratory protective devices. Gas filter(s) and combined filter(s).
Requirements, testing, marking, British Standards Institution

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