SAFETY & HEALTH GUIDANCE NOTE 36

Occupational Health Management Aspects of Spraying Epoxy Coatings

Version – 2
January 2004

Occupational Health Management Aspects of Spraying Epoxy Coatings

1. Introduction
2. Scope of Guidance
3. Epoxy Coatings
4. Health Hazards
   4.1 Skin
   4.2 Respiratory system
   4.3 Epoxy resins
   4.4 Curing agents and accelerators
   4.5 Reacted material (dryspray and sanding dust)
   4.6 Summary
5. Legal Responsibilities
   5.1 Operator Exposure
6. Scenarios of Risk
7. Mixing of Coatings System
8. General Good Working Practices
   8.1 Additional good working practice
9. General Protection: Clothing and Equipment
   9.1 Additional protection: clothing and equipment
10. Wearing Clothing and Equipment Good Practices
11. Replacement and Cleaning Good Practices
12. Waste Products and Equipment Cleaning
13 Heat Stress
14 Personal Hygiene
15 First Aid
16 Training
17 Health Checks
18 Sources of Information

Appendix 1 – European Health & Safety Legislation
1 Introduction

The European review system for existing substances has raised some concerns over the use of nonylphenol in coatings. Specifically the human health risk assessment for the spray application of coatings containing nonylphenol concluded that there could be a potential risk to human health.

The review also concluded that the risks associated with spray application could be controlled through statements of best practice. Nonylphenol is not found in all coating systems but is present in some epoxy resin based coatings. In response to the review and its findings, European Council of Paint, Printing Inks and Artists’ Colours Industry (CEPE) in conjunction with the European Convention on Constructional Steelwork (ECCS) has produced two documents designed to give guidance on control procedures to be followed during the application of epoxy based coatings in the marine and protective coatings industries.

This document ‘Occupational Health Management Aspects of Spraying Epoxy Coatings’ is a comprehensive document covering issues that are necessary to safeguard the health of those involved in the spray application of epoxy coatings. This guidance contains general good practice for spray applications but this should not be used to cover the spray application of isocyanate (polyurethane), antifouling or powder coatings.

The poster ‘Your Health – Spraying Epoxy Resin Based Coatings’ is a simple guide stepwise guide for all the application team involved in the spray application of epoxy-based coatings. It contains practical advice on what personal protective equipment should be worn and good hygiene practices. The poster should be put in a prominent place frequented by personnel involved in spray applications. The application team should be instructed to read the poster and to follow the guidance.

2 Scope of Guidance

This guidance predominately covers health protection:

- It does not cover specific legislation in each Member State
- It does not cover specific guidance on high pressure spray equipment
- It covers airless spray application including mixing of epoxy coatings
- It deals with application inside and outside

This guidance is general and the label and Health and Safety Data Sheet or Material Safety Data Sheet (MSDS) should always be consulted for each individual coating so as to identify any specific hazards associated with it. European and National legislation on issues such as operator exposure levels (discussed later in the document) should be complied with and take preference over this document if they require more stringent control measures.

This guidance can be used to aid someone to design and carry out a risk assessment, it can also be used to aid in risk management. This document does not however, take away the need to carry out a risk assessment. Risk assessments are scenario specific and thus they will need to be carried out on a case-by-case basis.
3  Epoxy Coatings

Epoxy coatings are usually supplied as two components, comprising a base and a curing agent. The epoxy resin is usually in the base component and can vary in physical form, from a high viscosity liquid at ambient temperatures to a high melting point solid. Solid type epoxy resins (high molecular weight) require a solvent to dissolve them when being formulated into a coating. Liquid epoxy resin (low molecular weight) will require less solvent or can be used as the sole liquid in a formulation.

The curing agent is added to the base prior to use and requires mechanical or hand stirring. This mixture is then applied, by brush, roller, air assisted or in the case of heavy-duty coatings, airless spray.

Due to environmental legislation on air quality there has been a move to use solvent free or low solvent coatings. For epoxy resins this has meant that there has been a need to use low molecular weight resins that can be used neat or with small amounts of solvent. As will be discussed in the following section this can increase the potential risks associated with their use.

The curing agents are required to be chemically active and are designed to react with the epoxy resin to promote film formation by initiating chemical reactions within the mixed coating. The curing agent usually contains amine or amide functions that react with the epoxy function on the resin to crosslink the polymer chains. Other reactive species include accelerators such as nonylphenol and monofunctional glycyl ethers.

4  Health Hazards

In this instance the hazards being discussed are health related. Hazard describes the potential of a substance (a coating) to cause health effects. The hazard warning found on the container label and Material Safety Data Sheet (MSDS) describes the hazard, though this is only the potential to cause harm. The actual potential can only be realised upon use; this is where risk becomes involved and is discussed later. Always read the label or MSDS prior to mixing or application.

4.1  Skin

The main hazard of coatings is the potential to cause skin damage. The skin acts as a permeable barrier (though substances can leave the body through the skin they can also enter the body). Solvents can wet and remove the natural oils from the skin (known as defatting); this can leave the skin feeling dry and in extreme cases can lead to cracked and scaly skin. This cracking in turn can reduce the skin’s barrier properties and allow substances to penetrate more easily. Solvents and substances penetrating the skin can enter the blood stream and be transported to other sites in the body. If the quantity reaching the blood stream is significant it could cause adverse health effects, in extreme cases ‘sensitisation’.

The epoxy resin and the curing agents are potential skin irritants and sensitisers. Irritation (sometimes called irritant contact dermatitis) can vary from redness and swelling (inflammation) of the skin, which may develop after regular or prolonged contact with a substance. Corrosive substances can cause severe reactions such as chemical burns; sometimes even from brief skin exposure.
Sensitisation (allergic contact dermatitis) is an allergic type response to a substance, and the response is often difficult to distinguish from general irritation. Sensitisation occurs following an induction period. This can be the result of one exposure to a substance or it can take several exposures. The induction period is dependent on the individual. The problem is the subsequent allergic response to the substance – even in small quantities. The only course of action following sensitisation is to prevent exposure to this substance; in effect, the sensitised person can never work with that substance again.

4.2 Respiratory system
The other significant hazard is damage to the respiratory tract and lungs. Inhalation of solvent and particles in the spray mist can lead to health effects. Solvents can have short and long-term effects; they can range from short-term drowsiness or dizziness (intoxication) to long-term impact on the central nervous system. Solvents and particles can also cause inflammation and irritation of the lungs. Substances in the lungs can pass into the blood stream and have adverse effects on health at other sites in the body.

As discussed earlier some substances can cause sensitisation. This can occur in the respiratory tract as well, this is sometimes referred to as ‘occupational asthma’, a serious and debilitating condition. Again like skin sensitisation the only course of action for a sensitised person is to never work with that substance again. This is essential, occupational asthma has in severe cases caused fatalities.

4.3 Epoxy resins
Generally, epoxy resins are not acutely toxic as they are not readily absorbed through the skin. Many of the high molecular weight epoxy resins are either not irritating or only mildly irritating to skin and eyes. However, epoxy resins of low molecular weight as described in the previous section are potentially more hazardous as they are usually more biologically active with a greater irritancy and sensitising potential.

4.4 Curing agents and accelerators
Amine and amide curing agents can present a hazard to health. Some of these materials are corrosive in contact with the skin and are potential sensitisers.

Accelerators such as nonylphenol are potentially hazardous to the skin and can have some toxic effects if they enter the blood stream in significant quantities on a repeated basis.

Nonylphenol has been recently reviewed in Europe under the Existing Substances programme; there was limited human data on nonylphenol, however animal studies did identify some hazards. To summarise, nonylphenol was shown to be moderately toxic by the oral route and moderate to low toxicity by the dermal route. No data are available on the acute inhalation toxicity, although the corrosive nature of nonylphenol suggests that acute toxicity could be elicited following exposure by this route. Liquid nonylphenol can be corrosive to the skin and a severe eye irritant, though this may be formulation dependent. Nonylphenol does not appear to have any significant sensitising potential.

Chronic studies (repeat dose) showed that effects on the kidneys and higher dose levels indicated that the liver might also be a target organ. Mutagenicity and carcinogenicity concerns are low. There was marginal evidence to suggest reprotoxic effects in multigenerational studies.
4.5 Reacted material (dryspray and sanding dust)
The hazards presented by epoxy based spray dust formed by overspray or dryspray are much less than for wet paint. Chemically, the majority of epoxy groups on the resin and the functional groups of the curing agent should be reacted with each other in the dry state. However, dusts are potentially a health and safety (fire and explosion) hazard and should be controlled.

Dust from the sanding of applied coatings is largely cured but may contain a significant percentage (c 10%) of active chemical groups especially in the 24 hours after application. Sanding dust from epoxy fillers has been associated with severe irritation, particularly in hot conditions where the wearing of protective clothing is uncomfortable and wet sweaty skin allows excellent contact between the dust and the surface of the skin.

4.6 Summary
To protect operators it is important to be aware of the hazards, carry out a risk assessment and take precautions when applying coatings. Prolonged or repeated exposure could lead to occupational skin disease or lung damage. Remember prevention is better than cure.

5 Legal Responsibility
People are exposed to a variety of substances in the workplace everyday and some of these can have harmful effects under certain circumstances, these are ‘hazardous substances’. In all EU countries there is a legal responsibility to protect people in the workplace from exposure to hazardous substances such as chemicals, dust, fibres and pathogenic biological material (see Appendix I for information on relevant EU Directives).

5.1 Operator Exposure Levels
To protect the workforce, national health and safety bodies set occupational exposure limits for hazardous substances. These exposure limits relate to the concentration of hazardous substances in the air, averaged over a specified period of time referred to as a time weighted average. Usually two time periods are used: a long term 8 hours and a short term 15 minutes.

The health effects that are associated with product are given as risk phrases that can be found on the label and the MSDS. For substances that are thought to have the most serious health effects such as cancer and occupational asthma occupational exposure should be reduced, as far below this limit as practically possible and the exposure should never be exceeded when averaged over the specified time period. Occupational exposure limit associated with less serious and transient health effects such as irritation relates to a level below which (based on current scientific knowledge) a worker can be exposed to on a day-to-day basis (over the specified time period) without risk to his/her health. To reduce the exposure to at least this level is sufficient.

As mentioned in the hazards section dryspray and sanding dust should be controlled and most countries have a provision for the control of general dusts.

Other legal responsibilities may include air monitoring for hazardous chemicals and health surveillance of workers.
6  Scenarios of Risk

Risk describes the likelihood that harm will occur from the use of a substance in a given situation. Where the application takes place will have a large influence on the nature of the risk, the amount of exposure and the people at risk. Another important consideration is the duration of the application, the longer the application the greater the likelihood of exposure.

It is impossible to deal with every foreseeable scenario, but the aim of this document is to give advice that covers the following scenarios:

- Spray application in the open air e.g. ship’s hull or a bridge
- Spray application in confined spaces e.g. inside of tanks
- Spray application in a paint cell e.g. large sections of steel work
- Spray application in a workshop (spray booth or natural ventilation) e.g. small scale application

Generally speaking the closer a person is to the application the greater the risk of exposing himself or herself to hazards associated with the coating. However, everyone within reach of airborne spray particles and those coming into contact with the spray dust are potentially at risk.

7  Mixing of Coating System

Where no extraction is available mixing should be carried out in a well-ventilated area. If extraction is available then mixing should be carried out within reach of the extraction’s ‘pull’. Extraction should be sited away from doors, windows and walkways to stop draughts interfering with the ventilation.

Skin and eye exposure from splashes etc. should be avoided during mixing. A pair of cotton overalls, gloves and eye protection should be worn as minimum protection. If there are any particular solvents or substances of concern i.e. substances with a low operator exposure limits or respiratory sensitisers then suitable Respiratory Protective Equipment (RPE) should be considered.

Mixing should take place in areas where spillages can be contained and cleaned up as per instructions on the Material Safety Data Sheet. Non-combustible material such as sand or vermiculite should be available to absorb spillages. Spillages should not be washed into drains or waterways.

8  General Best Working Practices

The best way to protect people is to have ways of working that reduce their exposure to the splashes, spray mist, vapour and dryspray. All unnecessary staff should be kept out of the spraying zone.
Extraction coupled with good natural ventilation will help limit exposure, but this is not always practical in open-air applications. In these situations it is probably best to assess the application process: look for situations where the risks may be increased such as in a dry-dock where the distance between the ship and dry-dock wall is narrow restricting air movement and potential splash back is high. It may be best practice to limit essential staff to the areas where contact is likely or unavoidable.

All unnecessary equipment should be removed from the spray area to avoid contamination.

After spraying and sanding it is generally good practice to remove any dryspray or sanding dust from areas where it could fall onto or blow onto people. The dryspray dust should not be removed by high-pressure air as this has the potential to blow it around. Sanding dust can be dampened with water and scraped or brushed clear. The damp waste from this can be swept up and removed. The waste should be disposed of in accordance with national legislation.

National legislation may require systems of working for confined spaces and these should be consulted prior to commencing work and your organisation may have developed guidance or procedures based on the legislation. Paint manufacturers may also supply guidance on applying coatings such as tank linings, this will give guidance on controlling solvent vapour levels to avoid the build-up of explosive air/solvent mixtures and these should be consulted prior to application.

8.1 Additional good working practice

It may be necessary to employ additional good working practices in the situations mentioned below:

**Open air**

- If possible use protective sheeting or screens to stop spraymist travelling.
- Mark out an exclusion zone with cones and tape.
- Warning signs should be put up around the exclusion zone.
- Keep everyone out of the zone except the application team.
- All other staff should be kept upwind of the spraying.
- Avoid spraying in high winds.

**Confined spaces**

- Assess that the atmosphere contains or will contain sufficient oxygen (17 % v/v) during the whole process so as normal respiratory functions can be maintained. If solvent vapours force air out of a confined space the atmosphere’s oxygen levels may drop to dangerous levels and asphyxiation can occur.
- The solvent vapour levels should be controlled below the lower explosive limit. This can be controlled through mechanical ventilation or extraction of the confined space.
- Other safety procedures and advice with regards to working in confined spaces should be adhered to.
- Signs can be put up outside the confined area to indicate that spraying is in progress and unauthorised staff should stay out.
**Paint Cell**
- The extraction should be checked prior to application and the airflow at the point of application should meet national requirements.
- Work should be carried out away from entry doors.
- Entry doors should carry a sign or some other indication system to show that spraying is in progress.
- If possible the sprayhand should avoid standing or spraying into the airflow.
- If it is necessary to stand between the object and the direction of airflow the work should be planned so as to minimise the time spent in this position and respiratory protection should be worn.
- Make sure that all extraction and ventilation equipment is maintained as per supplier/installer’s instructions.

**Workshop**
- In a workshop with natural ventilation it may be necessary to have a system of designated areas, i.e. an area for spraying and drying of coated objects.
- Work should be carried out away from entry doors or other facilities.
- Entry doors should carry a sign or some other indication system to show spraying is in progress.
- If possible objects being sprayed should be put on a turntable or a device that allows easy manoeuvring.
- If a booth is present the extraction should be checked prior to application and the airflow at the point of application should meet national requirements.
- Make sure that any extraction and ventilation equipment is maintained as per supplier/installer’s instructions.

**9 General Protection: Clothing and Equipment**

**Clothing/Skin Protection**
All members of the application team should wear:

- A long sleeve, long leg cotton overall (preferably minimum of 60% cotton).
- Long sleeve chemical resistant gloves, i.e. gauntlets.
- Safety boots that are anti-static with steel toecaps and should at least cover the ankles.

The choice of gloves will be dependent on the conditions of use and the types of solvents in the product. Different types of gloves will protect to differing levels depending on the solvents and extent of use. The box or packet the gloves come in will usually carry a breakthrough class, this often indicated by a chemical flask and a number. The Classes are 1-6 and based on a rating developed in a standard European test (BS)EN 374, 1 offers the lowest protection and 6 the highest and this depends on the type of solvent being used. A glove manufacturer should be consulted for more information.
Respiratory Protection

For staff that are likely to come into direct exposure with spraymist respiratory protection should be worn.

For staff carrying out the application best practice is to wear a full-face respirator with tear-off vision strips. This may be air-fed or equipped with solvent vapour and particulate filters.

Other staff should wear half-face respirators with solvent and particulate filters.

The expected working life of any filter will depend on the type of filter being used and the nature of the work being carried out i.e. high or low exposure. The filter’s efficiency will decrease with time and with loading of particulates and vapour on to the filter. Breaks to change filters should be factored into the working patterns so as to avoid the staff working for periods during which their filters are inefficient.

The choice of a solvent or vapour filter is important. Many of these filters rely on adsorbent materials such as activated charcoal. The adsorbent must be suitable for the solvents the applicators are being exposed to. The selection of the filter should therefore match the type of filter to the hazardous vapour.

Respiratory protection in a spray booth may not be necessary if the levels of exposure can be controlled below national exposure limits. If not then respiratory protection should be worn that will give the operator sufficient protection.

Eye Protection

Everyone should wear eye protection, full-face mask or at least safety goggles or glasses. This is also important for people mixing paint to protect against splashes.

Skin Protection

Where skin is exposed, for example, the face skin of people wearing half masks, they should use a proprietary barrier cream (not petroleum jelly as this can sometimes promote absorption of solvents). Barrier cream should not be used in place of protective clothing such as gloves or hood if they are required. If a half face respirator is being worn then the cream should be applied following fitting of the respirator to avoid problems of the respirator slipping or a breaking the seal with the face. Both of these problems will reduce the efficiency of the respirator.

9.1 Additional Protection: Clothing and Equipment

Open air

- It is recommended that a second disposable overall with a hood is worn over the cotton overall during intense spray activity (long duration or large volume applications).
Confined spaces
- It is recommended that a second disposable overall with a hood should be worn over the cotton overall.
- It is recommended that a full-face mask with tear off vision strips is worn. This may be aired or equipped with solvent and particulate filters.

10 Wearing Clothing and Equipment Best Practices

Cotton overalls must be fully done up at all times to avoid skin contact. If a disposable hood or a disposable overall with hood are worn it must be fitted over the head and pulled tightly around the face.

If a second disposable coverall is worn, then the cotton overall may be tucked inside boots and gloves. Disposable outer overalls should be worn over the top of boots and gloves. Overalls with poppers, Velcro or elasticated cuffs should be used to make sure the overall sleeve stays in place at the wrist and that there is no gap and no exposed skin between overall and glove. Adhesive tape may also be used to secure sleeves/gloves. Gloves must have long sleeves.

Similar methods should be used to make sure there is no gap between trouser leg and boots. With calf length boots (rigboots) and one or both overalls outside the boots, taping may not be necessary.

Full-face masks worn with hoods should cover all face skin. Half facemasks, goggles and hood should cover as much skin as possible and any exposed skin should be protected with a proprietary barrier cream (not petroleum jelly). Care should be taken as masks rely heavily on a good seal between the mask and the wearer’s face; damaged seals, beards and stubble can reduce the efficiency of the mask’s protection.

11 Replacement and Cleaning Good Practices

Disposable overalls should be replaced every time they are taken off and at least daily.

Cotton overalls should be changed and washed on a regular basis.

If there is any paint breakthrough to the inside of cotton overalls, they should be replaced with a new pair.

Gloves should be replaced if there is any sign of breakthrough or as soon as they become dirty inside. Wearing of lightweight cotton inner gloves may be considered.

Fabric sweatbands in hard hats should be washed daily, and the hats cleaned with detergent and water to remove any dirt and dryspray contamination.

Full face and half masks should be cleaned with detergent and water inside and out and stored in a dedicated container at the end of each shift.
Filter cartridges should be changed daily or more frequently if breakthrough occurs. Particulate filters will become clogged when heavily loaded, breathing difficulties may be noticed and the filter should be changed. Vapour filters will have a limit to their adsorption capacity, and they lose their effectiveness completely when they are saturated. This should be considered in the risk assessment for the application and the operator should be informed of the likely useful life of the filters and they should be advised to leave the spraying area or change his/her filters well before they become saturated or clogged. Filters should be at least disposed of at the end of each shift and new ones fitted at the beginning of the next shift. Ensure the appropriate (correct) cartridges are being used for the application.

Goggles and protective glasses should be cleaned with detergent and water inside and out; care should be taken to store them safely.

12 Waste Products and Equipment Cleaning

Any wet paint left over should be allowed to pot (solidify) and this can then be disposed of as solid waste in accordance with national and/or local legislation.

Spray equipment should be cleaned with the recommended cleaning product. It should be noted that good practice and similar levels of protection should be maintained during the cleaning process.

13 Heat Stress

In hot climates, a single overall, worn next to the skin, can become completely wet with sweat. In this case, it is possible for substances in paint on the outer surface of the overall to be drawn through it and irritate the skin. To prevent this and to prevent paint that soaks through the outer overall reaching the skin, two overalls are recommended in most of the scenarios discussed.

However, wearing two overalls may subject people to undesirable heat stress especially if the inner overall is thick. It is possible that a single impervious overall that cannot be penetrated by paint or sweat may provide sufficient protection. Local protective clothing suppliers should be consulted for full details to facilitate correct selection.

14 Personal Hygiene

Those coming into contact with paint should remove outer overalls, at least, and wash their hands thoroughly before going to the toilet and wash their faces before smoking, drinking or eating.

Transfer of irritant materials from hands to more delicate areas of skin can be very unpleasant and is to be avoided.

Showering following work is recommended or as soon as possible after coming in contact with wet paint or dryspray/sanding dust. Personnel should not change into other clothes without first having a shower, or go home in working clothes. Following washing an after-work moisturising cream can be applied to restore the skin's natural oils.
15  First Aid

Skin
There are no specific antidotes for skin irritation. Any rashes should be gently but thoroughly cleaned and a soothing anti-inflammatory type cream applied. Affected areas should recover in a few days. If the irritation persists a doctor should be consulted.

Eyes
If paint or dryspray gets in eyes, they should be washed with water or saline solution for at least ten minutes. If discomfort continues, the sufferer should see a doctor or specialist eye hospital as soon as possible.

Lungs
Any respiratory symptoms should be referred immediately to a doctor or hospital.

16  Training

Inform people working with potentially hazardous substances as to the nature of the hazard. Give them the necessary instruction and training to use the product safely. Keep records of training given and have a system to check that the control measures recommended are being followed.

Ways of Working
People do not change behaviour and ways of working as the result of a single instruction. The best practice described above needs to be introduced with full training for all personnel and will need clear procedures plus constant reinforcement from management and supervision.

Clothing and Equipment
People need to be trained in the detail of wearing protective clothing. The overlap of sleeves/gloves and trousers/boots, the wearing of hoods and the use of barrier cream all need repeated instruction and supervision.

Specific Respiratory Protective Equipment training should be given. In particular, RPE should be tested for fit and people taught how to test for leaks. In situations where the RPE is relying on filters as a means of protection it is important to reinforce and provide scheduled breaks to change filters before they become inefficient or ineffective.

Personal Hygiene
The disciplines of personal hygiene are a very personal area. None the less it needs to be enforced and supervised if people are to be protected from skin problems.
17 Health Checks

Regular health checks can be of positive benefits to the workforce, they can identify early symptoms of dermatitis or reduction in lung capacity. The earlier the symptoms are recognised and treated, the more likely it is that the sufferer will make a full recovery. It may also be necessary to investigate why the symptoms have occurred and to carry out training.

Health checks also are another means to assessing whether adequate standards of control are being maintained.

18 Sources of information

National health and safety bodies, occupational hygienists and occupational physicians can be a source of information regarding many of the issues discussed in this document.

Manufacturers of safety products and equipment can be contacted to discuss issues related to protective clothing and equipment. Some useful websites are given below.

Disposable overalls

DuPont’s Tyvek website: http://www.tyvekprotech.com/

Respiratory Protective Equipment

3M’s website: http://www.mmm.com/

Protective gloves

Best Manufacturing website: http://www.bestglove.com/
Marigold Industrial: http://www.marigoldindustrial.com
APPENDIX I

European Health & Safety Legislation

As at January 2004, Community legislation relating to health and safety at work are:


Objective: The directive aims to ensure a high degree of protection of workers at work through the implementation of preventative measures to guard against accidents at work and occupational diseases and through the information, consultation, balanced participation and training of workers and their representatives.


Objective: The Directive lays down minimum requirements for the protection of workers from risks to their safety and health arising, or likely to arise, from the effects of chemical agents that are present at the workplace or as a result of any work activity involving chemical agents.


Objective: The directive aims to harmonise national measures on classification, packaging and labelling of dangerous substances to facilitate the establishment of a single market and to provide protection for public health and the environment.


Objectives: The directive aims to harmonise national measures on classification, packaging and labelling of dangerous preparations to facilitate the establishment of a single market and to provide protection for public health and the environment.

Objectives: The Directive lays down detailed arrangements for the specifications of safety data sheets for substances and preparations.


Objectives: The directive aims to harmonise the standards for the design, manufacture, specifications and test methods applicable to personal protective equipment.