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APPLICABILITY TABLE

X

indicates the businesses, within the division, to which this document applies.

Australian Vinyls / ModWood <input type="checkbox"/>	Kleenheat <input checked="" type="checkbox"/>	WesCEF Shared Services <input checked="" type="checkbox"/>
Ammonia / Ammonium Nitrate <input checked="" type="checkbox"/>	Sodium Cyanide <input checked="" type="checkbox"/>	CSBP Fertilisers <input checked="" type="checkbox"/> Decipher <input checked="" type="checkbox"/>

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1. GENERAL PRINCIPLES

The essential materials used in fibre-reinforced plastics (FRP) processing are glass reinforcement, resin, accelerators, catalysts, mould release agents, fillers, pigments and cleaning agents. These materials can pose significant hazards to people at the workplace and the environment, if the materials and FRP construction is not carried out and managed correctly.

The following general principles apply:

- a. Reasonable steps must be taken identified all FRP through ChemAlert;
- b. Where FRP is identified, a risk assessment and controls must be implemented; and
- c. Identification of FRP and associated risk assessments should only be undertaken by competent persons.

2. OBJECTIVES

The objectives are to:

- a. Provide brief overview of materials used in fibre glassing;
- b. Make people aware of the hazards these materials pose;
- c. Provide details of the applicable regulations;
- d. Provide responsibilities of employees and contractors; and
- e. Advise how to comply in minimising any health risk to employees and others at the workplace, and risk to the environment from hazardous materials and chemical products.

3. LEGISLATION

The AMP is based on the following regulation, codes of practice and guidance materials:

- a. <https://www.commerce.wa.gov.au/publications/working-fibreglass>;
- b. Occupational Safety and Health Act;
- c. Occupational Safety and Health Regulations;
- d. Australian Dangerous Goods Code; and
- e. Environmental Protection (Controlled Waste) Regulations 2004.

This document should be read in conjunction with referenced documents in Section 9.

4. ROLES AND RESPONSIBILITIES

The following provide the general roles and responsibilities.

Employees

- a. Provide and maintain a safe and healthy working environment;
- b. Ensure that all applicable Australian standards and legislative regulations are adhered to;
- c. Provide instruction and training on health and safety issues to all employees;
- d. Ensure appropriate and maintained personal protective equipment is used;
- e. Ensure that approved procedures for FRP processing are followed; and
- f. To provide health surveillance to all workers if exposure levels could be exceeded.

Contractors

- a. Comply and conform with instructions given to them regarding their own health and safety and that of others in the vicinity;
- b. Comply with all standards, legislative regulations and procedures associated with FRP processing;
- c. To wear, as instructed, all personal protective clothing and equipment provided; and
- d. To participate in pre-employment medical and annual check-ups, and as required blood and urine testing and biological-monitoring program.

5. MATERIALS USED IN FIBREGLASS

Safety Data Sheets (SDS) of all materials to be used shall be made available at the workplace. Reference shall be made to the Supplier's SDS and the product labels before they are used. Safety precautions specified on the SDS and the product labels shall be adhered to.

The following essential materials can be used in FRP.

GLASS REINFORCEMENT

Glass reinforcement is available as roving, chopped strand and woven mat.

RESINS AND GEL COATS

- Epoxy Resins
Commonly used for chemical resistance and in specialised composite areas e.g. aerospace.
- Polyester Resins and Vinyl Ester Resins

The most commonly used resins in Australian industry. Unsaturated polyester and vinyl ester resins evolve styrene monomer vapour during lay-up and during initial curing.

ACCELERATORS AND PROMOTERS

- Cobalt Solutions
- Dimethylaniline (DMA)

CATALYSTS AND CURING AGENTS

- Methyl Ethyl Ketone Peroxide (MEKP) and Peroxides

Unsaturated polyester resins and vinyl ester resins are cured by the action of catalysts, which are normally organic peroxides - the most common being MEKP.



Incorrect proportion mixing with resin can generate a fireball

- Polyamine and Polyamide Hardeners
Polyamine and Polyamide hardeners are used to cure Epoxy resins.
- Polyurethane Curing Agents
These are normally polyfunctional isocyanates such as methylene diisocyanate (MDI) and toluene diisocyanate (TDI).

MOULD RELEASE AGENTS

Waxes, silicones, polymeric films and polyvinyl alcohol are used to facilitate removal of the cured composite product from its mould.

FILLERS AND PIGMENTS

Fillers such as calcium carbonate, talc, fumed silica etc., can be added to enhance the properties of the composite. Pigments may be added for colour.

CLEANING AGENTS

Solvents such as acetone and MEK are used in FRP manufacturing for cleaning purposes.

6. FIBREGLASS PROCESSES

All FRP processes follow the same basic principle. Resin; fibreglass reinforcement and a catalyst are all applied to a mould where polymerisation takes place. During the fabrication of the composite products, the resin changes from liquid or paste to solid. The fibreglass process and products can cause significant hazards.

Styrene Based Resins

In Western Australia, the wet spray-up or hand lay-up processes are most commonly used. These processes involve the application of styrene-based resin to a mould either by spraying or by rollers and brushes. Large amounts of styrene vapour are given off during the application and curing stages. As a result, laminators will be exposed to excessive amounts of styrene unless adequate ventilation is provided. A typical polyester resin contains 40-60% styrene.

Note: Typically, the spray-up process generates 2-3 times as much styrene vapour as the hand lay-up process.

7. HAZARDS WORKING WITH FIBREGLASS

Hazards during the manufacturing process are as follows:

- a. Health risk to workers arising from inhalation of dusts and absorption of chemicals;
- b. Fire or explosion risk from the resins and solvents used and vapours generated;
- c. Fire or explosion risk from dust generated during grinding, sanding and finishing stages;
- d. Fire risk from spontaneous combustion of waste materials; and
- e. Explosion risk from mixing different chemicals together without referring and adhering to manufacturer's specific instructions.

8. MANAGEMENT OF FIBREGLASS

Legislation requires that the person responsible for the workplace must identify all hazards that a person at the workplace is likely to be exposed to, assess the risk and identify the means by which the risk may be reduced.

8.1 IDENTIFY, ASSESS AND CONTROL

The following documents outline the process to be followed to minimise health risk to employees and others or the environment from hazardous materials and chemical products either manufactured or used and should be used for all work involving FRP:

- a. Control of workplace hazardous material;
- b. Work permit system; and
- c. STOP and Job safety analysis risk assessment.

Note: No chemical product shall be used on site until the hygiene and environmental departments have granted approval.

8.2 MONITORING AND HEALTH SURVEILLANCE

8.2.1 Monitoring

Refer to the WesCEF occupational hygiene management plan for details regarding monitoring requirements.

8.2.2 Health surveillance

Refer to the WesCEF health surveillance and biological monitoring plan for details regarding health surveillance.

9. SAFE WORKING PRACTISES

9.1 STORAGE AND HANDLING OF HAZARDOUS MATERIALS

All hazardous materials shall be stored and handled in accordance with product labelling and the manufacturer's SDS.

In general, keep all containers tightly closed, away from sources of ignition and store in a cool, dry dark and well-ventilated area.



Keep away from direct sunlight and heat and segregate incompatible materials.

Emptied containers retain vapour and product residue and may therefore present explosive vapour and irritant / toxic material hazards. Observe all safeguards on labels and in the MSDS until container is cleaned, reconditioned or destroyed.



Do not cut or weld on or near emptied containers.

Disposal shall be in accordance with regulations. Refer to section 9.7.

9.2 VENTILATION AND PERSONAL PROTECTION

Carefully planned and designed workplace ventilation system, using fans, ducting, hoods and booths, scrubbers and filters if contaminants are to be removed before air is discharged, is essential to ensure vapours are removed or reduced to levels that do not pose a hazard to workers.

Booth ventilation is the most desirable form of effective vapour control as it ensures the hazardous activity is restricted to a designated area and it prevents the rest of the area from being contaminated.

Fans are used to blow vapours away from the worker's breathing zone and towards an extraction system.

Personnel working inside a mould, tank or enclosed structure can result in high exposure to styrene or other harmful vapours. Essential requirement in ventilation of confined spaces is that fresh air must be supplied to move from behind or above the operator. Extraction should move the contaminated air away from the operator. There should be airflow from inlet to outlet and the fresh air and extraction systems must be placed in such a position to create this flow. To check that the airflow pattern through the confined space is correct, air current tubes should be used to enable the airflow to be seen.

When mixing and handling resins, curing agents and solvents, the safety precautions specified in the SDS for each component shall be adhered to. Suitable protective clothing, gloves, goggles, respiratory devices and barrier creams shall be used.



It is extremely important to avoid inhaling vapours and to avoid skin and eye contact with chemicals. Ensure that appropriate personal protective equipment is used.

In conjunction with the work practices specified in Section 11, the following shall be followed:

- a. Eye and skin protection must be worn when decanting and using resin, promoters, catalyst and cleaning solvents;
- b. Decant and mix under a fume hood or a well-ventilated work area;
- c. Clean up all spills immediately;
- d. Use safety cans for solvents;
- e. Ensure there is adequate forced ventilation of work area. Vapours from solvents are heavier than air; extraction should draw air from the floor level;
- f. Avoid inhalation of vapours when cleaning tools. Use as little solvent as possible, work outside or in a fume hood and complete the task as quickly as possible. Containers filled with cleaning agent must be covered;
- g. To avoid inhalation of dust when grinding, use approved dust masks; and
- h. Frequent hand washing is essential especially prior to meal breaks. Use hot running water, soap and a nailbrush.



Smoking, eating, drinking and storing food in fibre-reinforced plastic work areas is forbidden.

9.3 FIRST AID

First aid treatment following contact with FRP materials shall be in accordance with the manufacturers supplied SDS. Advice from the medical centre should also be sought if required. As a guide typical treatment is as follows:

HAZARDOUS SUBSTANCE	FIRST AID TREATMENT	
Glass fibres	Eyes	<ul style="list-style-type: none"> Irrigate carefully with plenty of water.
	Skin	<ul style="list-style-type: none"> Wash skin with plenty of water.
Resins Accelerators Catalysts Cleaning agents	Eye	<ul style="list-style-type: none"> Immediately and carefully irrigate with plenty of water. Ensure irrigation under eyelids by occasionally lifting them. Do NOT try to remove contact lenses unless trained. Seek immediate medical assistance.
	Skin	<ul style="list-style-type: none"> Immediately wash affected area with soap and water. Remove contaminated clothing and footwear. Ensure contaminated clothing is thoroughly washed before using again. Seek immediate medical assistance.
	Inhaled	<ul style="list-style-type: none"> Remove from exposure into fresh air. If breathing abnormal give respiratory aid. Keep warm, comfortable and at rest. Seek immediate medical assistance.
	Ingested	<ul style="list-style-type: none"> Wash mouth out with water and give water to drink as slowly as can be tolerated (3-5 glasses), provided the victim is completely conscious. Do NOT induce vomiting. Lean victim forward to reduce the risk of aspiration. Keep warm, comfortable and at rest. Seek urgent medical assistance.

9.4 SAFETY SHOWERS

Safety showers and eye washing facilities shall be provided near the workplace where chemicals are handled and used. If contamination occurs, irrigate the eyes and/or wash the contaminated area for at least 20 minutes under the shower. Remove contaminated clothing in the shower and wash underlying skin.

In the case of peroxide contact, the eye should be flushed continuously until medical treatment is available.

Note: Where it is not practicable to provide an eye wash facility, portable eye wash bottles shall be provided. Care must be taken to ensure they are protected from contamination such as dust and that the solution is changed at the interval recommended by the supplier.

9.5 FIRE PRECAUTIONS

The following fire precautions must always be observed:

- a. Styrene, acetone and MEK are volatile, flammable solvents. Strict fire precautions must be observed;
- b. Dust produced by grinding is highly flammable – meticulous housekeeping is essential. Surfaces shall be vacuum cleaned, not swept;
- c. Promoters and catalysts will react violently and spontaneously. The promoter must be stored, decanted or added at a point remote from the catalyst. Add promoter to resin and mix, then add catalyst;
- d. Catalyst (MEKP) may cause spontaneous combustion with organic material such as a rag. Cleaning rags must be disposed of under water in a ‘wet bin’; and
- e. In all work areas, identify the nearest fire extinguisher prior to commencing work.



Strictly no smoking allowed in the work area or chemical storage areas.

9.6 HOUSEKEEPING

A clean and tidy workplace shall always be maintained with particular attention to the following:

- a. Ensure workplace area floors are of sound construction suited to the process, kept free of all obstructions and are cleaned regularly;
- b. Provide two (2) ‘wet’ and one (1) ‘dry’ waste bin for each 40 square metres of floor space;
- c. No more than a day’s or a shift’s supply of materials should be kept at the work area;
- d. Put all waste (off cuts, process waste, excess packaging material etc) into the appropriate and labelled bins;
- e. Immediately clean up spilled chemicals and put the contaminated cleaning rags into the appropriate ‘wet’ bin;
- f. Do not use previously contaminated rags and do not use the same cleaning rag on more than one type of chemical;
- g. The rags used to clean spillages of promoter and accelerators must be placed in a ‘wet’ bin quite separate from the rags used to clean up spillages of catalysts;
- h. Empty all bins at the end of each shift or as soon as full, whichever comes first. The two types of bins shall remain separate throughout the disposal stage, be emptied into separate transport bins and be disposed of appropriately, by licensed carriers;
- i. Thoroughly clean all working areas at the end of each shift;
- j. Ensure there is clear access to exits, fire extinguishers and fire-fighting equipment at all times;
- k. Ensure there is good air space around stored materials and components;
- l. Inspect exhaust ducting, rafters, and projections etc., weekly and clean way dust deposits;

- m. Inspect concealed spaces and keep clear of wastes;
- n. Maintain lights in good condition; and
- o. Hand-mix resins in a well-ventilated area and only mix the necessary amount.

Note: Because of the potential hazard, only competent personnel shall carry out resin mixing.

9.7 WASTE DISPOSAL

All waste generated on site must be tracked to its final destination and disposed in accordance with WesCEF Department of Environmental Protection “Licence to Operate”, Controlled Waste Regulations and Department of Mineral and Petroleum Resources Regulations.

Please contact the environmental department representative for waste disposal requirements.

Contaminated water from the “wet” bins shall not be discharged to sewers, drains, waterways or poured onto the ground to evaporate or soak away. Contaminated water or liquids shall be held in labelled containers that are sealed and held in a bunded area on site until approval to dispose is granted.

Excess chemicals left over at the end of the job should be removed from site. WesCEF encourages all work on site to reduce wastes. Where possible recover or re-use all wastes, for example:

1. Acetone waste can be reduced by distillation to recover the acetone for re-use; and
2. Resin drums and containers may be suitable for recycling if they are sealed immediately after becoming empty.

10. DEFINITIONS

ADG CODE: Australian code for the transport of dangerous goods by road and rail referred to as the Australian dangerous goods code.

Competent: A person who has acquired through training and experience the knowledge and skills required to carry out the work safely.

DMA: Dimethylaniline

FRP: Fibre reinforced plastic

LSE: Low styrene emission

MEKP: Methyl Ethyl Ketone Peroxide

11. REFERENCE MATERIAL

All materials, equipment and work covered by this document shall conform to the requirements of all statutory authorities having jurisdiction over the work site.

Should there be a conflict between the works, WesCEF documents and statutory authority requirements the most stringent requirements shall prevail.

11.1 WESCEF DOCUMENTS

- Personal protective equipment ([CSBP-GM-11-031-01](#))
- Use of personal protective equipment ([KHO-GM-OHS-070-28](#))
- Respiratory protection ([CSBP-GM-11-031-05](#))
- Health surveillance and biological monitoring ([WCEF-PD-OHS-090-02](#))
- Asbestos management plan ([WCEF-PD-OHS-130-01](#))
- Gas testing procedure ([CSBP-GM-11-031-33](#))
- Control of workplace hazardous material ([CSBP-GM-11-037-05](#))
- Work permit system ([CSBP-GM-11-031-51](#))
- STOP and Job Safety Analysis Risk Assessment ([CSBP-GM-11-031-23](#))
- Basic safety rules ([CSBP-GM-11-035-02](#))
- Confined spaces ([CSBP-GM-11-031-52](#))
- Confined spaces procedures ([KHP-GM-OHS-070-02](#))

11.2 AUSTRALIAN STANDARDS

- | | |
|-----------|---|
| AS 1715 | Selection, use and maintenance of respiratory protective devices |
| AS 1716 | Respiratory protective devices |
| AS 1940 | The storage and handling of flammable and combustible liquids |
| AS 2161.2 | Occupational protective gloves – general requirements |
| AS 2714 | The storage and handling of hazardous chemical materials – Class 5.2 Substances (Organic Peroxides) |
| AS 2865 | Safe working in a confined space |
| AS 3765 | Clothing for protection against hazardous chemicals |
| AS 3780 | The storage and handling of corrosive substances |
| AS 3833 | The storage and handling of mixed classes of dangerous goods in packages and intermediate bulk containers |
| AS 4081 | The storage, handling and transport of liquid and liquefied polyfunctional isocyanates |

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