1 Status

1.1 Update of existing policy effective 06/03/11.

2 Purpose

2.1 To provide guidelines for the safe operation of airless spraying equipment and to identify and eliminate the hazards associated with these tasks.

3 Applicability

3.1 This policy applies to all subsidiary companies and departments of The Cianbro Companies.

3.2 All organizations are required to comply with the provisions of this policy and procedure. Any deviation, unless spelled out specifically in the policy, requires the permission of the Corporate Safety Officer or designee.

4 Definitions

4.1 Airless Spraying: An airless sprayer uses air or an electrically run hydraulic pump to move paint from a bucket or container, through a tube, into a high-pressure hose, to a spray gun and finally to the surface.

   An airless sprayer is made from several components which are:

   • Pump / Fluid Section
     This is what moves and pressurizes the material to be sprayed. Airless pumps are made of hardened, heavy-duty steel so they can create the high pressure needed to atomize paints.

   • Motor & Drive Train
     Cianbro uses both air and electric powered pumps.

   • Gun, Hose & Tip
     The hose, gun & spray tip get the pressurized liquid onto the surface.

   • Pressure Control
     There are 2 main types of pressure controls; electronic and mechanical. A majority of Cianbro’s airless spraying equipment utilizes a mechanical pressure regulator valve.

4.2 Atomize: When pressure in the gun nozzle breaks up the paint and solvents into fine particles.

4.3 Competent Painter: A team member who through training and experience has acquired and demonstrated the appropriate skills and behaviors for safety, quality, productivity and desired work practices. A competent painter will have the knowledge to identify hazards within their work environments for themselves and fellow team members. A competent painter has the authorization and the responsibility to stop work and eliminate hazards when identified. Competent painters will be identified by the site management team.

4.4 Dermal: Pertaining to the skin.

4.5 Flow: The ability of a coating to level out and spread into a smooth film.

4.6 Grounded: A conducting connection between an electric circuit or equipment and the earth or some other conducting body.
4.7 Pressure: The amount of force exerted evenly on a given surface area, typically reported in pounds per square inch.

4.8 Skin Microflora: Living microorganisms that are so small that they can be seen only with a microscope and that maintain a more or less constant presence in a particular area, e.g. the pharynx or the rumen. Includes bacteria, viruses, protozoa and fungi.

4.9 Static Electricity: Electric discharge resulting from the accumulation of electric charge on an insulated body.

4.10 Thinner: Volatile liquid used to adjust viscosity or to modify other properties of paint. Thinner is also used to clean.

4.11 Toxicity: Is a concern with some exotic coatings injected directly into the bloodstream.

5 Policy

5.1 The project’s top management is responsible for the airless spraying operations. Management shall implement and adhere to this policy and all other Cianbro policies and procedures relating to this operation.

6 Responsibilities

6.1 The top Cianbro manager on the job site is responsible for the implementation of this policy on the project.

6.2 The corporate safety department is responsible for maintaining this document.
7.1 Procedure/Best Practices

7.1.1 Obtain and review the MSDS for the paints and solvents you will be using and follow any specific recommendations for personal protective equipment above and beyond Cianbro's own requirements.

7.1.2 All painting operations must be done in a well ventilated area.

7.1.3 When spraying in a spray booth (even if a temporary one) the booth must be properly maintained, including regular cleaning of the filters and overspray.

7.1.4 Respirator selection and use will be based on a hazard assessment of the components in the paint and the protection factors required. (Follow the site specific respiratory protection plan).

7.1.5 Protective clothing must be provided to prevent dermal exposure. This includes coveralls/Tyvex, head socks, gloves and boot covers at a minimal.

7.1.6 Contaminated PPE must be disposed of (or commercially laundered) immediately.

7.1.7 All food and/or drinks will be kept separate from any painting applications.

7.1.8 Select the appropriate spray equipment based on pressure and flow requirements of the application.

7.1.9 Check all equipment regularly and repair or replace worn or damaged parts before use.

7.1.10 Equipment and accessories must be used within their rated capacities. (Do not exceed the maximum working pressure of any component of the system.)

7.1.11 Use only water based cleansers to removed paint from hands or skin that are meant for personal clean up.

7.1.12 All electrical equipment and tools used in spraying areas must have appropriate electrical rating and must be grounded.

7.1.13 Ergonomics Spraying can require holding static positions for long periods of time and also involves repetitive motions. Remindsprayers to relax and stretch frequently.

7.1.14 Never use an airless sprayer without the tip guard in place.

7.1.15 Never repair high pressure hoses. Destroy damaged hose and replace with new hose.

7.1.16 Never leave an airless pump unattended without first shutting off the pump, triggering the gun to release all pressure and setting the trigger lock on the gun in the "locked" position.

7.1.17 Always ensure that the power switch is "off" before plugging in the electrical units.
7.1.18 Check all connections and fittings for tightness before operating the unit.

7.1.19 Observe good housekeeping; keep spray area clear of obstructions as visibility while spraying can be limited.

7.2 Specific Hazards

7.2.1 Fire and Explosion
Fires and explosions occur when there is an ignition source combined with flammable vapors and oxygen. It is imperative to our safety to eliminate all ignition sources from the spraying area. Possible ignition sources are:
- Electrical switches or motor
- Lighting/heating
- Open Flames/sparks
- Static electricity

Static electricity may build up when fluids flow through pumps, hoses, and sprayers. In these situations ungrounded objects can accumulate a charge and subsequently a discharge.

To prevent fire and explosion the following precautions should be taken:
- Install and use proper ventilation.
- Remove or extinguish all ignition sources.

Ground all equipment, objects and team members to prevent electrostatic discharge. Proper grounding of the airless system safely dissipates this charge. Grounding should be to a designated ground source if possible (i.e. grounding rod, copper cold water pipes, or building steel). When grounding ensure:
- Remove all dirt, rust, or corrosion from areas where connections are to be made.
- Use connectors that are strong enough for the job.
- Connect metal to metal.
- Protect ground clamps and fittings from physical damage.

7.2.2 Skin Injection
Airless spray guns atomize by hydraulic pressure, forcing paint through a very small orifice in the nozzle (0.011 to 0.023in). Paint is delivered from high pressure pumps between 2000 and 5000psi. Spray particles retain enough velocity to travel into the skin.

Injection in the skin is a serious traumatic injury. IT IS IMPORTANT TO TREAT THE INJURY SURGICALLY AS SOON AS POSSIBLE. Do not delay treatment to research toxicity. The seriousness of the wound depends on where the injury is on the body, whether the substance hit something on its way in and deflected causing more damage, and many other variables including skin micro flora residing in the paint or gun which are blasted onto the wound. The following precautions should be taken to avoid injection:
- Never use an airless spray gun without a safety tip guard or if any safety devices are not working or have been removed. (Trigger lock, diffuser, etc.).
- Always have trigger lock on when cleaning/changing tip, adjusting swivel and when depressurizing the airless system to prevent air injection.
- Always relieve pressure from air line before disconnecting hoses from pump or gun.
- Always make sure that all connections on air line are properly secured to prevent them from separating while under pressure.
- Always make sure that all personnel are out of line of fire before using the airless spray gun.
- Never point the airless spray gun at any one.
- Make sure you know where your hands and fingers are at all times in relations to the tip of the airless spray gun.
• Always depressurize your gun and lines before making any disconnections. (Use the dump valves on the pump.) Secure gun and lines to avoid “whip” effect.

7.2.3 Chemical Exposures/Toxicity
Toxicity is a potential hazard when the work environment exposes team members to:
• Fumes from coating materials or fluids.
• Gas engine exhaust fumes.
• Toxic fluid that contacts skin, nose, mouth or eyes.

Whenever chemical exposures are present; review product MSDS sheets and follow the proper procedures to eliminate or protect from exposure hazards.

7.2.4 Pinch Points:
Moving parts, such as the priming piston, can pinch or amputate your fingers. To prevent injury from moving parts:
• Never operate equipment with guards or other protective devices removed.
• Properly use bleed type shutoff valves.
• Keep clear of all moving parts when starting or operating the pump.
• Depressurize all components before doing and service/maintenance.
• Identify pinch points when working from elevated work platforms (baskets) and keep team members hands/arms clear from these areas.

7.3 Training
Training for airless sprayers will be done through On the Job Training (OJT) and performance evaluations, safety knowledge, quality measures, and productivity along with skill abilities will be evaluated by a qualified and competent painter.

7.3.1 On the Job Training (OJT)
Novice sprayers are encouraged to practice operating spray equipment, but only under the close supervision of a qualified and competent painter to gain experience. The competent painter and trainee both need to be identified in the Daily Activity Plan. In addition, both need to be approved by job management. The supervisor shall only permit certified competent team member’s who are qualified by training and experience to operate airless spraying equipment (with the exception of training situations, in which case the trainee is under close supervision of a Cianbro competent painter).

7.3.2 Documentation
During the OJT process the competent painter will document the trainee’s progression on the Airless Sprayer Competency Checklist (see 9.4 Appendix D). Novice sprayers will not be allow to work alone until they have mastered all components of airless spraying listed on the Airless Sprayer Competency Checklist. Once completed the Airless Sprayer Competency form will be sent to the Cianbro Institute to be added to team member’s personnel file.

7.4 Safety At Home
Follow the manufacturer’s guidelines for safe operation of spraying equipment.

8 Budget / Approval Process

8.1 It is the responsibility of each jobsite to procure and provide all materials and PPE required and provide necessary training.
9 Related Documents

9.1 References
Graco Concept and Theory Training and www.graco.com D Library

9.2 See attachments

9.3 Document available on Cianbro.net>Standard Operating Procedures – SOP.

| Airless Sprayer Competency Checklist | SD1057 |
9.1 Appendix A

Pressure Relief Procedure

**WARNING**

1. Engage trigger lock.

2. Shut off pump.

3. Disengage trigger lock.

4. Trigger gun to relieve pressure. Always wear a face shield.

5. Engage trigger lock.

6. Open fluid drain valve; have a container ready to catch drainage. Leave drain valve open until you start spraying again.

7. If you suspect that pressure is not fully relieved because:
   - *Spray tip is clogged.*
     - **Switch Tip:** Follow procedure in 9.3 Appendix C.
     - **Flat Tip:** Very slowly loosen tip guard retaining nut and relieve pressure gradually then loosen completely. Clear tip.
   - *Hose is clogged*
     Secure the hose with a clamp then slowly loosen hose end coupling and relieve pressure gradually. Clean hose obstruction.

9.2 Appendix B
If RAC Spray Tip Clogs

1. If spraying tip clogs while spraying, stop immediately.

2. Engage trigger lock.

3. Rotate RAC tip handle back 180° (arrow points back).

4. Disengage trigger lock.

5. To remove clog, trigger gun into a pail or onto the ground.


7. Rotate RAC tip handle (G) to spraying position (arrow points forward).

8. If tip is still clogged:
   a. Engage trigger lock.
   b. Shut off sprayer and disconnect power source.
   c. Open fluid drain valve to relieve pressure.
   d. Remove and clean GHD RAC spray tip.

9.3 Appendix C

Flushing
4. Start pump at its lowest pressure.

Flush pump and gun before fluid can dry in it. If available, use flushing procedure provided in your pump or sprayer manual instead of this procedure.

1. Follow Pressure Relief Procedure, 9.1 Appendix A. Engage trigger lock.

2. Remove spray tip. Clean with solvent.

Leave guard on.

3. Put the pump intake in a pail of compatible solvent.

4. Start pump at its lowest pressure.

5. Disengage trigger lock, then trigger gun into the paint pail. When solvent appears, release trigger.

6. Trigger gun into solvent pail. Circulate fluid until system is thoroughly flushed.

7. Follow Pressure Relief Procedure, 9.1 Appendix A. Engage trigger lock.