Airless Spray Painting

In this bulletin we will discuss airless spray application and provide general guidelines to follow when using airless spray equipment with ***GLIDDEN PROFESSIONAL™*** *products. As a starting point we will look at safety first.*

Safety First

Airless spray painting involves a system that applies paint without the use of compressed air to carry the paint. Instead, an airless spray system holds paint under pressure then releases the pressurized liquid on application. This allows for a greater amount of material applied with less chance of it floating off into the atmosphere. With it come particular safety issues. The major one being that liquid released under pressure can penetrate the skin, causing serious injury. The following safety guidelines and good common sense should always be adhered to:

- Do not place your hand or other parts of the body in front of the airless gun.
- Never direct spray at yourself or any other person.
- Always wear protective clothing, gloves and goggles when painting. The use of a good pair of leather gloves could possibly prevent a serious injection wound.
- Follow all of the airless spray unit manufacturer's safety recommendations.
- Always use a tip guard.
- Always wear the proper breathing apparatus (consult the paint manufacturer's Material Safety Data Sheet).

How an Airless Spray System Works

Basically an airless spray system consists of a pump that draws paint through a pick up tube and sends it through a line or hose to the nozzle of an airless spray gun. The pressurized liquid paint is released through a spray tip when the nozzle .at the gun is opened. The spray tip determines the size of the spray pattern and the amount of paint being discharged.

The key to the system is pressure. Examples of a simplified airless spray system would be a garden hose or bathroom shower. If you don't have adequate pressure the system will not perform correctly.

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The maximum pressure in pounds per square inch (psi) at the pump of typical electric and gas powered airless spray units is around 3000 psi. These types of units are rated by delivery rate given in gallons per minute (gpm). This rating is related to the horsepower (hp) of the unit. The higher the hp the more paint per minute the unit can supply.

The pressure at the gun (atomization pressure), however, will be lower irregardless of which type of unit is used. This loss in pressure is determined by:

1. Length of the fluid hose or line
2. Inside diameter (ID) of the fluid hose
3. Viscosity of the paint
4. Obstructions in the line
5. Orientation when spraying

Let's consider each of these points:

1. The longer the fluid hose the greater the loss in pressure. 50 feet of hose is ideal. 100 feet of hose is long but can work. 150 feet of hose can create problems.
2. The diameter of the hose can be even more important than the length. An ID hose that is too narrow can greatly reduce the pressure at the gun.
3. If the viscosity of the coating is reduced by addition of solvent there is less loss of pressure at the gun. This is the most common remedy for airless spray problems; however, it is far from the best solution. Thinning can defeat the purpose of getting the film build you want and can lead to sag issues. Small amounts of thinner can be used if necessary.
4. Whenever there is a spray problem the filters in the gun and at the pump should be checked as well as the hoses and pipe connections for clogging, obstructions or restrictions. Dried out paint in the hoses and pipe elbows is common. The pick up tube and its filters should also be checked. Too fine a filter or too porous a filter can also lead to problems.
5. Consider you have 50 feet of line and you are 25-30 feet in the air spraying the side of a building, gravity will have an affect on the pressure in the line and reduce the pressure at the gun slightly.

Airless spray application should be begun at the lowest pressure adjustment possible, and then slowly increase the pressure until the spottiness and lines (called "fingers") disappear. Increasing the pressure past this point will increase over spray (or "blowback") and waste material.

Things to Check If You See "Fingers" or a Non-uniform Spray Pattern

- Check to see if you have maximum air pressure to the pump and the pump ratio is adequate.
- Check filters, hoses and pipe connections for dried paint, obstructions or restrictions.
- Switch to a smaller tip size.
- If using a previously used and possibly worn out tip, try a new one.
- Reduce fluid hose length or increase diameter of the hose.
- Thin to allowable limits.

General Recommendations for Airless Spray Application

Pump

For application of conventional latex and oil/alkyd paints, in general 1500-2000 psi atomization pressure at the gun will be adequate. This is easily achieved using common electric and gas powered units rated from 0.4-1.0 gpm. Higher build coatings such as block fillers and smooth elastomeric coatings require 2000-2500 psi atomization pressure that can be achieved using units rated at or near 1.0 gpm.

Higher powered gas and air-assisted units are available with increased material delivery rates and increased maximum pressure ratings. These units allow for longer line lengths and multiple guns to be used on larger jobs. There are also special airless and air-assisted airless units for spraying texture coatings. These units typically have higher delivery rates and special nozzles to accommodate the aggregate in texture coatings.

Hose Length and Diameter

For application of conventional latex and oil/alkyd paints, a ¼ to ⅜ inch ID hose at 50 to 100 foot is typical. For high build, high solids coatings such as block filler and smooth elastomeric coatings a minimum ⅜ inch ID hose at 50 feet is required and a minimum ½ inch ID hose if the length exceeds 100 feet.

Tip Size

The airless spray gun tip size determines the amount of paint applied. It also determines the spray pattern or size of the spray fan. When choosing the proper tip size things to consider include: surface porosity, desired coverage, wind conditions, surrounding surfaces, amount of detail and humidity levels.

- A more porous surface will absorb more material so a larger tip size should be used, while a sealed surface requires less material and a smaller tip size should be used.
- When wind conditions become strong switching to a smaller tip will help reduce excessive overspray.
- If overspray is a problem for surrounding surfaces switching to a smaller tip can help.
- If a large area of detail work is present, using a smaller tip will help reduce the likelihood of runs and sags.
- High humidity can greatly increase dry time of the applied paint. In situations where high humidity exists, switching to a smaller tip can also reduce the likelihood of runs and sags.

Filters

Always operate your system with a pick up tube filter even if you know the material has been strained properly and is free of foreign objects. This will insure that any objects accidentally falling into your paint without your knowledge will not be drawn up into the pump causing internal damage.

Some pumps are equipped with an inline filter that helps reduce the amount of impurities which could be sent to the gun. This filter should be cleaned before each use of the system. If you properly strain all of your material prior to use, this filter can be removed. With application of some high build, high solids materials such as block filler or elastomeric coatings it may be best to remove the inline filter anyway prior to use.

The tip filter located in the airless gun just before the tip stops particles or impurities from reaching the tip and causing a plug up. In choosing the proper tip filter you must consider the tip size and the material being sprayed. As a general rule, if you are using a seventeen thousandth inch (.017") orifice or smaller, you should be using a fine filter. If you are using an eighteen thousandth inch (.018") orifice or larger, a medium or coarse filter should be used. Some materials tend to coagulate quickly when forced through small openings. Even after proper straining, these materials can quickly plug a fine filter. If you run into this situation, try switching to a larger orifice size and medium or coarse filter.

Material Type	Atomization Pressure (psi)	Pump	Hose ID at 50 feet	Fan Size	Orifice	Tip Filter
Lacquer and Semi-Transparent Stains	1300	0.4 gpm	¼″	8″-12″	.011-.017	Fine
Oil/Alkyd Enamels and Primers	1500-2000	0.4-1.0 gpm	¼″	10″-12″	.013-.017	Fine
Solid Color Stains	1500-2000	0.4-1.0 gpm	¼″	10″-12″	.015-.019	Fine-Medium
Interior and Exterior Latex Paints and Primers	1500-2000	0.4-1.0 gpm	¼″	10″-12″	.015-.021	Fine-Coarse
Latex Block Fillers	2000-2500	1.0 gpm minimum	⅜″	10″-12″	.021-.025	Coarse
Smooth Elastomeric Coatings	2000-2500	1.0 gpm minimum	⅜″	10″-12″	.023-.025	Coarse
Texture Coatings (Decraflex Fine Coating)	N/A	3.0 gpm air-assisted (minimum air compressor rating 25 cfm @ 90 psi for best results)	¾″	N/A	#2 nozzle & ⅛″ spray disk	N/A
Texture Coatings (Decraflex Coarse Coating)	N/A	3.0 gpm air-assisted (minimum air compressor rating 25 cfm @ 90 psi for best results)	¾″	N/A	#2 nozzle & ¼″ spray disk	N/A
Texture Coatings (Buildtex™ Medium Coating)	N/A	3.0 gpm air-assisted (minimum air compressor rating 25 cfm @ 90 psi for best results)	¾″	N/A	#2 nozzle & ⅜″ spray disk	N/A

With all of the different types of airless spray units available on the market today we can not cover every situation and particular case. Please read the specific requirements/specifications (e.g. maximum tip size, maximum hose length, delivery rate, maximum working pressure, etc.) for your particular airless spray unit and follow all manufacturers' safety precautions.