

# Course on Lacquering and Painting

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### **What is paint?**

Generally speaking, all paint is made up of three components: a pigment, a vehicle, and a solvent.

Pigment is the material that gives paint its color. Pigment can be organic or chemical, but pigments have nothing to do with how the paint is classified.

A paint vehicle is material that bonds to pigment and remains on the surface once the paint dries. The vehicle is what gives paint its protective properties.

A solvent is any liquid that dissolves the vehicle to make paint liquid in the bottle or can. Note that a solvent does not have to be a chemical. Water is a solvent if it dissolves the vehicle in a given paint.

### **How are paints classified?**

There are only two general classifications of paint enamels or lacquers.

Enamel paint is one that both dries and cures once applied to a surface. As the solvent evaporates, the vehicle undergoes a chemical reaction making it harder and less soluble than the liquid paint. This is why you typically can't remove fully cured enamel with the same solvent as in the original paint.

Lacquer only dries it does not cure. The solvent evaporates with no chemical reaction. This is why water-based lacquers can be dissolved with water long after the paint has dried. This is also why applying multiple layers of lacquer can result in underlying layers dissolving.

### **What about Acrylics?**

"Acrylic" refers to the vehicle used in paint and not with how the paint reacts once it is applied. The vehicle in acrylic paint is a form of plastic and there are both "acrylic enamels" and "acrylic lacquers". There are also both petroleum-based and water-based solvents for each of these acrylics, depending on the vehicle formulation. For years, modelers, hobby shop owners, and even "experts", have referred to modeling paints as either enamel/lacquer (meaning that the paint uses a chemical solvent) or acrylic (meaning that water is the solvent). This is just plain wrong and only adds to the confusion. Try adding water to petroleum-based acrylic enamel and you quickly realize that not all acrylics are water-based. Water-based acrylics should be referred to as "aqueous acrylics".

### **What are the differences in paints?**

Traditionally, enamels have used a relatively mild petroleum-based solvent with an alkyd vehicle. This combination, while generally safe, takes a long time to cure, sometimes weeks to reach maximum hardness. They are an extremely stable paint and can last for decades without degrading, if properly stored. There are now enamels that dry nearly as fast as lacquers and nearly as hard.

Lacquers tend to dry quicker and to a harder consistency than enamels typically in 24 to 48 hours. However, they use harsher solvents to accelerate the drying time. These solvents can attack plastic parts, brush bristles, and brain cells with equal vigor. There are now lacquers available that use much milder solvents (including water) yet maintain their traditional hard finish.

With the advent of aqueous acrylics, many of the differences between traditional paints have merged, but aqueous paint has its own problems. Some people think aqueous paint doesn't "stick" to styrene parts like chemical paint. Aqueous paint is more sensitive to humidity and temperature. Modelers who choose aqueous acrylic paint generally do so to avoid exposure to chemicals.

### **Different Types of lacquer/paint**

In a general sense, lacquer is a clear or colored varnish **that** dries by solvent evaporation and often a curing process as well that produces a hard, durable finish, in any sheen level from ultra matte\_ to high gloss and that can be further polished as required.

The term lacquer originates from the Portuguese word for Lac, a type of resin excreted from certain insects. Regardless, in modern usage, Lac-based varnishes are referred to as shellac, while lacquer refers to other polymers dissolved in Volatile Organic Compounds (VOCs), such as nitrocellulose and later acrylic compounds dissolved in a solvent generally referred to as lacquer thinner.

While both lacquer and shellac are traditional finishes, lacquer is more durable than shellac.

### **Urushiol-based lacquers**

Lacquer and producing lacquer ware had been known to the Chinese since at least 5000 B.C, with a painted bowl found at Hemudu culture, as the world's earliest. These lacquers, produce very hard, durable finishes that are both beautiful, and very resistant to damage by water, acid, alkali or abrasion. The active ingredients of the resin are urushiol a mixture of various phenols suspended in water, plus a few proteins.

**2** Urushiol-based lacquers differ from most other lacquers in that they are slow-drying, water based, and set by oxidation and polymerization, rather than by evaporation alone. In order for it to set properly it requires humidity and warm temperature. The phenols oxidize and polymerize under the action of enzyme lactase, yielding a substrate that, upon proper evaporation of its water content, is hard and fairly resistant to mechanical stress. Lacquer skills became very highly developed in India and Asia, and many highly decorated pieces were produced. The process of lacquer application in India is different from China and Japan. There are two types of lacquer: One is obtained from the Rhustree and the other from an insect. In India the insect lac was once used from which a red dye was first extracted ; later what was left of the insect was a grease that was used for lacquering objects. Insect lac was introduced to India from Persia (Iran). The fresh resin from the Rhus trees causes urushioi-induced contact dermatitis and great care is required in its use. The Chinese treated the allergic reaction with shell-fish.

The contemporary theory held that from China, knowledge of lacquer technology was introduced to Korea, and from there to Japan. It was believed that Japan had also been using lacquer from ancient times, but the systematic process of application was developed by the Chinese. With the discovery of lacquer ware in Japan dating back to jomon period, conflicting theories claim that technology may have been independently developed in Japan. Trade of lacquer objects traveled through various routes to the Middle East. Known applications of lacquer in China included coffins, plates, music instruments and furniture. Lacquer mixed with powered cinnabar is used to produce the traditional red lacquer ware from China. The trees must be at least 10 year old before cutting to bleed the resin. It sets by a process called “aqua-polymerization”, absorbing oxygen to set; placing in a humid environment (called “furo” or “muro” in Japanese, means “a bath” or “a room”) allows it to absorb more oxygen from the evaporation of water.

Lacquer yielding trees in Thailand, Vietnam, Burma and Taiwan, called Thitsi, and are slightly different; they do not contain urushiol, but similar substances called “lacco” or “thitsiol”. The end result is similar but softer than the Chinese or Japanese lacquer. Unlike Japanese and Chinese Rhus verniciflua resin, Burmese lacquer does not cause allergic reactions; it sets slower, and is painted by craftsmen’s hands without using brushes.

Raw lacquer can be “colored” by the addition of small amounts of iron oxides, giving red or black depending on the oxide. There is some evidence that its use is even older than 8,000 years from archaeological digs in China. Later, pigments were added to make colors. It is used not only as a finish, but mixed with ground fired and unfired clays applied to a mould with layers of hemp cloth, it can produce objects without need for **3** another core like wood. The process is called “kanshitsu” in Japan. Advanced decorative techniques using additional materials such as gold and silver powders and flakes (“makie”) were refined to very high

standards in Japan also after having been introduced from China. In the lacquering of the Chinese musical instrument, the gugin, the lacquer is mixed with deer horn powder ( or ceramic powder) to give it more strength so, it can stand up to the fingering.

$R=(CH_2)_{14}CH_3$  or  $R=(CH_2)_7CH=CH(CH_2)_5CH_3$  or  $R=(CH_2)_7CH=CHCH_2CH=CH(CH_2)_2CH_3$  or  $R=(CH_2)_7CH=CHCH_2CH=CHCH=CHCH_3$  or  $R = (CH_2)_7CH=CHCH_2CH=CHCH_2CH=CH_2$  and others.

### **Nitrocellulose lacquers**

Quick-drying solvent-based lacquers that contain nitrocellulose, a resin obtained from the nitration of cotton and other cellulosic materials, were developed in the early 1920s, and extensively used in the automobile industry for 30 years. Prior to their introduction, mass produced automotive finishes were limited in color, with Japan black being the fastest drying and thus most popular. General Motors oak land automobile brand automobile was the first (1923) to introduce one of the new fast drying nitrocellulose lacquers, a bright blue, produced by DuPont under their Ducotrader name.

These lacquers are also used on wooden products, furniture primarily, and on musical instruments and other objects. The nitrocellulose and other resins and plasticizers are dissolved in the solvent, and each coat of lacquer dissolves some of the previous coat. These lacquers were a huge improvement over earlier automobile and furniture finishes, both in ease of application, and in color retention. The preferred method of applying quick-drying lacquers is by spraying, and the development of nitrocellulose lacquers led to the first extensive use of spray guns. Nitrocellulose lacquers produce a very hard yet flexible, durable finish that can be polished to a high sheen. Drawbacks of these lacquers include the hazardous nature of the solvent, which flammable, volatile and toxic; and the handling hazards of nitrocellulose in the lacquer manufacturing process. Lacquer grade of soluble nitrocellulose is closely related to the more highly nitrated form which is used to make explosives.

### **Acrylic lacquers**

Lacquers using a synthetic polymer, were developed in the 1950s. Acrylic resin is colorless, transparent thermoplastic, obtained by the polymerization of derivatives of acrylic acid. Acrylic is also used in enamels, which have the advantage of not needing to be buffed to obtain a shine. Enamels, however, are slow drying. The advantage of acrylic lacquers, which was recognized by General Motors, is an exceptionally fast drying time. The use of lacquers in automobile finishes was discontinued when tougher, more durable, weather and chemical resistant two-component polyurethane coatings were developed. The system usually consists of primer, color coat and clear topcoat, commonly known as clear coat finishes. It is extensively used for wooden finishing.

### **Water-based lacquers**

Due to health risks and environmental considerations involved in the use of solvent-based lacquers, much work has gone in to development of water-based lacquers. Such lacquers are considerably less toxic and more environmentally friendly, and in many cases, produce acceptable results. More and more water-based colored lacquers are replacing solvent-based clear and colored lacquers in under hood and interior applications in the automobile and other similar industrial applications. Water based lacquers are used extensively in wood furniture finishing as well.

### **Japanning**

As Asian and Indian lacquer work became popular in England, France, the Netherlands, and Spain in the 17<sup>th</sup> century the Europeans developed imitations that were effectively a different technique of lacquering. The European technique, which is used on furniture and other objects, uses varnishes that have a resin base similar to shellac. The technique, which became known as japanning, involves applying several coats of varnish which are each heat-dried and polished. In the 18 century this type of lacquering gained a large popular following. In the 19<sup>th</sup> and 20<sup>th</sup> centuries this lacquering technique evolved into the handicraft o decoupage. The English novelist George Eliot mentions a “lacquer (sic) box “in her novel Silas Marner.

### **Japanese lacquer**

**Just** as “China” is a common name for Chinese ceramic, “Japan” is old name for Japanese Lacquer ware (made from the sap of the Lacquer tree) and its European imitations.

### **Degreasing:**

The list of metals and their features explains how raw materials have natural surface conditions that interfere with coating adhesion and performance. In the process of being stored, handled and worked they will pick up additional some contamination on their surface. On metals, some of the probable contaminants are oily soils including petroleum products, animal fat, or vegetable oils, deposited during manufacturing operations for rust protection, drawing, machining and forming. There may also be heavy duty drawing compounds and lubrication greases or waxes and some solid soils such as carbon, graphite smuts, metal shavings, polishing products, metal oxides, welding scale, die release products, and red or white oxidation. Removal of soils priorto powder coating is essential to the successful life of the product. It affects the initial adhesion and the ultimate performance in the field. Soils that are present on metal parts can be removed by a variety of mechanical and chemical methods. What method should be used in a given situation is determined by the part to be coated (size, configuration, material), the type of soil to be removed (dust, wax, oil, salt crystals, etc,) and

the performance requirements of the finished product. The degreasing methods are classified as below:

- Mechanical Cleaning
- Ultrasonic Cleaning
- Vibratory or Tumbling Cleaning
- Chemical Cleaning
- Acidic Degreasing
- Alkaline Degreasing

### **Cleaner Performance Factors**

Over time, the soils that are removed from the parts will build up in the cleaner solution. Solid particles will settle to the bottom of the tank as sludge and oils, grease and some floating debris will float on the top of the solution. There is a limit to the amount of contamination that a cleaner bath can tolerate before it will cease to clean and need to be dumped and recharged. Overflowing the solution can help to reduce the accumulation of floating debris but solids can still be a problem and overflowing the solution will create a need for more chemical. Oil skimming and sludge removal can extend the life of the cleaner. Techniques for this are explained in the discussion on washer design.

### **Control Parameters**

The parameters for process control of a cleaning solution are process time, chemical concentration, temperature, spray pressure, drain time, and the volume of contaminants in the solution. These are the items that must be monitored, recorded, and maintained within proper ranges in order to achieve predictable cleaning performance. The set of charts shows how some of these control items can affect performance. There are many variables that affect the length of time that a solution will remain effective, such as the number of shifts, the volume of metal processed, the type of metal processed, and the types of soils removed. This chart shows a typical relationship between time and performance.

### **Ultrasonic Degreaser**

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An ultrasonic degreaser uses energy emitted from a transducer to break up grease and other contaminants on a part. The transducers in ultrasonic degreasers emit an electromagnetic radio frequency (RF) signal of approximately 30 kilohertz (kHz), which results in a mechanical vibration called 'cavitations' in the contaminants. In industrial degreasing, an ultrasonic degreaser is often incorporated into vapor degreasers.

Because an ultrasonic degreaser is effective in cleaning parts difficult to degrease using other methods, it is now used widely for certain applications ranging from cleaning a glass lens to degreasing automobile parts. Porous materials such as brass are especially difficult to clean using conventional metal degreasers. Vapor degreasing solvent alone tends to leave contaminants in pores and crevices that an ultrasonic degreaser can effectively clean.

Ultrasonic degreasers consist of few basic parts, which include a signal generator, transducer, and tank. As many ultrasonic degreasers are integrated into a solvent cleaning process, components such as filters, risers, dryers, and other design-specific features are included in the ultrasonic degreaser. Components will vary depending upon the use requirements of the degreaser. Industrial models may be quite large and have multiple chambers, while tabletop models for personal use are easily portable.

Ultrasonic degreasers are used to clean and sanitize critical parts by incorporating ultrasonic immersion cleaning and conventional vapor degreasing. These devices are used to remove oil, paints, stains, grease, dirt, wax, lubricants and other contaminants or coatings from parts and machine components. During the ultrasonic degreasing process, solvents dissolve contaminants on the part which then run off, leaving the part clean and sanitized. Degreasing is performed in a contained chamber because of the pressure properties that allow the process to succeed. Z

Ultrasonic degreasers are similar to ultrasonic washers or cleaners in that they use high frequencies to create millions of tiny bubbles that perform a scrubbing action that reaches into grooves and hidden parts of products that are immersed into agitated fluid of water, solvent or vapor. Though tightly bonded soils, greases, and contaminants cannot always be removed with the use of ultrasonic degreasers alone, combining traditional cleaning techniques with ultrasonic cleaning technology has been found to be an effective and environmentally-safe method of cleaning. Ultrasonic degreasers are capable of cleaning individual parts as well as multiple items simultaneously and are used in a variety of commercial and industrial applications in the fabrication, metal processing, automotive, pharmaceutical, electronics and weapons industries

There are two methods that are combined in ultrasonic degreasers: ultrasonic cleaning and vapor degreasing. Ultrasonic degreasers are composed of metal tanks equipped with heating elements in the bottom of the tanks that heat special cleaning solvents to a boil in a closed vessel. As the solvent evaporates it rises to a chamber where the part is placed. Because of the difference in temperature, the solvent condenses onto the part, dissolves the stain and drips off of the part. The stain particles are contained in the liquid beads of the solvent which may be collected, filtered and reused. The other process is conventional ultrasonic cleaning. The transducer sends electrically signaled ultrasonic frequencies travel through liquid, stretched any further. The size of these bubbles increases until equilibrium is reached and the bubbles are rapidly compressed. Millions of tiny powerful micro bursts from the collapsing bubbles perform

a scrubbing action that cleans the part. The tanks also have cooling coils near the top that help condense the vapor. Other common features of an ultrasonic degreaser include filters, water separators, safety controls and refrigeration capabilities

### **Moisture Separator**

Putting down a nice paint job on that project car you've been working on is hard enough without having the aggravation of air line contaminants running it. Preventing moisture and oil from contaminating your air line and subsequently your paint job is all a matter of having the right equipment and using it properly. The key to keeping moisture out of your air line is to separate the moisture from the air entering your paint gun with an in-line air water separator and filter.

### **Instructions**

Locate a suitable position to mount the wall-mounted in-line air water separator and filter unit in your air supply line a few feet from the air compressor itself. This unit will remove most of the moisture from your air supply line and will also remove all other contaminants and leave you with a nice, clean air supply to not only your spray gun but your other tools.

Mount the tool-mounted mini in-line air water separator between your paint gun and the clean, dry air hose you will use only for painting. This mini air water separator will remove the last traces of moisture that may be in the air supply line just before it enters your spray gun

Open the drain petcock valve on your compressor to drain any water from your compressor tank. Close the valve when the water is drained.

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Test your new moisture-free air supply line to make sure it's leak-free and that the filters and separators work properly according to their instructions. **Begin painting.**

### **Vapor Degreasing Process**

**Vapor degreasing** is a surface finishing process. It involves solvents in vapor form to cleanse the work piece in preparation for further finishing operations

The acting principle behind the vapor degreaser process is that the solvents will dissolve the contaminants on the work piece and remove them by dripping off the part. A basin of solvent is set up with a heating coil to bring the solvent to boil. As the solvent evaporates it rises to the fill-line in the chamber, above this is air with a much lower density than the solvent. This contains the vaporized solvent in a closed space where the work piece is placed. The solvent condensed on the more frigid work piece and the now liquid solvent dissolves the greases on the part. With are designed to capture and reclaim this solvent, making the process much more economical.<sup>[1]</sup>

Other adaptations to the simple system include:

- Several tanks for solvents and rinsing
- Having a solvent spray to coat the work piece prior to entry into the chamber to speed up the process and to allow for more complex parts to be cleaned. The spray must be below the vapor line.
- Vacuum degreasers.

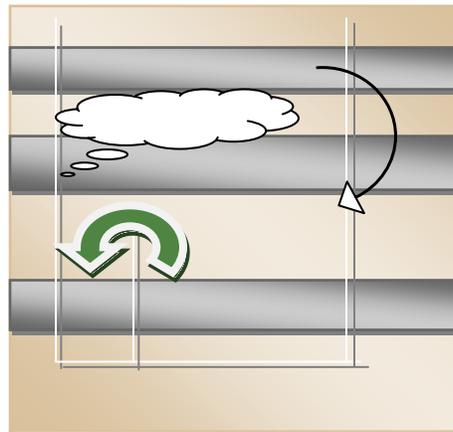
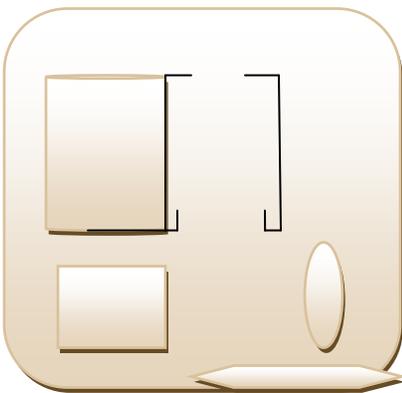
### Benefits

- Can be used on electronic parts to remove excess oil, grease, wax and other non-water soluble particles because water is not used.
- Used where water-based systems are impractical.
- Cleans and prepares part surfaces for various finishing processes like painting, welding, soldering, and bonding.<sup>[disambiguation needed][2]</sup>

- Issues of part Oxidation and water spots are not present.<sup>[3]</sup>

- With vacuum degreasers, there is no solvent emitted. However they have

a high cost and low production rate.



## TRANSFER PUMPS

Transfer pumps can be used for a wide variety of applications involving low to high viscosity materials.

**Applications:** For paints supply systems, conventional spraying systems, paint circulation systems and dispensing stations in industry and trade.

**Compatible materials:** paint and lacquers with low to high viscosity, water based lacquers, solvent, oil and grease, separating agents, stain, adhesives, plastisols, sealing materials, bitumen, epoxy material, undercoating materials, roof coating and insulation material, sound protection and other materials with solids content.

**Mounts available:** large variety of mounting versions such as cart, wall-mounted, drum cover attachment as well as in combination with ram presses, elevating carts and lifts

**Pump versions:** carbon steel, corrosion resistant steel and stainless steel Versions assure com

### Technical data transfer pump

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Pressure ratio	output	model
3, 5:1	150	150.03,5
5, 5:1	150	150.05,5
15, 5:1	150	150.15,5
3:1	375	375.03
5:1	375	375.09,5
9, 5:1	375	375.09,5
3:1	600	600.03
6:1	600	600.06
12:1	600	600.12 cmm/cycle

## Paints Booths

### SPRAY PAINTING BOOTH

SPRAY PAINTING BOOTH has been advocated through out industry as the most efficient method of filtering paint over spray. At the same time it effectively prevents in over spray from reaching the surrounding area.

SPRAY PAINTING BOOTH are used to increase efficiency of operator, reduce dust problems, paint dust, increase corrosion resistance of the product to be painted. SPRAY BOOTH also plays a big role in removal of waste spray paint and the sludge formed by it.

Painting in SPRAY PAINTING BOOTH provides the highest quality in all kinds of painting application. Our SPRAY PAINTING BOOTHS are for every kind of business, all kind of components and different products. OUR PAINT BOOTH can meet all your requirements.

The SPRAY PAINTING BOOTH is on simple construction, easy to install and maintain. Normally paint Booths are made of mild steel company (Value addition can be done by all stainless steel components), it also consists of a highly efficient exhaust blower or blowers to throw thinner in higher altitudes of air.

A SPRAY PAINTING BOOTH is also termed as PAINT EXHAUST SYSTEM, SPRAY PAINTING BOOTH, and PAINTING BOOTH etc. Even through the names are different the purpose is the same, i.e., to eliminate over spray and keep a healthy surrounding

#### Why you need spray booth?

**LAW:** There is a statutory requirement under the Factories Act that adequate ventilation be installed wherever spray painting is carried out.

**SAFETY:** Spraying paint may involve fire risk from both solvent and overspray deposits. A spray booth is essential to dispose off both.

**POLLUTION:** The air exhausted from the paint shop must be clean of paint as much possible.

Only an efficient spray booth will ensure this and prevent pollution from the atmosphere.

**QUALITY OF WORK:** To remove dry-over spray effectively, thus eliminating its setting on wet painted components.

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## STANDARD PRODUCTS

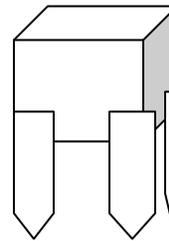
### Laboratory Spray Booth

**Ideal Application:**

\*0-10 Liters. Paint Consumption.

\*For Laboratory Samples.

\*For Light Weight Components



[click here to view photo](#)

### Low Production - Dry Back Spray Painting Booth

The DRY BACK SPRAY PAINTING BOOTH is also called as Low Cost Spray Booth, i.e., if the components or the products to be painted is very small or less in numbers or the production is too low then DRY BACK BOOTH is the ideal equipment. These

kinds of booths are more popular in laboratory and research and development divisions. As mentioned above "Auto Coat" designed DRY BACK SPRAY BOOTHS are categorized into Metal Baffled DRY BACK BOOTH and Coarse Filter DRY BACK BOOTH. Metal Baffled DRY BACK BOOTH consists of specially designed and air calculated metallic baffles or paint eliminators.

80 to 90 percent of the dry over spray dust is been trapped into these baffles, thus leaving behind clear and less smoky air towards the exhauster.

The main advantages in the metallic baffled DRY BACK BOOTH is that it can be cleaned by usual cleaning methods and reused as before and also reduce the maintenance cost. Coarse Filter DRY BACK BOOTH consists of specially designed and air calculated paint filters or air filters. 80

to 90 percent of the dry over spray dust is been trapped into these filters, thus leaving behind clear and less smoky air towards the exhauster.

The main disadvantage in the coarse filter DRY BACK BOOTH is that it cannot be cleaned by usual cleaning methods and reused as before since the filters are to replaced as per the paint accumulation frequency by new filters, thus increasing maintenance cost.

Both the above DRY BACK BOOTH is available in sizes from 1500mm w (5 feet) and multiples of 750mm above. Also these DRY BACK BOOTHS are a good substitute for places where production is low and there is a difficulty in disposal of wet paint sludge.

<b>Model</b>	<b>hp</b>	<b>Recommended component Max. Size for painting</b>
AELP 900	1 hp	300x300x300
AELP 1500	3 hp	600x600x600
AELP 2250	5 hp	900x900x900
AELP 3000	7.5 hp	1200x900x900

**IDEAL. Application**

**Components**

- \*5-10 L./shift Paint            Pumps, Motors, Valve
- \*Low Budget                    Gensets, Gear Box
- \*Low Production                Panels, Transform
- \*Heavy Components            More

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**Standard (Pump less)**

<b>Model</b>	<b>hp</b>	<b>Recommended component Max. Size for painting</b>	<b>Weight of component</b>
AES 1200	3 hp	300x300x300	0-10 kg
AES 1500	5 hp	600x600x600	0-20 kg
AES 2250	7 hp	900x900x900	0-20 kg
AES 3000	12.5 hp	1200x900x900	0-20 kg

**Ideal Application**

- 5-10 L./shift Paint
- Heavy Paint Consumption
- High Production
- Any Components

**Components**

Cycles, Automobiles & their Ancillary components, Home Appliances, furniture Electrical Panels, etc.

**Down Draft Spray Painting Booth**

M/S Auto Coat Engineering(I) Pvt. Ltd., designed DOWNDRAFT SPRAY PAINTING BOOTHS are specially used for painting of heavy parts and components which have large size, load and weight and those which are difficult to handle namely, wagons, earth moving machineries, chassis of vehicles, trailers, etc. In a DOWNDRAFT SPRAY PAINTING BOOTH the fresh air flows from top to bottom. The water tank is placed underground in the DOWNDRAFT SPRAY PAINTING BOOTH. The DOWNDRAFT SPRAY PAINTING BOOTH can be single sided or double sided depending on the size of component. Painter goes around the component to paint all sides of competence. The over spray paint particles in a DOWNDRAFT SPRAY PAINTING BOOTH are removed through a metallic grill by blowing the extra paint particles off by the fresh air which passes from top to bottom.

DOWNDRAFT SPRAY PAINTING BOOTHS are available in many models.

- (A) Downdraft Dry Back Type
- (B) Downdraft Wet type.
- (C) Downdraft Pit type i.e. collection tank is situated under the finished floor level
- (D) Downdraft specialized Uplifted Tank model allows most shop the opportunity to utilize the benefits of a DOWNDRAFT SPRAY PAINTING BOOTH.

(E) Downdraft Booths are also available in conveyorised schemes for continuous painting of huge mass products such as chassis, car body, large engines, transformers, export containers, truck body cabin etc.

(F) Downdraft Central suction type down draft booth.

(G) Downdraft Single Sided.

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Pit styles DOWNDRAFT SPRAY PAINTING BOOTHS require excavation and additional concrete work. The side walls of this kind of booth can be added up with water curtains or water screen. DOWN DRAFT BOOTH can be connected in line with air supply units or air replacement units for better performance.

Along with this for the removal of the sludge formed by the paint waste Auto Coat has developed Paint Sludge Removers.

Model	hp	Recommended component Max.size for painting	Weight of component
AEDD3000	25hp	600x600x600	--
AEDD4500	30hp	900x900x900	--
AEDD6000	50hp	1200x900x900	--
AELP 3000	7.5hp	1200x900x900	--

**Idea. Application**

- Large Objects
- Product Stationery

**Components**

Transformer, Machine Tools, T, etc.

**Water Wash Spray Painting Booth**

The WATER WASH SPRAY PAINTING BOOTH provides an extremely efficient means of removing paint particles from the exhausted air by using water as a filtration media, have designed the WATER WASH SPRAY PAINTING BOOTHS for many finishing applications.

We also offer both pump as well as no-pump versions in open type model, enclosed type model and conveyerised models. Standard WATER WASH SPRAY PAINTING BOOTHS are utilized for high volume paint usage, medium or large sized components and batch processes.

WATER WASH SPRAY PAINTING BOOTH contains special features like water tank or over spray paint collection disposal tank, specially designed eliminators (baffles), saw tooth plates, washing chamber and high pressure exhaust blower. This type of painting booth is more popular where the paint consumption is 10 -100 liters/shifts, heavy paint consumption, high production and / for any component.

Working of WATER WASH SPRAY PAINTING BOOTH is very simple. When the paint is sprayed on the component the over spray is sucked rapidly by the high pressure centrifugal blower through the saw tooth plate and the eliminator. During the above process the paint waste particles get cut at the saw tooth plate thereby separating the thinner to the exhaust blower and paint waste into the tank. Finer spray dust is eliminated in the washing chamber. Paint is actually washed in this chamber.

The best advantage of WATER WASH SPRAY PAINTING BOOTH is that lumps of waste paint are collected in the collection tank thereby helping the user to dispose it easily.

Maintenance in this kind of booth is very low as compared to the Dry Back versions. The WATER WASH SPRAY BOOTHS designed and engineered by Auto Coat, is available in three kinds of schemes, namely

AEIPL (Auto coat Engineering (I) Pvt. Ltd.)

1 Standard WATER WASH SPRAY PAINTING BOOTH (available in the selection chart) also known as No-Pump Booth or Pump less Booth

2 WATER WASH SPRAY PAINTING BOOTH with water curtain or water screen (available in mild steel or stainless steel versions).

3 Civil Escavated WATER WASH SPRAY PAINTING BOOTH

4 Conveyerised WATER WASH SPRAY PAINTING BOOTH etc. WATER WASH SPRAY BOOTH can be connected in line with air supply units or air replacement units for better performance.

Along with this for the removal of the sludge formed by the paint waste Auto Coat has developed Paint Sludge Removers, specially recommended for paint consumption over 100 liters/day.

**WE ALSO PROVIDE**

- Filter Doors
- Energy Saver
- Exhaust Chambers
- Exhaust
- Bench (Andrew Filters)
- Bench Type Booth (Andrew Filters)
- Bench Type Booth (Paint Arrestor)
- Floor Type Spray Booth

### **How A Spray Gun Works**

Pneumatic spray guns, when properly adjusted and operated, produce consistent and smooth paint surface that can't be achieved in any other way. However, since most people don't take the time to understand how the gun works the results are often very poor. This, in turn, causes many hobbyists to lose faith in the equipment or to be hesitant to use it because they don't really understand all the adjustments. Let's clarify the subject. Paint guns convert the fluid paint into thousands of tiny, atomized droplets. To do so the guns have specific components that must work in unison. Guns come generally in four forms: Pressure, Siphon, Gravity- Feed and HLVP (high volume-low pressure), in order of efficiency. Pressure and Siphon-feed guns are the oldest of designs.

In pressure guns the fluid is pressurized, allowing it to flow out (these aren't used much anymore). In siphon guns the movement of the air inside creates a siphon that pulls paint out of the reservoir. Gravity-feed guns mount the paint reservoir on top and utilize gravity to allow the paint to flow down into the air stream. HLVP guns come in both siphon and gravity-feed forms and are designed to utilize low air pressure (10-20psi) to flow a relatively large volume of paint. Their chief advantages are: low overspray and, therefore, a much higher transfer ratio of paint to the surface.

The Reservoir is the cup or can that hold the paint. Siphon guns can have reservoirs that hold as much as a quart of paint, whereas gravity-feed guns typically hold about a pint. The sole purpose of the reservoir is to hold paint and to allow atmospheric pressure inside, usually through a non-spill valve or pinhole vent.

The Air Cap is the part that does the real work. It has precision-drilled holes that are carefully placed to produce the best atomized pattern, or Fan, on the surface to be painted. Air entering these holes not only atomizes the paint but also creates the shape of the fan.

The Fluid Tip sits inside the air cap. Its internal size is dependent upon the viscosity of the material being sprayed and various sizes are available for every gun. Inside the air cap's centre hole sits the fluid needle

The Fluid Needle is a tapered shaft is attached to the gun's trigger. When the gun is triggered slightly it opens the air valve and starts retracting the fluid needle into the gun. The unseated needle allows material to flow and to be atomized by the air cap.

A spray gun has two distinct passageways: one for air, the second for paint. As the trigger pulls the tapered needle away from the tip, an increasing amount of paint will flow through the orifice in the cap. At the same time, the trigger actuates the flow of air to simultaneously atomize the paint (in the case of siphon guns, the fast-moving air over the siphon creates a low-pressure area. Allowing the ambient air pressure to push the paint from the cup.)

As fluid volume increases, more air is required to atomize the paint. Note the two areas on the air horn, one set adjacent to the fluid and one on either side of the air cap crown. These air outlets disperse and shape the "fan" we see coming from the gun. Distortion in that fan is often a result of clogged air passages, damage to the air orifices or leaks in the system. Cleanliness of the gun is essential for proper operation.

### **So What's So Difficult about Using a Spray Gun?**

Nothing, really, but most of us get impatient to start painting and don't want to spend the time to get accustomed to the gun. Consequently, we don't get the adjustments correct and the gun is blamed. The chief things to remember about spray guns are:1)air pressure; 2)fan size; and 3) paint flow.

The inlet air pressure on a particular gun is recommended by,, manufacturer, and for most siphon/gravity guns is between 30 and 50 psi. Greater air pressure atomizes paint more, but also creates more overspray. It can also dry out the solvents and cause more "orange peel" in the paint surface.

The fan control is used to control the spray pattern width. As a rule, most painters want to use as wide a fan as possible, but as the fan widens, the amount of material distributed decreases.

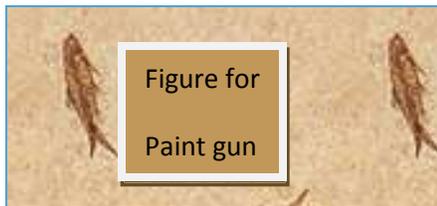
Paint flow is generally adjustable on modern guns and should be optimized for the specific paint being used. Usually this adjustment- once set – doesn't need to be changed unless a different air cap/needle is used in the gun.

While there are three adjustments to be made and gross misadjustments can be frustrating, the real secret of getting good results from a gun is simply to prepare the paint and then shoot test

patterns on a clean scrap panel or paper-covered surface. A little “playing around” with the gun for a few minutes will ensure an excellent pattern and a good painting experience.



**Disassembled gun. Note that the reservoir (A) is easily removable for cleaning. Below it are the fan control screw (B) and the needle (C) Under the needle are the spring-loaded parts (D) that hold it in and just how far it will move when the trigger is pulled. At the front of the gun are the fluid tip (E) and the parts that comprise the air cap(F). The trigger (G)and air filter (H) assemblies are removed for maintaining.**



**This gravity-feed gun is assembled and ready for painting. Attached to the bottom of the handle are an air filter (black) and quick-disconnect fitting for the air hose. The filter is a good final security item to trap contaminants and moisture in the air line. A quick-disconnect fitting is always a desirable thing to have because it allows greater flexibility in moving the gun from place to place or changing**

Air Coat atomization:

Greater Power – less environmental pollution usable

A characteristic of the Air Coat process is the the Distinctly lower paint pressure compared to the This type Airless process, and the particularly soft and demands for Homogeneous spray jet, due to the feed of range of

Additional atomizing air. This is provided by applications is

Air atomization:

excellent surface finish – universally

The conventional air atomizing process is classical method of atomizing paints. of application meets the highest surface quality and finish. Its universal use in industry and also for special

The air feed in the air cap, which surrounds technology

The sprayed medium like a sheath. Further this process

Advantages are a high coating speed, and this the

Low paint mist and overspray. annular

Summary of the benefits: shaped from a

- Excellent surface finish fan
- High coating speed
- The reduction of paint mist and Overspray
- Uniform application of paint materials
- Soft spray jet with soft run-out at the Edges accordance with
- Can also be used for high viscosity material compounds
- Reduction of the emissions in accordance with the VOC guidelines for liquid organic compounds industry

Main areas of use:

- Industrial coating
- Aircraft industry
- Agricultural machinery
- Construction vehicles

what makes this tried-and –tested

such a success. The characteristic of

is that the paint is atomized by air. For

Atomizing air flows out through an

opening in the air cap and can be

round jet to a flat jet by means of the

control.

Summary of the benefits:

- \* Excellent surface finish
- \* Universally usable
- \* Simple to handle
- \* Reduction of the emission in

the guidelines for liquid organic

Main areas of use:

- \*Automotive and commercial vehicle industry
- \* Automobile and supply industry
- \* Agricultural machines
- \* Machine tool builders
- \*Aircraft industry
- \* Plastics painting

### Other air fittings around the shop

### Electrostatic gun and benefits

### What is electrostatic painting? The history of electrostatic spray guns

Electrostatic is a term used for a special type of coating application equipment, developed in 1938. The first system was created whereby an electric charge could apply into liquid paint and sprayed onto grounded objects. The particles of paint attracted to the surface of the object and little paint was wasted in the air. In other words The particles can actually **change** direction in midair, even 180 degrees, to attract themselves to the grounded object !

### Why use electrostatic painting?

- 1) **A** conventional spray paint application only goes to the surface directly in front of the spray gun. An electrostatic coating application wraps the material around the substrate ensuring an even mill thickness of the coating system. This leaves behind a finished coating without the unevenness, high and low spots of conventional paint spray applications. Brush painting of these types of substrates cannot even be considered here due to their historically poor applications as well as being a non atomized applied finish.

In other words electrostatic painting can coat uneven surfaces like poles, porous materials, fences, carvings etc.

- 2) **A**tomization is the breaking down of a liquid by air pressure **into** a small particle mass therefore creating a spray. This is how conventional paint spray equipment basically works. Air pressure is used to breakdown the paint and by doing so creates a radical forward velocity to blow paint onto the surface directly in front of the spray gun. As well as create a tremendous amount of damaging unsightly overspray.

In other words Electrostatic painting saves a lot of paint and has very little overspray. You can expect to achieve almost 90% transfer efficiency.

### **What can I paint?**

Nearly any piece can be sprayed electrostatic ally. If the electrostatic ally charge paint “sees” a conductive grounded surface it will be attracted to it . A nonconductive piece can be sprayed electrostatically by either putting it between the applicator and a conductive grounded surface or spraying the piece conventionally with a conductive primer. **Restroom partitions...Elevators...Storage Units...Playground Equipment...Bookcases... Shelving... Railings, Dental, Hospital & Manufacturing Equipment... Windows and Door Frames, Store Fronts, and Canopies...Windows and Door Frames, Store Fronts, and Canopies...**Other items Many black rubber items have enough carbon content to be spray able. Others, such as wood parts, sometimes have enough moisture to produce a ground sufficient to spray electrostatically. Non conductive material may be pretreated with conductive spray coatings.

### **What is the advantage and disadvantage of electrostatic/airless and air spray ? 21**

The finish required between an airless gun and an Electrostatic Air Spray gun is significant. Even ambient conditions can make a large difference. In general, the electrostatics works best on small particles such as are common with an Air Spray product. Conventional airless produces larger particles and a high directional velocity basic, the Electrostatics Air Spray offers more gain in efficiency and a much higher finish quality than airless. If the product is currently sprayed airless and higher efficiency is needed, the best route is to go to an Electrostatic Air Assisted Airless technology. The operator can use the same pump/system as his old Airless and all that is needed is a small air compressor for the gun.

**What is the advantage and disadvantage of electrostatic /airless and HVLP and Reduced Pressure air guns?**

HVLP (High volume Low Pressure) and reduced pressure will produce higher finish quality however, Electrostatic will create a more uniform and even coating especially on non flat surfaces.

**Why should I choose an electrostatic spray gun over a conventional spray gun?**

Although an electrostatic gun may cost more, it has many advantages over a conventional spray gun. An electrostatic gun has a very high transfer efficiency (up to 98%) which results in a lower paint cost, less **VOCs**, less cleanup and faster production.

**Does electrostatics work only when spraying metal pieces?**

No, nearly any piece can be sprayed electro statically. If the electrostatic ally charge paint “sees” a conductive grounded surface it will be attracted to it. A nonconductive piece can be sprayed electro statically by either putting it between the applicator and a conductive grounded surface or spraying the piece conventionally with a conductive primer.

**Can electrostatics be used to paint something other than metal? If so, will you get the same benefits as spraying metal electro statically?**

Almost any product can be finished electrosatically. Some may require pretreatment with chemical sensitizers to produce a conductive surface. With some products, a metal object may be placed behind the part to create a ground image for attraction. Many black rubber items have enough carbon content to be spray able. Others, such as wood parts, sometimes have enough moisture to produce a ground sufficient to spray electro statically. The many advantages and savings associated with electrostatic spraying justify the application of a pretreatment or preparation product. Material, maintenance, labor and filter savings alone help justify an electrostatic application, not to mention increased production.

**Will painting electro statically provide better adhesion?**

Painting electro statically will give better transfer efficiency (more paint on the part) but not better adhesion. Adhesion depends on the condition of the substrate and the properties of the paint. Painting, in general, electrostatic or conventional, requires the same type of properly prepped surface before applying paint. Proper preparation is an important key to a good paint job.

**Can waterborne paints be sprayed electro statically?**

Yes, waterborne paints are the most conductive paints made. This makes them ideal for electrostatic applications. However, when spraying waterborne paint electro statically, the charge will be carried back to the fluid-supply system. Therefore, spraying waterborne paint electro statically requires isolating the paint-supply system from contact with people.

**What needs to be grounded when using electrostatic guns?**

All of the equipment, personal and target parts in the spray booth area must be grounded. Any ungrounded object, or person, in the spray area can become electrically charged. Improper grounding can result in static sparking which can cause fire or electric shock.

**What is the best way to check the voltage of an electrostatic gun?**

Asahi spray guns have built in voltage control and alarm systems. You may also use PRO Electrostatic test equipment kit. Included in this kit are the high voltage probe and meter, the PRO Cartridge and Alternator test fixture, and the alignment sleeve for use with all of the Pro Guns and power supplies. With this kit, you are assured of accurate voltage measurements of both the electrostatic gun and power supply.

**Drying Process- Ovens**

**Equipment for paint drying Oven**

The provision of an oven in a production shop ensures speeding up of the paint drying operation. Depending upon the rate of production, the oven can be either batch type or tunnel type.

**Batch type Industrial Oven**

This type of oven is largely used where there is batch production and where the volume does not justify a conveyorised installation.

Examples: General engineering workshops and fabrication shops, where different types of equipment are manufactured and production volume is low.

### **Tunnel type Industrial Oven**

This type of oven is preferred where production volume is fairly large and continuous.

Examples: Continuous production plants manufacturing sheet metals components for Tractors two – wheelers, power tillers, typewriters, fans, refrigerators, air conditioners, etc.

### **Stoving methods**

Stoving involves heat transfer from the heat source to the coating or paint film and two methods in general use for this purpose are convection and radiation. The method of stoving is recommended after taking into consideration the size, weight, shape and material of the component to be dried.

### **Convection heating Industrial Oven**

Convection heating is carried out by heating the air surrounding the article to be stoved. This is generally done by having a heating chamber where air is heated and the heated air is circulated inside the oven chambers by means of fans. Normal source used to heat the inlet air are electricity, gas, steam or oil. Convection ovens are suitable for both batch and continuous operation, depending on the work load.

A limitation of the convection type oven is that it will usually require to be started from twenty minutes to half an hour before stoving operations can begin. This is because the air inside the oven will have to be heated to the required temperature, and this takes time.

Normally, the temperature in a convection oven is thermostatically controlled, so that the heat and therefore the fuel consumption is regulated depending upon the amount of work entering the oven.

As the object is heated by circulation of air, any shape and size of object can be dried by convection heating.

This method is generally used for drying of large casting, machined components and objects having a non uniform weight distribution.

### **Radiation Heating Industrial Oven**

This is attained by heating the source so that the source starts emitting infra-red radiation and this radiation heats up the paint film. The infra-red emission can be directed towards the object to be heated by means of suitably shaped reflectors if necessary. The absorption of the radiation takes place

at the surface of the charge, and infra-red heating is thus essentially a surface heating process. Since infra-red radiation is emitted in straight lines from the source or reflector, plain surfaces are most readily treated. In infra-red paint stoving, the temperature attained by the paint film depends upon the intensity of radiation on the painted surfaces, the time of exposure, and the mass of the article. The color of the paint also plays a part in the speed with which the surface is heated. Black paints tend to absorb more heat, whereas a glossy white paint requires a longer time of exposure.

For infra – red heating, infra-red gas burners working of LPG gas, infra-red bulbs or infra-red electrical heaters can be used.

### **Construction of drying ovens**

The design of an oven is determined by many factors, such as total heating capacity, shape of the object to be dried, type and thickness of insulation required, adequate exhaust arrangement for removing the solvent fumes, and a proper arrangement for location of burners and heaters to ensure uniform heating. The arrangement of burners or heaters should ensure the provision of uniform heating across the cross section and the length of the oven

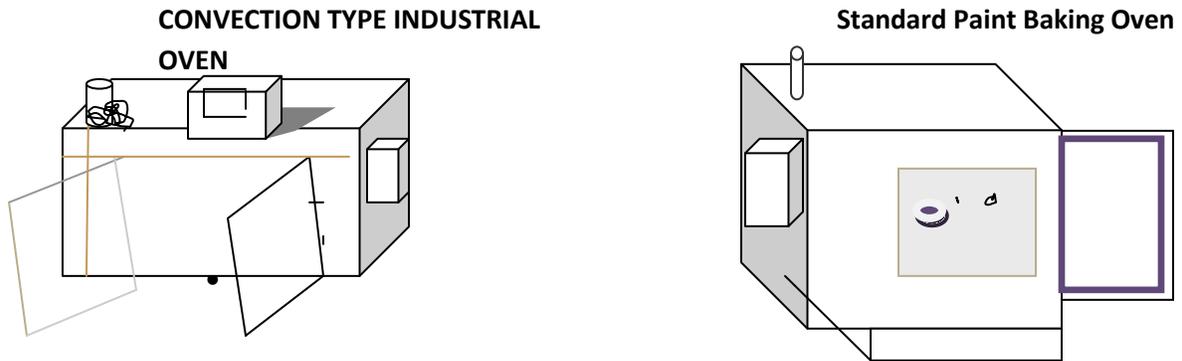
Stoving ovens are generally constructed out of mild steel sheets with strengthening members and supports on the outside and aluminum sheets on the inside, with an adequate thickness of insulation in between.

During regular operation, the temprature inside the oven is automatically maintained at a pre-determined level with the help of thermostatic controls in the case of electrical heating and by temperature controllers operating solenoid valves in the case of steam, gas and oil heating.

Improved quality and durability of paint finish can be achieved by providing proper facilities for stoving the painted components. This requires an oven of the right type, size and having the correct stoving temperature. In many cases, an improvement in the finish and economics in paint costs can be achieved for users of air drying paints, by adding stoving facilities and changing over to enamel paints.

### **Paint Drying Oven or Paint Curing Ovens Or Paint Baking Oven**

Paint Drying Ovens, also referred to as Dryers or Paint Curing Ovens or Paint Baking Oven removes the moisture from water-based coating and adhesives. Paint Drying Ovens are also removes water from the surface or interior of products with the help of thermostatic controls in case of electrical heating and temperature controllers operating solenoid valves in case of steam, gas and oil heating. A Paint Drying Oven dries the paint through the heated air that is re-circulated in the Oven. This is generally done by having a heating chamber where air is heated and the heated air is circulated inside the Paint Drying Oven chambers by means of fans



**CURING OVENS** are designed in such a way so as to consume low power with a uniform temperature in the working space provided in the **CURING OVENS**. Our **CURING OVENS** are specially built and designed for Power Curing and Liquid Curing purposes. The powder is firstly melted at a required degree of temperature for a certain time. The product is then flown out, chemically reacting so that it is completely cured and ready to use for which it is designed.

A gas burner and a fan is required for heating the inside of the **CURING OVENS**. The curing temperature depends on the requirement of power materials. The material is heated by the hot air in the curing oven which helps in heating the coating. The curing time may be short or long depending upon the load of the product. Curing Oven is dependable and flexible. Infrared radiations are used in the infrared ovens to increase the heat. The heating means in an infrared oven comprise a plurality of centrally directed infrared lamps extending from a frame member which selectively projects radiation onto the component as it passes through the leading end of the first zone. One of the key features associated with using infrared lamps in infrared ovens is that each lamp can be controlled to emit radiation at a selected efficiency between 0-100percent. By controlling the efficiency of each infrared lamp, compensation for differences such as size, shape and the amounts and types of coatings used on the component.

A gas Fired Oven is generally cost benefit and efficient. Excessive air in the **CURING OVEN** can cause the powder to be blown off of the parts. It can also lead to damage of other parts or the walls of the **CURING OVEN**. In order to avoid such turbulence the duct of the **CURING OVEN** is built in such a way so as to enable even distribution of heat in the **CURING OVEN**.

The **CURING OVEN** must be sized according to the mass of the product, the capacity of the burner and also be able to handle the production volume. Any unevenness in temperature may lead to uneven coloring of the product. Therefore balancing the airflow and temperature in the **CURING OVEN** is very essential.

**Fresh Air System**

This Fresh Air System utilizes outside air to automatically provide comfort without running the air conditioning when in the cooling mode. The system consists of an EC (Enthalpy Control), a fresh air control panel and outside air dampers. The EC is a control that will sense the temperature and humidity in the air around it. This is adjustable for the desired set point. With the EC in operation this will allow for a very economical way to cool your home or building with fresh air. The EC is wired to an **HK2000** which will open the outside air damper and turn on the fan to circulate the air to where it is needed. This will only happen when there is a thermostat calling for cooling and the EC senses that the outside air can do the job before using the air conditioning. Once the outside air is not acceptable, the fresh air system will shut down and turn on the air conditioning.

### Quality Checks

Testing Types



### Salt Spray (FOG) Testing

Salt Spray (FOG) Testing involves submitting test pieces, parts or panels (coupons) to a precisely-controlled accelerated corrosive environment (a salt spray cabinet) to evaluate the relative corrosion resistance of the coating or part. Because the environment inside the cabinet is warm, moist and a little bit salty, it's almost like taking your car to the beach for few months to see how much it will rust. Although no direct correlation can be made between number of hours in Salt Spray and number of hours, days or years in the real world (or other media) before corrosion, the test has been used as a standard for evaluation of the corrosion resistant properties of coating for many years. Alike in many ways, Salt Spray testing is generally considered more extreme than High Humidity testing (link).

THERE ARE MANY STANDARD SPECIFICATIONS DETAILING CABINET PARAMETER, LENGTH OF TIME IN THE CABINET, EVALUATION OF CORROSION, AND THE AMOUNT OF ALLOWABLE CORROSION PER PART PER TEST LENGTH, INCLUDING MILITARY, COMMERCIAL, AND INDUSTRIAL SPECS. SOME OF THE VERY COMMON SALT SPRAY TESTS ARE RUN TO CONFORM TO MIL-C-5541/BAC 5719 FOR CHROMATE CONVERSION COATING, MIL-A-8625/BAC 5019 FOR ANODIZING, AND TT-C-490 FOR PHOSPHATING AND PAINT. WE ALSO HAVE A GREAT DEAL OF EXPERIENCE IN ASSISTING CUSTOMERS WITH DESIGNING A SET OF PARAMETERS TO MEET INDIVIDUAL RESEARCH OR PRODUCTION NEEDS. IN ADDITION TO THE ABOVE APPLICATIONS, SALT SPRAY CAN ALSO BE USED TO EVALUATE THE PERFORMANCE OF ASSEMBLED ELECTRONIC EQUIPMENT.

ASHLEY LABORATORIES, LTD. MAINTAINS A CABINET CONFORMING TO ASTM-117 (LATEST REVISION) 365 DAYS A YEAR. OUR TURN AROUND IS RAPID; PARTS OFTEN GO INTO THE CABINET THE SAME DAY THEY ARE RECEIVED, PARTS ARE EVALUATED THE SAME DAY TESTING IS COMPLETED, AND REPORTS ARE QUICKLY GENERATED. MOST TESTS RUN FOR INTERVALS OF 24 HOURS. We are an approved vendor for Salt Spray testing of the Boeing Corporation (insert Boeing link here [www.boeing.com](http://www.boeing.com)) and others. We offer individual attention to our wide base of clients from across the globe. **27**

### High Humidity Testing

High Humidity Testing, like Salt Spray (FOG) Testing (link here) is a form of evaluating coatings, or electronic equipment performance, after exposure to a precisely-controlled accelerated environment. Unlike Salt Spray, the cabinet generally maintains a moist and warm environment, but without the additional corrosivity of the salt. For that reason, High Humidity is generally considered a bit less harsh a test than Salt Spray. Both the temperature and the relative humidity of the cabinet are adjusted to conform to the desired specification to which parts are to be tested.

THERE ARE MANY STANDARD SPECIFICATIONS DETAILING CABINET PARAMETERS, LENGTH OF TIME IN THE CABINET, EVALUATION OF CORROSION, AND THE AMOUNT OF ALLOWABLE CORROSION PER PART PER TEST LENGTH, INCLUDING MILITARY, COMMERCIAL, AND INDUSTRIAL. SOME COMMON HIGH HUMIDITY TESTS ARE RUN TO CONFORM TO ASTM A 380/ QQ-P-35, WS 16198, BAC 5751 AND MIL STD 753. WE ALSO HAVE A GREAT DEAL OF EXPERIENCE IN ASSISTING WITH DESIGNING A SET OF PARAMETERS TO MEET YOUR INDIVIDUAL RESEARCH OR PRODUCTION NEEDS. **OUR TURN AROUND IS RAPID; PARTS OFTEN GO INTO THE CABINET THE SAME DAY THEY ARE RECEIVED, PARTS ARE EVALUATED THE SAME**

**DAY TESTING IS COMPLETED, AND REPORTS ARE QUICKLY GENERATED. MOST TESTS RUN FOR EITHER A FEW HOURS OR INTERVALS OF 24 HOURS.**

### **Solution Analysis**

Solution analysis is one of the essential services provided by Ashley Laboratories, Ltd. Whether you need regular checks for solution control or specific analyses to assure compliance with specification requirements Ashley's analysts provide quick, careful and accurate attention to all your solution analysis needs. With our vast experience and background we can assist you with solution analyses from the most routine daily, weekly, or monthly solution controls for in-house quality requirements, to quality system procedures to support the needs of the **FAA, NASA**, or the aerospace industry, from periodic checks against in-house testing kit types of analyses, to individually designed research projects.

### **Waste Water Analysis/ Environmental Testing**

In our effort to offer comprehensive soup-to-nuts service for our customers, Ashley Laboratories, Ltd. offers a full range of waste water, effluent and other environmental testing to meet your waste water discharge permit needs and more. We have built a wide range of clients from all manner of metal finishers (job shop platers, aircraft engine and landing gear refurbishers, pc board manufacturers, machine shops, etc.) to soft drink bottlers, from bakeries and laundries to real estate auction houses. Look to Ashley first for your Fed EPA, state or local regulatory permit-required effluent testing, in-house studies of your waste treatment systems, TCLP leachate testing and other environmental services. All tests are performed where required in accordance with current EPA approved methods (including 40 CFR part 136, 600-4-79-020). Our rigorous quality program includes in-house and EPA round robin blind studies.

### **Abrasion Resistance (Taber) Testing**

Abrasion resistance (Taber) testing is a regulated wear test used to evaluate the durability of coatings and materials. Most commonly associated, in our industry, with hard coat anodize (MIL-A-8625, type III), this test is internationally recognized for its accuracy and reliability as an indication of the quality of a wear resistant coating. A coated test panel (or section of material) is weighed, then rotated and abraded by specially designed grit-embedded wheels for a specific number of cycles (the aforementioned MIL-A-8625 requires 10,000 cycles) and weighed again to determine coating weight loss and/or wear index. Ashley Laboratories, Ltd. Provides regular testing to existing specifications. We also have and will gladly assist in designing individual research projects for new or experimental coatings.

### **Adhesion Testing**

Metal finishers have a wide variety of needs for adhesion testing from the ability of a plated coating to stick to a substrate, to a painted surface's integrity to the reliability of aerospace parts to maintain a tenacious adherence between the substrate, a chromate conversion coating and the primer and paint layers. Ashley Laboratories, Ltd. offers the full gamut of adhesion testing: wet tape, dry tape, bend, knife, cross hatch, scribe, etc.

### **Knife Test**

This simplest test requires the use of a utility knife to pick at the coating. It establishes whether the adhesion of a coating to a substrate or to another coating (in multi-coat systems) is at a generally adequate level. Performance is based on both the degree of difficulty to remove the coating from the substrate and the size of removed coating.

Using the knife and cutting guide, two cuts are made into the coating with a 30-45 degree angle between legs and down to the substrate which intersects to form an "X". At the vertex, the point of the knife is used to attempt to lift up the coating from the substrate or from the coating below.

This is a highly subjective test and its value depends upon the inspector's experience. A coating which has a high degree of cohesive strength may appear to have worse adhesion than one which is brittle and hence fractures easily when probed. There is no known correlation to other adhesion test methods (pull-off, tape, etc.).

### **Tape Test**

On metal substrates, a more formal version of the knife test is the tape test. Pressure sensitive tape is applied and removed over cuts made in the coating. There are two variants of this test; the X-cut tape test and the cross hatch tape test.

The X-cut tape test is primarily intended for use at job sites. Using a sharp razor blade, scalpel, knife or other cutting device, two cuts are made into the coating with a 30-45 degree angle between legs and down to the substrate which intersects to form an "X". A steel or other hard metal straightedge is used to ensure straight cuts. Tape is placed on the center of the intersection of the cuts and then removed rapidly. The X-cut area is then inspected for removal of coating from the substrate or previous coating and rated.

The cross hatch tape test is primarily intended for use in the laboratory on coatings less than 5 mils (125 microns) thick. It uses a cross-hatch pattern rather than the X pattern. A cutting guide or a special cross-hatch cutter with multiple preset blades is needed to make sure the incisions are properly spaced and parallel. After the tape has been applied and pulled off, the cut area is then inspected and rated.

### **Pull-Off Tests**

A more quantitative test for adhesion is the pull-off test where a loading fixture, commonly called a dolly or stub, is affixed by an adhesive to a coating. By use of a portable pull-off adhesion tester, a load is increasingly applied to the surface until the dolly is pulled off. The force required to pull the dolly off or the force the dolly withstood, yields the tensile strength in pounds per square inch (psi) or mega Pascals (Mpa). Failure will occur along the weakest plane within the system comprised of the dolly, adhesive, coating system, and substrate, and will be exposed by the fracture surface.

This test method maximizes tensile stress as compared to the shear stress applied by other methods, such as scrape or knife adhesion, and results may not be comparable. Further, pull-off strength

measurements depend upon the instrument used in the test. Result obtained using different devices or results for the same coatings on substrates having different stiffness may not be comparable.

### **Solder ability Testing**

Solder ability testing is performed to assure the ability of the coated parts to be soldered successfully in assembly for electronic performance. Ashley Laboratories offers solder ability testing to individual coating specifications such as **MIL-T-10727** and **QQ-S-365** or broader test method standards such as **MIL-STD-202 Method 208**. Following strictly scripted laboratory procedures, we test actual parts or test coupons, per your requirements, to these and other rigorous standards.

### **Porosity Testing**

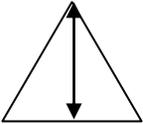
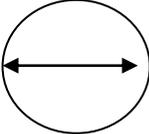
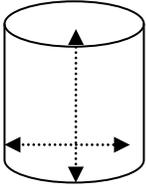
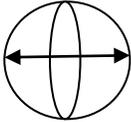
Ashley Laboratories, Ltd. also offers porosity testing in our full line of testing procedures for coated products. As its name implies, porosity testing assesses the integrity of the coated surface, by revealing holes or pores in the coating. A common porosity test is the ferroxyl test for chromium coatings as detailed in **QQ-C-320**. Other tests are also available.

### **Calculate amount of paint needed.**

#### **Step 1:**

To calculate how much paint you'll need, begin by determining the square footage of area to be painted using the appropriate formula(s) based on the area(s) to be painted. Measure every aspect of the area to be painted and keep the following in mind:

- Many walls and other areas are not simply a straight, flat area and you will need to measure each separate area
  - Measure both sides and all edges of doors if you are painting both sides.
  - Measure trim if it will be painted and keep in mind it probably isn't a flat surface. Surface area/paint coverage hints:
    - Lap Siding – calculate wall width x height and multiply by 1.5
    - Extremely weathered surfaces will absorb more paint and will therefore require more paint.
    - Drywall and bare substrates will require two coats of paint – a primer(or first) coat and a finish (or second) coat. The surface will absorb more of the first coat than second coat and will therefore require more paint for the first coat.

<p><b>Square:</b> Side x Side = Total Area Example: 8' x 8' =64sq. Ft.</p>	<p>8'</p>  <p>8'</p>
<p><b>Rectangle:</b> Width x Length (Height)=Total Area Example: 8' x4' =32 sq. Ft.</p>	<p>8'</p>  <p>4'</p>
<p><b>Triangle:</b> <math>\frac{1}{2}</math> Base x Height = Total Area Example: <math>\frac{1}{2}(30') \times 10'</math> =150 sq. Ft.</p>	<p>10'</p>  <p>30'</p>
<p><b>Circle:</b> Diameter diameter x .7854 =Total Area Example: 25' x25' x .7854 =491 sq.ft.</p>	<p>25'</p> 
<p><b>Cylinder:</b> (Circumference x Length) + Area of End(s)=Total Area Example: Circumference(3.14 x20')x Length(40') + Area of 1<sup>st</sup> End (20'x20'x.7854)+ Area of 2<sup>nd</sup> End (20' x20' x .7854)=3140 sq.ft.</p>	<p>20'</p>  <p>40'</p>
<p><b>Sphere:</b> Diameter x Diameter x 3.14 =Total Area  Example: 20' x 20' x3.14 = 1256 sq. ft.</p>	<p>20'</p> 

**Step 2 :**

Divide square footage by theoretical coverage per gallon as indicated on the paint label. The resulting number is the approximate number of gallons of paint you will need. (Theoretical coverage per gallon will be approximately 200 to 400 sq. ft. per gallon on most products; however, primer or first coats over weathered or bare substrates and drywall may be 150-200 sq.ft. per gallon.)

**EXAMPLE:**

Re-painting an entire room that measures 12' x20' and has an 8' high ceiling. Paint selected has a theoretical coverage of 300sq. ft. per gallon.

Wall 1	12' x8'	96 sq. ft.
Wall 2	12' x8'	96 sq. ft.
Wall 3	20' x8'	160 sq. ft.
Wall 4	20' x8'	160 sq. ft.
Ceiling	12' x20'	240 sq. ft.
<b>Total</b>		<b>752 sq. ft.</b>

752 total sq. ft.+300 sq. ft. per gallon = 2.5 gallons. Purchase 3 gallons.

**EXAMPLE:**

Painting an entire room for the first time – walls and ceiling are drywall. Room measures 12' x20' and has 8' high ceiling. Selected primer (first coat has a theoretical coverage of 175 sq. ft. per gallon. Selected finish (second coat) has a theoretical coverage of 300 sq. ft. per gallon.

Wall 1	12' x8'	96 sq. ft.
Wall 2	12' x8'	96 sq. ft.
Wall 3	20' x8'	160 sq. ft.
Wall 4	20' x8'	160 sq. ft.
Ceiling	12' x20'	240 sq. ft.
<b>Total</b>		<b>752 sq. ft.</b>

752 total sq. ft. + 175 sq.ft. per gallon of primer coat = 4.3 gallons of primer

752 total sq. ft. +300 sq. ft. per gallon of finish coat = 2.5 gallons of finish

**NOTES:**

- When calculating how much paint you'll need for your paint job ,there are many variables to consider. The information and examples provided here are meant to be a general reference only and are based on typical structures and typical coatings.
- Please refer to the paint label for detailed information regarding volume solids, suggested dry film thickness and theoretical coverage per gallon which will all affect quantity of paint needed, and ask your local paint store for assistance in determining the actual amount of paint you should purchase.

**Practical:**

Furniture description ---job work –decoration of new furniture such as bookshelf. Dressing table, job work decoration of old furniture for dinning room, dressing room , kitchen room—toilet room etc.	Different colors used, shades and their effects procedures of decoration etc patching work, cleaning the various surfaces curved, round ornaments grills etc. Methods of work applied	Development of surfaces.	Reading and plotting simple graphs.
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	for various painting surfaces, instruments used in different position for cleaning and painting . Precautions for colors painting in same parallel surfaces.		
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	<b>ACHIVEMENTS : The Trans</b>			
	<b>Should be able to :</b> 1. Remove paints, prepare surfaces and paint machine tools equipment's etc. 2. Repair painting defects. 3. Repair silk screen painting. 4. Repair job work decoration of new & old furniture etc.			
	Spray painting in different surfaces like corner, round parallel, curved surfaces angles , rectangular, cone , cylinder, square , adjustment of spray gun stroke And holding spray – gun etc, for multipurpose work.	Spray painting equipment,spraygun-different types, and methods of spraying techniques on various surfaces. Precautions in holding of spray gun & spraying stroke.	Development of surfaces.	Stable, unstable and neutral equilibrium of bodies – simple explanation. <b>33</b>
	Practice of painting safely color code on different symbolic articles & identification of pipe lines as per international & Indian standard.	Various color-code identification of pipel ines as per International Indian Standards.	Freehand sketching of small parts related to the trade.	Reading & plotting of simple graphs.
	Spray painting with compressed air atomization, practice in deferent types of spray guns viz. Externally fed spray gun, suction, pressure and gravity feed guns, catalyst spray guns with external mixing of catalyst and resin –their application.	Various types of spray guns & their accessories used in industry their maintenance. Techniques of their use, safety precautions.	Freehand sketching of simple assembled parts.	Friction--limiting Friction—lows Friction— coefficient of friction angle of friction.
	Practice of airless & electrostatics spraying such as Hydraulic airless spraying steams spraying. Electro static spraying----Rausburg No,1 process & No.2 Electrostatic hand guns. Rausburg Electro---air gun,	Airless and Electro static's spraying---description, safety precaution. Comparison between air and hydraulically	-----do-----	Simple estimation on the requirement of material etc, related to the trade.

	stat air gun, Rausburg Electro---hydraulic gun.	operated guns.	-----do-----	
	Practices on Rausburg electrostatics blade coater. High tension supplies for electrostatics spraying , handling of electromagnetic generators. Safety devices in electrostatic spraying, applications electrostatic	Rasuburg electrostatic blade coater--- Description its use. Paint used on electrostatic spraying different types of paints and	Freehand sketching of simple assemblies parts.	-----do-----
	Spraying Handling of paint for electrostatic.	Mixing procedure		50
	<p><b>ACHIVEMENTS :The Trainees should be able to :</b></p> <p>1. Do spray painting in different surfaces like corner, round, curved, cylinder etc.</p> <p>(2) Paint safety color codes as per international &amp; Indian standards.</p> <p>(3) Identify pipelines as per international, and Indians standards.</p> <p>4. Do Spray painting with different types of spray guns.</p> <p>5. Handle airless and electrostatics spraying. Rausburg electrostatic blade coaters</p>			
	Practice on different types of spray booths such as simple cabinet booths, back extract, wet booth etc for spray painting of various parts stack cleaning, spray booth water treatment handling paint sludge, booth cleaning.	Different types of spray booths--- system of inlet & outlet of the booths. Booth sizes---booth development--- cellulose solutions regulations. Description of filtration equipment.	Freehand sketching detailed components from assemblies	Mechanical advantages velocity ratio & efficiency of simple machine-- -pulley , wheel & axle , screw jack wrench etc.
	Spray painting on machines and cast surfaces--- finishing of iron casting---pretreatment for removal of paints and surface treatment – Fettleing degreasing--- solvent	Different types of pretreatment processes cleaning of the surfaces. Method of spraying on various	Freehand sketching of detailed parts and production of working	Problems on simple estimation as above.

	wiping –Grease burning—removal of scale. Finishing priming---puttying and filling end surfacing, finishing coats. Practice on other types of machine coating, non—ferrous casting, sheet metal finishing etc.	ferrous & non – ferrous castings, sheet metal containers. Use of higher performance coatings like chlorinated rubber and epoxy paints.	drawing of the parts Production of working drawings as above.	
	Spray painting on Car body---finishing – pretreatment process, primer, surface stoving. Wet sanding, synthetic finishing cellulose finishing, acrylic finishes (thermos-setting) finishing sheet metal components etc. spray	Methods and application processes of car body finishing. Various types of systems of spray painting and their effect on metal surfaces. Synthetic cellulose and acrylic	Production of working drawing as above.	Problems on simple estimation as above.
	Painting on scooters and motorcycle including pretreatment processes.	Paints and finishing		52
	Spray painting practice on refrigerator and domestic appliance---pretreatment of surfaces ---priming – finishing coats. Refrigerator liner finishing.	Stoving methods of heat transfer, time temperature relation in a stoving oven. General idea of oven design and their classification. Safely precautions in use of ovens.	Production of working drawing as above.	Problems on simple estimation as above.
	<p>ACHEVEMENTS : The trainees should be able to</p> <ol style="list-style-type: none"> <li>1. Do spray painting on different types of booths.</li> <li>2. Do spray painting on machine and cast surfaces.</li> <li>3. Do spray painting on car scooter and motorcycle bodies and their components</li> <li>4. Do painting of Refrigerator and domestic appliances.</li> </ol>			
	Dismantling assembling & fitting of painting and varnish equipment and accessories and their routine maintenance. Handling practice of firefighting equipment & the safety precautions.	General idea of ISI specification on paints varnishes. Function of different types of firefighting equipment safety	Exercises on blue print reading.	Magnetic substances— natural and artificial methods of magnetization – use of magnets.

		precautions		53
	Practice in storage of paints & handling storage of materials conveying, lifting & weighing. Systematic arrangement for keeping paints containers.	System of storing--- storage of paints & lacquers solvents & thinners. painters tools including spray painting equipment etc. Maintenance of store records.	Revision exercises on blue print reading.	Simple electric circuit ohm's Law simple calculation.
	Revision practice of varnishing of wooden surfaces, painting by brushing, painting of walls & metal surfaces , painting of letters and figures , spray painting	Methods of estimating labor, materials costing procedures for painting & varnishing. Preparation of work schedules.	-----do-----	Revision
	<p><b>ACHIVEMENTS : The</b> Trainees should be able to :</p> <ol style="list-style-type: none"> <li>1. Handle painters' tools, equipment &amp; machinery.</li> <li>2. Carry out routine maintenance.</li> <li>3. Handle fire-fighting equipment.</li> <li>4. Store paints and painter tools &amp; equipment.</li> <li>5. Prepare estimate for labor and materials and find costs for painting work.</li> </ol>			54

**Safety precautions:**

Safeguarding flammable materials

PRG refinish products contain volatile solvents, and are often flammable. Therefore it is extremely important that work areas be properly designed for use and storage of flammable liquids and that NO SMOKING be permitted. Proper fire extinguishers and other fire extinguishing systems should be readily available when handling any flammable liquids. Be sure to check that your facility is designed in accordance with the guidelines set by the National Fire Protection Association and that it meets all applicable federal, state and local fire codes. In areas where flammable liquids are handled, make sure to use explosion-proof equipment that meets codes set by the National Fire Protection Association.

**Safeguards to follow:**

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- The quantity of flammable liquids stored in the spraying area should not exceed what is required for one day's use.

- Paint and solvent products should be kept away from all sources of ignition including heat, sparks, flame, motors , burners , heaters, pilot lights and welding.
- Static electricity generated by liquid transfer must be prevented by proper bonding and grounding of solvent containers.
- Paint-or solvent- soaked rags should be replaced frequently.

### **Use spray equipment safely**

Spray equipment can be hazardous if used improperly. Spraying with airless or electrostatic methods can cause static electricity and create a fire hazard. So be sure that careful grounding and bonding practices are observed. Re-finishers should be aware that the high pressure of airless spraying can inject coating into the skin and may cause serious injury requiring immediate medical treatment.

Safety in the spray booth:

- Be sure the filtration system is clean at all times.
- Check frequently to see that exhaust system is operating at peak efficiency , at a rate up to the manufacturer's specifications
- Be sure your spray booth is up to local codes and OSHA standards regarding electrical equipment and air velocity

### **Safeguarding Your Personal Health & Safety**

The health and safety of everyone who works in a collision center must be of almost importance. Working with hazardous materials can present health problems if proper safety precautions are not taken seriously.

To properly protect yourself always remember to:

- Properly plan and organize job
- Use the correct respirator and protective equipment recommended for the job
- Maintain good housekeeping. Clean up spills and place products in storage after use

Hazards to avoid:

Breathing:

- Dust from grinding
- Aerosols from spraying
- Vapors from spraying, mixing and stripping

Skin or Eye contact :

- Thinner or reducer splashes
- Phosphoric acid (metal treatment products)
- Paint or catalyst splashes

Protective equipment: The well- protected professional should wear the following:

At the Prep Station:

- Quality paint cap
- Safety goggles
- Lint-free coveralls
- Leather gloves
- Steel- toed safety shoes
- Approved dust respirator

In the Spray Booth:

- Quality paint cap
- Safety goggles
- Lint- free coveralls
- Nitride gloves
- Steel-toed safety shoes

Approved air-supplied mask or hood respirator for spraying 2-pack isocyanate primers and topcoats or Approved dual – cartridge respirator for spraying single-stage primers, topcoats and clear coats.