Fluid Types:
Paints and Other Coatings
Concept and Theory
The Basic Components of All Coatings

Four Components

Virtually every coating contains four basic components:

- **Binder, resin, or polymer**, which holds together the other components prior to application and whose molecules bond to form a hard film that protects the *substrate*, the surface to which the coating is applied.
- **Pigment**, which hides the substrate, provides decorative color, and also may enhance desired properties of the coating, such as corrosion resistance.
- **Solvent**, which adjusts the viscosity of the binder to allow efficient film flow and application as well as some desired characteristics of the cured film.
- **Additives**, which change the formulation in one or more ways.

Following is more detailed information on the four basic components of coatings.

**Binder, Resin, or Polymer**

The binder, resin, or polymer serves two essential purposes in a coating. As the name *binder* suggests, the first purpose is to hold the other components together prior to application of the coating. Then, during the *curing process*, which may be achieved by heating, radiation, or a chemical reaction, the binder's molecules join to form the hard protective film that protects the surface onto which the coating has been applied. This surface is often called the *substrate*.

**Convertible Binders**

Binders are categorized as to whether their molecules are polymerized prior to or after application. A *convertible binder* is in an unpolymerized or partially polymerized state prior to application. The convertible binder undergoes polymerization after application to form the cured coating. Examples include:

- Alkyd resin – the most commonly used binder for many years.
- Oils, such as linseed oil and tung oil.
- Amino resin
- Epoxy resin
- Phenolic resin
- Polyurethane resin
- Silicone resin
Non-convertible Binders

The other type, the *non-convertible binder*, is polymerized prior to application but is mixed with or dissolved in a medium that evaporates after the coating has been applied, leaving a continuous film. Such a mixture or solution of binder and medium is called *vehicle*. Examples of non-convertible binders are:

- Cellulose resin
- Chlorinated rubber resin
- Acrylic resin
- Vinyl resin

Pigment

The *pigment* in a paint is composed of solid particles of uniform and controlled size that are permanently insoluble in the vehicle or binder of the coating. The purpose of the pigment is to hide the substrate, provide decorative color, and in some cases also to enhance desired properties of the coating, such as corrosion resistance or mar resistance.

Pigment Types

Literally thousands of different pigments are used by coating manufacturers. However, all pigments fall into these general categories:

- Colored pigments
  - Natural pigments, such as red iron oxide and brown iron oxide
  - Synthetic pigments, of which there are many types
- White pigments, such as titanium dioxide and zinc oxide
- Metallic powders, such as powdered aluminum and zinc
- Functional pigments that provide corrosion resistance, slip resistance, or other desired properties
**Solids**

You will often hear coating industry people speak of the *solids* content of a coating. This term is used to refer to slightly different aspects of a coating, depending on whether the coating is in the as-supplied condition or has already cured.

**Solids in the As-Supplied Coating**

In many coating formulations, the binder and pigments comprise the solids component of the fluid. In other formulations, the binder is dissolved in the solvent prior to application; in that case, the binder is not considered part of the solids component prior to application. Some additives will be included in the total solids content of a coating, but when solid additives are present, they make up only a small percentage of total solids.

**Solids in the Cured Coating**

After all solvents have evaporated and the coating has cured, “solids” refers to the sum total of the components that remain as the hardened coating.

**Solvent**

The job of the solvent is to reduce the viscosity of the binder. This enhances flow characteristics and application, and maximizes the uniformity of the coating.

In the coating industry, the word, “solvent," is used in several different—and sometimes ambiguous—ways. In the most formal sense, a solvent is any liquid that can dissolve some other substance. For example, water is a solvent for sugar. But in many coating formulations, a chemical referred to loosely as a solvent may not be dissolving anything. Instead it may simply dilute or thin the formulation.

**Volatile Organic Compounds**

The word “solvent" is often loosely equated with the term *volatile organic compound*, commonly abbreviated VOC. VOC’s create air pollution problems when they evaporate into the air. The amount of VOC’s allowed in materials is specified and limited in many parts of the world.
Solvents, VOCs, and Water-Borne Coatings

In water-borne coatings (discussed in detail later in this module; you may also hear them referred to as “water-based” but this is incorrect usage), water is the primary solvent—but not the only solvent. Most water-borne coatings also contain VOC’s, but in smaller amounts than in conventional “solvent-borne” coatings. VOC’s in water-borne coatings are called co-solvents. They function as intermediaries, allowing water and polymers that otherwise would not mix to co-exist in a mixture called a dispersion.

In spite of the fact that water-borne coatings contain VOC’s, you will often hear people make a distinction between water-borne coatings and “solvent-borne.” In these cases, “solvent-borne” is being used to refer to coatings in which the primary solvents are VOC’s.

Why Do You Need Multiple Solvents?

Many kinds of solvents are used in coatings. In fact, usually there are several solvents in one coating formula. One reason for this is that there is no such thing as a “universal solvent”—a fluid that can dissolve anything. Thus, a given fluid may reduce the viscosity of one binder, but may have no effect on another binder. And since a given coating may contain several binder components, several solvents may be necessary—each one to reduce a specific binder or binders. Also, various solvents may be chosen because they have varying evaporation rates. This reduces stresses on the coating during curing, leading to a more uniform, more highly protective coating.

Categorizing Solvents According to Their Effects on Binders

Solvents are categorized according to the effect that they have on a given binder. There are three categories:

- An active solvent dissolves the binder and rapidly reduces viscosity

The next two types work in combination with an active solvent, but have opposite effects on it:

- A diluent, when added with an active solvent, extends a solution and also weakens the solvency power of the active solvent
- A thinner, when added with an active solvent, extends a solution but does not weaken the solvency power of the active solvent

Solvent Choice Affected by Intended Application Method

One important factor considered by chemists when they are choosing solvents is the method to be used in applying a coating. For example, for a coating that will be sprayed, a chemist chooses a fast-evaporating solvent. During application, such a solvent will evaporate quickly enough to prevent running or sagging of the coating film. On the other hand, brush-applied coatings require slow-evaporating solvents to avoid premature curing and to allow enough flow so that brush and lap marks are minimized.
Additives

In general, manufacturers put *additives* into coatings to perform one or more of these tasks:

- Aid during manufacturing
- Enhance application characteristics
- Enhance properties of the cured coating

Usually the volume of additives is less than two percent, yet the additives profoundly affect the coating. Surfactants (a contraction of surface-active agent) are additives that affect the coating in one or more ways, including:

- Maximize adherence to the substrate
- Disperse the pigment evenly
- Stabilize an emulsion
- Prevent sagging of a newly applied coating
- Flatten the finish – that is, reduce gloss

Other types of additives include anti-foaming agents, UV (ultra-violet) stabilizers that protect the cured coating from ultra-violet light, and fire-retardants.
Progress Check

Directions: After answering the following questions, compare your answers with those provided in the answer key following this progress check. If you respond to any items incorrectly, return to the text and review the appropriate topics.

For items 1 through 4, match the terms with their definitions.

Terms

a. Binder, Resin, or Polymer
b. Solvent
c. Pigment
d. Additives

Definitions

1. Hides the substrate, provides decorative color, and in some cases also enhances desired properties of the coating, such as corrosion resistance.
2. Aid during manufacturing, enhance application characteristics, and/or enhance properties of the cured coating.
3. Holds the other components together prior to application and, after application, forms the hard protective film that protects the substrate.
4. Reduces the viscosity of the binder.

For items 5 through 9, match the terms with their definitions.

Terms

a. Convertible binder
b. Active solvent
c. Non-convertible binder
d. Diluent
e. Thinner

Definitions

5. A fluid that, as a component of a coating formulation, extends the solution but does not weaken the solvency power of an active solvent that is also a component.
6. A binder that is in an unpolymerized or partially polymerized state prior to application.
7. A fluid that, as a component of a coating formulation, extends the solution and weakens
   the solvency power of an active solvent that is also a component.
8. A fluid that, as a component of a coating formulation, dissolves the binder and rapidly
   reduces viscosity.
9. A binder that is polymerized prior to application but is mixed with or dissolved in a
   medium that evaporates after the coating has been applied.
Answers to Progress Check

1. C. **Pigment** hides the substrate, provides decorative color, and in some cases also enhances desired properties of the coating, such as corrosion resistance.
2. D. **Additives** aid during manufacturing, enhance application characteristics, and/or enhance properties of the cured coating.
3. A. **Binder, resin, or polymer** holds the other components together prior to an application and, after application, forms the hard protective film that protects the substrate.
4. B. **Solvent** reduces the viscosity of the binder.
5. E. A **thinner** is a fluid that, as a component of a coating formulation, extends the solution but does not weaken the solvency power of an active solvent that is also a component.
6. A. A **convertible binder** is one that is in an unpolymerized or partially polymerized state prior to application.
7. D. A **diluent** is a fluid that, as a component of a coating formulation, extends the solution and weakens the solvency power of an active solvent that is also a component.
8. B. An **active solvent** is a fluid that, as a component of a coating formulation, dissolves the binder and rapidly reduces viscosity.
9. C. A **non-convertible binder** is one that is polymerized prior to an application but is mixed with or dissolved in a medium that evaporates after the coating has been applied.
The Six Basic Curing Systems

**Solvent Loss**

Coating manufacturers supply solvent-loss coatings with the polymers dissolved in solvents. Curing consists of evaporation of the solvent while the binders come out of solution to form the cured film. Curing may be by air drying at ambient temperature or the solvent may be evaporated faster by heating. Examples include acrylic lacquers, alkyd baking enamels, and water-borne paints.

**Water-Borne Coatings: A Special Solvent-Loss Class**

Water-borne coatings are a special class of solvent-loss coating, wherein the major (but not the only) solvent is water. Water-borne coatings are covered in more detail later in this module.

**Chemical Reaction**

As with solvent-loss coatings, coating manufacturers supply chemical-reaction coatings with the binders dissolved in solvents. In the curing process of a chemical reaction coating, which may initiated by heat or contact with moisture, the binders react with each other to form a three-dimensionally cross-linked film. Heat also may serve to evaporate the solvents faster. After curing, the coating will not dissolve or soften with application of heat; coatings of this type are called *thermosetting*. Chemical-reaction coatings are used in most industrial applications, including the automotive industry. Examples include urethane top coats and epoxy primers.
Air Reaction

Air-reaction coatings often contain highly viscous oil-type binders, such as linseed oil. This makes it necessary to include solvents in the formulation to decrease viscosity during application. In the curing process, these coatings react with oxygen in the air to form a cross-linked film. The solvents evaporate quickly leaving a coating that is dry to the touch. But cross-linking may go on for several weeks. Examples include enamels and alkyd baking primers.

Air-Reaction versus Solvent-Loss

The difference between solvent-loss and air-reaction systems is that a solvent-loss coating cures in the air but does not reach chemically with the air, while an air-reaction coating cures in a chemical reaction with the oxygen in the air.

Emulsion Drying

Coating manufacturers supply these coatings with the binder and solvent in an emulsified mixture. During the curing process, the solvents evaporate and the binder and particles of pigment form a continuous film. Solvents may be either water or organic compounds. An example of an emulsion-drying coating is latex paint.

Emulsion-Drying versus Air-Drying

The difference between emulsion-drying and air-reaction coatings is simply that, in emulsion-drying coatings, the binder and solvent are an emulsion, while in air-reaction coatings, the binder is dissolved in the solvent.

Radiation Curing; Also Called UV (Ultraviolet) Curing

Coating manufacturers supply radiation-curing coatings as low-molecular weight binders in diluents. Curing is accomplished by exposing the applied coating to UV, electron beam, or gamma-ray radiation. The result is a highly cross-linked coating. Radiation-curing systems are considered to be 100 percent nonvolatile since both the polymer and the diluent enter into the curing reaction; thus, these coatings are relatively environment-friendly.
Polyurethane Resins and their Curing Systems

Polyurethane resins are in a class by themselves, both in terms of chemical composition and curing system. Curing is accomplished via the reaction between two kinds of chemicals: an isocyanate, of which there are three types, and a chemical that contains hydroxyl groups, of which there are also many types. Cured polyurethane resin coatings are especially noted for:

- Abrasion resistance
- Toughness
- Flexibility
- Resistance to chemicals
- Excellent electrical insulation

These attributes make polyurethane coatings especially well-suited to aerospace and automotive applications where very strong, tough coatings are needed.
Progress Check

For items 1 through 6, match the terms with their definitions.

Terms

a. Solvent-loss curing system  
b. Chemical-reaction curing system  
c. Air-reaction curing system  
d. Emulsion-drying curing system  
e. Radiation curing system  
f. Polyurethane curing system

Definitions

1. Curing is accomplished via the reaction between an isocyanate and a chemical that contains hydroxyl groups.
2. The coating is supplied with the binders dissolved in solvents. During curing, the binders react with each other to form a three-dimensionally cross-linked film. The cured coating is thermosetting.
3. As supplied, the binder and solvent are components in an emulsified mixture. During the curing process, the binder and pigment particles merge to form a continuous film. Solvents may be either water or organic compounds.
4. The coating is supplied with the polymers dissolved in solvents. Curing consists of evaporation of the solvent while the binders come out of solutions to form the cured film.
5. As supplied, this type of coating consists of a low-molecular weight binder in a diluent. Curing is accomplished by exposing the applied coating to either UV, electron beam, or gamma ray radiation. The result is a highly cross-linked system.
6. Often contain highly viscous oil-type binders as well as solvents to decrease viscosity. In the curing process, these coatings react with oxygen in the air to form a cross-linked film.
**Answers to Progress Check**

1. F. **Polyurethanes** cure via the reaction between an isocyanate and a chemical that contains hydroxyl groups.

2. B. In the **chemical-reaction curing system**, the coating is supplied with the binders dissolved in solvents. During curing, the binders react with each other to form a three-dimensionally cross-linked film. The cured coating is thermosetting.

3. D. In the **emulsion-drying curing system**, the binder and solvent are supplied as components in an emulsified mixture. During the curing process, the binder and pigment form a continuous film. Solvents may be either water or organic compounds.

4. A. In the **solvent-loss curing system**, the coating is supplied with the polymers dissolved in solvents. Curing consists of evaporation of the solvent while the binders come out of solution to form the cured film.

5. E. In the **radiation curing system**, the coating is supplied in the form of a low-molecular weight binder in a diluent. Curing is accomplished by exposing the applied coating to either UV, electron beam, or gamma ray radiation. The result is a highly cross-linked system.

6. C. In the **air-reaction curing system**, the coatings often contain oil-type binders alone with a solvent to decrease viscosity. In the curing process, these coatings react with oxygen in the air to form a cross-linked film.
Comparing Three Types of Coatings: Conventional Solvent-Borne, High-Solids Solvent-Borne, and Water-Borne

Conventional Solvent-Borne Coatings

In terms of composition, this category is comprised of coatings with 50 - 70 percent solvent content. Or to look at it the other way, this category is comprised of coatings with 30 - 50 percent solids content. (It may be important to know whether stated percentages are in terms of weight or volume; consult with the coating supplier.) You may hear these coatings referred to as low-solids coatings. “Conventional” refers to the fact that these coatings have been in use much longer than the other two systems we are comparing here. In fact, low-solids solvent-borne coatings have been in use for thousands of years.

Available and Familiar

Often, conventional solvent-borne coatings are more readily available than other types simply because they are well established in the marketplace. Spray operators often choose these coatings because they are experienced with them and know how to work with them.

Environmental Impact

Most of the solvents in conventional solvent-borne coatings are VOC’s.
High-Solids Solvent-Borne Coatings

High-solids coatings were first introduced in direct response to the environmental problems associated with conventional solvent-borne coatings. With strong competition among suppliers in a free market, it is not surprising that there is little agreement as to just what percentage of solids constitutes a “high-solids” coating. According to one set of definitions, high-solids coatings are those that contain 50 - 80 percent solids (resin + pigment).

Cost and Equipment Considerations

High-solids solvent-borne coatings may be more expensive by volume than conventional solvent-borne coatings. But when correctly applied, one gallon of a 60 percent-solids coating should cover twice as much surface area as a 30 percent-solids coating. Many high-solids coatings are baking enamels. The ovens required for proper curing of these baking enamels add to the total cost of using high-solids coatings as compared to coatings that cure at room temperature.
Abrasiveness

Many high-solids coatings contain highly abrasive pigments; also, to achieve the desired solids content, some may contain highly abrasive fillers. Therefore, abrasion-resistant pumping equipment is required.

Problems Associated with High Viscosity

There are problems associated with the high viscosities of high-solids coatings. For example, they tend to have problems with inconsistencies in the cured film. This, in turn, may lead to a high number of rejected parts. While the viscosities of high-solids coatings cannot be reduced much by adding further solvent, in most cases, viscosities can be reduced by heating during circulation. The Graco Vis-con\textsuperscript{2} in-line heater can do this job for your customer. Also, the “overspray” of a high-solids coating, if left to accumulate on the floor of a paint booth, can become a problem for operators.

Water-Borne Coatings

Water-borne coatings are those in which water is the major solvent and in which a small amount of VOC’s serve as co-solvents.

Terminology

- Water-borne coatings are more properly (but less often) called water-reducible. This term refers to the fact that the viscosity of the coating may be reduced with the addition of water.
- Water-borne coatings are available with a variety of binders, including epoxy, polyester, acrylic, and alkyd.
- In water-borne coatings, the binder-water relationship is one of these:
  - A true solution, in which the binder is dissolved in water.
  - An emulsion, which is defined as a dispersion of droplets of a liquid in a second carrier liquid.
  - A dispersion, which is defined as a mixture of fine solid particles and a liquid. An example of dispersion is latex paint, which is discussed below.
- Manufacturers supply latex paint as a fine dispersion of resin, natural rubber, or synthetic rubber particles in water. Synthetic rubber formulations dominate the marketplace today. Most of these synthetics are made by a chemical process called emulsion polymerization. While the emulsion polymerization process involves the use of an emulsion, the result of the process is not an emulsion but a dispersion. Nonetheless, paint industry people use the words “latex” and “emulsion” interchangeably to refer to this type of paint.
- Water-borne coatings may be either thermoplastic—that is, capable of being repeatedly softened by heat and hardened by cooling; or thermosetting—that is, capable of reaching a relatively infusible state via a chemical reaction induced by heat, catalysts, ultraviolet light, etc.
Flammability and Hazardousness

Water-borne coatings usually contain about 10-30 percent of VOC’s by volume—as compared with conventional solvent-borne coatings that usually contain up to 70 percent VOC’s. So water-borne coatings are less stressful to the environment and are less of a fire hazard. But the VOC’s in water-borne coatings are still environmentally hazardous and flammable. Therefore, while switching to water-borne coatings has helped, doing so does not completely eliminate environment and fire-hazard problems.

Substrate Cleaning

Starting with a clean substrate is important to the quality of the cured film with all coatings. But cleaning is more critical with water-borne coatings than with solvent-borne coatings. Expensive part washers are commonly used in industrial water-borne coating systems.

Over-Reduction

If water is added to a water-borne coating, the consistency can quickly become too thin for good coating—a condition that may not be reversible, in which case the material must be discarded. Customers should always follow label directions for use of these products.

Metallic-Pigment and Pearlescent-Pigment Water-Borne Paints

For many years, the automobile industry has used conventional solvent-based paint formulations that contain metallic pigments such as flaked aluminum or pearlescent pigments such as iron-oxide-coated mica. But recently these pigments have also become readily available in water-borne formulations.

Drying/Curing

Water-borne coatings dry more slowly than conventional solvent-borne coatings. And, since water evaporation is the major action involved in curing water-borne coatings, their curing times are affected more by changes in ambient temperature and humidity than are those of conventional solvent-borne coatings. A common response to this problem is to bake the coating/substrate after application. This adds to the cost of using these coatings. And, if heating is done too quickly, the coating may blister.
Viscosity

The at-rest viscosity of a water-borne coating may be two to three times that of a conventional solvent-borne coating. But like many other types of coatings, water-borne coatings are pseudoplastic—that is, their viscosities are reduced with increased shear. There are several implications for specifying Graco equipment:

- Greater pressure is needed to initiate flow; this may require heavier-duty, more costly equipment than that used for conventional solvent-borne coatings.
- The various system components—pumps, regulators, agitators, and piping—will all cause different amounts of shear. This makes prediction of the resulting viscosity difficult.
- The viscosity of water-borne coatings may vary from supplier to supplier. Be sure your customer has chosen a specific coating before you recommend equipment.

Because of these (and other) factors, the design of systems used to move water-borne coatings is critical to success. For help with system design, call Graco Technical Assistance at 1-800-543-0339.

Corrosion Resistance

Water corrodes carbon steel. Under long service, water even corrodes some stainless steel alloys. Thus, a major corrosion problem is presented by the water in water-borne coatings and the de-ionized water that is used to flush water-borne coatings from pumping systems.

One common problem is that corrosion products flake off from system components and contaminate the finish. Accordingly, you should specify Graco equipment specially designed for moving water-borne coatings. If your customer requests a particular grade or type of stainless steel, call the specialists at Graco Technical Assistance: 1-800-543-0339. They can tell you what materials are used in specific Graco products. They also may be able to help with special-orders of equipment made with specific stainless steel types.

Agglomeration

Metal ions can degrade water-borne coatings by causing agglomeration, a clumping or curdling of the solids. Metal ions are removed from internal metal parts in Graco equipment by passivation and electropolishing. If a question arises about the compatibility of Graco equipment with water-borne coatings, call Graco Technical Assistance: 1-800-543-0339.
Problems Related to Premature Curing in the Circulating System

A skin of dried paint may build up on the internal surfaces of pumps and other system components. This is especially a problem because water-borne coatings cannot be re-dissolved after drying. The dried paint may flake off and become a contaminant. Or conversely, it may adhere to the container so strongly that sandblasting will be required to remove it. In such cases, you and your customers should take the following steps:

- To ensure that all flakes are removed from the system prior to paint application, specify appropriate filters in all systems.
- Customers should maintain high coating levels in the system and should minimize contact between the coating and air.
- Recommend that customers always flush the system before the coating dries.

For help with system design, call Graco Technical Assistance: 1-800-543-0339.
Progress Check

1. The advantage of water-borne coatings is that they do not contain hazardous solvents.
   a. True
   b. False

2. When correctly applied, a 60 percent solids solvent-borne coating should cover about twice the surface area of a 30 percent solids solvent-borne coating.
   a. True
   b. False

3. Cleaning of substrates prior to coating is much more important with water-borne coatings than with other types.
   a. True
   b. False

For items 4 through 10, match the terms with their definitions:

Terms

a. Water-reducible
b. Emulsion
c. Dispersion
d. Latex paint
e. Thermoplastic
f. Thermosetting
g. Agglomeration

Definitions

4. Capable of being repeatedly softened by heat and hardened by cooling.
5. A better name for water-borne coatings.
6. A mixture of fine solid particles and a liquid.
7. Capable of reaching a relatively infusible state via a chemical reaction induced by heat, catalysts, ultraviolet light, etc.
8. A mixture of small droplets of two liquids.
9. A clumping or curdling of the solids in a water-borne coating.
10. A fine dispersion of resin, natural rubber, or synthetic rubber particles in water.
**Answers to Progress Check**

1. False: Most water-borne coatings do contain hazardous solvents – but they contain less of these solvents than other formulations.
2. True: When correctly applied, a 60 percent solids solvent-borne coating should cover about twice the surface area of a 30 percent solids solvent-borne coating.
3. True: Cleaning of substrates prior to coating is much more important with water-borne coatings than with other types.
4. E. A material that is capable of being repeatedly softened by heat and hardened by cooling is called **thermoplastic**.
5. A. A better name for water-borne coatings is **water-reducible**.
6. C. A **dispersion** is a mixture of fine solid particles and a liquid.
7. F. A material that is capable of reaching a relatively infusible state via a chemical reaction induced by heat, catalysts, or ultraviolet light is called **thermosetting**.
8. B. An **emulsion** is a mixture of small droplets of two liquids.
9. G. An **agglomeration** is a clumping or curdling of the solids in a water-borne coating.
10. D. **Latex paint** is a fine dispersion of resin, natural rubber, or synthetic rubber particles in water.
Material Safety Data Sheets

The U.S. Occupational Safety and Health Administration (OSHA) and similar agencies of other national governments require suppliers of chemical products to make available safety information about their products. In OSHA regulations, the document that contains this information is called a material safety data sheet. In common usage, this is always referred to as an MSDS. OSHA states that each MSDS should contain at least the following information:

- Product identification, such as a chemical name and/or a common name
- Listing of all hazardous ingredients
- Physical/chemical characteristics, such as boiling point and evaporation point
- Fire and explosion hazard data, including counteractive measures
- Reactivity data, such as conditions to avoid and hazardous byproducts of decomposition, if any
- Health hazard data, such as whether the product is known to cause cancer
- Precautions for safe handling and use, including steps to be taken if the material is spilled

The name “material safety data sheet” suggests that an MSDS will be one sheet of paper. However, since it must convey all of the above information and more, a complete, well-designed MSDS is usually several pages long. You will find considerable variation among MSDS’s obtained from various suppliers. Some are much more complete than others. Some are much easier to read than others. In any case, MSDS’s are likely to provide some of the information you need to correctly specify Graco products for your customers.
Application Data Sheet

Another document available from coating suppliers is an application data sheet. While an MSDS focuses on safety measures to be taken with a coating, an application data sheet focuses on how to apply the material to obtain a good coating. In fact, many application data sheets recommend specific Graco products to be used in applying the coating. Obviously then, you should ask your customer if he or she can show you an application data sheet for the coating that will be applied. It may give you precisely the information you need to close your sale.

Military Specifications

A third type of document you may encounter is a military specification – commonly called a “mil spec.” Mil specs are published by the U.S. Defense Department to define requirements for products sold to the U.S. Military. Also, the U.S. federal government publishes federal specifications to define requirements for products sold to non-military parts of the government. Usually, there will be a mil spec and a federal spec that contain exactly the same requirements for a given product.

Literally thousands of these specs are available from the U.S. government covering an extremely wide range of products—everything from tanks to tin cups. If your customer is a supplier to a government agency, that agency may require that the supplied products meet one or several specs. For example, your customer may tell you that the paint on the tractor he manufactures and sells to the government must meet a mil spec.

Mil specs always focus on the performance of the item specified. Therefore, for coatings, a mil spec will state detailed, specific requirements for the cured coating, such as minimum peel strength, color, film thickness, and so on. Specific test methods are also usually specified for determining if a coating meets the specification. Mil specs usually do not contain information on how to obtain the required specifications. Therefore, unlike a supplier’s application data sheet, you will not find a requirement in a mil spec to use a particular Graco product—or any other brand-name equipment.
Progress Check

For items 1 through 3, match the terms with their definitions:

Terms

a. Mil spec
b. MSDS
c. Application data sheet

Definitions

1. Provides information on how to use a coating
2. Specifies requirements for the cured coating
3. Includes information on hazardousness of a coating
Answers to Progress Check

1. C. An application data sheet provides information on how to use a coating.
2. A. A mil spec specifies requirements for the cured coating.
3. B. An MSDS includes information on hazardousness of a coating.