

HOW TO CHOOSE A LABEL ADHESIVE

General Information

In order to meet the increasing demands of new bottle labeling equipment, coatings and higher speeds required by machinery, new types of bottle labeling adhesives are continually being developed. At Cattie, we offer a full line of labeling adhesives, from the latest advancements to more traditional industry products.

Read -for-use dextrans

The earliest types of bottle labeling adhesives with which we are familiar are the ready-for-use dextrin types that were supplied on Pony Labelrite equipment and table gummers. This type of adhesive was adequate when machine speeds were slow and bottle coatings not too difficult to bond. While ready-for-use dextrin adhesives are being used today, the volume continues to decrease.

Resin-dextrans

When the bonding requirements of the adhesive are more demanding, such as with some types of coated glass, a resin-dextrin adhesive may be used. A typical resin-dextrin adhesive affords high wet tack and can be cleaned up with relative ease. Additionally, a resin-dextrin adhesive will usually exhibit better adhesion to coated glass and some plastics than a dextrin adhesive.

Jelly gums

Another adhesive development is commonly known as jelly gum — this is a viscous product having excellent tack. Although the adhesive does not have a high degree of water resistance, it does exhibit excellent humidity resistance, which is normally required on dry bottles stored in refrigerators. Jelly gum viscosities may be changed so that they operate in high-speed labeling equipment.

Water-resistant adhesives

During the last few years, water-resistant, dextrin-based adhesives have been developed. After 3 days have

been allowed for label and adhesive drying, these products will withstand the water immersion test on a labeled container.

The water-resistant dextrin types do not have the drying speed of casein adhesives. However, in some instances the dextrin type adhesives may serve as a replacement for casein or be used whenever water resistance is required.

Dextrin water-resistant bottle labeling adhesives, sometimes known as non-casein water-resistant adhesives, can also be manufactured in a wide range of viscosities suitable for various bottle labeling application equipment.

Caseins

One of the best known types of adhesives is casein-based. It is used especially when a high degree of water resistance is required such as in the brewing industry. On returnable bottles, casein adhesives can be used to bond labels, which are removed using a caustic cleaning system. This type of product also has the advantage of being able to bond to a wide variety of glass coatings that jelly gums may not bond to very well.

Casein adhesives can afford the highest speed of drying and positive adhesion to cold, very wet bottles. Casein adhesives usually will give excellent mileage and are very effective in preventing label flagging, particularly on foil label stock.

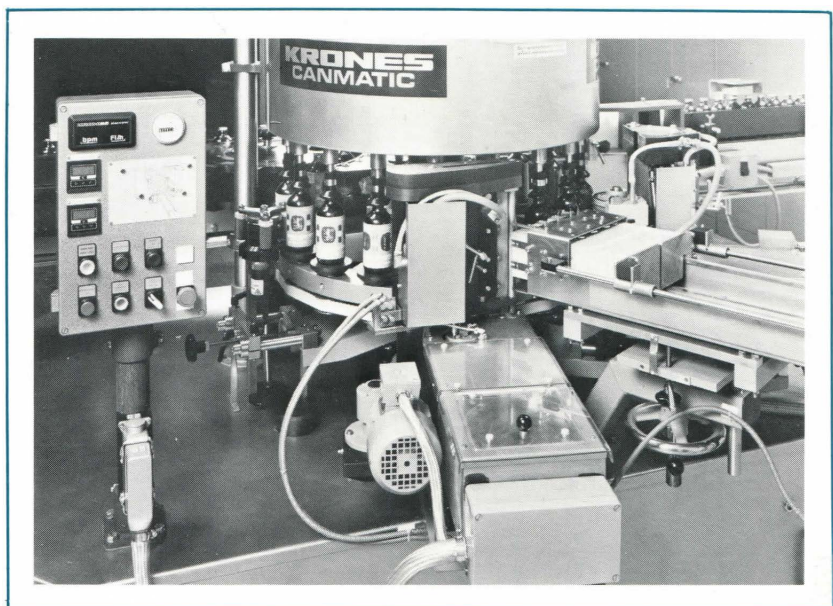
Summer and Winter Viscosity in centipoise

TYPICAL CASEIN PRODUCT

	<i>Summer</i>	<i>Winter</i>
50° F	108,000	88,000
60° F	90,000	66,000
70° F	60,000	46,000
80° F	41,000	25,000
85° F	30,000	21,000
90° F	27,000	18,000
100° F	19,500	10,500

Synthetic resin adhesives

With the advent of polyvinyl chloride, polyethylene terephthalate (PET), polypropylene and various untreated plastic containers, we have developed a series of synthetic resin adhesives which afford acceptable label adhesion to various plastic and glass bottles.



The synthetic resin bottle labeling adhesives typically machine as cleanly as the other types; however, viscosities need to be on the high side to obtain the desired tack required to pick up labels.

Cattie Hot Melt Labeling Adhesives

Hot melts are 100% solids thermoplastic materials that must be heated for application, at which time they become fluid, and upon cooling, resolidify into a solid mass.

With the introduction of polyolefin type polymers such as polyethylene and EVA, hot melts were first used in case and carton sealing applications and bookbinding. Today, their use has expanded greatly to include such applications as PET and glass labeling.

The popularity of hot melts over other adhesives is due in part to their increased speed of set. This is achieved because their vehicle, heat, dissipates much faster than solvents or water. This makes the adhesives particularly well suited for high speed applications where rapid tack development is important. In addition, the lack of liquid solvents allows hot

melts to be shipped and stored in convenient form for long periods of time without fear of freezing, settling or decomposing.

Cattie offers a wide selection of hot melt adhesives for glass, can and plastic labeling. These products have the basic requirements of labeling hot melts: low viscosity, clean machining, light color, good hot tack, and adhesion to a wide variety of substrates.

In addition, we offer a line of PET base cup hot melt adhesives specially formulated to extrude cleanly, withstand normal impact and adhere well over a wide range of temperatures.

Types of hot melt labeling adhesives

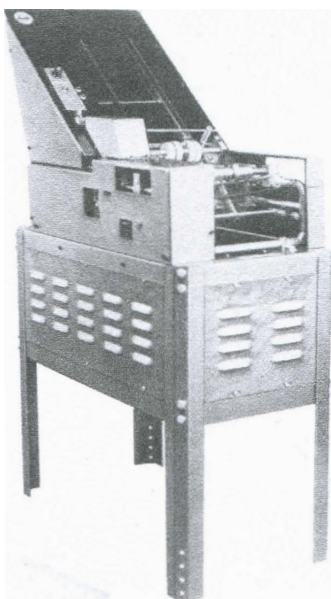
Hot pick-ups: These are light amber, opaque, resinous, 100% solids thermoplastic materials. They were

designed to accommodate can or jar

temperature ranges of 32° F. — 150° F.

Spot labeler adhesives: These adhesives offer some advantages over water base labeling adhesives. They set much faster and run cleaner. Because they are 100% solids, there is no moisture to soak into the back of the label and possibly cause wrinkling and puckering. They also work well when both substrates are nonporous, eg. plastic-coated label to polystyrene bottle; water cannot evaporate through these, but heat will dissipate through them, allowing the adhesive to set.

Several applicators have made particular inroads regarding the use of hot melts for labeling dry or wet containers, whether plastic or glass. These labelers are B & H, Krones, Labelette and Trine.*



*Machines manufactured by: B & H Manufacturing Company; Krones, Inc.; Labelette Company; Trine Manufacturing Company.

Specific viscosities and open times are formulated for each type of equipment.

For packaging glass and plastic containers, Cattie has designed the , a family of light-colored, high performance hot melt adhesives. We

formulated these adhesives for use in a broad range of applications, including case sealing, carton closing and tray forming. Whether they're applied on high speed corrugated container lines or coated frozen food cartons, these hot melt adhesives provide superior heat stability, clean application, excellent machining and good bonds at high and low temperatures.

Usage & Selection

Shipping, handling and storage considerations of waterbase adhesives

Ideally, liquid bottle label adhesives should be stored in the temperature range of 70° — 80° F. because lower temperatures can cause the adhesive to thicken and machine poorly.

Some adhesives thicken during an extended period of storage. This will give poor machine results. The oldest adhesive stock should be used first, and a 60-day supply of adhesive should be the maximum stock that is kept on hand. It is important to remember that labeling adhesives as well as other types of adhesives should be used on

the first in and first out basis, since some adhesives tend to increase in viscosity after 60 days storage period.

During the transportation of adhesives, especially during very cold days, adhesives will chill and thicken. If this happens, adhesives should be stored at room temperature for at least 24 hours or until the product reaches a temperature range of 68° — 80° F. If ice crystals appear at the sides of a drum, the adhesive may have been totally frozen and therefore will no longer do an adequate job.

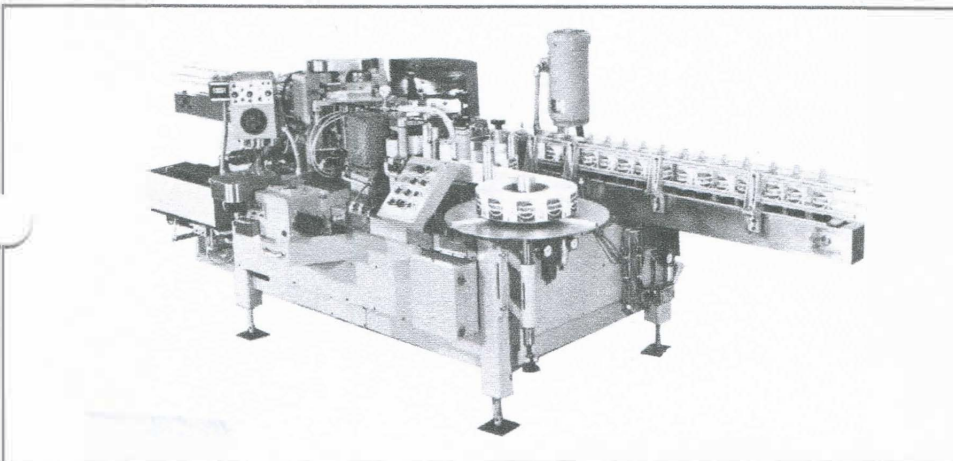
Selecting the right waterbase labeling adhesive

Conditions of the bottle - wet? dry? cold? warm?

The exact model of the labeling machine should be supplied so that the Cattier technical representative can give you the correct product recommendation for the particular equipment as well as for the conditions of the bottle. We suggest pre labeling several glass or plastic containers for the purpose of checking label adhesion before making major production runs.

Cattie supplies adhesives of various viscosities depending on the equipment applying the adhesive and the conditions of the glass or plastic bottles.

Viscosities can vary from 2,000 centipoise (cps) for a table gummer, to more than 100,000 cps for automatic equipment.



Labeling Plastic Containers

Plastic containers are more difficult to bond to than glass, and generally require a synthetic resin adhesive specifically formulated for each type of plastic. The adhesive must have the correct combination of tack, bonding properties, flexibility and flow characteristics.

Each end use market has specialized adhesive needs determined by the substrate, labeling equipment, ambient conditions, and the demands placed on the labeled container.

In general, all plastics except treated polyethylene (PE) require synthetic resin adhesives. Either jelly gums or resins are used to label flame-treated polyethylene. We usually recommend resins.

Figure 1 shows the viscosity range for labeling synthetic resin adhesives used on different types of equipment.

Let's take a look at a list of plastic containers, their typical end use, the equipment to be used for labeling, and the plant conditions that aid or hinder the efficiency of the label application.

Polycarbonate

Polycarbonates are generally used for five gallon water containers. The adhesive should be the type that readily allows label removal so that the container can be reused. Adhesive formulations are available for all labeling equipment used for these operations.

Polyethylene Terephthalate (PET)

PET bottles are used for beverages, toiletries and food products. Their principal use is for bottling soft drinks, liquor and wine. This requires that the adhesive used for labeling have good tack to prevent label movement before drying. The adhesive should dry rapidly but should not dry so fast as to cause buildup on the labeling equipment.

Since soft drinks are exposed to temperature extremes, the adhesive must hold the label in place at warm and cold temperatures. The adhesive must be sufficiently flexible to "give" with the expansion of the bottle, since plastic containers sometimes change dimensionally after filling.

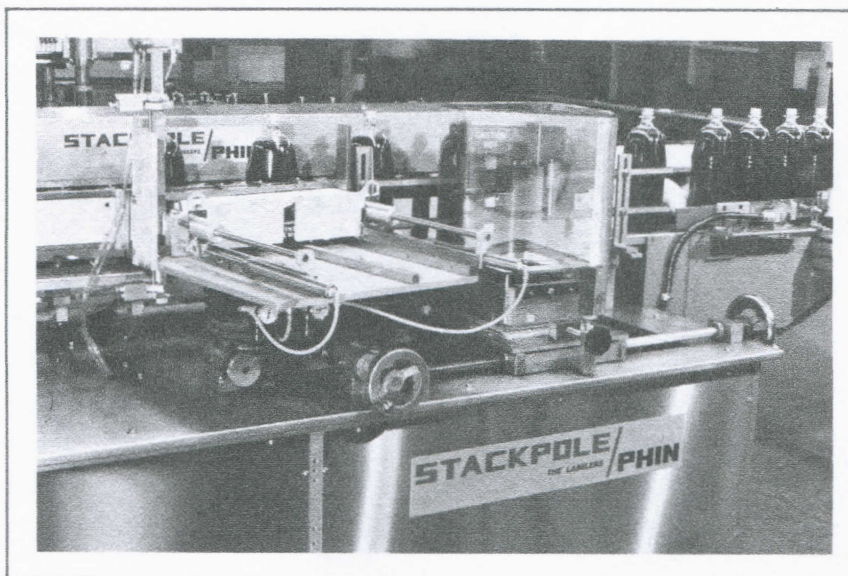
Viscosities of PET labeling adhesives must be varied to meet the particular requirements of Krones, Inc.; Stackpole Machinery Company; George Meyer Manufacturing (World) and P.T. Bachmann & Son Inc. labeling equipment. The adhesive user must remember that temperature affects the product's viscosity. Cold adhesives (45 — 65° F.) dry slower, are heavier, don't machine well, slow production and put down a thicker film than adhesives at 70 — 80° F. Problems attributed to the adhesive frequently can be corrected by warming the adhesive before application.

Figure 1

MACHINES*	Typical Viscosity Range Synthetic Resin Labeling Adhesive (cps) thousands
1. Krones	20 - 50
2. Stackpole/Phin	7 - 28
3. World Super CM	25 - 85
4. NJM	15 - 25
5. Jagenberg	20 - 50
6. MRM	8 - 11
7. Bosch	20 - 50
8. Biner-Ellison	35 - 45
9. Pirzer	20 - 50

***Machines Manufactured by:**

(1) Krones, Inc. (2) Stackpole Machinery Co. (3) George Meyer Mfg. (4) New Jersey Machine, Inc. (5) Jagenberg, Inc. (6) MRM Elgin Corp. (7) Bosch Packaging Machinery (8) Biner-Ellison Manufacturing Co. (9) Pirzer, Inc.



Labeling Plastic Containers

Polyethylene (PE)

Polyethylene bottles are flame-treated either in-line or by the manufacturer. The gas flame oxidizes the surface of the polyethylene to permit better label adhesion. The degree of surface treatment may be measured according to ASTM Test Method D2578, which determines the wetting tension of the polyethylene surface. When the flame treatment is satisfactory, synthetic resin-based adhesives may be used for labeling.

If the polyethylene is not flame-treated, only a latex type or hot melt product will afford a satisfactory bond.

Polyvinyl Chloride (PVC)

Only resin adhesives are used to label PVC bottles. Since there is significant variation among the types of PVC containers, it is important that a few containers be labeled and checked at least 24 hours after labeling before production runs are made.

Polypropylene (PP)

Polypropylene, like polyethylene, is normally supplied after the containers have been flame-treated. This treatment oxidizes the surface, making it more receptive to label adhesion. Here again, we recommend that several containers be labeled and held at least 24 hours to check the quality of adhesion before making a full production run.

Only resin adhesives are used to label polypropylene.

Polystyrene (PS)

Synthetic resin adhesives are used to label polystyrene containers.

Labeling Considerations

In order to make the proper adhesive recommendation, end use requirements for the product must be known, as well as the machine, substrates and ambient plant conditions. When high and low temperature resistance are required, user should specify the temperature ranges at which he wants the labeled container tested. A series of humidity range tests can be conducted to verify the adhesive's resistance to changing ambient conditions.

The end use of the plastic container will help determine the type of adhesive to be supplied. While the type of plastic is the key factor in selecting a labeling adhesive, other variables should be considered, such as the label stock, which may be paper or foil. Good adhesion depends on the degree to which the label "wets out". The adhesive will wet out differently on a foil

label than a paper label, generally taking longer to dry on the paper-backed foil.

The label stock itself plays an important role in efficient labeling. In general, the label stock should have adequate tear strength to permit its use on high speed equipment using fast-setting adhesives without tearing of labels. At the same time, the labels should be flexible and pliable to insure that the labels can be fully and efficiently fixed to the bottle surface with the applied adhesive. The grain of the paper label should be horizontal to minimize any tendency for the label to curl after the adhesive is applied. Paper-backed foil labels, metalized labels, and plastic-coated paper labels also present a different set of conditions which must be considered by the adhesive supplier.

The condition of the containers has an effect on adhesive performance. An adhesive that adheres to dry bottles at room temperature may not bond to the same bottles when they are brought in cold from a warehouse or box car, and are wet with condensation. If the containers are labeled after filling, any spillage on the area to be labeled can prevent good label adhesion.

The plastic industry will continue to expand into new markets. As these markets develop, the packager should supply samples and adhesive specifications so that the appropriate adhesive product will be evaluated.

In selecting an adhesive for labeling plastics, performance is the key to productivity. While the adhesive represents only a small portion of the total cost of the package, it is perhaps the most critical element. Cattie has the experience with labeling adhesives and a strong technical department to meet changing adhesive needs in the beverage, food and drug packaging market.

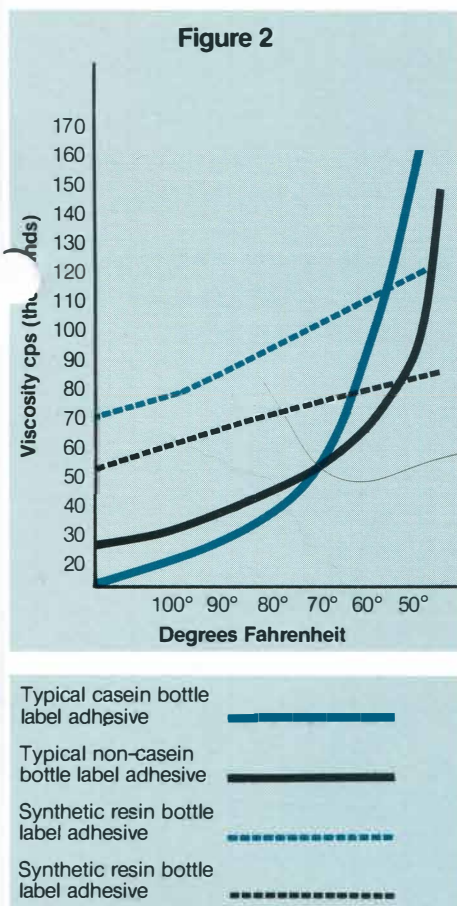


Figure 2 shows the relationship between viscosity and temperature for several typical bottle labeling products.