

Note: This is a reference cited in *AP 42, Compilation of Air Pollutant Emission Factors, Volume I Stationary Point and Area Sources*. AP42 is located on the EPA web site at www.epa.gov/ttn/chief/ap42/

The file name refers to the reference number, the AP42 chapter and section. The file name "ref02_c01s02.pdf" would mean the reference is from AP42 chapter 1 section 2. The reference may be from a previous version of the section and no longer cited. The primary source should always be checked.

Pressure-Sensitive Tapes

PRESSURE SENSITIVE
TAPES AND LABELS
AP-42

What's the state of the industry? What's ahead?

Section 4.2.2.9
Reference Number
11

By **BEN MILAZZO**, PRESSURE SENSITIVE TAPE COUNCIL, GLENVIEW, ILLINOIS

As with many other kinds of manufacturers, pressure-sensitive tape producers have been plagued by inflation, a scarcity of raw materials, and increasingly restrictive government regulations. However, in attempting to solve these problems, new technologies and new opportunities have been created. Foremost, the pressure-sensitive tape industry is slowly changing from a primary dependence on hydrocarbon solvent systems to water-based systems. To a lesser degree, the industry is also paying more attention to the development of more effective 100-percent-solids hot melt techniques.

During the next five years, the shift from using solvents in the production of pressure-sensitive tape to other methods will be increasingly noticeable. Today, solvents are utilized in the manufacture of 60-75 percent of all of the pressure-sensitive tape produced annually in the U.S. Water-based systems account for approximately 20 percent of the output, and 100-percent-solids hot melt pressure sensitives make up roughly 10 percent of the total.

By 1983, we estimate that the yearly production of water-based systems should rise sharply to 40-50 percent or more of the total pressure-sensitive tape output. At the same time, 100-percent-solids hot melt pressure sensitives should increase to 25-35 percent of the total, while hydrocarbon solvents should decrease to 15-25 percent. Of course, these shifts will be gradual and will vary in degree from company to company within the industry.

Federal Regulations

The Environmental Protection Act (EPA) and the Occupational Safety and Health Act (OSHA) will continue to effect the production of pressure-sensitive tapes. For example, in order to meet EPA requirements, the pressure-sensitive tape industry will continue experimenting with new production techniques as well as modifying traditional processes.

For hydrocarbon solvent-based systems two to three pounds of solvents are required for each pound of dry adhesive, and the vapors given off during the coating process have posed environmental problems. While there is no single nationwide standard governing the type and amount of permissible air pollution, restrictions are being developed on the basis of regional climate, industrial plant density, and population levels.

The first legislation on the emission of solvent fumes was enacted by the Los Angeles Air Pollution Control District in 1966. The significance of Rule 66, as it has come to be known, is that its provisions have served as a model for controls in other parts of the country. There is every reason to believe that as further legislation is developed, the restrictions will become even more severe. It is also doubtful that, with more stringent standards, hydrocarbon solvent adhesives will be able to be used economically.

While EPA has emphasized the need to safeguard the environment, OSHA has been equally forceful in establishing protective regulations for the health and safety of workers. In the pressure-sensitive tape industry, our concern has been to provide adequate safety controls in relation to potentially hazardous substances used in the manufacturing process. Since hydrocarbons have an extremely low flash point, the possibility of fire is a con-

stant danger. Because of this, at critical points around coating stations and drying ovens in pressure-sensitive tape plants, several carbon dioxide fire extinguishers are readily available. In addition, because some hydrocarbon solvents are toxic, some plant workers in certain areas of the plant must wear respirator masks to prevent inhalation of the fumes. Furthermore, OSHA requires the virtual elimination of detectable concentrations of solvent fumes as an additional safeguard.

Energy Costs

The 14 percent increase in the price of OPEC fuel supplies this year, as well as higher costs for the solvents themselves, has created difficulties in keeping down production costs. Fuel is an important expense because in the production of pressure-sensitive tape, high temperatures (200-450°F) must be maintained during the evaporation and curing processes. At the same time, there is always the threat of curtailed production when natural gas is used as the heating agent, a situation many in the industry had to deal with during the winter of 1976-1977.

To complicate the matter, much of the natural rubber used in the production of solvent adhesives comes from Malaysia and Indonesia. As a result of the dollar devaluation and the heavy demands for more natural rubber in the production of other products, these countries have raised the price of their raw rubber shipments by 15-20 percent, far outpacing normal inflation rates. In addition, both Malaysia and Indonesia have at times in recent years been politically unstable, causing uncertainty concerning the regularity of shipments of the raw material.

Better Products in the Future

The trend to water-based systems does not in any way suggest that the

Mr. Milazzo is chairman of the PSTC's Technical Committee and Manager of Commercial Development for Borden's Mystic Tape Div., Northfield, Ill.



"Within five years water-based systems should make up 40-50 percent or more of the annual pressure-sensitive tape production in the U.S."

industry will be producing interior pressure-sensitive tape products. On the contrary, water-based formulations now exist which allow the production of tapes as good or superior to those obtained from hydrocarbon solvent technology.

In terms of performance, water-based adhesives possess good peel adhesion, quick stick, and shear resistance. They also have good chemical and mechanical stability and permit uniform deposits of relatively high solids on the substrate.

On the other hand, water-based adhesives have the disadvantage of being more susceptible to freeze damage. Moreover, there is greater difficulty in adjusting the viscosity during production and, as with any new technology, the variety of performance features is limited.

Water-based systems require equal or slightly lower heating energy consumption than solvent-based systems because the air flow through the coating operation can be much slower. In fact, the air can be almost inert because there is no danger of hydrocarbon saturation. In contrast, hydrocarbon sol-

vent systems require a constant, heavy flow of fresh air into the chamber to keep the solvent concentration from exceeding 25 to 30 percent.

The change-over to water-based systems will not require large capital expenditures. Conversion, in many instances, will require a minimal investment in new equipment. Many hydrocarbon solvent coating units can be retro-fitted easily and economically.

Hot Melt Potential

As the industry moves away from solvents to water-based systems, individual manufacturers are looking more closely at 100 percent-solids hot melt methods of production. In the future, pressure-sensitive tapes produced in this manner may be cured either by an electron beam or an ultraviolet process.

Hot melts have been available for some years and offer distinct advantages. They eliminate atmospheric pollution, toxic vapors, and flammability hazards. Other advantages include reduced energy consumption as well as the ability to meet significant performance criteria.

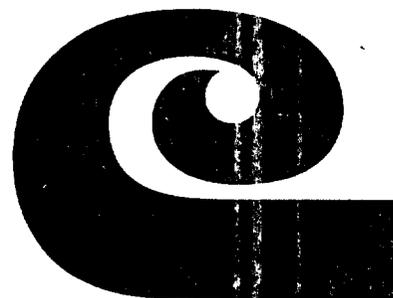
One of the limitations in the application of 100-percent-solids hot melt technology is the investment required for new equipment. Furthermore, high temperatures are needed to melt the adhesive; and the internal shear strength of the final product does not currently match that of other tapes. A great deal of coordination by the tape producers, adhesive suppliers, and equipment manufacturers is also necessary to ensure a smooth flow of new and improved products.

Conclusion

The pressure-sensitive tape industry is in a period of transition. There is no doubt that outside influences such as governmental regulations have hastened the process of change. Nevertheless, the changes being made are also part of a natural evolution.

During the next few years water-based systems will gradually capture a main part of the pressure-sensitive tape market, and the new production technology associated with water-based systems will reduce energy consumption and atmospheric pollution as well as provide safer work environments. ■

CELANESE — A SOURCE FOR YOUR INDUSTRY



Celanese ...
A SOURCE for
Pressure Sensi-
tive emulsions
and solution
adhesives.

Celanese ...
A SOURCE
with excellent
raw material
position and
multi-plant
locations.

Celanese ...
A SOURCE for
assistance in
solving your
pressure sensi-
tive adhesive
problems.

Celanese ...
A SOURCE
dedicated to
the pressure
sensitive adhe-
sive industry —
eager to serve.

Celanese ...
A SOURCE for
satisfying your
ever changing
needs. Call or
write today.

HEADQUARTERS
P.O. Box 32190
Louisville, Ky 40232
Toll Free: 800-626-5331

CHICAGO AREA
7351 So. 78th Avenue
Bridgeview, Ill. 60455
Phone 312-458-4000

WEST COAST
Union Bank Bldg., Suite 201
2115 Hawthorne Blvd.
Irvine, California 92714
Phone: 714-261-1100

**Celanese Polymer
Specialties
Company**

Circle No. 17 on Reader Service Card

Sum
of en
lation
are
adhes
tradi
based
D
opin
no.
I
have
need
as w
metal
being
sive a
tic
and a
ment
Ac
traci
alte
Acryl
con
man
to the
vin
sives
high
solve
equi
of
sive
This
center
Comm
nat,
the
Fam
ington