CHEMETRON™ Fire Systems

CARDOX

CO_2 Application Bulletin

Carbon Dioxide Fire Suppression —

Flexographic Printing —

Paper, Film & Foil Conversion

Flexography is a form of rotary web letter press printing. Because of its color brilliance, flexography is used in the decorating and packaging industry to print on foil, cellophane, polyethylene, and other plastics. It is well suited for printing large areas of solid color; inks can be overlaid to obtain high gloss and special effects. It is not suited to printing work requiring accurate register or intricate design.

There are several types of flexographic printers. The most common, for printing flexible foils and films, is the central impression cylinder press whereby two to six color printing stations are arranged in planetary fashion around a frame. (See accompanying drawing — four color unit shown.)

They are often coupled with extruders, laminators, wax mounters, and other facilities required to produce special packaging, coverings, etc.

The printers covered by this bulletin are not the same equipment as the flexographic presses now being used in newspaper publishing.

Like newspaper letterpress printing, flexography uses raised type, though rubber or plastic compounds are used for the plates instead of metal. The ink is transferred from an ink pan to the plate cylinder by ink rollers. The plate cylinder then transfers the inked impression to the web of material being printed.

The web is fed from a feed roll at one end of the printer, then travels around the central impression cylinder at the other end of the printer where it comes in contact with the plate cylinder at each color station. Following the last color impression, the web passes through a dryer before being rewound for further finishing. The printer is often arranged with the feed and rewind rolls adjacent to one another.

CHEMETRON™ Fire Systems
A World of Protection

4801 Southwick Drive
Third Floor
Matteson, IL 60443
Telephone: 708/748-1503
Fax: 708/748-2847
email: info@chemetron.com

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Presses

Flexo printers can operate at speeds of up to 1,000 feet per minute. The speed of the material as it passes from color station to color station around the impression cylinder, while not as fast as rotogravure printing, still creates an ink mist that accumulates in and around the presses. Thus, the hazard may not be limited to the ink pans and rollers.

Lower operating speeds and the use of nonmetallic printing impression cylinders do reduce the chance of ignition, as compared to rotogravure printing. But some of the inks used for flexographic printing are the low flash point type. These presses are sometimes called alcohol-flexo presses because of the polar solvents used.

Slitting is often performed on press lines to put the printed material in a form where it can undergo finishing operations. The resultant accumulation of dust can also extend the fire hazard.

Ink Handling System

Ink reservoirs, from which the ink is pumped to the ink pans, are usually located to the side of the printer. They can be pail-sized, filled for each run, or they can be semi-permanent with hinged lids through which additional ink may be supplied from portable ink buggies. In some cases, the reservoirs are supplied through piping connections from an ink supply room. Whichever the case, the ink tank floor area becomes coated with ink and solvent drippings that are highly flammable.

Dryers

When less volatile inks are used, larger hot air dryers are used to speed drying before the web is rewound. For more volatile inks, the dryer may be smaller.

One type of dryer used for volatile inks is a rather compact unit located above the web feed-rewind section of the press. Just before the web returns to the take-up spool, it passes through the plenum of the dryer into which hot air is discharged from a heater. An exhaust duct draws off the vapors. This arrangement is shown in the sketch on page 3.

Another type of dryer, as shown on page 4, is designed such that its plenum runs the length of the overhead press superstructure, from the printing section to the web feed-rewind section. As the web leaves the last color station to travel overhead to the rewind spool, it passes through the length of the dryer.

The dryer exhaust may or may not be connected to a solvent recovery system. The plenums and exhaust ducts of the dryers may accumulate a coating of combustibles condensed out of the vapors, which necessitates that they be included as part of the hazard. Fire dampers are recommended in exhaust ducts.

Exhaust ducts are flooded with CO_2 up to the fire damper and CO_2 is discharged on the back side of the damper to function as a fire stop.

NOTE

THE DRYING DUCTS – HOT AIR IN, FUMES OUT – ARE MOST OFTEN OFF THE BACKSIDE OF THE DRYER, BUT ARE SHOWN OFF THE TOP IN THE ACCOMPANYING DRAWING FOR CLARITY.

Press Line Protection Requirements

Printer & Ink Handling System: Carbon dioxide protection of the flexographic printers and ink handling system usually is accomplished by local application using the rate-by-area method of calculation to determine the rate of discharge and nozzle arrangement.

The drawing shows a carbon dioxide protection arrangement for a typical flexographic press installation. Nozzles are located near and above each end of the printer rolls to cover the ink pans and roller area. One nozzle is located over each set of ink reservoirs.

Each nozzle on a printing stage covers half that printing stage, with the opposite nozzle covering the other half. The web rarely exceeds 72", so the discharge rate per nozzle, based on covering half the width of the ink pan, is usually not large.

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Nozzles directed down at ink supplies can often cover two at the same time (as shown). CO_2 is calculated on a rate-by-area basis. The total local application discharge required is full liquid CO_2 flow for 30 seconds from all nozzles.

Dryers: The flexographic press dryers and connecting exhaust ducts are protected by total flooding with CO_2. The discharge is at least 1 pound per 8 cubic feet of volume. Since the local application discharge is for essentially 30 seconds, the CO_2 required to flood the dryer and ducts must also be applied in 30 seconds. Allowance should be made for carbon dioxide loss through openings, and additional CO_2 must be added if the temperature of the dryer exceeds 200°F.

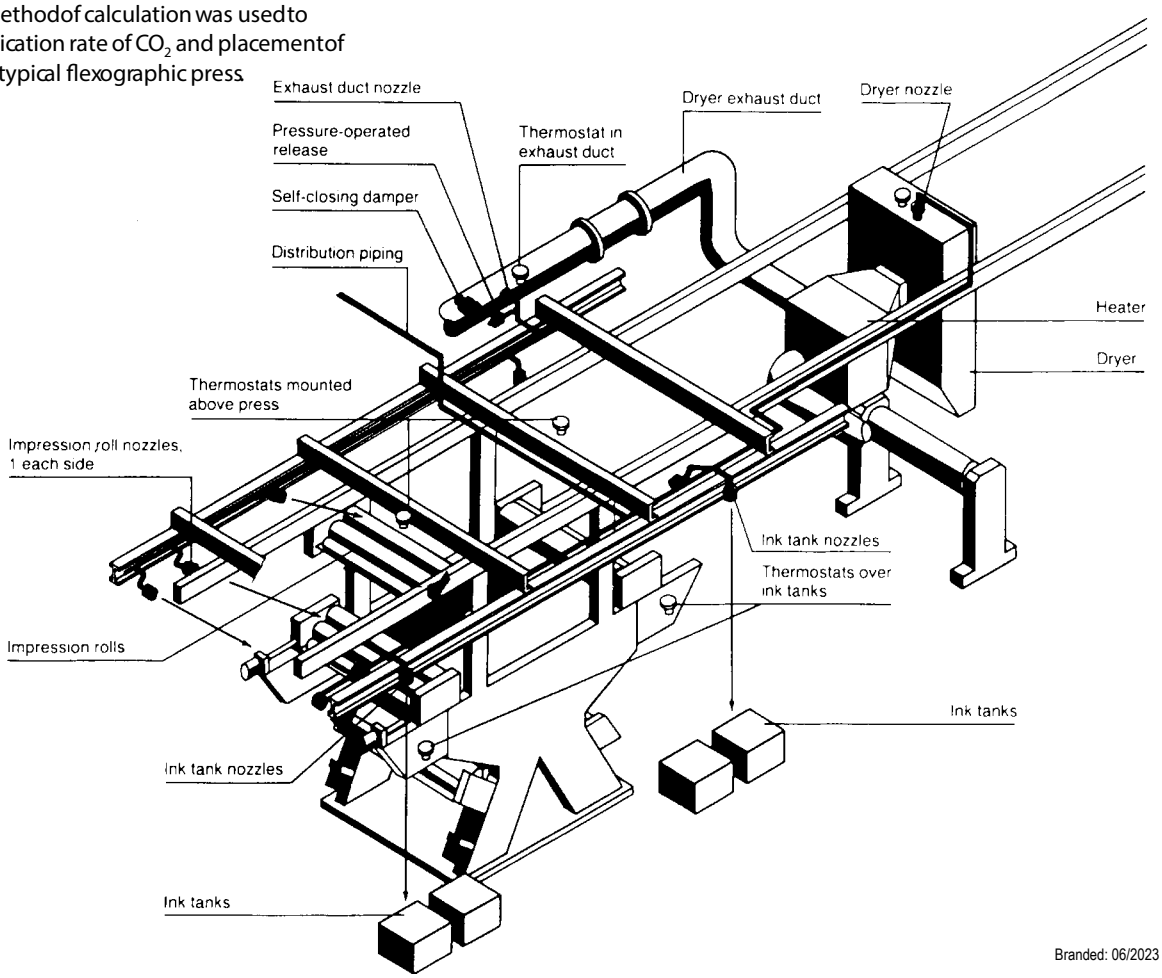
CO_2 is discharged through nozzles located in the dryer hood or chamber and the exhaust duct. If a damper is used, CO_2 must be discharged ahead of and behind the damper, even if the duct beyond the damper is not considered part of the hazard.

When the carbon dioxide system discharges, complete shutdown of the exhaust system is essential to prevent the introduction of fresh air and possible spread of fire.

Factory Mutual, In the Loss Experience Section of its Loss Prevention Bulletin 7-96, states:

> Loss experience indicates that fixed carbon dioxide protection systems on printing presses have resulted in significant decreases in both property damage and business interruption.

The rate-by-area method of calculation was used to determine the application rate of CO_2 and placement of the nozzles for this typical flexographic press.



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CO_2 Fire Protection for Flexographic Printer