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# Product Usage Information

## METO®*DIAZ* D-18

## Introduction

The diazo process is ideal for use as a photo tool:

- The photo layer is sensitive to only short wave radiation (408 nm) and is much less sensitive than silver halide films. The film can be handled for brief periods in room light. The limited spectral sensitivity allows users to install yellow lights in the work area as a form of safe light.
- Diazo images are developed with ammonia and moderate heat. The simple development process does not utilise complex chemistry and produces a finished print without additional processing steps.
- The image layer is a tough plastic resin, unlike the scratch sensitive gelatine emulsions used with silver halide films.

## Conditioning

It is extremely important to condition all photo tool films prior to use. Without conditioning dimensional stability will be a problem. Below is a chart that illustrates the time factors involved for conditioning 7 mil films. Note that within the first 6 minutes, if the film is moved from one environment to another, 20 % of the final change occurs. The other chart shows which temperature and humidity is necessary in order to maintain a certain growth or shrinkage specification.

The percentage specified in the following chart is the rate of equilibration. For example, the film has reached 45 % of equilibration in 1 hour. In 10 hours the film is fully equilibrated; this applies to 7 mil (180 µm) film.

| 6 min | 30 min | 1 h | 2 h | 5 h | 10 h |
|---|---|---|---|---|---|
| 20 % | 32 % | 45 % | 63 % | 88 % | 100 % |

Diazo is usually packed at 70 °F and 50 % RH. However, it is good practise to unpack the film needed within the next 24 hours and allow it to acclimatise in the photo tool room before use. Make sure the film is protected from UV light, which can cause premature exposure and hence diminish the density of the film. Special sleeves can be slipped over fluorescent lamps to reduce radiation in the UV range and help prevent inadvertent exposure.

The presence of ammonia vapour is another source of trouble while acclimatising the film. Even a small amount of ammonia in the air can yellow the background (clear area) of diazo. This will increase the exposure times when the diazo is used to image photo resist. A hooded exhaust system is the popular way of isolating the unexposed diazo from ammonia and is essential in preparing clean photo tools. Diazo should be stored in a clean, dry place.

**Diazo film product usage**

## Environmental Control

This chart relates to environmental control areas where film is used. This may require the installation of special air conditioning equipment. The following table may serve as a useful guide to the environmental control required with today's dimensionally stable films to stay within a given tolerance.

| To hold ± 1 mil in | Hold temp to | Hold RH to |
|---|---|---|
| 10" | ± 4 °C | ± 9.0 % |
| 20" | ± 2 °C | ± 4.5 % |
| 30" | ± 1 °C | ± 3.0 % |
| 40" | ± 1 °C | ± 2.0 % |

To maintain dimensional stability, the dark room, photo tool storage and stencil exposure areas must be seen as a continuous space with controlled conditions of 21 ± 1°C and 45 to 50 % RH. The temperature of the glass in the exposure frame should be controlled. Exposure involves the use of high powered lamps that are easily capable of raising the temperature of the glass (and thus the photo tool) by as much as 8 to 10 °C. Radiational heating of the glass can be minimised by venting the lamp's exhaust fans, choosing stencil materials requiring minimum exposure and maximising the lamp-to-glass distance, which has the secondary benefit of increasing exposure precision.

## Exposure Instructions

Before exposing the photo tool it is important to determine which side of the film contains the photo sensitive coating. Each sheet has a corner cut. When the sheet is held with the long side vertically the notch will be in the upper right hand corner when the image layer faces the observer. The emulsion of the film to be copied must be in contact with the sensitised coating on the diazo photo tool. Emulsion to emulsion contact is necessary for highest possible resolution and edge sharpness. On matted diazo films the emulsion side can be detected by touching the film. The side with the matting is also the side of the emulsion.

The diazo process is a positive working photo process which means that exposure will reduce image density. Correct exposure is defined by producing the maximum density difference between background and lines without causing the lines to soften. If you have a densitometer at your disposal it is a simple matter to run a series of step tests using a step wedge and determine what exposure produces a clear step UV density of 0.13 or less. If you do not have a densitometer run a step test and determine what exposure burns step 2 of a Stouffer

21-step wedge down to equal the density in the clear area preceding the first density step.

A vacuum frame, a non-reflective backing and a UV-light source with 360 to 430 nm output are needed to expose diazo photo tools like METODIAZ D-18. Exposure units such as carbon arc, metal additive, xenon arc or high-intensity mercury vapour lamps are all acceptable. Underexposure leaves the background unclear with a high $D_{min}$ and tends to lengthen the exposure time when the diazo photo tool is used to image the photo resist. Overexposure can cause line width changes and diffuse edges.

A Stouffer 21-step wedge (ASMETEC-Code 1025057) is the most common technique for establishing the correct exposure time. Place the step wedge between the master and the unexposed sheet of diazo so it is under a clear portion of the master. The emulsion side of the step wedge must have contact with the emulsion side of the diazo film. Adjust the exposure for "a clear step 2, haze on step 3" which means the second step should vanish with just a hint of the third step still visible. An exposure of step 3 or even 4 may be used to clean out slight imperfections in the original artwork.

## Development

Diazo films like METO*DIAZ* D-18 are most commonly developed in an ammonia developer operating with aqueous ammonia in the 23 to 29 % range (23 to 26 ° Baumé) with a chamber temperature of approx. 140 to 150 °F (60 to 65 °C). A conventional diazo developer can be used for processing. Maximum density ($D_{max}$) is usually achieved in one pass through a properly adjusted developer. The amber image colour can make it difficult to visually verify full development. For this reason we recommend that METO*DIAZ* D-18 is passed through the developer twice to assure complete development.

A soft porous cover sheet can be used during the development process to prevent scratching. You cannot overdevelop a diazo print. The diazo film can experience a slight shift in image colour after development, due to a change in pH as the ammonia vapours leave the film. Your METODIAZ D-18 print can be used immediately after processing, no other finishing is required. Despite this we recommend to allow the processed film to equilibrate for a minimum of 5 hours after development.

## Helpful Hints for Proper Development

- Make sure your developer unit is operating at the suggested development temperature (approx. 150 °F resp. 65 °C). Too much heat can cause the film to stick and become dimensionally stretched. On the other hand, a developer that is too cold can cause incomplete development and low blocking density. Use temperature strips fastened to the emulsion side of the diazo film to check that the temperature is in the recommended range.
- Use fresh ammonia in the 22 to 24 ° Baumé range. Aqueous ammonia can loose strength as it sits in a polypropylene container/bottle. Use a hydrometer (such as $NH_3$-Tester, ASMETEC-Code107283) if you wish to check concentration.
- In low concentrations ammonia is a harmless substance. Humans can detect levels as low as 5 to 10 ppm. This sensitivity means that individuals retreat from levels higher than 20 ppm. Ammonia concentrations higher than 50 ppm are the lower limit for health concerns. Most diazo developers have provision for venting. A vented processor, with reasonable room air flow, should not be a source of objectionable odours.
- If you do have a UV reading densitometer check the density after one development pass and then re-check after a second pass. If the two readings are within a few points of each other than you may not need to double pass your diazo photo tool.

## Dimensional Stability

METO*DIAZ* D-18 are coated on a 7 mil (0.18 mm) polyester base which provides excellent stability and durability. Further, the heat generated from infrared absorption in the molecular imaging process is extremely low. Therefore, the film stays cooler during exposure which eliminates image creep and distortion.

Polyester based photographic films, both silver and diazo, change size with temperature and relative humidity (RH). Although there are small differences between film types, most 0.18 mm (0.007") polyester photo tool films have these approximate coefficients of linear expansion: 0.00002/°C (0.00001/°F) and 0.000015/%RH.

| | 8 in | 10 in | 12 in | 14 in | 16 in | 18 in | 20 in | 22 in | 24 in | 36 in |
|---|---|---|---|---|---|---|---|---|---|---|
| **-40 %** | -3,5 | -4,4 | -5,3 | -6,2 | -7,0 | -7,9 | -8,8 | -9,7 | -10,6 | -15,8 |
| **-30 %** | -2,6 | -3,3 | -4,4 | -4,6 | -5,6 | -5,9 | -6,6 | -7,3 | -7,9 | -11,9 |
| **-20 %** | -1,8 | -2,2 | -2,6 | -3,1 | -3,5 | -4,0 | -4,4 | -4,8 | -5,3 | -7,9 |
| **-10 %** | -0,9 | -1,1 | -1,3 | -1,5 | -1,8 | -2,0 | -2,2 | -2,4 | -2,6 | -4,0 |
| **5 %** | -0,4 | -0,6 | -0,7 | -0,8 | -0,9 | -1,0 | -1,1 | -1,2 | -1,3 | -2,0 |
| **0** | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 |
| **5 %** | 0,4 | 0,6 | 0,7 | 0,8 | 0,9 | 1,0 | 1,1 | 1,2 | 1,3 | 2,0 |
| **10 %** | 0,9 | 1,1 | 1,3 | 1,5 | 1,8 | 2,0 | 2,2 | 2,4 | 2,6 | 4,0 |
| **20 %** | 1,8 | 2,2 | 2,6 | 3,1 | 3,5 | 4,0 | 4,4 | 4,8 | 5,3 | 7,9 |
| **30 %** | 2,6 | 3,3 | 4,4 | 4,6 | 5,6 | 5,9 | 6,6 | 7,3 | 7,9 | 11,9 |
| **40 %** | 3,5 | 4,4 | 5,3 | 6,2 | 7,0 | 7,9 | 8,8 | 9,7 | 10,6 | 15,8 |

**Effects of humidity changes**

| | 8 in | 10 in | 12 in | 14 in | 16 in | 18 in | 20 in | 22 in | 24 in | 36 in |
|---|---|---|---|---|---|---|---|---|---|---|
| **-40 %** | -3,0 | -3,8 | -4,6 | -5,3 | -6,1 | -6,8 | -7,6 | -8,4 | -9,1 | -13,7 |
| **-30 %** | -2,3 | -2,8 | -3,4 | -4,0 | -4,6 | -5,1 | -5,7 | -6,3 | -6,8 | -10,3 |
| **-20 %** | -1,5 | -1,9 | -2,3 | -2,7 | -3,0 | -3,4 | -3,8 | -4,2 | -4,6 | -6,8 |
| **-10 %** | -0,8 | -1,0 | -1,1 | -1,3 | -1,5 | -1,7 | -1,9 | -2,1 | -2,3 | -3,4 |
| **-5 %** | -0,4 | -0,5 | -0,6 | -0,7 | -0,8 | -0,9 | -1,0 | -1,0 | -1,1 | -1,7 |
| **0** | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 |
| **5 %** | 0,4 | 0,5 | 0,6 | 0,7 | 0,8 | 0,9 | 1,0 | 1,0 | 1,1 | 1,7 |
| **10 %** | 0,8 | 1,0 | 1,1 | 1,3 | 1,5 | 1,7 | 1,9 | 2,1 | 2,3 | 3,4 |
| **20 %** | 1,5 | 1,9 | 2,3 | 2,7 | 3,0 | 3,4 | 3,8 | 4,2 | 4,6 | 6,8 |
| **30 %** | 2,3 | 2,8 | 3,4 | 4,0 | 4,6 | 5,1 | 5,7 | 6,3 | 6,8 | 10,3 |
| **40 %** | 3,0 | 3,8 | 4,6 | 5,3 | 6,1 | 6,8 | 7,6 | 8,4 | 9,1 | 13,7 |

**Effects of temperature changes**

At constant relative humidity, film size increases as the temperature increases and decreases as temperature decreases. Film size also increases as humidity increases and decreases as humidity decreases. When the temperature changes, the film size changes within a few minutes. When the humidity changes, however, 5 to 10 hours will be required for the film to reach its equilibrium size. It is important to know that the effects of changes in temperature and relative humidity are cumulative.

## Density

Technically speaking, density is the logarithmic measure of opacity. Practically speaking all you need to know is the relationship between opacity (image darkness) and the density numbers. You will note on the chart below that density numbers are not linear. A density of 2.0 is not twice as dark as 1.0. In fact, on this particular scale every 0.30 represents a doubling of density.

**X-Rite density reading vs. % transmission (spectral response: 350 to 420 nm, peak at 380 nm)**

| X-Rite densitometer reading | % Transmission of light through image | % of light blocked (absorbed) by image |
|---|---|---|
| 0.30 | 50,000 % | 50,000 % |
| 0.60 | 25,000 % | 75,000 % |
| 0.90 | 12,500 % | 87,500 % |
| 1.00 | 10,000 % | 90,000 % |
| 2.00 | 01,000 % | 99,000 % |
| 3.00 | 00,100 % | 99,900 % |
| 4.00 | 00,010 % | 99,990 % |
| 5.00 | 00,001 % | 99,999 % |

Increasing the density of an image from a reading on the densitometer from 4.00 to 5.00 has only increased the blocking power by 0.009 %. Therefore, if one manufacturer of diazo photo tools argues his film has a higher density (e.g. 4.40) than a competitor's film (e.g. 4.30) this increase represents the following:

- 4.30 blocks 99,993 % of the light
- 4.40 blocks 99,994 % of the light

As these numbers indicate increasing density from 4.30 to 4.40 represents only a 0.001 % increase of the light blocking ability. This small difference will have no affect on film performance.

## Film Cleaning

Your photo tool prints can be safely cleaned with CIMASOLVE CC-100 film cleaner solution. Moisten a clean cotton cloth and wipe the surface gently.

## Retouching

The final photo tool should not require excessive retouching (opaquing with ink or scraping excess image area). Inking should be done carefully on the base side, when possible, to prevent ink build-up. Ink build-up can "push into" and thin the resist and can prevent good photo tool-to-resist contact.

Excessive retouching of the photo tool indicates:

- Non-corrected intermediate artwork, especially the photo tool master and/or
- Poor duplicating practices (dirty artwork, exposure frame or environment)

Retouching should be done on intermediate artwork. There are 3 reasons for this:

1. Retouching on the photo tool should be minimised because it will be used many times and retouching inks are susceptible to flaking off. If retouching inks flake off then re-inking is necessary and the ink flakes aggravate the dirt situation when exposing resist. On the other hand intermediate artwork is used only a few times and under more controlled conditions. Therefore ink flaking is minimised.
2. Often several sets of photo tools are made. If the master is defective each photo tool set will need touch-up whereas only one master requires touch-up.
3. We recommend LightCut Super pake density retouching pens, red ink, available at ASMETEC with tips of 0.1 mm, 0.3 mm, 1.0 mm and 3.0 mm. There are various retouching pens available, but all our experience shows that this special type of ink works perfect with all standard and advanced METODIAZ D-18 coatings.

## Handling and Storage of Processed Diazo Film

The major cause of damaged photo tools is improper handling. To avoid damaging photo tools:

- Keep work areas and exposure equipment clean. Remove dust, dirt and resist chips that can become embedded in the photo tool. In clear photo tool areas these particles will block light and prevent polymerisation. Also, particles will prevent good contact between the photo tool and the resist and may press into the resist and thin it, reducing its functionality.
- It is important to remove particulate matter from the resist (MYLAR® film cover sheet) and the photo tool before placing them in contact. This can be done with a soft brush, water-dampened lint-free cloth or cleaning roller and transfer adhesive pads as referred to previously.
- Avoid sliding photo tools across other films or surfaces. The sliding action will scuff the film even if the surface is clean. If the surface is dirty the damage can be severe.
- Operators should avoid using hand creams or lotions. If deposited on the photo tool these will attract and retain dirt.
- Sharp objects such as the corner of panels or burrs will gouge and scrap photo tools. Extra caution during registration can minimise retouching the photo tool.
- Avoid damaging registration holes in the photo tool when placing them on or removing them from the pins. If the hole becomes enlarged, the photo tool may not properly register to the drilled panel. Hole reinforcements, available from suppliers of registration equipment, may be required.

Storage conditions should prevent mechanical damage and dimensional changes. The following are recommended:

- Always store films flat - never roll them up. Rolling will cause curl and dimensional changes which may make the photo tool difficult or impossible to use.
- Always store at the temperature and humidity the photo tool will be used.
- Store in envelopes to prevent accumulation of dust or dirt.
- Store vertically to avoid pressure which might embed particulate matter: if stored horizontally, do not stack.
- Interleave with paper or other material which will minimise particulate matter scratching the film.

## Handling and Storage of Unprocessed Diazo Film

Storage and handling conditions are generally the same as for other photographic films. But in addition, diazo film must be stored away from ammonia fumes. If ammonia vapour contacts the film, development of the final sepia colour results. This is most likely to occur along the edges of packaged film where the vapours can easily penetrate.

Unprocessed diazo films are sensitive to blue and ultraviolet light, but insensitive to most visible light. Therefore, film can be handled for indefinite periods under yellow fluorescent lamps, such as found in dry film resist processing areas, and red "safe" lights found in darkrooms. Unprocessed diazo films can also be handled for 15 to 30 minutes under normal artificial room lighting, such as white fluorescent and tungsten lamps.

Unprocessed diazo film should not be exposed to sunlight, mercury lamps, and other sources rich in UV light. Even short periods of exposure may cause a loss if image density in the processed films.

## Working Conditions and Shelf Life

One of the major advantages offered by diazo film is that it can be used and handled under ordinary room light since is only very slightly sensitive to visible light. However, some precautions are necessary.

- Sunlight (daylight) does contain ultraviolet radiation; therefore, the film should always be protected, especially from exposure to direct rays.
- Fluorescent lights contain a small amount of ultraviolet radiation. Lengthy exposure (for more than few minutes) under these conditions should be restricted. Yellow fluorescent lights offer excellent protection and are highly recommended. Yellow filters (e.g. ASMETEC ASR-G-10, SFG-10) can effectively block all harmful radiation.
- Incandescent lamps are also relatively harmless and unlikely to affect the emulsion over a short period of time. In practice, the film should always be properly protected in order to avoid unnecessary risk.

The **shelf life** of diazo film is limited. After a specific time, the stabiliser in the emulsion decomposes and pre-coupling of the dye may occur before exposure. The film is generally warranted for 6 months at 75 °F (24 °C) which can be extended to 1 year at 60 °F (16 °C) and 18 months at 45 °F (7 °C). Unexposed diazo film cannot be harmed by X-ray or infrared radiation. Needless to say, the film must be stored away from any ammonia or ammonia fumes to prevent premature development of the coating. Though it seems to be convenient to have the diazo films near by it will cause trouble once you should store your film boxes in the same room where you do the diazo developing. Even if you do not smell it, the air in the working area is enriched with ammonia.

It is important to know that ammonia in aqueous solution (stored in PE-bottles (polyethylene)) can diffuse through the polyethylene and enrich the air surrounding with additional ammonia.

## Daily Start-up

It is important that all of your diazo processing equipment is checked every morning to make sure that nothing has changed from the previous day. Diazo, being a photo system just like silver halide films, should be checked for any variations. It is important that your equipment is warmed up for 30 minutes before being used to create the proper processing conditions without fluctuation.

### Materials Needed

- Silver target master similar to the type of work
- Stouffer 21-step wedge sensitivity guide
- Temperature tapes 140 to 180 °F (60 to 80 °C)
- Check ammonia degree Baumé to be 23 or greater (use hydrometer)
- A piece of unexposed diazo film

### Exposure

Take a raw piece of diazo film and place the silver target master on it, emulsion to emulsion. Put the step wedge outside of the target film, emulsion to emulsion. Expose the film at normal time.

### Developing

Check ammonia with a hydrometer.

Attach a temperature tape to the exposed diazo film and run the film through the processor in normal manner. The temperature readings should be in a range of 140 °F to 160 °F (60 to 70 °C).

Check $D_{min}$ and $D_{max}$ with your densitometer (important: densitometer warm-up minimum 30 minutes!). The densitometer must be calibrated using zero adjustment and once a week using the calibration wedges.

## Trouble Shooting Guide

METO*DIAZ* D-18 diazo film has been manufactured to achieve the highest quality image for pcb photo tools, maximum image density and ease of processing.

| Visual Effect | Possible Cause | Corrective Action |
|---|---|---|
| Inadequate image density | Improper Development | · Check ammonia strength and flow rate<br>· Ammonia should register 23 Baumé (25 %) or higher<br>· Check film plane temperature, it should register 150 to 170 °F (65 to 70 °C)<br>· Pass through the processor a second time |
| | Film exposed to white room light prior to processing | · Use yellow light or yellow shielded light in the processing area |
| | Poor master | · Master does not have adequate density in image area, causing light to pass through, reducing diazo image density |
| | Excessive heat during exposure | · Density reduction is usually accompanied by a reddish image colour. Heat at exposure pane should not exceed 100 °F (38 °C)<br>· Install an infrared cut-off filter, or change to a more appropriate light source (peak 408 nm)<br>· Wattage may be excessive for distance of copy board to light source |
| | Improper film cleaner | · Film cleaner may be reducing coating. Check cloth for excessive yellow, which indicates coating is being removed<br>· Change film cleaner. Use I.P.A. (Isopropyl Alcohol) diluted 50/50 with distilled water |
| Reddish visual image | Excessive heat during exposure | · See above |

| Visual Effect | Possible Cause | Corrective Action |
|---|---|---|
| Background discoloration (uniform) | Under-exposure | · Increase exposure time to burn out residual diazo |
| | Film exposure to ammonia vapour prior to processing | · Remove storage of film away from possible ammonia contamination<br>· If diazo master is being used, residual ammonia may remain in the film. Prior to placing in contact with another piece of Diazo film, allow time for ammonia to evaporate. |
| | Background of master opaque to light | · Increase exposure time to permit passage of light through background of master |
| | Exposure of excessive heat prior to processing | · Keep film stored in cool and dry environment |
| | Over-aged product | · Obtain new product |
| Background discoloration (Random) streaks and edges show yellow or brown | Light "fall-off" and distortion from light source | · Increase exposure time to compensate for "fall-off" and distortion<br>· Change to new bulb<br>· Change reflector in light source to give more uniform distribution of light |
| Background discoloration (Random) streaks and edges show yellow or brown | Improper contact of film to master | · Draw down vacuum more slowly, to allow proper evacuation of air<br>· Draw down vacuum for longer period of time |
| Background discoloration (Random) shadows and light spots | Turbulence of ammonia vapour in developer chamber | · Check fan system and exhaust, reduce fan speed |
| | Poor ammonia concentration | · Check ammonia with ammonia hydrometer<br>· Check ammonia flow |
| | Uncontrolled heat in developer chamber | · Check heat system using temperature stripes every 10-15 cm all over the working width<br>· Call for service to adjust or repair heat system |
| Image lines have become thinner or spaces larger | Over exposure causes undercutting | · Reduce exposure time<br>· Use Stouffer step wedge to determine proper exposure time |
| | Master and film not emulsion-to-emulsion | · Check master and film for emulsion side<br>· Place in contact emulsion-to-emulsion |
| | Reflective surface being employed on copy board causing bounce back | · Change copy board or obtain black backing for copy board |
| Blurred images | Master and film not emulsion-to-emulsion | · See above |
| | Reflective surface being employed on copy board | · See above |
| | Improper contact of film to master | · See above |
| Pin-holes in image | Pin-holes in master | · Check for pin-holes in master<br>· View master on an angle for diagonal pin-holes<br>· Opaque appropriate areas |

| Visual Effect | Possible Cause | Corrective Action |
|---|---|---|
| Black dots in clear area of film | Dust on master or vacuum frame glass | · Clean with anti-static film cleaner or glass cleaner<br>· Use cleaning rollers and transfer adhesive pads to the surface |
| | Image dots on clear area of master | · Eradicate or physically remove from master<br>· Increase exposure to burn through existing dots |
| Straight lines showing on processed film | Usually caused by stripped or pasted up masters. The edges of the paste-up cause distortion of the light | · Increase exposure time to burn out through cut-lines<br>· Physically remove lines from first duplicate and use the corrected dupe to make another print |
| Random yellow spots in image area | If yellow spots appear after exposure onto photo-resist, cause is particles of resist adhering to photo tool | · Check resist laminated boards for loose resist chips and remove |
| | Improper film cleaner | · Check film cleaner. Do not apply directly to film. Apply to cloth and then clean film<br>· Some cleaners will bleach the film<br>· Do not use petrol |
| Image fading or shifting colour | Caused by a pH-shift when the ammonia exits the film. This shift will not affect the UV density. | · Pass through ammonia to achieve original colour |
| Density dropping when measured with a densitometer | Underdevelopment. The visual image is normal nut the UV density is inadequate. | · See above |
| Image passes light after being used several times | Underdevelopment as described above. | · See above |
| Ammonia will not flow when using a pump or flow stops after extended use | Vapour lock | · Dilute ammonia 10 - 15 % with distilled water or use a pre-mixed ammonia at 22 - 4° Baumé<br>· Do not adjust ammonia below 22°Baumé or development problems will occur |
| | Pump in confined area which causes it to become overheated | · Place pump in ventilated area or<br>· Blow air across pump using a fan to keep temperature reduced |
| Ammonia processor not developing properly even with proper heat and temperature | Too much exhaust | · Exhaust fan too strong, drawing the ammonia out of the developer |
| | Blocked feed tubes to processor | · Feed tubes blocked causing improper ammonia feed to chamber, call for service |
| Film sticking in processor | Developer too hot | · Adjust temperature to 150° to 190°F (60 to 65 °C) using temperature tapes |
| | Dirty slip screen | · Deposits on slip screen causing film to stick. Remove and clean slip screen if developer has one |
| | Sticky rollers | · Clean the rollers of developer |