Several factors are involved in choosing a stripping method: Type of paint, base material of part, time required to strip, shape of part, and available equipment.

For stripping smaller parts, either singly or in volume, tank immersion is recommended. If the part to be stripped is relatively flat, with unbroken surfaces, either the hot or cold method can be used with good results. In cases where the parts have a number of turns and recessed areas, the parts should be pre-tested to determine whether cold or hot stripping would be more effective.

For parts that are too large or cumbersome to be immersed in a tank, or for vertical surfaces, a brush-on stripper is recommended. As with parts stripped in a tank, brush-on strippers are rinsed with cold water from a nozzled hose. Do not use hot water to rinse; hot water creates more solvent vapors and tends to re-deposit material onto the stripped surface.

The type of material to be stripped also helps determine the stripping method. Most non-ferrous metals will react with the caustic materials in hot alkaline strippers. The active material in caustic strippers is quickly consumed with each non-ferrous part, thus killing the tank.

Oftentimes, strippers are chosen to be compatible with existing equipment. If you have an unheated tank, but do not wish to go to the expense of installing an immersion heater, cold solvent strippers are the only alternative. However, cold strippers require more ventilation. If present equipment is not adequate to handle solvent vapors, the cost of installing additional equipment must be taken into consideration. Finally, if it is undesirable to install any kind of tank, cold solvent brush-on strippers are the only alternative.

COMPARING HOT AND COLD STRIPPERS

The perfect stripper has yet to be formulated. There is no product which will remove all finishes from all surfaces. And because of the development of increasingly complex and durable coatings and finishes, new strippers are becoming more specialized than before.

There are four basic types of strippers: Hot or cold, acid or alkaline. Hot strippers are used in dip tanks. They are strongly alkaline materials that are mixed with water and heated to, or near, the boiling point. The high alkalinity dissolves the paint, and is used up in the process. As each piece is stripped, the solution becomes a little more contaminated and a little weaker.
Hot stripping requires heat and agitation to be most effective. Agitation may be produced either mechanically, by air, or through the boiling action of the solution. As a general rule, stripping efficiency doubles for every 10°F increase in temperature, noticeably after 200°F. Agitation significantly reduces stripping time.

An advantage of the hot stripping system is that the initial cost per gallon in solution is usually lower than with cold strippers. In use, however, the overall costs can go up or down, depending on: Type of finish removed; stripping time; and type of part. Heating the tank also results in higher energy cost.

Cold strippers contain solvents. They work by first penetrating the finish, then breaking the bond between the finish and the surface of the part. They do not need to be heated in order to work, and they do not have to be mixed or dissolved; they normally come ready-to-use.
When cold strippers are used for immersion, the paint falls to the bottom of the tank; paint does not "use up" or contaminate the stripper. Only cold strippers will strip certain non-ferrous parts without attacking the base metal. And only cold strippers can remove the toughest of today's paints and finishes.

The solvent used in cold strippers does evaporate, causing the stripper to lose strength. Evaporation can be lessened by using water or other seals and by keeping the tank covered when not in use. To form a water seal, one to two inches of water is simply floated on top of the stripper tank. Solvent fumes do not easily penetrate the water.

Fremont Industries does not recommend using a water seal. Water tends to absorb the accelerators in the stripper, causing it to lose strength. You can check to see if this is happening by dipping pH paper into the seal. If it reads acid, your stripper is losing efficiency. Unless evaporation from a cold solvent tank is controlled, as much as 10% of the solvent can be lose in a week. The vapors can also be corrosive to nearby equipment, such as furnace air intakes. This loss of solvent is not only costly, it can pose health hazards. Cold solvent stripping operations therefore usually require more elaborate ventilation systems than do hot alkaline operations.

All Fremont cold solvent strippers contain a built-in seal to minimize evaporation loss. On larger tanks, covers may be constructed with hinged sections (see illustration). When parts of small bulk are being stripped, part of the cover can be lifted to expose a smaller surface area to the air.
Choosing a Fremont

COLD SOLVENTS

<table>
<thead>
<tr>
<th>PRODUCT</th>
<th>pH: A-ACID B-ALK</th>
<th>FORM</th>
<th>BASE</th>
<th>CONC</th>
<th>WPG</th>
<th>Tank or Equip.</th>
<th>For Stripping Paint From These Base Materials</th>
</tr>
</thead>
<tbody>
<tr>
<td>550</td>
<td>A</td>
<td>L</td>
<td>MC</td>
<td>AS</td>
<td>10:30</td>
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<td>Steel, Aluminum, Stainless, Poly-Lined</td>
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<td>551</td>
<td>A</td>
<td>L</td>
<td>MC</td>
<td>AS</td>
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<td>L</td>
<td>MC</td>
<td>AS</td>
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<tr>
<td>555</td>
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<td>L</td>
<td>MC</td>
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<td>L</td>
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Additive

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<th>For Stripping Paint From These Base Materials</th>
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<td>37</td>
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<td>MC</td>
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<tr>
<td>57</td>
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<td>Paste</td>
<td>MC</td>
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Spray

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<th>FORM</th>
<th>BASE</th>
<th>CONC</th>
<th>WPG</th>
<th>Tank or Equip.</th>
<th>For Stripping Paint From These Base Materials</th>
</tr>
</thead>
<tbody>
<tr>
<td>57</td>
<td>B</td>
<td>Paste</td>
<td>MC</td>
<td></td>
<td>9:39</td>
<td>x</td>
<td>Steel, Aluminum, Stainless, Poly-Lined</td>
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</table>

HOT ALKALINE STRIPPERS

<table>
<thead>
<tr>
<th>PRODUCT</th>
<th>pH: A-ACID B-ALK</th>
<th>FORM</th>
<th>BASE</th>
<th>CONCENTRATION</th>
<th>TEMP</th>
<th>WPG</th>
<th>Tank or Equip.</th>
<th>For Stripping Paint From These Base Materials</th>
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<tbody>
<tr>
<td>70S</td>
<td>A</td>
<td>P</td>
<td>Caustic Soda</td>
<td>8-20 oz/gal</td>
<td>180-200</td>
<td>NA</td>
<td>x x</td>
<td>Steel, Stainless</td>
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<tr>
<td>254</td>
<td>B</td>
<td>P</td>
<td>Caustic Soda</td>
<td>1-2 lbs/gal</td>
<td>180-225</td>
<td>NA</td>
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<td>3060</td>
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<td>P</td>
<td>Caustic Soda</td>
<td>4-8 oz/gal</td>
<td>90-100</td>
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<td>105</td>
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<td>L</td>
<td>Glycols</td>
<td>1-2 lbs/gal</td>
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<td>8.76</td>
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<tr>
<td>319PF</td>
<td>B</td>
<td>L</td>
<td>Glycols</td>
<td>1-2 lbs/gal</td>
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<td>9.17</td>
<td>x x</td>
<td>Steel, Stainless</td>
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<tr>
<td>154</td>
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<td>P</td>
<td>Caustic Soda</td>
<td>1-2 lbs/gal</td>
<td>Cold or 180-210</td>
<td>NA</td>
<td>x x</td>
<td>Steel, Stainless</td>
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</tbody>
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All Fremont powdered strippers are de-dusted.
# Paint Stripper

## To Strip These Finishes

<table>
<thead>
<tr>
<th>Material</th>
<th>Alkyd</th>
<th>Enamel</th>
<th>Epoxies</th>
<th>Phenolic</th>
<th>Polyurethane</th>
<th>Vinyl</th>
<th>Urea-Formaldehyde</th>
<th>Powder Coats</th>
<th>Epoxy</th>
<th>Polyester</th>
<th>Acrylics</th>
<th>Modified Epoxy</th>
<th>Polyesters</th>
<th>Natural Resins</th>
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</thead>
<tbody>
<tr>
<td>Metal</td>
<td>X</td>
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<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
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<tr>
<td>Wood</td>
<td>X</td>
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<td></td>
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<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Glass</td>
<td></td>
<td></td>
<td></td>
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<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

## Special Features

- Cleans hot melt residue and char.
- Patented! Leaves wood grain natural color.
- Evaporation retarded; Low odor.
- Long tank life
- Strips Scotchlite from road signs
- Highly accelerated; Heavy duty. Designed to strip insul. from electric wire.
- Designed for printed circuit industry. 3030 and 3030M remove tough finishes like photo-resist coatings. Vacuum metalized racks and parts.
- Stable. Removes decals. No flash rusting.
- Patented! Excellent for removing stains
- Stable. Removes decals. No flash rusting.

## Do Not Use On:

- Fiberglass
- Plastic
- Aluminum
- Zinc
- Cadmium
- Galvanized
- Phenolic
- Plastic
- Aluminum
- Zinc
- Non-Porous
- Fiber Glass

<table>
<thead>
<tr>
<th>Product</th>
<th>550</th>
<th>551</th>
<th>552</th>
<th>555</th>
<th>570</th>
<th>5015</th>
<th>3030</th>
<th>3030M</th>
<th>37</th>
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## Strips These Finishes

<table>
<thead>
<tr>
<th>Oil Base</th>
<th>Spumers</th>
<th>Vernish</th>
<th>Stains</th>
<th>Acrylics</th>
<th>Natural Resins Polyid</th>
<th>Special Features</th>
</tr>
</thead>
<tbody>
<tr>
<td>X</td>
<td>X</td>
<td></td>
<td>X</td>
<td>X</td>
<td>x x</td>
<td>Economical</td>
</tr>
<tr>
<td>X</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td>x x</td>
<td></td>
</tr>
<tr>
<td>x x x x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x x x x x x x x x x</td>
<td></td>
</tr>
</tbody>
</table>

## Special Features

- Economical
- Removes rust; highly pigmented paint.
- Low comp. mild odor
- Biodegradable. Can strip paint from certain hard plastics.
- Booster for hot alkaline strippers. Removes rust.
- For hot or cold stripping. No phenols or chromates. Removes rust.

All Fremont strippers contain built-in detergents for easy rinsing.
## Comparing Hot and Cold Strippers

### HOT ALKALINE STRIPPERS

<table>
<thead>
<tr>
<th>ADVANTAGES</th>
<th>DISADVANTAGES</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Lower cost per gallon in solution.</td>
<td>1. Active ingredient consumed with each part stripped.</td>
</tr>
<tr>
<td>2. Vapors pose less health hazard.</td>
<td>2. More difficult to rinse.</td>
</tr>
<tr>
<td>3. Requires less ventilation.</td>
<td>3. Usually requires heat and agitation.</td>
</tr>
<tr>
<td>4. Can be less expensive for stripping parts in volume.</td>
<td>4. Not recommended for most non-ferrous metals.</td>
</tr>
<tr>
<td>5. Needs no evaporation retardant; does not lose strength from evaporation.</td>
<td>5. Requires longer stripping time.</td>
</tr>
<tr>
<td>6. Introducing water does not kill solution.</td>
<td>6. Not as effective on tough, modern finishes.</td>
</tr>
<tr>
<td>7. Removes rust.</td>
<td>7. Must be diluted with water before use.</td>
</tr>
<tr>
<td></td>
<td>8. Can raise grain and discolor wood surfaces.</td>
</tr>
</tbody>
</table>

### COLD SOLVENT STRIPPERS

<table>
<thead>
<tr>
<th>ADVANTAGES</th>
<th>DISADVANTAGES</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Usually do not need to be diluted.</td>
<td>1. Higher cost per gallon.</td>
</tr>
<tr>
<td>2. Active ingredient not consumed by dead paint.</td>
<td>2. Solvent evaporates rapidly; causes solution to lose strength.</td>
</tr>
<tr>
<td>3. Faster stripping action.</td>
<td>3. Fumes can pose health hazard.</td>
</tr>
<tr>
<td>4. Removes all finishes; more effective on tough finishes than hot solutions.</td>
<td>4. Easily killed by introducing water.</td>
</tr>
<tr>
<td>5. Needs no heat.</td>
<td>5. Vapors can be corrosive to nearby equipment.</td>
</tr>
<tr>
<td>8. Easier rinsing.</td>
<td></td>
</tr>
<tr>
<td>9. Cold strippers compatible with wood, do not discolor surface or raise grain.</td>
<td></td>
</tr>
</tbody>
</table>
WHAT SHOULD A GOOD PAINT STRIPPER CONTAIN?

**Cold Solvent Type**

**Solvent Base**  (Methylene Chloride) Neutral or minimal; no attack on base metal.

**Evaporation Retardant**  Minimizes loss of solvent due to evaporation.

**Accelerator**  Allows faster stripping. Prolongs tank life by providing more uniform stripping action.

**Detergent Emulsifier**  For easier rinsing of stripped parts.

**Corrosion Inhibitor**  Protects stripped parts and tank against attack. Also prevents consumption of accelerator.

**Hot Alkaline Type**

**Base**  Caustic Soda, Caustic Potash

**Accelerator**  Allows faster stripping. Prolongs tank life by providing stripping action even as tank becomes contaminated.

**Surface Active Agent**  For easier rinsing of stripped parts.

**Water**  Hot alkaline strippers are diluted in water.
TANK LIFE

Regular sludge removal and filtering of the stripper solution will greatly extend tank life. Installing removable screens or wire baskets (preferably stainless steel) at the bottom of a cold stripper tank makes it easy to sieve out dislodged paint particles. The perforations should be 1/4" in diameter and spaced 1" apart. This is a very economical system. Alternately, filter systems can be installed which automatically remove paint particles, but they are difficult to design and install. They are economically feasible only for very large operations.

Filtering and removal of paint sludge in hot tanks is usually accomplished by first allowing the suspended paint to settle. The top three-fourths of the solution are pumped into a holding tank. Then the sludge remaining on the bottom is dumped. This is the least expensive method, in terms of equipment. The entire contents of the tank can also be pumped into cone-shaped settling receptacles. The sludge accumulates at the bottom of the cone where it is drained into barrels, after the clarified stripping solution has been pumped out. Automatic filtering systems can also be used in hot stripping tanks.

EXTENDING TANK LIFE

Hot and Cold Tanks

1. Regular filtering and sludge removal.
2. Do not allow solids level in a tank to go too high.
3. Make regular additions of stripper as solution is consumed, evaporated, dragged out by parts.
4. Strip paint hooks regularly, before paint becomes too thick.

Cold Tanks Only

1. Keep tank covered when not in use to minimize evaporation.
2. Do not allow water to get into tank.
3. Do not introduce alkaline chemicals into acid stripper tanks or visa-versa.

Hot Tanks Only

1. Maintain proper chemical/water ratio.
2. Strip only those parts made from a material for which stripper was designed, normally steel or steel alloys.
3. Do not introduce acid chemicals into alkaline stripper tanks or visa-versa.
WHEN TO DUMP

With every part stripped, the stripping solution loses some of its strength. Deciding when to dump the tank instead of adding fresh chemical is often a matter of judgement.

For hot alkaline tanks, titration will show how much alkaline material is in solution. This method is only accurate for a short time after a fresh charge, because as the stripper becomes contaminated, with old paint, etc., the foreign material in solution will push the alkalinity reading up. Thus, even though titration shows a high alkalinity level, the chemical may be nearly spent, and parts cannot be stripped.

The most common method to judge when to add more chemical is when the parts take longer to strip and are more difficult to rinse. Remove paint sludge from tank. If performance is still unsatisfactory, make an addition of stripper. If this doesn't work, the active stripping material has been consumed, and no amount of additional chemical will make a significance difference. Dump the tank and re-charge with fresh stripper.

(When properly maintained and by making additions as required, cold solvent stripping tanks can run for years without dumping.)

HOW TO KILL A STRIPPING TANK

1. Process non-ferrous metals in a hot alkaline stripper. Caustic materials react with non-ferrous metals, consuming the active ingredient in the stripper. This can kill the tank in a matter of hours.

2. Allow too much spent paint to accumulate in the tank. Stripper may continue to work on previously-stripped paint, consuming active ingredients. Certain paint resins and vehicles will also react with and consume alkalinity in a hot system. This is called saponification - making soap.

3. When removing parts from a tank, let some of the stripper drip onto the floor or go down the drain. This loss is known as "drag out".

4. Introduce chrome into the stripping tank. Few things will contaminate a stripping solution as quickly as chrome.

5. Allow too much water to accumulate in a cold solvent tank. If 20% water by volume is mixed in the stripper, the solution will be de-activated.
GENERAL HINTS ON PAINT STRIPPING

1. Hot stripping is easier when parts have been recently painted. After paint has been baked, or aged more than 24 hours, cold stripping is more effective.

2. Heating paint hooks right before hot alkaline stripping will often make it easier to remove heavy paint accumulation.

3. Thorough rinsing with water under pressure may be necessary to remove the last remaining traces of paint.

4. Acid based strippers can make parts more vulnerable to flash rust. Some form of neutralization or corrosion protection is recommended immediately after stripping.

5. Tanks should be deep enough so that parts do not touch the sludge layer on the bottom.

6. When using cold solvent strippers, parts can be pulled out of the solution so the air can evaporate some of the solvent and then replaced in the tank. This evaporation breaks the paint bond and can speed up stripping time.
All persons involved with paint strippers should understand how to work with them safely. To protect their health and promote maximum safety, people need thorough training in how to properly handle paint strippers and the stripping procedure. They also need to know and understand the hazards associated with paint strippers, the first aid treatment prescribed in case of accidents, and the proper use of protective equipment.

**Basic Safety Rules:**

1. Store or use stripper in a cool, dry area.
2. Keep stripping tanks covered when not in use.
3. Clearly identify stripping tanks by labeling them "ACID STRIPPER" or "ALKALINE STRIPPER".
4. Dispose of dirty or contaminated stripper by placing it in a suitable container. Local health regulations should be observed in waste disposal of strippers.
5. Wear protective garments and use protective equipment.
6. Avoid any body contact with strippers. Strippers can cause severe burns to eyes and skin.
7. Do not take internally. Strippers may be fatal if swallowed.
8. Use strippers only in well ventilated areas.
9. Do not use open containers or open tanks unless adequate ventilation is provided to draw vapors away from working area.
10. A continuing strong or objectionable odor should not be tolerated. It indicates excessive vapor in the air. A person who becomes light headed or dizzy in a stripper area should leave the area immediately and get to outside fresh air.

**Additional Safety Rules for Caustic Soda Based Powders:**

1. Powdered strippers will generate heat when added to water. Add powdered strippers to cold water slowly while mixing to avoid violent boiling or spattering. Always add acids to water; never add water to acid concentrates.

**Additional Safety Rules for Methylene Chloride Based Strippers:**

1. Do not store under direct sunlight.
2. Wear face shield. Cover vent plug with clean rag and remove very slowly because of pressure build-up in drums.
Additional Safety Rules for Methylene Chloride Based Strippers Cont'd:

3. Avoid the possibility of exposing strippers or their vapors to excessive heat such as welding, furnace, or space heat.

4. Do not smoke while handling stripper.

5. Do not heat or use heated water for rinsing.

6. Do not use through sprayers or other means which atomize the material. Thixotropic, viscous material (such as 57 or 553) may be applied with special airless, pot type sprayer when they are used outside.

Hazards and First Aid Treatment:

SKIN: Use solvent resistant gloves, rubber boots, rubber apron, face shield and hard hat. Discard when evidence of deterioration appears. Contact can cause severe burns to skin. If skin is exposed, immediately remove all soaked clothing. Wash skin with running water immediately. Do not wear soaked clothing until it is thoroughly washed and dried.

EYES: Use goggles (acid type splash proof) and preferably a face shield to protect from eye injury. When stripper is spattered into eyes, serious injury to eyes may result. In case of contact with eyes, immediately flush eyes thoroughly with large amounts of water. Obtain medical attention immediately.

SAFETY EQUIPMENT: Safety garments and protective equipment should be provided to safeguard the health and safety of operators, maintenance men, and all other people working with paint strippers. Safety garments and protective equipment are not intended to substitute for proper operation and maintenance practices. The manufacturer's instructions should be followed at all times.

SUGGESTED GARMENTS AND EQUIPMENT

Gloves: polyvinyl alcohol plastic or neoprene.
Apron: polyvinyl alcohol plastic or neoprene.
Goggles: acid type splash-proof.
Shoes: rubber boots.

Note: PVA plastic, though solvent resistant, is soluble in water.
ORAL: Do not take internally. Never store in unlabeled or improperly labeled container. Keep out of reach of children.

Swallowing stripper may cause severe burns, illness, or death, depending upon the quantity swallowed. If swallowed, call a physician immediately. Drink large quantities of water. In case of unconsciousness, follow the procedures shown below.

INHALATION: Use strippers only with adequate ventilation. Inhalation of excessive amounts of vapor may produce light headedness, dizziness, nausea, or unconsciousness. In case of excessive inhalation, remove to fresh air. Obtain medical attention at once. If breathing stops, artifical respiration should be used. Mouth to mouth is the most effective and easiest method. When breathing starts, oxygen should be administered. If the heart has stopped, give closed chest cardia massage, but only if properly trained to recognize and treat this condition.

Decomposition Hazards with Methylene Chloride Solvent Based Strippers:

Poor ventilation may cause corrosiveness due to fumes, vapor, and degraded gas due to heat or flame sources. Never weld in areas where these type strippers are used or stored. Avoid open flames and space heaters. When exposed to high temperatures, these type strippers may decompose and produce hydrochloric acid and harmful vapors. A strong indication of solvent reaching an open flame is corrosion of exhaust flues.

Ventilation:

The amount and type of ventilation required for a stripping operation depends on its level of vapor concentration in the air. The legal allowable concentration of air-vapor mixture is called the threshold limit value (TLV).

TLV is a registered trademark of the American Conference of Governmental Industrial Hygenists. TLV is the threshold limit value or occupational exposure limit. This is defined as the time weighted average concentration for a normal 8 hour workday, 40 hour weekweek, to which nearly all workers may be exposed repeatedly without adverse effect.

Generally, the longer your stripping tank is completely covered, the less ventilation is required to insure meeting the TLV. Some type
of mechanical exhaust system is usually required to maintain proper ventilation. The purpose of mechanical ventilation is to insure that the vapor concentration for open surface tanks does not exceed the eight-hour, time weighted average (TLV).

The potential effects from overexposure through inhalation of strippers are: light headedness, dizziness, drunkeness, nausea, and unconsciousness. If the TLV cannot be met, workers should be supplied with NIOSH approved respirators for organic vapors.

Mechanical exhaust systems help insure meeting the TLV. This is accomplished with blowers and ductwork necessary to maintain the proper air-vapor mixture, or TLV. Mechanical exhaust systems draw vapors away from the stripping tank, and also draw vapors away from the tank or area where parts are rinsed. Normally, the exhaust system is placed by the tank sides, by the top and by the bottom of the tank.

For specific recommendations on the type and amount of ventilation equipment your operation requires, contact an industrial hygenist or a firm specializing in ventilation engineering.

TLV (threshold limit value) is expressed in parts per million (ppm) or milligrams per cubic meter (mg/m^3). For each cubic meter of vapor produced, a minimum of 10,000 cubic meters of fresh air is needed to maintain a vapor concentration of 100 ppm.

Refer to the most recent Material Safety Data Sheet for the latest recommended maximum exposure limit (TLV) for each stripper used.