

EnSolv[®]

Precision Cleaning Solvent

USERS GUIDE

Designed for
Vapour Degreasing
and Cold Cleaning

**READ WITH MATERIAL SAFETY DATA SHEET
FOR SAFE HANDLING INFORMATION**

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EnSolv[®] is a range of solvents specially formulated to address a wide variety of precision cleaning problems.

EnSolv[®] solvents are non-flammable, azeotropic, environmentally friendly and possess excellent solvency and soil loading capacity.

EnSolv[®] solvents contain a unique, patented inhibitor package to neutralise acid, inhibit rust, prevent corrosion of metals and enhance solvency and soil lifting removal.

VAPOUR DEGREASING

EnSolv[®] can be used in new or existing equipment. This guide explains the simple procedure needed to use **EnSolv[®]** safely and effectively.

SAFE USE OF **EnSolv[®]**

- Check material compatibility. If in doubt test before use.
- Do not smoke or eat while using machine.
- Do not enter tanks even when empty unless properly equipped.
- Do not lean over machine.
- Do not inhale vapours.
- Avoid contact with skin and eyes.

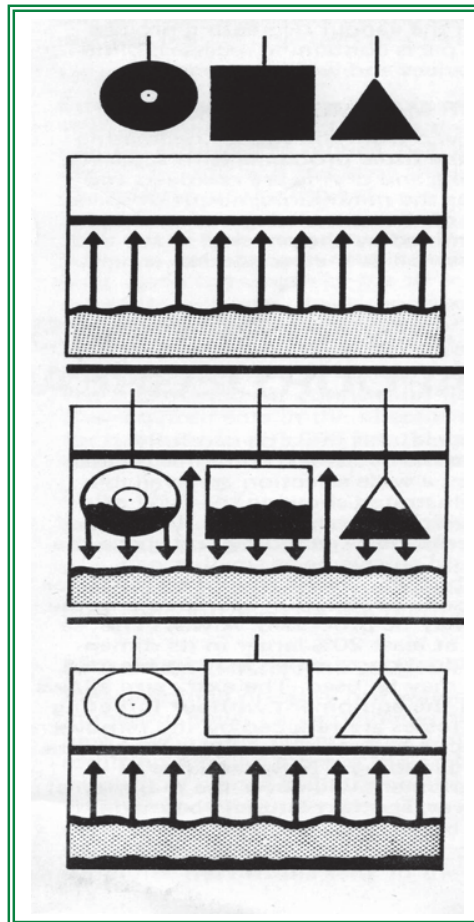
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HOW VAPOUR CLEANING WORKS

Vapour cleaning offers a quick, efficient method of removing oil, tar, grease and insoluble solids from all types of machined and fabricated parts producing clean, dry articles for subsequent finishing and/or fabrication. The term vapour cleaning is a misnomer, from the following description it will be clear that condensation cleaning would be a more accurate description. We do, however, refer to vapour cleaning as this has become the generally accepted term for this process.

EnSolv[®] non-flammable solvent is heated in the sump of the tank to boil to form a vapour which is approximately four times as heavy as air. The height of the vapour zone is controlled by condenser coils around the top of the tank. Parts to be cleaned, at room temperature, are lowered into the hot vapour which condenses on the surface and the hot liquid solvent dissolves the oil and grease flushing this with the insoluble solids into the sump. Solvent is recycled continuously.

The soil accumulates in the boiling sump and only pure solvent vapour comes into contact with the work load. The work is held in the vapour zone until it reaches vapour temperature at which time condensation ceases. The parts are then removed from the vapour zone clean and dry and immediately available for further processing.



Parts at room temperature are introduced into hot vapour.

Boiling solvent produces vapour.

Vapour condenses on to cold parts and liquid solvent flushes oil, grease and dirt into sump. Condensation continues until parts achieve vapour temperature. Condensation then ceases.

Clean parts are removed from vapour to dry in the freeboard area and are ready for further processing. Vapour recycles continuously for next cleaning cycle. Dirt and oil accumulate in sump.

TYPICAL VAPOUR DEGREASING TANK AND RECOMMENDED SETTINGS FOR *EnSolv*[®]

FREEBOARD

The distance from top of tank to vapour line. Reduces effects of draughts and movement of work – Drainage area for parts before removal. Freeboard should be at least 100% of tank width preferably 150%.

CONDENSING COILS

Control level of vapour in tank. Mains water can be used for cooling but low temperature refrigeration cooled recirculated water reduces solvent usage. Max 25°C Min 8°C.

SAFETY CUT-OUT

Switches heating off if vapour level rises. Set to 45°C.

SUMP CUT-OUT

Detects high contamination level in solvent. Set to 75°C.

WATER SEPARATOR

Removes water from condensed solvent by gravity separation due to difference in specific gravity – Water in solvent causes solvent decomposition – increasing losses by reducing vapour density. Seal separator with 20mm water layer. Load and unload using hoist at controlled speed, maximum 3m/min.

PIT INSTALLATION

For safety, tank must protrude 1 metre. Allow adequate space for cleaning & maintenance. Install extraction fan rated at 10 times pit volume per hour.

EXTRACTION DUCT

Continuous stream of air reduces solvent levels around the tank, protects operators. Control extraction rate to prevent solvent being removed by airflow. Recommended rate 650/950 m³/hr/m² of bath surface area.

EXTRACTION FAN

Airflow expels solvent laden air to the atmosphere. Use low loss ducting for maximum effect.

NOTE:- The Environmental Protection Act sets limits on emissions which may require abatement plant to be fitted.

CONTROL PANEL

Preferably should include time clock and energy control system.

CONDENSATE COLLECTOR

Directs condensed solvent to water separator, prevents condensed water on cooling coils from entering tank.

VAPOUR ZONE

To prevent piston action driving vapour from tank, allow 20/30% free space around basket.

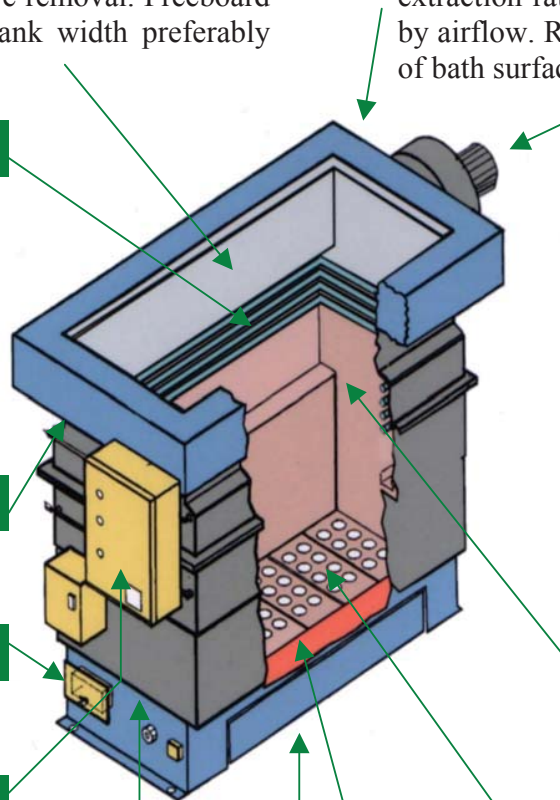
liquid fill to 15cm below work support plates. DO NOT MIX *EnSolv*[®] WITH OTHER CLEANING SOLVENT. This may be detrimental to solvent stability.

HEATING

Electricity or steam-heated coils are the only form of heating which should be used. Electric immersion heaters or base mounted limpet heaters can be used – Maximum heat density 2 watts/cm².

CLEANOUT PLATE

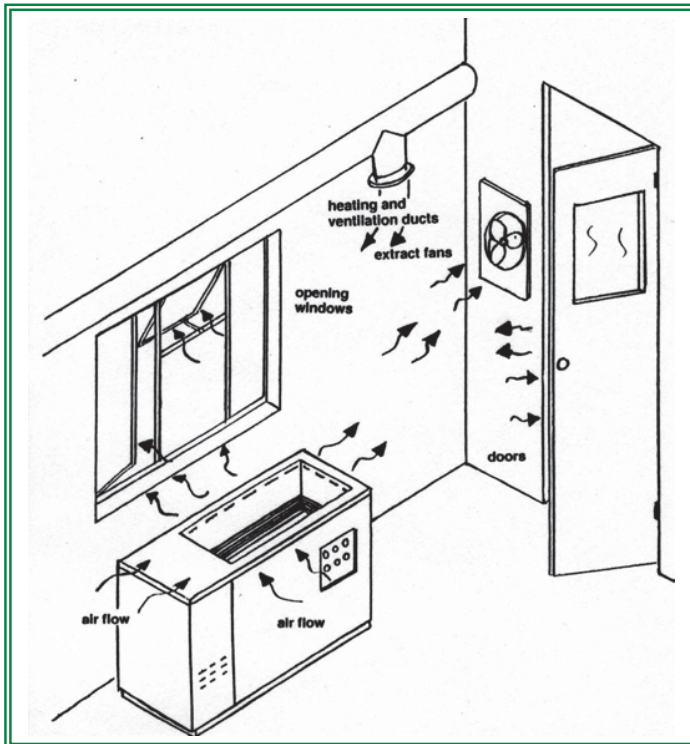
Use Viton or cellulose gaskets.



EnSolv[®]

POSITIONING OF TANKS

Draughts are often the cause of excessive solvent loss. Positioning tanks to avoid draughts and uncontrolled air movement is essential. The drawing illustrates some of the situations where air movements can result in solvent being removed from the tank. Reversing the flow of air from windows and doors may result in high levels of solvent in air around the tank.



BE AWARE OF DRAUGHTS

Use smoke tapers or anemometers to isolate the source.

ENCLOSE

or surround tanks if necessary with metal, wood or plastic

BAFFLE

air streams from extraction fans, heating ducts and refrigeration cooled chillers away from the tank.

SEAL

windows to prevent opening.

LOCK

doors (if possible) or fit with flexible plastic screens.

PREPARING AN EXISTING VAPOUR DEGREASER FOR EnSolv[®]

It is essential that no cross contamination occurs as this can produce interaction between the inhibitor systems. All acidity must be neutralised.

IMPORTANT!

In cleaning tanks it is particularly important to remember to drain and clean water separators, pumps and associated pipe work. These are often overlooked and can be the source of many problems of cross contamination.

- 1) Drain tanks completely.
- 2) Drain water separator and pipework.
- 3) Drain pumps.
- 4) Remove any solids or liquid sludge from tanks.

!!! SOLVENT VAPOURS EXCLUDE AIR. DO NOT ENTER THE TANK OR PIT UNLESS ABSOLUTELY NECESSARY. WEAR FRESH AIR RESPIRATORY APPARATUS WITH SAFETY HARNESS. DO NOT USE REGENERATIVE BREATHING APPARATUS. CONSTANT SUPERVISION IS ESSENTIAL.

- 5) Fill tanks with water. Heat to at least 50°C and add 50g of Sodium Carbonate per litre of water. DO NOT USE STRONG ALKALIS. If possible heat to boiling.
- 6) Scrub walls and bottom of tanks with brush to remove any sediment. If pumps are fitted circulate liquid for 1 hour. Ensure that all pipe work and the water separator are flooded.
- 7) Drain solution from tanks.
- 8) Refill to same levels with fresh water to rinse. Repeat 6) above.
- 9) Drain rinse water.
- 10) Dry tank and pipework, drain pumps and water separator to remove as much water as possible.
- 11) Use a small amount of *EnSolv[®]* to flush tank, pipework, water separator and pumps. Discard this material.
- 12) Fill tanks, water separator and pumps to required level.
- 13) Check gaskets, valves and joints for leaks.
- 14) Set thermal cut-outs to: **LIQUID SUMP: 75°C** and **FREEBOARD: 45°C**
- 15) Check cooling system is operating.
- 16) Switch on heating.

ACID ACCEPTANCE

EnSolv[®] is protected from breakdown by specially formulated stabiliser packages. During normal use in a vapour degreaser these stabilisers are sacrificed to prevent the *EnSolv*[®] from breakdown and the system becoming acidic. The depletion of stabilisers can be accelerated by a number of factors:

- Excessive moisture from water-borne soils.
- A poorly functioning water separator
- The cleaning of white metals (aluminium, magnesium or titanium) and accumulation thereof in the degreaser

Always remember the depletion of stabiliser protection can lead to corrosion or even to breakdown of the *EnSolv*[®] and to the system becoming acidic.

MONITORING THE CONDITION OF *EnSolv*[®]

The condition of *EnSolv*[®] can be monitored by the determination of acid acceptance and solvent pH. Acid acceptance is a measure of the stabiliser level in the solvent, and provides an early indicator of a developing acid condition. The acid acceptance of *EnSolv*[®] can be monitored by ASTM Test Method D-2942-92 "Standard Test Method for Total Acid Acceptance of Halogenated Organic Solvents", details of which are available on request.

A simpler method of measurement and control is available in the easy and quick to use *EnSolv*[®] Acid Acceptance Test Kit which is available, free of charge, from Croftshaw Solvents Ltd. or your local distributor.

When testing the acid acceptance it is important to obtain a sample from the water separator rather than the boiling sump, as samples from the sump will be too dirty to provide an accurate test. Even traces of water will cause low acid acceptance values. Therefore, the sample must not contain water that has phase separated. It should be noted that Acid Acceptance can be improved by adding fresh *EnSolv*[®].

EnSolv[®] ACID ACCEPTANCE VALUES

0.19 – 0.259	%	Acid Acceptance of <i>EnSolv</i> [®]
0.15 min	%	Measure acid acceptance weekly
0.11 – 0.15	%	Measure acid acceptance daily
0.07 – 0.10	%	Add <i>EnSolv</i> [®] 1 part t 1
<0.07	%	1. Replace with fresh <i>EnSolv</i> [®] 2. Remove, distil and blend. (Blend four parts fresh <i>EnSolv</i> [®] with 1 part distilled <i>EnSolv</i> [®])

SOLVENT RECLAMATION

The soil contamination in the boiling sump should never be allowed to exceed 25% and should be maintained below this level. Figures 1 and 2 are examples of solvent/oil percentage curves indicating boiling sump temperature and specific gravity for one example of soil-machine oil. Each soil tested will have different curves. Maximum recommended sump temperatures for *EnSolv*® are approximately 3 to 5°C above the normal solvent boiling point. A vapour degreaser delivers its greatest output and economy when the solvent is clean. Contaminated solvent can be regenerated through distillation.

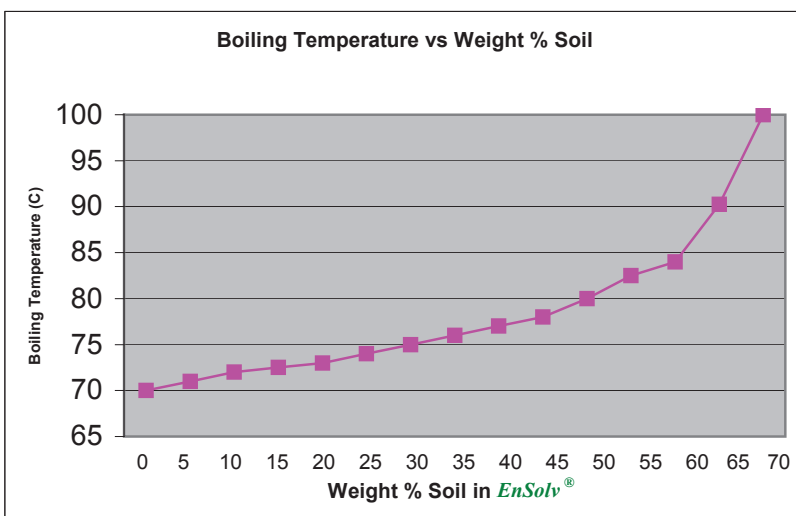


FIGURE 1

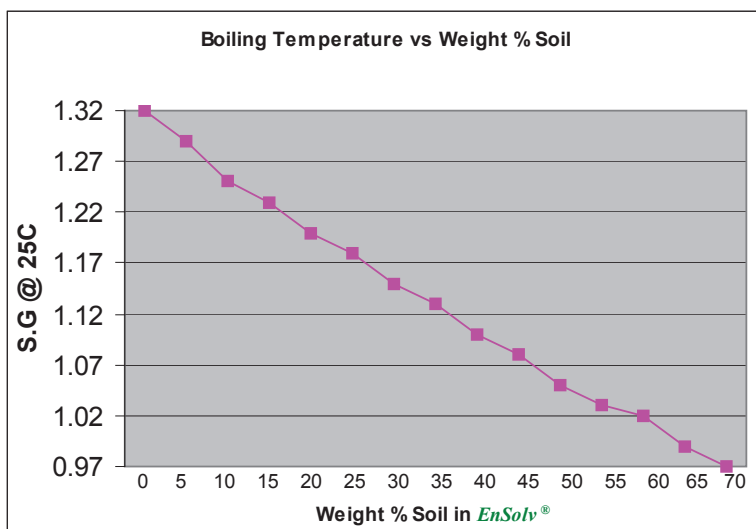


FIGURE 2

INTERNAL DISTILLATION

By taking the degreaser out of production, solvent can be reclaimed and soil concentrated by boiling down the residues and diverting the distillate to a storage tank. Throughout this process a minimum of 1½ inches of liquid must be maintained over the heating element. Lesser amounts of liquid may cause significant damage to the degreaser.

After the degreaser has been turned off and the solvent-soil mixture has been allowed to cool, the mixture can then be removed from the sump. The solvent-soil mixture can be stored if the metal fines are removed. Metal fines can deplete the solvent stabiliser system and reactions may occur. Accumulated solvent-soil mixtures must be properly reclaimed or disposed in accordance with regulations governing disposal or hazardous wastes.

EXTERNAL DISTILLATION

Solvent from the boiling sump can be continuously removed and sent to an external still or to an outside distiller or reclamation facility for distillation. This method is generally used when production volumes are high. Make up solvent must be added to the system continually to replace the solvent spent for distillation.

COLD CLEANING

EnSolv[®] is an excellent solvent for cold cleaning by immersion or hand wiping with rags or swabs. *EnSolv*[®] evaporates quickly leaving no residues.

SAFE USE OF *EnSolv*[®]

- Do not breathe vapour or spray.
- Avoid contact with skin and eyes.
- Use in well-ventilated place.
- DO NOT SMOKE when using *EnSolv*[®].

Use lidded containers to minimise evaporation losses or apply *EnSolv*[®] from pressure packs or aerosols. Used rags or swabs should be stored in closed containers or plastic bags to minimise evaporation into the workplace. Control operator exposure using appropriate ventilation or extraction systems.

Simple natural ventilation (fig.1) may be sufficient for limited usage but an enclosed cabinet (fig. 2) with positive ventilation will give better protection. When more extensive use is needed, local extraction systems with flexible ducting to centralised fans can be used.

EnSolv[®] should be used at room temperatures when using ultrasonic tanks. Monitor temperature rise due to energy input from transducers.

DO NOT ALLOW TEMPERATURE TO RISE ABOVE 50°C.

Measure operator exposure regularly.

EnSolv[®] is non-flammable but like other halogenated solvents has flammable limits in air.

DO NOT cut or weld drums that may contain residual vapours or an explosion may result.

DO NOT use near open flames, hotplate or other heat sources as corrosive gases can result.

Figure 1

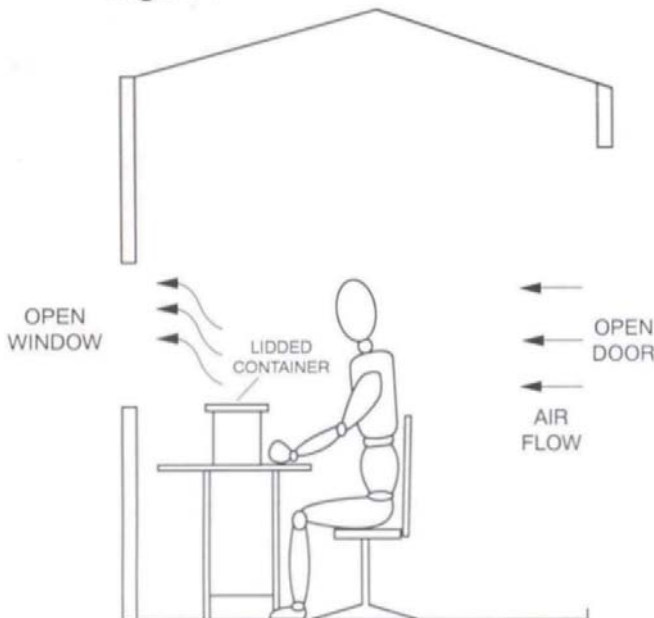


Figure 2

