



***EnSolv*[®] MATERIALS COMPATIBILITY**
Metals, Plastics, Elastomers & Phenolics

This MATERIALS COMPATIBILITY fact sheet is offered solely for your information, consideration and investigation. **USERS SHOULD ALWAYS THOROUGHLY TEST THE *EnSolv*[®] CLEANING SOLVENT FOR THEIR APPLICATION PRIOR TO USE.** Testing is the only way to ensure that the product meets user requirements. All products are sold on the understanding that the user is solely responsible for determining its suitability for any purpose and Enviro Tech International, Inc. is not responsible for uses for which the product is not intended.

Enviro Tech International, Inc. provides no warranties either expressed or implied, and assumes no responsibility for the accuracy or completeness of the data contained herein. The information contained herein is believed to be accurate but is not warranted to be so. **Users are advised to confirm in advance of use in production that the *EnSolv*[®] Cleaning Solvents is suited to the circumstances of use by the users own tests.**

Enviro Tech International, Inc. assumes no responsibility for injury to user or third persons caused by the material if reasonable safety procedures are not adhered to as stipulated in the data sheet. Furthermore, vendor assumes no responsibility for injury caused by abnormal use of this material even if reasonable safety procedures are followed.

The information below is supplied as a general guideline. Plastics and elastomers can be manufactured to a wide range of physical properties thereby necessitating thorough testing prior to usage. Any trade names supplied in brackets are the sole property of the owners of those names.

TABLE OF CONTENTS
OF
MATERIALS COMPATIBILITY FACT SHEET

- Table 1: Ferrous Metals and Alloy Metals Corrosion Recommendations
- Table 2: Plastic Compatibility Recommendations
- Table 3: Elastomer Compatibility Recommendations
- Table 4: Accelerated Phenolic Lining Recommendations

**TABLE 1:
FERROUS METAL AND ALLOY METAL CORROSION RECOMMENDATIONS**

METAL SPECIMENS	CORROSION TEST ¹	IMMERSION CORROSION TEST ²	IMMERSION CORROSION TEST ²	IMMERSION CORROSION TEST ²	VAPOR DEGREASER VAPOR LAYER CORROSION TEST ³
	PER MILITARY SPEC. T-81533A 4.4.9 FOR VAPOR DEGREASERS	SAMPLES IMMERSSED FOR 2 WEEKS AT 120°F	SAMPLES IMMERSSED FOR 1 MONTH AT 120°F	SAMPLES IMMERSSED FOR 2 MONTHS AT 120°F	SAMPLES IMMERSSED IN VAPOR FOR 60 MIN
ALUMINUM ⁴	PASSED	NONE	NONE	NONE	NONE
BERYLLIUM ⁴	PASSED	NONE	NONE	NONE	NONE
BORON ⁵	PASSED	NONE	NONE	NONE	NONE
NAVAL BRASS ⁴	PASSED	NONE	NONE	NONE	NONE
BRONZE ⁵	PASSED	NONE	NONE	NONE	NONE
CARBON STEEL	PASSED	NONE	NONE	NONE	NONE
CHROMIUM ⁵	PASSED	NONE	NONE	NONE	NONE
COPPER ⁴	PASSED	NONE	NONE	NONE	NONE
HASTELLOY-B ⁴	PASSED	NONE	NONE	NONE	NONE
HASTELLOY-C ⁴	PASSED	NONE	NONE	NONE	NONE
HASTELLOY-D ⁴	PASSED	NONE	NONE	NONE	NONE
INCONEL	PASSED	NONE	NONE	NONE	NONE
IRON CAST ⁵	PASSED	NONE	NONE	NONE	NONE
IRON, HIGH	PASSED	NONE	NONE	NONE	NONE
LEAD ⁵	PASSED	NONE	NONE	NONE	NONE
MAGNESIUM ⁴	PASSED	NONE	NONE	NONE	NONE
MANGANESE ⁵	PASSED	NONE	NONE	TRACE	NONE
NICKEL ⁴	PASSED	NONE	NONE	NONE	NONE
PLATINUM	PASSED	NONE	NONE	NONE	NONE
SILVER ⁵	PASSED	NONE	NONE	NONE	NONE
316 STAINLESS	PASSED	NONE	NONE	NONE	NONE
TIN ⁵	PASSED	NONE	NONE	NONE	NONE
TITANIUM ⁴	PASSED	NONE	NONE	NONE	NONE
URANIUM ⁵	NOT TESTED	NONE	NONE	TRACE	TRACE
VANADIUM ⁵	PASSED	NONE	NONE	NONE	NONE
ZINC ⁵	PASSED	NONE	NONE	NONE	NONE
ZIRCONIUM ⁵	PASSED	NONE	NONE	NONE	NONE

- 1) T81533A, 4.4.9, was followed for Metal Corrosion testing except that 1,1,1-Trichloroethane was replaced by EnSolv.
- 2) TM-01-69, Laboratory Corrosion Testing of Metals for the process Industry. The Total Immersion Test Method for Corrosion described within: Any oxides of the specimens were degreased by scrubbing with bleach-free scouring powder (e.g. except for aluminum, magnesium and copper and silver and other relatively soft metals) followed by thorough rinsing with acetone and air-dried. Specimens were totally immersed in EnSolv for two weeks, one month and two months at 120°F. The test specimens were then examined for any signs of corrosion, pitting, discoloration and embrittlement and weight loss.
- 3) Vapor Degreaser Vapor Layer Test Procedure: Any oxides of the specimens were degreased by scrubbing with bleach-free scouring powder (e.g. except for aluminum, magnesium, copper, silver and other relatively soft metals) followed by thoroughly rinsing with acetone and air-dried. Specimens were placed into the vapor layer of the vapor degreaser for 60 minutes and then examined for any signs of any signs of corrosion, pitting, discoloration and embrittlement and weight loss.

- 4) Test Strip Coupons were 2" X 1" long X 1/16" thick.
- 5) Test Disk's were 1 ½" in diameter X 1/8" thick.

**TABLE 2:
PLASTICS COMPATIBILITY RECOMMENDATIONS**

PLASTIC MATERIAL	ACCEPTABILITY ¹ RECOMMENDATION	INCOMPATIBLE ¹ RECOMMENDATION	VAPOR DEGREASER VAPOR LAYER TEST ² FOR 60 MIN
ABS		X	INCOMPATIBLE
ACRYLIC		X	INCOMPATIBLE
ARLON (POLYETHER ETHER KETONE)	X		ACCEPTABLE
CHLORINATED POLYVINYL CHLORIDE	X		ACCEPTABLE
DELRIN	X		ACCEPTABLE
EPOXY RESINS	X		ACCEPTABLE
FURANE RESINS	X		ACCEPTABLE
FLUOROETHYLPROPYLENE	X		ACCEPTABLE
HIGH DENSITY POLYETHYLENE	X		ACCEPTABLE
IONOMER RESIN	X		ACCEPTABLE
KYNAR (POLYVINYLIDENE FLUORIDE)	X		ACCEPTABLE
LEXAN		X	INCOMPATIBLE
METHYLMETHACRYLATE	X		ACCEPTABLE
MYLAR	X		ACCEPTABLE
NYLON	X		ACCEPTABLE
POLYAMIDE	X		ACCEPTABLE
POLYETHYLENE TEREPHTHALATE	X		ACCEPTABLE
POLYIMIDE	X		ACCEPTABLE
POLYOXYMETHYLENE	X		ACCEPTABLE
POLYPROPYLENE	X		ACCEPTABLE
POLYSTYRENE		X	INCOMPATIBLE
POLYURETHANE	X		ACCEPTABLE
POLYVINYL CHLORIDE (RIGID, PIPE COMPOUND)	X		ACCEPTABLE
TEFLON	X		ACCEPTABLE
ULTEM (POLYETHERIMIDE)	X		ACCEPTABLE

- The plastic coupon strips tested were 1 1/2" wide X 3" long X 1/8" thick. Each coupon was placed into 8 ounces of **EnSolv**[®] in a 16 ounce glass bottle. This allowed for both a vapor and a liquid phase during the test. The bottles were then placed in a 120°F oven for twenty four hours. The coupons were then removed and the **EnSolv**[®] was heated to boiling point until a vapor layer was clearly visible. The plastic coupons were then placed into the vapor layer of the **EnSolv**[®] within the glass bottle. After a 30 minute exposure to the vapor, each of the plastic coupons was examined under magnification. If the plastics coupons tested showed any indication of solvent attack such as dissolving, swelling or fraying were designated as "Incompatible ". Those that showed no indication of solvent attack were designated as "Acceptable".
- Vapor Degreaser Vapor Layer Test Procedure: Plastic test strips 1 ½" wide X 3 "long X 1/8" thick were placed into the vapor layer of the vapor degreaser containing **EnSolv**[®] for 60 minutes and then examined under magnification. Plastic showing any signs solvent attack such as dissolving, swelling or fraying were designated

as "Incompatible".

**TABLE 3:
ELASTOMER COMPATIBILITY RECOMMENDATIONS**

ELASTOMER MATERIAL	ELASTOMER TEST ¹	VAPOR DEGREASER VAPOR LAYER TEST ²
ACRYLONITRILE-BUTADIENE	MC	MC
BUTADIENE NITRILE	NC	NC
BUTADIENE STYRENE	NC	NC
BUTYL	NC	NC
CHLOROPRENE	NC	NC
CHLOROSULFONATE POLYETHYLENE	NC	NC
EPICHLOROHYDRIN 956	NC	NC
ETHYLENE PROPYLENE	NC	NC
ETHYLENE-PROPYLENE (TERPOLYMER)	MC	NC
FLUOROELASTOMER ("VITON A, B")	NC	NC
ISOBUTYLENE-ISOPRENE (BUTYL)	MC	MC
NATURAL RUBBER	SC	SC
PERFLUOROELASTOMER ("CHEMRAZ")	NC	NC
POLYCHLOROPRENE (NEOPRENE)	SC	SC
POLYETHER URETHANE	NC	NC
POLYSILOXANE (SILICONE)	NC	MC
POLYSULFIDE	NC	NC
POLYURETHANE	NC	MC
VINYL-METHYL SILOXANE	NC	NC

- Elastomer Test Procedure:** The elastomers coupon strips weighing approximately 10 grams each, plus or minus 0.1 gram were placed into 4 ounces of *EnSolv*[®] in a 8 ounce glass bottle. This allowed for both a vapor and a liquid phase during the test. The *EnSolv*[®] was then heated to boiling point until a vapor layer was clearly visible. After 60 minutes exposure to the vapor, each of the elastomers were removed and weighed the following results are noted in the chart above.
- Vapor Degreaser Vapor Layer Test Procedure:** The elastomer test strips thick were placed into the vapor layer of the vapor degreaser containing *EnSolv*[®] for 60 minutes and then examined as above for SIGNIFICANT CHANGE (SC), MODERATE CHANGE (MC) or LITTLE OR NO CHANGE (NC):

SIGNIFICANT CHANGE (SC): The elastomer was rated as having "significant change" if the elastomer gained 11% to 15% weight after exposure. These materials did not return to their original weights

MODERATE CHANGE (MC): The elastomer was rated as having "moderate change" if the elastomer gained 6% to 10% weight after exposure. These materials returned were weighed again after 48 hours and had returned to their original weight.

LITTLE OR NO CHANGE (NC): The elastomer was rated as having "little or no change" if the elastomer gained 2% to 5% weight after exposure. These materials returned were weighed again after 24 hours and had returned to their original weight.

TABLE 4:
ACCELERATED PHENOLIC LINING TESTS RECOMMENDATIONS

Testing of Phenolic linings: A test cup consists of a lid, bottom and gasket. For sealing of the cups four binder clips were utilized. For the evaluation, two test cups with 2 coats for each Phenolic lining type described above were utilized. Test cups were filled with approximately four ounces of *EnSolv*[®]. A lid and gasket was placed on the bottom and clamped tight using the four binder clips. The test cups were then placed into a 120^oF oven.

After thirty days, the test cups were removed from the oven and inspected for any defects such as blisters, discoloration, etc. For the evaluation, we gently scrape the surface of the lining with a wooden tongue depressor to check for softness. All linings that show any defects were considered failures. The evaluation procedures were repeated at 60 & 90 days.

SERIES	LINING TYPE	COATS	1 MONTH	2 MONTHS	3 MONTHS	4 MONTHS
12	Phenolic	2	S	S	S	S
15	Phenolic	2	S	S	S	S
15M	Phenolic/Epoxy	2	S	S	S	S/D
46	Phenolic/Epoxy	2	S	S	S D	F Dissolved Softened
48	Phenolic	2	S	S	S	S

S = Satisfactory F = Failure D = Discolored