

Helpful Guide for METALNOX M6386 Users

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INTRODUCTION

KYZEN's METALNOX M6386 is a modified alcohol-based solvent. M6386 was developed for operation under vacuum conditions and designed to remove polar and nonpolar based soils for manufacturing purposes. M6386 is a low maintenance solvent which requires very little monitoring. Please use this document as a helpful resource toward getting started with a successful vacuum degreasing process. For details regarding equipment maintenance, please consult your equipment manufacturer.

ROUTINE TESTING AND MAINTENANCE OF M6386

Monitoring Acidity in a Vacuum System:

KYZEN's METALNOX M6386 modified alcohol will not go acid like many other industrial solvents. Water from coolants and moisture in the air mixed with other manufacturing soils (such as chlorinated lubes) can mix in the system and lead to the potential formation of HCl and in rarer instances, the formation of H₂SO₄. Monitoring solvent for acid formation needs to be done on a routine basis.

KYZEN's ASK 86 test kit is a specific process kit designed to monitor/analyze your M6386 solvent for acid formation. The test takes roughly 15 minutes to complete. Each user will find different requirements for time between ASK 86 tests based on production hours and soil loading. KYZEN recommends each user starts by testing their solvent on a weekly basis for at least 3 months of normal throughput conditions before deciding to increase the time between tests. We recommend you perform the ASK 86 test at least once per month. Follow the test instructions supplied in the test kit or found in the METALNOX M6386 Technical Supplement.

Note: Sample should be typically collected from the condensation tank when performing ASK 86 test.

Note: Many machines are equipped with a two-valve sample port. To collect a sample: open the top valve to allow the sample tube to fill. Return the top valve to closed position and then open the bottom valve to dispense sample into solvent compatible container. Purge the line 1-2 times prior to collecting a fresh sample used for testing.

Based on the sample analysis results, you may need to add an appropriate amount of Booster 86 to treat the solvent as stated below.

Adding Booster 86:

Promptly add the appropriate amount of Booster 86 to your vacuum system as specified by ASK 86 test. Follow the table included with test instructions to determine the amount of Booster 86 required to neutralize the acid in your system.

Add Booster 86 to filter housing. Perform operation to prepare machine for a filter change. Once machine is prepped, open filter housing and dispense appropriate amount of Booster 86 directly into the filter housing. Adding too much Booster 86 will not impact process. Perform the ASK 86 test again after adding Booster 86; wait 3-4 hours prior to retesting while machine is turned on (distillation unit is actively working).

Note: Always check filter housing cover/gasket for sealing after any service when the system is placed back in operation. Look for components that need to be replaced.

CP86:

KYZEN CP86 is designed to work in a vacuum degreasing system. CP86 provides a thin-film wax type coating to metal parts, providing long-term corrosion protection to ferrous alloys. Some users consider applying low concentrations (<2%) of CP86 to act as a lubricant in downstream processes (e.g., metal on metal assemblies). In this case, please ensure this is a good process for your application.

Nonvolatile Residue (NVR) testing is used to measure the concentration of KYZEN CP86. A Mettler Toledo HE53 Moisture Analyzer is recommended by KYZEN for measuring the concentration of CP86. Please see instructions for measuring CP86 concentration found in the METALNOX M6386 Technical Supplement.

Note: Use of CP86 typically requires a 3-tank system. Tank 3 is the dedicated CP86 Tank. User must ensure the CP86 Tank is not tied into the distillation loop. Recipes apply CP86 as the final step prior to the vacuum drying. Any subsequent cleaning steps will remove CP86 from parts.

Note: Downstream removal of CP86 can be done in your vacuum system. Run a cleaning recipe that does not call for CP86. CP86 can also be removed in a hot aqueous bath (150-160°F) with a 5-10% concentration of KYZEN's METALNOX M6314.

M6386 STUDY

Vacuum degreasing systems use an onboard distillation unit to continuously reclaim M6386 solvent back into the system. M6386 can be distilled and reused indefinitely if not contaminated by manufacturing soils. Volatile agents from upstream manufacturing soils with a similar boiling point to M6386 can accumulate in M6386 as they are introduced to the system. We encourage you review any known components of upstream manufacturing soils you expect to remove in your vacuum system with a KYZEN representative or actively research them yourself.

As a rule of thumb, volatile agents with an atmospheric boiling point between <341°F are projected to accumulate in M6386 solvent. Removal of materials with a boiling point <341°F should be consulted with your KYZEN representative. Accumulation of volatile agents in M6386 can lead to inconsistent cleaning and/or compatibility issues with materials and equipment components.

Gas Chromatography (GC):

The KYZEN lab in Nashville, TN is equipped with GC capabilities. We use this method to analyze samples of your M6386 solvent. KYZEN will perform this testing and provide a detailed report outlining the presence of certain volatile contaminants. Please consult your KYZEN representative for further details for an ongoing solvent study.

Karl Fischer Titration:

A Karl Fischer Titration can be performed on M6386 to determine water content. M6386 will contain 0.0% water when dispensed from an unopened container. M6386 will only absorb a small percentage of water (<3%), but other volatile agents may allow for an increase in water uptake which can impact cleaning. Many users may have inhouse capabilities to perform this standard test. KYZEN labs have the capability to provide this testing. Please consult you KYZEN representative for details if needed.

NVR:

NVR can be used to check "soil loading" of METALNOX M6386. When NVR is measured on a sample from the condensation tank, <1% NVR should be expected. Higher amounts of NVR are possible due to formation of aerosols and/or violent boiling in the still. If an excess (>3%) or climbing NVR value is observed, you should consult your equipment manufacturer to help address root cause. Adjusting the distillation process will likely resolve the soil loading issue. Cleaning of heating elements or still vessel(s) may be necessary.

Note: Users with an HE53 Moisture Analyzer can perform NVR testing in-house. Please use the same method found in the Technical Supplement for measuring concentration of CP86. The readout on your HE53 display at completion of test will be your %NVR or percent soil loading. Remember, a readout of less than 1% is expected if sample is collected from the condensation tank.

*Note: If samples are collected from other locations on the machine (e.g., sample is collected from Tank 1), an NVR can be expected above 3%. NVR will vary in a *work tank based on recent throughput and other operating conditions. If a lower NVR value is expected or desired from the time of testing (e.g., in the case of cleanliness issues), consult your equipment manufacturer to increase the volume of solvent being distilled in the system.*

**A work tank is a tank holding solvent used for cleaning parts or applying CP86 (generally notated as Tank 1, Tank 2, Tank 3, CP Tank)*

CONSIDERATIONS FOR CLEANLINESS QUALITY CONTROL (QC):

Inspection of parts after a cleaning process is necessary so downstream processes are not impacted by any residual contamination. KYZEN recommends a user develop a cleanliness spec for their parts. Inspect parts from each lot to ensure passing quality.

Inspection can also provide a user insight on the state of their system. Wet or failing parts exiting the machine are a sign that something is wrong. Please consult your KYZEN representative if you notice changes in your cleaning process.

Note: Parts should never exit wet. If you are experiencing wet parts, ensure parts are racked in a manner that does not allow "cupping or pooling" of solvent (perform basket rotation if possible). If

it is not a function of racking, ensure your dry time is sufficient. Consult your equipment manufacturer if problem persists.

COMMON IN-PROCESS QC TESTS:

Dynes Test:

Dynes test can be performed in an effective test for most applications. It is a good test for a fast-paced production setting. The test is best performed on parts that offer at least a 1 in² surface.

Visual and White Glove Test:

Visual inspection of parts under magnification or using a white cloth material over parts is a common way to determine the presence of residual contaminates.

Fluorescence:

Ensure fluorescence is an appropriate method to test your parts. A handheld Fluorescence meter can be used to measure the amount of certain residual contaminates.