

ENSEAL[®] 160

Aqueous inorganic / organic sealant for Zinc and Zinc alloy layers

INTRODUCTION

ENSEAL 160 is a water-based solution with a solids content of about 25 % and has been designed for the formation of a thin transparent, organic film on various coatings.

LAYER CHARACTERISTICS

ENSEAL 160 is mainly used for sealing passivated zinc or zinc alloy layers. Iridescent appearance obtained from passivated surfaces can be eliminated by single dip immersion using ENSEAL 160. The ENSEAL 160 will result in a uniform appearance (without edge pull back). This feature makes ENSEAL 160 especially suited for window fitting applications.

ENSEAL 160 is also recommended for use over black passivated parts. The high corrosion resistance and transparent film formation of ENSEAL 160 will compliment the black passivated surface very well.

ENSEAL 160 can be mixed with water in any concentration. Cured layers are exceptionally resistant to moisture, neutral salt spray as well as SO₂-containing environments. Layers from ENSEAL 160 also are highly resistant to UV exposure and sunlight.

ENSEAL 160 is an aqueous, slightly alkaline sealant without the addition of any lubricant.

Passivated zinc, zinc-iron and zinc-nickel surfaces achieve significantly higher corrosion resistance when post-treated with ENSEAL 160.

ENSEAL 160 is a combination of inorganic silicon compounds and polymers as well as chemically active and functional components. ENSEAL 160 does not contain any heavy metal.

ENSEAL 160 dry films can be removed by alkaline media. ENTHONE Sealant Remover has been specifically developed to serve this purpose.

The cured film will be around 0.5 – 2 µm.

ENSEAL 160 is free from Cr⁶⁺ compounds.

IMDS Classification: In their composition, layers from ENSEAL 160 correspond to material ID-No. 974954, stored in the IMDS system.

RoHS-compliant: ENSEAL 160 complies with RoHS regulation and does not contain any Pb, Cd, Hg, Cr⁶⁺, PBB, PBDE.

REQUIRED PRODUCTS AND THEIR EFFECTS

Produkt	Art.-Nr.	Usage	Density
ENSEAL 160 Ammonia solution (chem. pure, 25 %)	429043	for make-up and maintenance to increase pH	1.074

EQUIPMENT

Tanks

Steel tanks with a PVC or Koroseal lining or plastic tanks made of Polypropylene, Polyethylene and PVC-GFK can be used. Tanks made of stainless steel may also be used.

Heating

Use of heaters or heat exchange units is recommended. Materials: PTFE (Teflon), porcelain or stainless steel. A low surface temperature and/or good circulation around the heaters is required to prevent curing of the reactive organic materials on the surface of the heaters. The heating energy should not exceed 2 Watt/cm².

Filtration

In order to remove cured products or zinc flitters a filtration is needed from time to time. Recommended are sack type filters with polypropylene sacks. Filter mesh: 30 – 100 µm. Surface quality and corrosion performance will be increased.

Agitation

It is necessary to agitate mechanically on a continuous basis by means of a membrane pump (peristaltic pump) or a slow moving stirrer located near to the bottom system to avoid settlement of the emulsion. Air agitation leads to foaming and may be detrimental to the functioning of the process.

Exhaust

Normally, exhaust is not required.

COMPOSITION AND WORKING CONDITIONS

	Optimum	Range
ENSEAL 160	400 ml/l* corresponds to solids content 6 – 15%	250 – 600 ml/l
pH	9.0	8.5 – 9.5
Temperature	25 °C	18 – 35 °C
Immersion time	30 s	10 – 60 s
Drying time	15 min	5 – 20 min
Drying temperature	80 °C	65 – 100 °C
if necessary		up to 120 °C
Agitation	slight mechanical agitation (no air agitation)	

* for barrel plating a lower concentration is recommended (200 ml/l).

MAKE-UP

- Add de-ionised water to the tank to about 1/2 of the final operating volume. Regenerated water from circulation reservoir may not be used for make-up.
- Add the required amount of ENSEAL 160 (6 – 15% solids content) whilst stirring well.
- Top up with water to the final volume and stir thoroughly.
- Check pH-value and ensure that it is within range.
- To increase the pH ammoniumhydroxide solution (concentrated) can be used.
- After heating to working temperature and a further pH control the sealant is ready for use.

Operating temperature	18 – 35 °C
Drying temperature	60 – 120 °C

Caution: Never add concentrated acid directly to ENSEAL 160 – sealer.

PROCESS SEQUENCE

Application of ENSEAL 160 is usually the last step of the plating process. Parts are not to be rinsed after this step. After treatment with ENSEAL 160 allow parts to drain for at least 60 s or blow off using a suitable blow-off station prior to drying. Maximum drying temperature is 120°C.

Normal Sequence:

- Metal deposition (zinc layer or zinc alloy)
- Rinse (2 – 3 rinsing steps)
- Passivation (trivalent) or chromate (hexavalent)
- Rinse (2 – 3 rinsing steps)
- Drain for 30 to 60 seconds (alternatively: blow-off)
- Immersion into ENSEAL 160 (30 – 60 s)
- Allow to drain for at least 60 seconds to about 2 minutes (alternatively: blow-off with pulse blower or spinning in case of centrifuge)
Note: Do not rinse after ENSEAL 160!
- Dry at minimum of 60 °C

PRE AND POST-TREATMENT GUIDELINES

ENSEAL 160 is primarily used as sealant over passivated zinc or zinc alloys layers. Prior to immersion into the sealant solution it is imperative to rinse carefully. Drag-in of contaminations must be avoided!

Especially ensure no acid residues are dragged-into the solution as they will cause the solids content to precipitate. With black chromate passivation (hexavalent) intermediate drying is required.

The last rinse water before ENSEAL 160 has to have a pH of at least 6.5. Observe a drain-off time of at least 30 sec, prior to treatment with ENSEAL 160, to avoid dilution of the sealant solution.

DRYING

To obtain a high corrosion protection parts should be dried in an oven or in centrifuges at least 60 °C. For trivalent passivated parts a drying temperature of 80 – 120 °C is recommended. For hexavalent chromated parts the maximum drying temperature is approx. 80 – 100 °C. Drying time is about 10 – 20 Minutes. To avoid excess of spin off of the uncured ENSEAL 160 centrifuges should be operated at lowest possible speed.

Note: High performance sealants form chemically stable films on parts as well as on racks, barrels and or centrifuge baskets, which may be difficult to remove. The remaining film should be removed after each plating cycle by exposure to a hot alkaline cleaner or ENTHONE Sealant Remover. A mechanically stripping of racks, barrels or centrifuge baskets may be required from time to time.

MAINTENANCE AND CONTROL PROCEDURE

To avoid precipitation of the solids, the pH-value of the ENSEAL 160 solution has to be maintained between 8.5 – 9.5. Increase of the pH-value is done by use of ammonium hydroxide solution (concentrated).

As concentrate and ready for use solution may show some settlements it is mandatory to mix up the solution prior to use. The concentrate for additions may be mixed up by turning around the closed containers.

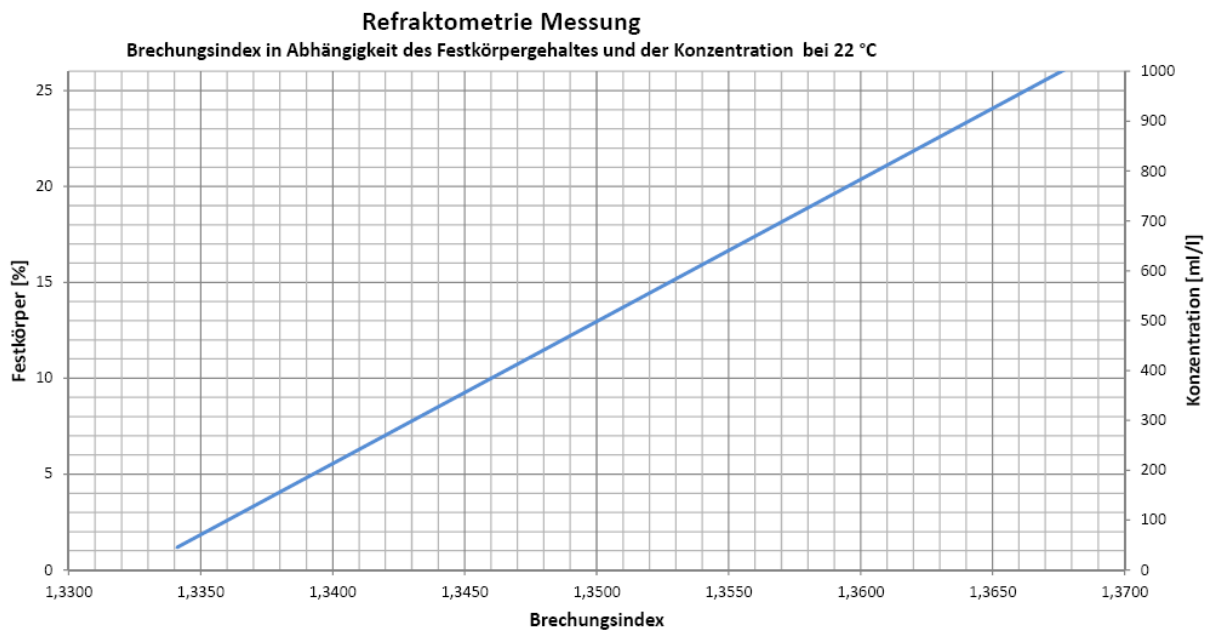
The ENSEAL 160 bath is maintained by regular additions of ENSEAL 160 concentrate based on drag-out. Additions should be made on a daily basis. Determination of the concentration of the ENSEAL 160 – solution is carried out via determination of the refractive index or by drying and weighing in accordance with following analysis.

ANALYSIS

Maintenance

If the solids content of ENSEAL 160 solution is too low, the corrosion resistance will decrease. Consumption of ENSEAL 160 strongly depends on the makeup concentration as well as drag-out and is to be determined in accordance with each individual installation. Solids content can be determined by means of a refractometer.

Relation between the refractive index and solids content of the product is as follows:



ENSEAL 160 at 22°C:

To increase the solids content, add ENSEAL 160 concentrate.
Check pH regularly and adjust, if necessary, with diluted ammonia solution.

A significant decrease in pH will lead to local polymerization shock and is therefore to be avoided.
Increase of pH to above 10 will diminish lifetime of the sealant.

Ensure that the total foreign metal content (Zn, Cr) will not exceed 100 mg/l through drag-in.
Values exceeding 100 mg/l may increase formation of droplets and lead to reduced corrosion resistance.
Exceptionally high contents of contaminants can cause irreversible damage to the deposit.

Determination of Solids Content

1. Weigh about 2 ml ENSEAL 160 into an aluminum cup
2. Dry for 1.5 h at 120 °C in oven
3. Allow to cool for 30 minutes
4. Re-weigh the cup with dry residue
5. Calculate the solids content:
 $(M2 - M0) / (M1 - M0) * 100 = \text{dry residue [\%]}$
M0 = weight of the watch glass
M1 = weight of 2 ml sample (ENSEAL 160)
M2 = weight of the residue after drying

WASTE DISPOSAL

ENSEAL 160 solution contains organic resins. The pH-value of the solution is dropped to about 2 by use of Sulphuric acid. The solids will precipitate and can be filtered off. The solid residues may be burned up in a suitable plant.

By drag in of chromates from chromate conversion solutions hexavalent chromium may be present in the used bath. In this case the Cr-VI in the clear phase has to be reduced to Cr-III

The clear phase is added to the waste water treatment or may be adjusted to ca. 9.0. After separation of the solids the clear water may be disposed.

Please note that all waste materials must be handled and discarded in accordance with local authority regulations and laws.

ENSEAL 160 does not contain hexavalent chromium when delivered.

STORAGE

The concentrates should be stored in a cold place but free from freezing. Storing time under normal conditions should not exceed 12 month. Opened canisters should be used in the short term.

The ready for use solution has no limitation in life time when maintained according to this data sheet.

HANDLING AND SAFETY INSTRUCTIONS

For detailed information consult the material safety data sheets for this product.
Please read material safety data sheets carefully before using this product.

DISCLAIMER

All recommendations and suggestions in this bulletin concerning the use of our products are based upon tests and data believed to be reliable. Since the actual use by others is beyond our control, no guarantee expressed or implied, is made by Enthone, its subsidiaries or distributors, as to the effects of such use or results to be obtained, nor is any information to be construed as a recommendation to infringe any patent.

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