LEGOR® | TECHNICAL SHEET

FASHION PLATING

CERAMIX

NANOCERAMIC INDUSTRIAL TRANSPARENT E-COATING - 5L

DESCRIPTION

- Ceramic impregnated into the resin improving abrasion resistance
- No “Orange peel” defects on large flat surface areas
- Undetectable uniform film thickness
- 5-35 micron of thickness
- Stable for use in industrial production cycles
- REACH & OSHA Compliant

CERAMIX is a second generation, transparent nano-ceramic e-coating specifically designed for industrial scale productions. It is a hybrid resin impregnated with ceramic improving resistance to abrasion as well as other international normative testing procedures. The incorporation of the ceramic particles also provide a metallic sensation to the touch. Achievable thickness ranges of the coating layer cover from 5-35 micron while remaining completely transparent and undetectable. The resin matrix has been specifically studied to remove the “orange peel” phenomenon common when coating large flat surfaces. In production CERAMIX e- coating is extremely stable, more resistant to chemical contamination and does not underperform when impure or conductive water greater than 5 microsiemens is introduced to the bath.

DEPOSIT DATA	
Hardness	4H
Thickness (um)	5 - 35 micron
Appearance	Completely transparent and shiny

PRODUCT FORM	
Form	Ready to use
Material color	whitish
Storage time	4 months after first opening date
Packaging	5 L

SOLUTION PREPARATION

CERAMIX is sold in already ready-to-use form for this reason no preparations are required prior to start to work once the product has been put inside the working tank.

PROCESS EQUIPMENT

A full range of specially developed equipment is available from Legor.
All tanks in contact with lacquer solution should be of suitable plastic construction or of steel with acid and solvent resistant lining such as rubber or polypropylene.

It is advised to use plastic vessels (PP) or glass (Pyrex). Do not use stainless steel or iron. The equipment should offer the basic requirements as indicated in the following sequence:

- Ultrasonic cleaning with detergent
- Electrolytic degreasing
- Recovery with normal water (2 recoveries are advised)
- Final rinse with demineralized water by sprinkling or by a ultrasonic device
- E-coating treatment, stabilized at a temperature of 20-26° C, provided with a 40 to 60 volts rectifier
- Recovery (2 recoveries with normal water)
- Final rinse in demineralized water by sprinkling
- Drying to air (min 5 to max 30 minutes)
- Drying in furnace (120-150° C for 30-45 minutes)

Ultrafiltration/demineralization unit for the e-coating and the first recovery vessel if the plant capacity is higher than 150-300 liters

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In particular The CERAMIX working tank should be fitted with:

- An overflow compartment.
- A circulating pump with a circulation capacity of 3 -4 times tank volumes per hour.
- A filter, preferably equipped with a bypass system for optimum circulation.
- Gravity filtration through a 5 - 10 micron size polypropylene cartridges type filter is essential.
- A low energy (quartz) heater. Never use a heater that has a high surface temperature.
- An anode compartment. The stainless steel grade 316 anodes should be housed in plastic anode boxes.
- sealed on the front face with ICI ion selective membrane.
- An ultrafiltration unit.

About the oven for the curing phase, re-circulatory hot air ovens or tunnel should be used.
An excellent system is a conveyor oven with temperature zoning in which the parts are heated slowly to the curing temperature.
NOTE: Box ovens require time to return to curing temperature when cold parts have been put in.

About plating racks: they must be made covered with normal PVC plastisol.
Moreover it has been found that if the rack is used in an electroplating line with an alkaline cleaning sequence then it is not necessary to remove the lacquer from the rack contact.

About rectifiers: use DC power rectifiers which are able to work in the range of 50 – 100 V provided of a function that permits to realize in case slow current ramps. For some specific work (like chains) some rectifiers able to reach up to 150 V are required provided with all the related safety devices.

Last but not least it is strongly recommended to use adequate ventilation equipment for the CERAMIX tank or the working area.

PRODUCT USAGE	RANGE	OPTIMAL
Voltage (V)	20-60 V, maximum ripple 20%	
Current density (A/dm2)	Average 0.05 – 0.1 A/dm2	
Working temperature (°C)	20-26°C	23°C
pH	3.5-4.5	
Exposure time (sec)	10-120	
Anode/cathode ratio	Not higher than 2:1	
Anode type	Stainless steel AISI 316	
Circulation	Moderate, but Mandatory. In holidays or when not working for long periods transfer the solution to closed containers.	
MEQ	25 -35	
Solid content	6.5%-7.5%	
Conductivity	390-420 µS at 25°C and 6.5-7.5% solid content.	
Curing	120-150°C for 30-45 minutes.	

The operation sequence to use properly CERAMIX ready-to-use lacquer is:

- pre-treatment,
- application of CERAMIX
- post-treatment
- stoving.

The pre-treatment is required to ensure absolute cleanliness and to obtain a surface free from water breaks.
Articles which have been electroplated should obtain a final cold water rinse. Mechanically polished or untreated articles should be cleaned using the appropriate treatments.
A typical process sequence is:

- demineralized water rinse, 2 x
- pre-rinse in demineralized water with 20 ml/l CERAMIX bath solution
- CERAMIX plate

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- post-rinse in pure ultrafiltrate (permeate) or demineralized water
- demineralized water rinse, 2 x
- air dry
- cure

The purpose of the demineralized rinse is to prevent the lacquer solution from being contaminated.
The pre-dip in dilute lacquer is considered essential in order to prevent film defects caused by gassing.
The post-rinse is used to remove the lacquer solution from the coated object.
Although a separate pre-and post-rinse is recommended, it is possible to use the pre-rinse also as post-rinse.
The air dry stage is not critical, in fact some drain time is required to avoid excessive drag-out loss.
During the stoving the deposited film will coalesce and cure.
A gradual heat-up to the recommended metal temperature is preferred.

BATH MAINTENANCE

CERAMIX solution

- Solution level: restored regularly by adding demineralized water.
Water is lost by evaporation, the level in the overflow section should be looked by watching the solution level in the weir compartment, do not let the pump suck air because of too much low level.

Do not use the post-rinse solution for topping up.

- Solid content.
A freshly prepared CERAMIX bath contains 6.5-7.5% by weight solids.
In order to obtain stable performances, it is required to check the dry weight residue on regular basis. The dry weight should remain to 6.5-7.5%.
It is recommended to run this analysis once a day, according to the use.
The more frequent is the use of CERAMIX, the more frequent the check could be necessary. If the dry residue should be below 6.5%, it is necessary to replenish the suspension with 10-15 g/l of concentrated resin CERAMIX-R for every percent of dry weight below the reference value (6.5-7.5%). The concentrated replenisher consists ofthe pre-mixed concentrated resin, ceramic CERAMIX-R.

The best method of addition is to premix the required amount of concentrate with the working solution in a separate container.
Preferably additions are done at the end of a production day.

- Solvent content.
Solvent is lost by evaporation and drag-out. Normally the solvent level is maintained by the addition of the CERAMIX concentrate.
If solvent additions are necessary, following long idle periods for example, they should be made in increments of 0.5% through the weir.
It takes about one to two hours of solution circulation before the effect becomes apparent. Solvent level should be determined once a week by analysis.

- pH
pH of the bath should lie between 3.5 -4.5.
Normally the pH is controlled inside the working tank by the membrane in the anode compartment.
It is good practice to check the pH once a day.
It is not advised to use pH paper for pH measurements.

- Anolyte.
During electrolysis lactic acid is formed at the anode and is retained within the anode cell. Therefore the anolyte solution must be regularly replaced with fresh demineralized water in order to keep the lactic acid at the proper MEQ levell.
The anode compartments should also be examined for any leakage.

- Ionic contamination.
Avoid contamination of the CERAMIX bath by soluble salts. They will decrease the efficiency leading to bad deposits.
Only with ultrafiltration the ionic contamination can be removed (slowly) by discarding the permeate.

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- **Adequate circulation and filtration will keep the lacquer in fit condition.**

Filter cartridge and/or bag will be clogged up with use.
They should be cleaned or changed periodically.
The circulation pump should not suck air, any air getting into the circulation system will cause pitting.
It is recommended to carry out a batch filtration, followed by tank cleaning every one or two months.

- **During prolonged idle periods tank circulation can be stopped, the cover of the tank must be closed.**

Alternatively the bath solution can be stored in closed containers.
Anode boxes should be flushed and left filled with demineralized water.
Always keep the membranes wet.

Rinses (pre- and post-) with Demineralized water

The demineralized rinses before lacquering serve to minimize drag-in of hard water salts and pre-treatment chemicals into the CERAMIX solution and thereby prevent it from being contaminated.
After lacquering it serves as a clean final rinse.
The rinse should be dumped when the conductivity exceeds 10 µs/cm.
While doing the Post-rinse this solution gradually becomes contaminated by drag-in from the CERAMIX bath.
It should be replaced periodically or when the solids content reaches 1.5% by weight
.

ABOUT THE ULTRAFILTRATION

The use of an ultrafiltration unit has proven to be an integral part of successfully operating CERAMIX baths.
Every installation of CERAMIX should have a single tube of Ultrafiltration unit.
Its scope is that to minimize the effect of metallic contamination and to stabilize the pH of the solution.

ANALYTICAL PROCEDURE

1. SOLID CONTENT DETERMIANTIOJN
   - Weigh a clean watch glass or aluminum foil
   - Add 10 ml of working CERAMIX solution
   - Heat it inside oven for 1 hours at 130°C
   - Cool down it and re-weigh.
   - Calculate the % solids content by weighing the difference.

   Now consider that to increase of 1% point of solid content, it is necessary to add 15 g of CERAMIX-R concentrated resin per every liter of working solution

   Vice versa for the "on the spot" solid content determination a pocket refractometer can be used:
   % solids (by weigh ratio) = 0.7 x Read °Brixel.

2. SOLVENT LEVEL DETERMINATION
   It has to be run in our Technical Assistance Laboratory.

3. pH measurement
   - Calibrate pHmeter
   - Rinse buffered electrodes carefully in demineralized water, dry and immerse in CERAMIX solution.
   - After measuring, thoroughly rinse again electrodes in CERAMIX solvent and finally rinse in demineralized water again.

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CORRELATED PRODUCTS

COMPLEMENTARY	
CERAMIX-R	Concentrate resin for CERAMIX restoring and maintenance
3019001	Lactic Acid 90% solution for CERAMIX, 1 liter bottle
3019002	Solvent for CERAMIX, 1 liter bottle
3009010	Stripper for CERAMIX, 10 kg tank
3009018	"ECO" Stripper for CERAMIX, 5 liters tank
3009011	Rinse aid solution

SUPPLEMENTARY INFORMATION

WORKING ENVIRONMENT
It is particularly important the quality of the air and the cleanliness of the working environment. Since the e-coating is sticky before the heat treatment, any air-borne particle may adhere on of the pieces causing surface defects. This problem may become particularly evident on large and flat surfaces (e.g.: medals, trays, etc.). If treated pieces are items with small surfaces (e.g.: chains) the risk for defects from airborne particles is less evident. In order to obtain the highest surface quality, it is recommended to place the equipment ina cleanroom.

OPERATING CONDITIONS - GENERAL RECOMMENDATIONS
An optimal voltage for e-coating application should be around 30 volts. Current density is low and decreases rapidly after the first secondsof treatment, due to the insulating properties of the deposit itself. Optimal treatment time is around 15-30 seconds. In order to keep in good efficiency the e-coating liquid suspension, it is extremely important to avoid any contamination of the CERAMIX suspension from the previous steps. Slight increase of salinity may negatively impair the e-coating performances, leading to clots formation.

BATH TURNOVER RATE
In order to maintain the optimum properties, the feed replenishment rate should be consistent with one bath turnover within three months.

CIRCULATION
Continuous pumped circulation from a skim weir and return via submerged pipe. Circulation turnover rate is 8-10 bath volumes per hour.

ABOUT WATER DISPOSAL AND SAFETY INFORMATION

Prior to dispose CERAMIX working solution, increase its pH to 7-8 with alkaline solutions. The solid will precipitate out in settlement tank. Recover the supernatant liquid which will contain around 4% on volume basis of lactic acid. This liquid should be further diluted before discharge in according with the local legislation.
The anolyte contains lactic acid which on neutralization with alkaline solution can be disposed.

The CERAMIX product It should be stored between 0° and 30°C. Never store in an area where the temperature can go above 35°C.
Smoking should be prohibited in the vicinity of the CERAMIX concentrate resin CERAMIX-R.

The CERAMIX ready for use solution will not support combustion.

The solution is irritating to eyes and skin. In case of contact with eyes rinse immediately with plenty of demineralized water and seek medical advice if symptoms persist. After contact with skin, wash immediately with plenty of soap and water.
The solvent level normally lies around 3% in the working solution.
It is strongly recommended to ensure adequate ventilation of the workroom in order to provide a healthy working atmosphere.
The anolyte is acidic; protect eyes and wear protective clothing when handling, or when handling pure lactic acid. Flush exposed areas immediately with cold water.

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In any case classification and designation are noted in the Material Safety Data Sheet (according to the European legislation). The safety instructions and the instructions for the environmental protection have to be followed in order to avoid hazards for people and environment. Please consider the explicit details in our Material Safety Data Sheets.

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 Legor Group, its subsidiaries of 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.