

## Technical data sheet and product guideline

# T-PRO

Anti-tarnish chemical passivation for oxidization resistance (ready-to-use)



### Product form

Form	<b>Ready-to-use</b>
Material color	<b>White-Transparent</b>
Storage time	<b>18 months</b>
Format	<b>Ready to use</b>
Chemical type	<b>Neutral</b>
Volume	<b>5 L</b>

### Operating data

	Range	Optimal
Voltage (V)	<b>3.5 - 4.5 (electrolytic way)</b>	<b>4.5 (electrolytic way)</b>
Working temperature (°C)	<b>55-60</b>	<b>55</b>
Exposure time (sec)	<b>5-20 (minutes)</b>	<b>10 mins (standard way), 5 mins (electrolytic way)</b>
pH	<b>5-7 and 3-4 after salts dissolution</b>	<b>6-7 and 3.4-3.5 after salts dissolution</b>
Anode/cathode ratio	<b>2-4/1</b>	<b>2-4/1</b>
Anode type	<b>Mixed metal oxide (MMO) or Titanium Platonized (Ti/Pt)</b>	
Agitation	<b>Moderate</b>	

### Deposit data

Thickness (um)	<b>0,001-0,010</b>
Appearance	<b>Totally Transparent</b>
Color	<b>Transparent</b>

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### Preparation

Fill your vessel with T-PRO under ventilation.

**Standard Use:** For optimum results the solution must be in a transparent state. Heat up to 55-60° C. The solution becomes transparent in this range: higher or lower temperatures will make the solution turbid.

**Electrolytic use:** In case of electrolytic usage through direct current application, add 2.5 g of T-SALT conducting salts per liter of ready-to use solution and wait their complete dissolution. Then heat up at the same temperature of the standard usage and apply a voltage using a DC power-rectifier in the range of 3.5 - 4.5 V for 5-6 minutes.

To get optimum results please follow these following steps:

#### TREATMENT OF SILVER PLATED PIECES

1. Rinse and wash in D.I. water
2. Rinse
3. Acid neutralization
4. Rinse
5. **STANDARD USAGE:** Immersion in T-PRO for 10 minutes (with moderate agitation)

**ELECTROLYTIC USAGE:** Immersion in T-PRO with T-SALT conducting salts (previously dissolved in) for 5-6 minutes (with moderate agitation) at about 3.5 - 4.5 V

6. Rinse with demineralized water
7. Rinse in hot water (70-75° C)(\*)
8. Dry with hot air (avoid drying systems that could remove the passivation)

#### TREATMENT OF OXIDIZED AND/OR SULFURATED PIECES

1. Electrolytic degreasing
2. Rinse
3. Acid neutralization
4. Rinse
5. **STANDARD USAGE:** Immersion in T-PRO for 10 minutes (with moderate agitation)

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7. Rinse in hot water (70-75° C)(\*)
8. Dry with hot air (avoid drying systems that could remove the passivation)

(\*) In case of items with complicated designs, liquid residuals can be removed more efficiently by rinsing in very hot water (85° C).

(\*\*) If you are dealing with Argentium alloys, never use electrolytic degreasing. Use only neutral pH detergents (7-9) by simple dipping or

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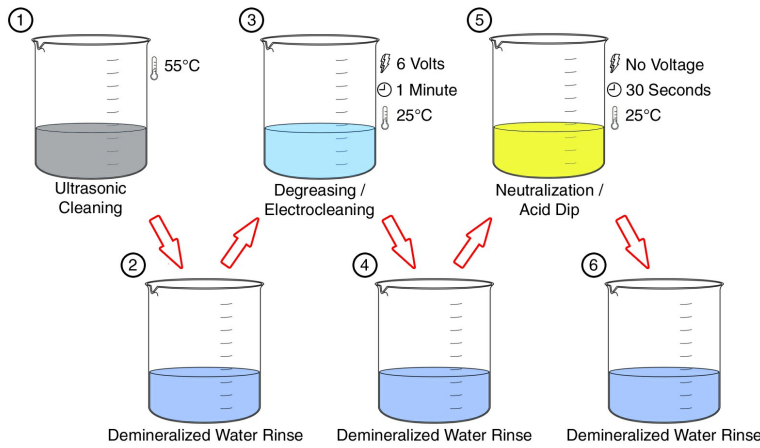
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by ultrasonic bath. Optimal cleaning results may be achieved by using the LEGOR CLEANING KIT system.

### Equipment

For a correct use of this product you are advised to use PVC, polypropylene or PYREX glass tanks provided with thermostat-controlled heaters. Do not use stainless steel or iron tanks.



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## Product usage

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### Supplementary information

#### PASSIVATION REMOVAL

To remove the passivation, simply degrease the pieces by means of alkaline cathode degreasing. Better results are obtained with the addition of a few grams of cyanide per liter.

#### SPECIAL PROCESS HINTS

##### Pre-treatment:

For successful coating with T-FENDER product line, the surface of the metal objects to be coated must be clean. Any drag-in from preceding process steps (e.g. silver electrolyte) must be avoided, otherwise the lifetime of the Antitarnish will be reduced and a new make-up will become necessary.

##### Coating process:

The parts are coated in an electrolytic immersion process. Immerse the object to be coated in the Antitarnish and apply a voltage of 3.5 volts.

We recommend a coating time of 5 minutes.

**Hint:** if the voltage is too high, gaseous hydrogen will form on the parts. The gas bubbles forming will inhibit the formation of a homogeneous antitarnish layer. In this case lower the voltage in 0.5 volt increments!

##### Optimum voltage:

Coat the parts at 4.5 volts and test the protection e.g. in a 2 % potassium sulphide solution. Then repeat the test with 4.0 / 3.5 / 3.0 and 2.5 volts to determine the optimum operating voltage.

##### Post-treatment:

After coating, sufficiently rinse the objects and then dry them at approx. 60 – 70 °C (hot-air oven, centrifuge, compressed air).

##### Production stops:

After longer production stops, we recommend a special replenishment of 10 ml/l of T-PRO20 initial concentrate or 4 ml/l of T-PRO50.

##### Reworking:

T-PRO must not be dragged into the electrolytic degreasing solution, the wetting agents contained are water-repellent and may cause wetting problems in the degreasing solution.

For this reason, a separate cathodic degreasing solution should be used for removing T-PRO if necessary. Current densities of 5 – 10 A/dm<sup>2</sup> are applied for 1 - 2 minutes. The Antitarnish has been completely removed when the surface can be rewetted.

##### Anodes:

We recommend mixed metal oxide anodes MMO 187 SO. They should be occasionally cleaned in a separate degreasing solution.

##### Contacting:

For optimum coating, light and floating parts should be thoroughly contacted.

With poor contacting, protection will be strongly reduced.

##### Turbidity:

After longer idle times, turbidities may occur. We recommend heating the electrolyte to 60 – 65 °C for 30 – 60 minutes in such a case and afterwards allowing it to cool down to operating temperature of 55 °C.

##### Electrolyte replenishment:

To increase and restore the concentration of the active principles, replenish with warm (60-65°C) initial concentrate solution T-PRO20. Stir the T-PRO20 solution well as it must be completely transparent and clear before use it as replenisher. The general rule is that to add it in the amount of 2-5 ml per liter of ready-to-us solution every week, when the passivating solution is continuously working.

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**REPLACING THE PASSIVATION SOLUTION**

In case of reduction of the volume due to water evaporation, solution has to be replenished by demineralized water. T-PRO concentrate should be added to the solution if the effectiveness of the passivating solution becomes weaker. Effectiveness of the solution can be checked by submitting the pieces to a TAA test. Another important indicator can be represented by the level of the surface hydrophobicity. A properly working solution should give a surface with low water adherence, where water drops slip away easily.

**EFFECTIVENESS OF THE SURFACE PROTECTION**

The formation of the initial monolayer deposits within seconds or minutes. After the initial monolayer has formed, the layer still contains defects and is not fully ordered. Over time (hours to days), the layer comes to a more uniform and stable configuration.

**STORAGE AND STABILITY**

Store at temperatures below 30° C. Avoid direct sunlight. In the closed package the solution is stable for about 18 months. When open, it is recommended to use it within 6 months. A color change from white to yellow may be sometimes observed during the storage, even in a sealed new bottle. This change in color doesn't affect the properties of the product.