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## **PROCESS SPECIFICATIONS**

# **PROCESS SPECIFICATIONS TDC TREATMENT**

**METALIFE Thin Dense Chrome Treatment provides a hard, dense surface for wear resistance, friction reduction and corrosion resistance.**

1. **CLASSIFICATION:**

This specification covers the requirements for controlled, extremely hard and thin dense chrome covering uniformly bonded into ferrous and non-ferrous metals by means of electrode position using a proprietary process.

2. **APPLICATION:**

The Thin Dense Chrome (TDC) process is utilized to increase wear resistance, resist erosion or corrosion, reduce friction, to prevent galling and seizing, and to affect a superior lubrication quality.

3. **TEMPERATURE, PROCESSING, AND OPERATING:**

Temperature of the processing solution is 136° F. Metalife TDC will withstand temperatures of -400° to 1800° F. At elevated temperatures above 1300° F, it will react with carbon monoxide sulfur vapor or phosphorus. At bright red heat, it will be attacked by water vapor and alkali hydroxides.

4. **CORROSION RESISTANCE:**

Metalife TDC resists attack by almost all organic or inorganic compounds except sulphuric and hydrochloric (muratic) acids. Metalife's thin dense chrome will show less than 0.05% rust at 50 hours according to ASTM B117. Verification tests may be run if deemed necessary to resolve any corrosion problems that may arise.

5. **HARDNESS:**

Metalife TDC has an average Knoop hardness of 970 KHN(100) on heat treatable material when measured using a suitable micro-hardness tester for thin coatings on appropriate laboratory samples according to ASTM E384. ASTM E384 test is run

periodically to verify plating standard; however, hardness is also maintained by a triannual analysis of our proprietary chrome solution and maintaining the correct levels of the tanks constituents.

6. **COEFFICIENT OF FRICTION:**

Using suitable samples the Coefficient of friction of Metalife's TDC against steel will have a static range from .12 to .30 and a sliding range of .12 to .30. This test according to ASTM D 1894-01 is run as needed and may be run upon request if required by the customer. Additional costs may apply.

7. **ADHESION AND DUCTILITY:**

METALIFE TDC is bonded into the base metal to become part of it; therefore, it does not chip, crack, flake, or peel, and it is ductile so it bends with the metal. It will not separate from the metal when subjected to standard bend tests over a radius equal to half the thickness of the metal to which it is applied. Adhesion test are performed according to ASTM 2438D. Adhesion tests are verified periodically; however adhesion is also verified triannual per section test ASTM B487.

8. **AFFECT ON BASIC METAL AND HYDROGEN EMBRITTLEMENT:**

The process shall not significantly affect the tensile, yield and fatigue properties of the basic metal. The purity of the chromium surfaces will be not less than 99.4% as deposited. The surface preparation and process controls prevent the embrittlement phenomenon from occurring during the process, but does not remove pre-induced conditions or prevent it if heavy TDC is requested. Hydrogen embrittlement tests are run according to ASTM F519-10 periodically to verify plating standard.

9. **THICKNESS:**

Under normal circumstances Metalife's TDC will have an average build-up of 0.00005" to 0.0002". Additional build-ups to 0.0005" may be requested; however thickness outside of the normal Metalife range may introduce hydrogen embrittlement and edge build up. Thicknesses are verified according to ASTM B 499 in house using

calibrated equipment. Tests are also performed triannual by an accredited laboratory according to ASTM B487.

10. **SURFACE QUALITY:**

Surface, when processed shall be smooth, continuous, fine grained and uniform in appearance. Metalife TDC conforms to the existing surface, threads, flutes, scratches, etc.. with excellent reproducibility. R.M.S. finish will be improved slightly down to about 8 R.M.S., below 4 R.M.S. the process may deter slightly. Processed parts will project a matte grey appearance and have excellent retention.

11. **METALS FOR TREATMENT:**

All ferrous and non-ferrous metals that are commonly machined wrought or cast iron and steel, brass, copper, etc. can be processed. Aluminum can be processed, but requires a special set-up and is not solicited at this time. Magnesium, titanium, lead and their respective alloys may be submitted for test.

12. **ORDERING DATA:**

*Size:* Prints should be submitted and surfaces to be plated highlighted. Capable of handling parts up to 1000 lbs., however, ability to plate will depend on the dimensions of the part to be plated.

*Geometry:* Internal and external surfaces on nearly all shapes and configurations can be uniformly coated. In general slots and grooves less than .187 wide, having a depth greater than width, and bores less than .187 in diameter may not be uniformly processed. Such parts may be submitted for test runs.

*Coverage required:* Parts to be treated should be submitted with a drawing indicating (1) Surface requiring process, (2) areas not to be treated which require masking, and (3) areas that may or may not be coated generally the balance of the part so that maximum latitude will be allowed for attaching fixture to the part. Material designation of the part should be called out.

*Condition of Parts:* Parts should be surface finished prior to shipment for Metalife TDC, as surface will not be changed in configuration by the process. Metalife TDC will not fill scratches, pits or dents, but will bond to side of walls of such imperfections. Paint, scale, rust or corrosion removed by us will result in extra charge. Oil, grease, or protective covering that does not adhere will be removed at our expense, except in extreme excessive applications.

13. **PACKING AND SHIPPING:**

All parts shall be properly wrapped and preserved to protect against damage and/or corrosion and shipped in suitable containers to give maximum protection, both prior to and after the Metalife process. This will be done by using the containers in which they were received providing they are intact. Hand carried parts to our plant will be paper wrapped or bagged prior to delivery.

14. **CERTIFICATION:**

Certification of Compliance to this specification shall be issued upon request.

15. **PRICES:**

Cost of METALIFE thin dense chrome is governed by condition, configuration and surface area of a part. Prices may be determined by your drawing or by processing of test part.