

## Chemical Process Test Specimen Material

## RATIONALE

AS2390 is a new specification to cover test sample materials to be used in chemical processing.

## 1. SCOPE

## 1.1 Purpose

This standard establishes definitions, guidelines, and requirements governing the specific material (e.g., alloy and heat treat condition) to be used for chemical process test specimens when requirements call for "the same generic class of alloy".

## 1.2 Application

This standard has been used typically for plating and chemical finishing processes, but usage is not limited to such applications. Corrosion test specimens and hydrogen embrittlement test specimens generally have specific test requirements and are excluded from this document.

## 1.3 Background

Test samples utilized in metal finishing serve an important function in assuring the quality and functionality of the plating or coating produced. Some attributes of surface finishes can be directly tested from actual parts that will see field service, and the testing of actual plated/coated parts is always preferred. However the testing of actual parts must always be non-destructive in nature, that is, any tests that can alter, disturb or remove a plating or coating will result ultimately in the rejection of the test part from delivery. Since metal finishing by definition is a topical plating or coating, many of the physical attributes of the plating/coating can be easily, economically, and accurately destructively tested using samples representative of the base metal being processed. The selection of appropriate test sample material and size establishes the foundation of quality acceptance of the metal finishing process. When testing for the quality attributes of the process, tests can be grouped in 3 categories:

- a. Tests of the physical-dimensional properties of the actual plating/coating: Examples of this can be general quality as observed visually, microhardness, microthickness, wear resistance, light fastness, residual stress, solderability, etc. Test sample material is often specified to be of the same generic type as the base metal, although test sample material differing from the base metal being plated should not affect the outcome of this type of test.
- b. Tests of the coating/plating functionality: Examples of this are adhesion, corrosion resistance, electrical resistivity, coating weight, heat resistance, IGA-Surface attack, etc. Test sample material is very important as this category test measures the coating/plating relationships with the base metal.
- c. Tests of coating/plating detrimental effects on the base metal: An example of this is hydrogen embrittlement and test sample material is of critical importance. Established industry testing protocol for hydrogen embrittlement restricts test sample material and heat treat condition. (ASTM F 519 is an example.)

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Current industry standards and specifications allow separate test specimens under certain conditions and the reader should refer to the processing document specified by the procuring customer. Generally accepted requirements state: "separate test specimens shall be made of the same generic class of alloy as the parts, distributed within the lot, cleaned, plated, and post treated with the parts."

This document establishes policy for separate test specimen material that is required to be of the "same generic class of alloy" as the parts processed. While specimens of the same alloy and heat treat condition are acceptable to represent the parts processed, the materials listed herein have also found general acceptance across the industry.

## 2. APPLICABLE DOCUMENTS

None.

## 3. REQUIREMENTS

Test specimens of the same alloy as the parts processed are acceptable for any material. In addition, the following generic alloys may be used to represent the "same generic class of alloy" as the parts processed. Other alloys shall not be used unless agreed upon by purchaser and vendor.

### 3.1 Transformation Hardening Steels

These steels include, but are not limited to:

1. Plain carbon steels such as AISI-SAE 10xx, 11xx, 12xx, 15xx types,
2. Low and medium alloy steels (AISI-SAE 1300, 4000, 5000, 6000, 8000, 9000 series alloys and other transformation hardening steels where sufficient carbon or alloy is present to effect a martensitic phase transformation during heat treatment (applicable where martensitic phase transformation properties are the dominant hardening mechanism), and
3. Bearing steels such as 52100.

Separate test specimens shall be any carbon or low alloy steel such as AISI-SAE 1xxx, 4xxx or 8xxx series in the annealed, normalized or heat treated condition. Alternative alloys may be used when agreed upon by purchaser and vendor.

### 3.2 Corrosion Resistant Steel (CRES or stainless)

Alloys containing primarily iron and chromium with or without nickel (ferritic, austenitic and martensitic grades), including 200, 300, 400 series stainless steels, and PH grade stainless steels. Separate test specimens shall be any stainless steel provided the precleaning, pretreatment processes are identical to the parts represented.

### 3.3 High Alloy Steels

To include, but not limited to Maraging grades, AF1410, AerMet 100, Hy-Tuf, HP alloys, etc. which rely on multiple strengthening mechanisms. Test specimens shall be designated by the cognizant engineering authority. Test specimens shall be any high alloy steel provided the precleaning and pretreatment processes are identical to the parts represented.

### 3.4 Tool Steels

Tool steels include AISI grades W, S, F, O, L, D, A, H and M series tool steels. Test specimens shall be any tool steel provided the precleaning and pretreatment processes are identical to the parts represented.

### 3.5 Heat Resistant Alloys

To include Inconel, Hastelloy, Rene', Waspaloy, AM 350, Custom 45X, Incoloy, Greek Ascoloy, and A286. Test specimens shall be any heat resistant alloy provided the precleaning and pretreatment processes are identical to the parts represented.

### 3.6 Aluminum Alloys

Tests specimens shall be any aluminum alloy, provided the precleaning and pretreatment processes are identical to the parts represented.

### 3.7 Copper Alloys

Tests specimens shall be any copper alloy provided the precleaning and pretreatment processes are identical to the parts represented.

### 3.8 Titanium Alloys

Test specimens shall be any titanium alloy, provided the precleaning and pretreatment processes are identical to the parts represented.

### 3.9 Other Metals and Alloys

Separate test specimens shall be from the same alloy and heat treat condition as the parts being processed.

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