



CORROSION TESTING LABORATORIES

Brochure & Price List

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Corrosion Testing Laboratories, Inc.

Corrosion Testing Laboratories, Inc. (CTL) is a complete, full service corrosion and materials evaluations facility, providing a wide variety of services to chemical, pharmaceutical, biomedical, petroleum, metal refinery, and other industries nation-wide and around the world. We offer conventional testing conforming to standard specifications (such as ASTM, NACE, MTI, ISO etc.) and also specialize in innovative, unique projects, custom-developed to meet sometimes elaborate and sophisticated needs of a client.

The CTL's staff is comprised of specialists proficient in Corrosion and Materials Consultation, Failure Analysis, and Expert Testimony. Articles published by CTL staff range in topics, such as Rouging, Formicary Corrosion, Medical Implant Testing for FDA, Failure Analysis, etc. In addition, the technical support staff of CTL has attained certifications from NACE International.

Being a fully equipped Corrosion, Materials and Assessment Facility, CTL offers a multitude of services to meet the needs of our clientele. Our services include:

- a) Corrosion Testing and Research
 - a. Medical Devices FDA Testing– ASTM F2129, G71
 - b. Formicary Corrosion (a.k.a., ant's nest) of HVAC unitary and commercial condensers
 - c. ASTM Acceptance, Immersion testing, Hot Wall, etc.
 - d. DOT and EPA Corrosivity Testing
- b) Failure Analysis and Field Assessments
 - a. Microbiologically influenced corrosion, stress corrosion cracking, formicary corrosion, fatigue, etc.
 - b. Failures dealing with shafts, pumps, chillers, propellers, tubes/piping, boilers, bolts, water systems, etc.
 - c. Rouging Assessment audits for pharmaceutical applications
 - d. Non-Destructive Assessment - wall thickness, vessel assessments, etc.
 - e. Assessments of failures in fire sprinkler systems, cooling water loops, domestic & industrial plumbing, etc.
- c) Expert testimony and litigation support service
- d) Materials consultation
- e) Metallographic examination

CTL follows a rigid quality assurance program in all of its work. In doing so, CTL has met and exceeded customer and industry requirements, including the nuclear industry. We are one of the few laboratories in the country that has met the stringent quality conditions set forth by the Department of Energy for the Yucca Mountain Nuclear Waste Depository.

Listed in this packet are some conventional corrosion testing, failure analysis and chemical analysis that CTL conducts. Please inquire for customized testing or for help in choosing the right test for your needs.

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1. CORROSION TEST	(US \$/Test)
Sample Preparation of Client's Supplied Material	60
Sensitization/Heat Treating (per lot)	80
Customer laboratory visit to oversee testing	25% surcharge
<u>ASTM Evaluation/Acceptance Tests:</u> (all others, quote on request)	
<i>Intergranular Corrosion:</i>	
• A-262 Practice A (Oxalic Acid Etch)	125
• A-262 Practice B (Streicher Test)	200
• A-262 Practice C (Huey Test)	215
• A-262 Practice E (Modified Strauss Test)	200
• G-28 Method A (Ferric Sulfate/Sulfuric) Acid	200
• G-28 Method B (PEMT Test)	200
<i>Stress Corrosion:</i>	
• G-36 Boiling Magnesium Chloride	450
• G-49 Constant Load Test	855
• G-123 Boiling Sodium/Calcium/Lithium Chloride	290
<i>Pitting and Crevice Corrosion:</i>	
• G-48 Method A or C (Ferric Chloride Pitting)	200
• G-48 Method B or D (Ferric Chloride Crevice)	225
• G-61 Cyclic Potentiodynamic (Hysteresis)	750
• G-150 Critical Pitting Temperature	800
<u>National Association of Corrosion Engineers (NACE) Tests:</u>	
TM-01-69 Standard Immersion (1 week or less)	200
TM-01-69 Standard Immersion (up to 30 days)	225
TM-01-74 Protective Coatings (per panel)	295
TM-01-77 Sulfide Stress Corrosion (ambient)	price on request
TM-02-84 Resistance to Stepwise Cracking	1295
<u>Materials Technology Institute (MTI) Tests:</u>	
MTI-1 Standard Immersion (per solution/temp.)	350
MTI-2 Ferric Chloride Crevice (triplicate)	450
MTI-2 Ferric Chloride Crevice (single)	200
MTI-3 Boiling Magnesium Chloride (triplicate)	850
<u>Heat Transfer Tests:</u>	
Hot Wall Test	375
Pressurized Hot Wall Test	750
<u>Immersion Tests:</u>	
Standard (ASTM G 31) (1 week or less)	200
Standard (ASTM G 31) (up to 30 days)	225
Planned Interval Test (NACE TM01 69)	350
3-Phase Immersion Tests	375
Autoclave	725

Corrosion Testing Laboratories, Inc.**1. CORROSION TEST (cont.) (US \$/Test)****Electrochemical Tests:**

Potentiodynamic (Potentiostatic) Polarization (ASTM G 5 or G 61):	
• Ambient	750
• Autoclave (high temperature/pressure)	1550
Medical Implant Tests (ASTM F 2129)	750
• Replicates in excess of 5	Price on Request
Critical Crevice Temperature (CCT)	750
Critical Pitting Temperature (CPT) (ASTM G 150)	750
Potentiostatic Coating Evaluations	495
Galvanic (Dissimilar Metal) Couple Test (ASTM G 71)	750
• Replicates in excess of 5	Price on Request

Formicary Corrosion Assessments:

Formicary Corrosion Pressurized Coil Testing	Price on Request
Formicary Assessment of Coils	350/sample

Evaluation of Fluids Suspected in Causing Formicary Corrosion:

1 - 2 Samples	500/sample
3 - 5 Samples	420/sample
6 - 10 Samples	375/sample
>10 Samples	350/sample

Exposed Coupon Rack:

Test Specimen Evaluation	80
Specimen racks - as per customer's requirements	Price on Request
Photo-Documentation	15 per specimen

Department of Transportation (DOT) Corrosivity Tests:

CFR Title 49, Chapter I, Section 173.137 (2005 Edition)	
In Vitro Corrositex Method (Skin Testing)	750
Metal Corrosivity Test (Steel and Aluminum) according to UN Model Regulations Section 37	2010 1800/test for quantities >1
Metal Corrosivity Screening Test (Steel & Aluminum) single specimen	400

Environmental Protection Agency Test:

EPA Publication SW-846, Method 1110 (Corrosivity towards Steel)	340
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Custom Corrosion Evaluation Tests: Price on Request**Test Specimens (most alloys available):** Price on Request**Corrosion Testing Laboratories, Inc.****2. FAILURE ANALYSIS (US \$)****Investigations Level:**

Forensic	Price on Request
Field Investigations	1,000 & up
Field Examination	500 & up
Failure Analysis	1,000 - 5,000

For detailed information visit – www.corrosionlab.com/failure-analysis.htm**3. METALLOGRAPHY (US \$/hr.)****Laboratory Metallography:**

Sample Preparation, including consumables	125
Optical Microscopy (OM)	125
Microscopic Videography (MV)	165
Scanning Electron Microscopy	270
Energy Dispersant X-ray Spectroscopy (EDS)	270
Elemental Dot Mapping (SEM pricing +)	50/Element
Photographs (on CD)	30/set
Use of full laboratory and facilities, including technologist	3,000/day

On-site Metallography (4 hours per day minimum):

Metallurgist/Corrosion Scientist	205
Replication 1cm x 3cm	175
Optical Videography (OV)	165
Optical Microscopy	175

4. SOLUTION ANALYSIS (US \$/Sample)

Sample Log-In	20
Anion Chromatography (F ⁻ , Cl ⁻ , Br ⁻ , NO ₂ ⁻ , NO ₃ ⁻ , SO ₄ ⁻² , MO ₄ ⁻²)	150
Alkalinity (as CaCO ₃)	20
Ammonia	30
Boron	22
Bromide-ion	20
Chloride-ion	20
Chlorine (residual)	20
Chromium (Cr ⁺³)	22
Chromium (Cr ⁺⁶)	22
Conductivity/Resistivity	10
Copper	24
Hardness (as CaCO ₃)	
Calcium (as CaCO ₃)	12
Total (Mg by difference)	14

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4. SOLUTION ANALYSIS (cont.)	(US \$/Sample)
Iron (Fe ⁺⁺)	22
Iron (Total)	22
Lead	30
Molybdate (as MoO ₄ ⁻²)	22
Moisture content	25
Nitrate-ion (NO ₃ ⁻¹)	33
Nitrite-ion (NO ₂ ⁻¹)	20
pH	12
Phosphates	
Moly-	22
Organic	19
Ortho-	18
Redox	12
Sample Preparation (solid)	50
Silicon	22
Sulfate-ion (SO ₄ ⁻²)	20
Sulfide-ion (S ⁻²)	20
Sulfite-ion (SO ₃ ⁻²)	23
Tolyltriazole	50
Total Leachable Solids	35
Zinc	24

5. CHEMICAL ANALYSIS (US \$/Sample)

<u>Spectroscopy</u>	
Fourier Transform Infrared Spectrum (FTIR)	180
Scanning Electron Microscopy (SEM)	270/hr.
Energy Dispersive X-Ray Spectroscopy (EDS)	270/hr.
Elemental Dot Mapping (SEM pricing +)	50/Element
Reflectance Spectrum (ATR/MIR)	195
Spectral Interpretation	145/hr.
<u>Soil Characterization</u>	
Sample Log In	20
Resistivity / Conductivity	10
Acidity	20
Oxygen Reduction	10
Hydro Sulfide	10
Chloride	20
Sulfate	20
pH 1:1 soil/water slurry	12

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5. CHEMICAL ANALYSIS (cont.)	(US \$/Sample)
<u>Supporting Laboratory Services</u>	
Titration, Extractions, Ashes	100/hr.
Ion Chromatography	150
<u>Polymer Characterization</u>	
Thermoplastics - IR spectrum and identification	180
Elastomers - ID via pyrolysis products (ASTM D3677)	180
Surface Coating - ATR/MIR sample spectrum and coating	195
Polyurethanes or polyamides - ID of resin type	180
Hydrolysis, separation and identification of monomers	500
Identification of fibers (ASTM D276)	180
<u>Determination of Additives – Plasticizers, UV Inhibitors, etc.</u>	
IR spectrum of sample, extraction and identification of plasticizer	250
<u>Analysis of Mixtures</u>	
Separation and identification of components	500
Contaminants, isolation and characterization	350
Determination of weight % of inorganic fillers	100

6. DIRECT LABOR (US \$/hr.)

Principal Corrosion / Materials Consultant	225
Principal Corrosion Scientist (NACE Corrosion Specialist)	175
Principal Metallurgical Engineer / Scientist	175
Senior Metallurgical Engineer	150
Senior Corrosion Scientist	150
Metallurgical Engineer	125
Certified Scientist	125
Certified Senior Technologist	105
Certified Technologist	90
Certified Technician	80
Technician	60

7. EXPERT CONSULTATION & TESTIMONY (US \$)

	Prepaid / Draw	N30 Invoice
Trial Preparation (Discovery)	225	300
Reports	225	300
Depositions	275	350
Court Testimony	275	350
Use of full laboratory and facilities, including technologist	3,000/day	