

# MINIMUM TEST SAMPLE SIZE "CHEAT SHEET"

Please note, ATRONA Test Labs performs all tests according to applicable standards and specifications. These charts are designed to serve as general guidelines for minimum sample size or weight. In most cases, we can work with larger sample sizes and in some instances, we can even work with smaller samples; so please feel free to contact us to discuss your specific testing requirements.

Metallography	Minimum Size
Microstructure	Test dependent - please contact us
Inclusion Rating	160mm square (0.25 in. square) per ASTM E45
Scanning Electron Microscopy (SEM)	N/A - Any size*

\*SEM - Maximum sample size is 3" x 3" x 3" or 1.5 lbs. max weight.

Tensile Testing	Minimum Size
Flat Stock	7" x 1" x thickness (mark rolling direction)
Bar Stock	7" x 1" x thickness (mark rolling direction)
Bar Round Standard	7" length x 1" diameter
Bar Round (or Flat) Sub-size	3" min. length
Full Tube Standard	16" length x 1" diameter (pulled as received)
Wire	18" length

Charpy Testing*	Sample Size (after prep)
Standard	3" x 1" x 1"
Sub-size	3" x 1/4" x 1/4"

\*Please provide raw part (bar, tube, etc.) or finished product for Charpy testing. We will machine to appropriate sample size. Charpy sets (three bars) can be v-notched or un-notched and tested at temperature per your requirement.

Hardness Testing	Minimum Size
Vickers & Knoop (Microhardness)	Hardness/material dependent - please contact us
Rockwell Hardness	Hardness/material dependent - please contact us
Brinell Hardness	Hardness value dependent - please contact us
Hydrogen Embrittlement	Need whole fastener

Additional Parameters	Minimum Size
Jominy	5-1/2" long x 1-3/8" diameter
Plating Thickness	Metallographically 0.0001" (2.5 microns)*

\*Other measurement options available upon request.

Alloy Chemistry (Metallurgy)	Min. Size/Weight
OES	1/2" x 1/2" x 1/16" or 1/8" diameter wire or 30 grams for remelt
Electron Dispersive Spectroscopy (EDS)	N/A - Any size*

\*EDS - Maximum sample size is 3" x 3" x 3" or 1.5 lbs. max weight.

Chemical and Thermal Analysis (Polymers)	Min. Size/Weight
Fourier Transform Infrared Spectroscopy (FT-IR)	Test dependent - please contact us
Thermogravimetric Analysis (TGA)	1 gram or 1 part
Differential Scanning Calorimetry (DSC)	1 gram or 1 part

**For a fast quote, call us at (815) 229-8620.**



## ATRONA. THE METAL TESTING AND FAILURE ANALYSIS EXPERTS.

*Our President and Principal Metallurgist, Atif "Ott" Odeh (pictured), has consulted with companies in North and South America, as well as Europe, China, Japan, Korea, India, and elsewhere on metallurgical, materials, processing, failure analysis, and heat treat issues.*

### FAILURE ANALYSIS

We can help you solve engineering issues, manufacturing issues, heat treat issues, material issues, and root cause investigation of failed components and assemblies.

### CHEMICAL ANALYSIS

We can analyze and identify any type of metal, regardless of sample size. Let us help assure that the composition of the metal you are using makes it appropriate for its intended end use. Using state-of-the-art equipment and methods, our experienced techs can analyze your sample and determine its type and chemical composition—findings which will be reported to you with a reference chart that provides a breakdown of all main elements by percentage.

### MICROSTRUCTURE EVALUATION

Most metals at different stages of their processing life and heat treat conditions exhibit a specific microstructure that can be evaluated to see if: the material was heat treated as required; to investigate if the raw material was processed and produced per quality standards; or to simply find out why a material is not responding to specific applications or machining operations. Microstructure can also be used to predict tool life or even the performance of a particular part, since it can be used to reveal specific properties, such as strength, ductility, corrosion resistance, and other conditions and properties. Finally, it can be used to help assess the quality of a specific heat treater or raw material supplier. We can determine grain size, grain boundaries, banding classification, nodularity, phase percent, particle size, dimensional measurements, coating thickness, retained austenite rating, morphology, and much more.

### HARDNESS AND MICRO-HARDNESS TESTING

We can accurately measure the hardness of any sample—regardless of the geometry. Utilizing an array of machines, anvils, fixtures, and instruments, along with proven test methods and proprietary techniques, our technicians are well-equipped to examine and accurately measure the hardness of all types of metal, metal alloys, and metal components. Difficult hardness testing assignments are no problem for our expert staff.

### MECHANICAL TESTING

We conduct Charpy impact, tensile, shear strength testing and more to determine the mechanical properties of metals, and other materials, weldments, etc. Part shape and size hardly matter with our extensive sample preparation capabilities. Our machine shop has equipment ranging from small high speed diamond saws to double column band saws with carbide blades, as well as mills, and lathes (manual and CNC), for fast, expert machining of tensile and Charpy standard and sub-size samples. With Charpy testing we can obtain ductile to brittle transition temperature (DBTT) and learn more about the material you plan to use or are currently using, and its toughness at high strain. Tensile testing allows us to generate a complete tensile profile with a stress-strain curve that shows how the sample reacted when powerful linear forces were applied. This curve helps us determine the elastic limit as well as the yield strength of the material. We also perform many different types of mechanical and metallurgical tests for fasteners, including tensile testing, torque measurement, proof load testing, shear strength testing, and much more.

### SALT FOG TESTING

How will your products stand up to the elements? Corrosion resistance is a key factor in extending the service life of fasteners, parts, components, assemblies, and even finished products that will be exposed to marine or other harsh conditions, including environmental cycles with high and/or low temperatures, humidity, moisture, or chemicals, or even just room temperature. With our Salt Spray Testing Chamber, we can simulate these conditions in a controlled laboratory environment and predict the likely result of even years of exposure to any form of weathering conditions within a relatively short time frame.

### MAGNETIC PARTICLE INSPECTION

Magnetic Particle Inspection (MPI) is a relatively low cost, yet highly effective non-destructive testing method used to identify surface and near-surface defects in ferrous metal parts or components, including castings, forgings, weldments and machined or stamped parts. We conduct fast and efficient wet magnetic particle inspection on a daily basis and employ a systematic approach, from our Pre-Test Checklist to our 7-Step Inspection Process to assure we exceed your expectations for MPI.

For a fast quote, call us at (815) 229-8620.



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ATRONA. WE DELIVER INSIGHT.



FAILURE ANALYSIS & TESTING: METALLURGICAL, POLYMER, CHEMICAL, MECHANICAL, NDT, AND CALIBRATION