

# Metallurgical & Nondestructive Testing

Revision Date: **October 1, 2014 (Amended November 20, 2015)**

(713) 460-3655  
6722 Guhn Rd.  
Houston, Texas 77040

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**Prices are based on testing to the following specifications:**

ASTM, API, AWS and ASME

(Other specifications may incur Engineering Review Charges – See page 7.)

**Note:** Additional charges may incur if extra specimen preparation is required (i.g. high hardness materials, threaded tensile, small specimens, etc.). Charges for such preparation will be added to prices listed.

**3<sup>rd</sup> Party Witness Charge – \$35.00**

(Additional charges may apply based on schedule coordinating and testing time.)

**TENSILE TESTING** includes yield, elongation & reduction of area.

<b>Carbon Steel – Low Alloys – Aluminum</b>	
.500" .350" .250"	\$65.00
Under .250"	Price upon request
Elevated Temperature (yield & modulus for information only.)	\$225.00
<b>Stainless Steel – Duplexes – Brass</b>	
.500" .350" .250"	\$75.00
Under .250"	Price upon request
Elevated Temperature (yield & modulus for information only.)	\$235.00
<b>Nickel Alloys – Beryllium Copper – Tool Steels – Titanium</b>	
.500" .350" .250"	\$120.00
Under .250"	Price upon request
Elevated Temperature (yield & modulus for information only.)	\$250.00
<b>Through Thickness Tensile: Carbon Steel – Low Alloys</b>	
Under 6" Thick	\$250.00
6" Thick & Over	\$65.00
<b>Load to Failure (Pull Test)</b>	Price upon request
<b>Stress/Strain Charts</b> (upon request)	\$25.00

**CHARPY IMPACT TESTING** includes lateral expansion & percent shear.

<b>Carbon Steel – Low Alloys – Aluminum</b>	
<b>Full Size:</b>	
Ambient to -100°F	\$100.00
-101°F to -325°F	\$115.00
<b>Sub Size</b> (thickness less than .394"):	
Ambient to -100°F	\$110.00
-101°F to -325°F	\$125.00
<b>Stainless Steel – Duplexes – Brass</b>	
<b>Full Size:</b>	
Ambient to -100°F	\$120.00
-101°F to -325°F	\$135.00
<b>Sub Size</b> (thickness less than .394"):	
Ambient to -100°F	\$145.00
-101°F to -325°F	\$165.00
<b>Nickel Alloys – Beryllium Copper – Tool Steels – Titanium</b>	
<b>Full Size:</b>	
Ambient to -100°F	\$160.00
-101°F to -325°F	\$175.00
<b>Sub Size</b> (thickness less than .394"):	
Ambient to -100°F	\$190.00
-101°F to -325°F	\$205.00
<b>Strain Aged Charpy Impacts</b> (per set)	\$300.00

## WELD SAMPLE TESTING *Reduced Section Tensile*

<b><i>Carbon Steel – Low Alloys – Aluminum</i></b>	
Up to 1"	\$70.00
Over 1"	\$85.00
<b><i>Stainless Steel – Duplexes – Brass</i></b>	
Up to 1"	\$80.00
Over 1"	\$95.00
<b><i>Nickel Alloys – Beryllium Copper – Tool Steels – Titanium</i></b>	
Up to 1"	\$110.00
Over 1"	\$160.00
<b>Stress/Strain Charts</b> (upon request)	\$25.00

## WELD SAMPLE TESTING *Charpy Impact*

See Charpy Impact Testing on page 3.

## BEND & NICK BREAK TESTING

<b><i>Carbon Steel – Low Alloys – Aluminum</i></b>	
Bend Test	\$60.00
Nick Break	\$65.00
<b><i>Stainless Steel – Duplexes – Brass</i></b>	
Bend Test	\$65.00
Nick Break	\$70.00
<b><i>Nickel Alloys – Beryllium Copper – Tool Steels – Titanium</i></b>	
Bend Test	\$80.00
Nick Break	\$85.00

## FRACTURE MECHANICS

<b>CTOD Testing</b> (three specimens) E-BS 7448 Part 1 & 2, ASTM 1290	Price upon request
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## HARDNESS TESTING

Hardness pricing for Nondestructive Testing – See Nondestructive Testing on page 8.

<b>Brinell or Rockwell</b> (minimum)	\$45.00
<b>Brinell or Rockwell</b> (when in conjunction with mechanical testing)	\$10.00
<b>One (1) Quadrant Survey</b>	\$80.00
<b>Four (4) Quadrant Survey</b>	\$125.00
<b>*Rockwell Hardness Weld Survey</b> (up to 18 points)	\$120.00
<b>*Rockwell Hardness 15 N Weld Survey</b> (up to 19 points)	\$140.00
<b>*Vickers Hardness Weld Survey</b> (up to 19 points)	\$155.00
<b>*Vickers Hardness Traverse</b> (up to 10 points)	\$125.00
<b>*Case Depth – Vickers or Knoop</b> (up to 10 points)	\$125.00
<b>Jominy (End Quench Hardenability)</b>	\$250.00
<b>Hardness Survey Additional Points</b>	\$5.00/each

\*Note: Hardness survey may require additional points.

## METALLOGRAPHY

<b>Failure Analysis</b>	Price upon request
<b><i>Carbon Steel – Low Alloys – Aluminum</i></b>	
**Microstructure Evaluation (includes one (1) sample preparation)	\$105.00
**Grain Size per E-112 (in conjunction with Micro Evaluation)	\$70.00
**Grain Size per E-112 (not in conjunction with Micro Evaluation)	\$115.00
Grain Direction	\$55.00
<b><i>Stainless Steel – Duplexes – Brass &amp; Nickel Alloys – Beryllium Copper – Tool Steels – Titanium</i></b>	
**Microstructure Evaluation (includes one (1) sample preparation)	\$120.00
**Grain Size per E-112 (in conjunction with Micro Evaluation)	\$80.00
**Grain Size per E-112 (not in conjunction with Micro Evaluation)	\$125.00
Grain Direction	\$70.00
<b>**McQuaid-EHN Grain Size with Heat Treatment</b>	\$300.00
<b>Inclusion Rating per E-45:</b>	
Method A, B or C	\$105.00
Method D	\$250.00
<b>**Macroetch Examination per E-381:</b>	
Bar or Forging – up to 6” square	\$135.00
Over 6”	Price upon request
<b>**Macroetch Examination – Grain Flow Determination:</b>	
Bar or Forging – up to 6” square	\$105.00
Over 6”	Price upon request

## METALLOGRAPHY *(continued)*

<b>Ferrite Point Count per E-562</b>	\$160.00
<b>**Decarburization</b>	\$120.00
<b>Metallurgical Photos</b>	\$30.00

\*\*Note: Photos will be added to the above Metallography prices unless otherwise specified on purchase order.

## CHEMICAL ANALYSIS

<b>Spectrograph</b> (up to 10 elements):	
<i>Carbon Steel – Low Alloys – Aluminum</i>	\$70.00
<i>Stainless Steel – Duplexes – Brass</i>	\$90.00
<i>Nickel Alloys – Beryllium Copper – Tool Steels – Titanium</i>	\$100.00
<b>Spectrograph Additional Elements</b>	\$5.00/each

<b>Re-Melt Button</b> (required for shavings & turnings)	\$90.00
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### Nitrogen:

<i>Carbon Steel – Low Alloys – Aluminum</i>	\$60.00
<i>Stainless Steel – Duplexes – Brass</i>	\$75.00
<i>Nickel Alloys – Beryllium Copper – Tool Steels – Titanium</i>	\$85.00

<b>Hydrogen</b>	Price upon request
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## CORROSION TESTING

<b>ASTM A262:</b>	
Practice A – Screening	\$120.00
Practice B – 5 Day Test	\$275.00
Practice C – 10 Day Test	\$350.00
Practice E – 1 Day Test	\$175.00
Practice F – 5 Day Test	\$275.00

<b>Sensitization</b> (required for extra low carbon & stabilized grades, i.e: 304L, 316L, 317L, 321 & 347)	\$50.00
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<b>ASTM G28 Method A</b>	\$275.00
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### ASTM G48:

Method A or B	\$175.00
Method D	\$225.00

### ASTM A923:

Method A – Screening	\$120.00
Method C	\$175.00

## HEAT TREATMENT

### Normalize or Austenitize & Quench

First Hour	\$40.00
Additional Hours	\$25.00/hour

### Temper

First Hour	\$35.00
Additional Hours	\$25.00/hour

### Post Weld (ASME Code Up & Down)

First Hour	\$35.00
Additional Hours	\$30.00/hour

<b>Annealing</b>	Price upon request
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<b>Heat Treat Charts</b> (upon request)	\$25.00
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## MISCELLANEOUS

### Ferrite Measurement by Fischer Scope:

Minimum	\$75.00
Per reading	\$25.00

### Flattening:

Up to 125,000 lbf	\$65.00
Above 125,000 lbf	Price upon request

<b>Drop Weight Testing</b> (set of two)	\$250.00
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<b>Engineering &amp; Consulting</b>	\$150.00/hour
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<b>Special Project Review &amp; Layout</b>	\$85.00/hour
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<b>Documentation Fee</b> (after first revision)	\$35.00/each
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## SAWING CHARGES

<b>Oversize Test Samples</b> (over 6" x 6" x 10")	\$55.00/hour
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<b>Prolongation</b>	Price upon request
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Sawing will be charged on hourly rate plus consumables.

## NONDESTRUCTIVE TESTING

### **3<sup>rd</sup> Party Witness Charge – \$50.00**

(Additional charges may apply based on schedule coordinating and testing time.)

<b>Level III Consulting</b>	\$150.00/hour
<b>Level III Services</b>	Price upon request
<b>Level II Technician:</b>	
Ultrasonic	\$70.00/hour
Magnetic Particle	\$70.00/hour
Dye Penetrant	\$75.00/hour
Specialized Dye Penetrant	Price upon request
<b>Field Services</b>	\$300.00 minimum
<b>Additional Hours</b>	\$70.00/hour
<b>Additional Personnel Required</b> (per person)	\$65.00/hour
<b>PMI</b> (Positive Material Identification)	\$125.00/hour
<b>PMI Field Services</b>	\$500.00 minimum
<b>AMS 2301</b>	\$225.00
<b>Tubular Over 11"OD</b>	\$330.00
<b>Heat Treatment prior to AMS 2301</b>	\$50.00
<b>Brinell Hardness</b> (minimum or 1 <sup>st</sup> reading)	\$65.00
<b>Brinell Hardness</b> (additional readings)	\$15.00/each
<b>Rockwell Hardness</b> (minimum or 1 <sup>st</sup> reading)	\$65.00
<b>Rockwell Hardness</b> (additional readings)	\$25.00/each
<b>Setup/Handling</b>	\$100.00

## OVERTIME RATES

One and one half times published pricing.

Definition:

1. Any work performed outside of what is considered normal and customary turnaround.
2. Work performed after normal business hours. Normal business hours are Monday through Friday, 7:00am to 5:00pm.

**Weekends & Holidays:** Price upon request.

## TERMS

3% 10 Days Net 30

Payments not made within terms may be subject to interest at the rate of 1.5% per month.