

**One of these welding electrodes can make
your welds better, and your profits stronger.**

**The other can have exactly the
opposite effect.**

Choose wisely.



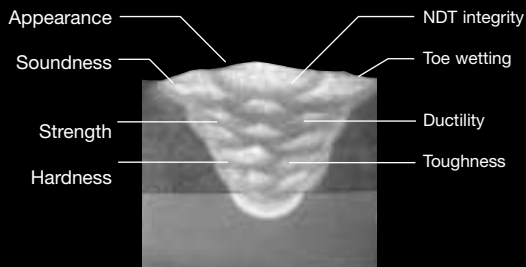
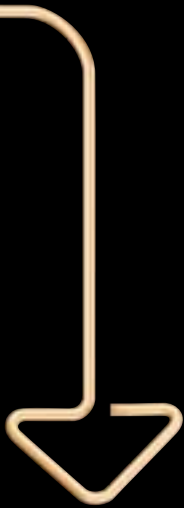
THE WELDING EXPERTS

What's riding on the integrity of
your welds?

Choose **Wisely.**

Quality welds are not a luxury in the fabrication business — they're a necessity. A bad weld is the shortest distance between you and an unhappy customer, between you and an unrenewed contract, maybe even between you and litigation.

Good welds help your company improve profits. Bad welds damage your company's ability to compete and grow.



Anatomy of a Weld

YOUR PRODUCT QUALITY.

YOUR REPUTATION.

YOUR PROFITS.

YOUR FUTURE.



Quality welds start
with quality welding
consumables.

Choose wisely.

**When it comes to the integrity of your welds,
little matters more than the quality of your
welding consumables.**

Choose Wisely



The highest quality, best performing welding consumables on earth bear the Lincoln Electric name. The reason is simple: Lincoln electrodes, fluxes and filler materials are produced under a unique Quality Manufacturing System, driven by a strong, company-wide commitment to Six Sigma process management.

The Lincoln Six Sigma-driven Quality Manufacturing System:

- ✓ Optical Emissions Spectrometer verification of chemical composition for both start and finish ends of all incoming steel coils
- ✓ Careful matching of steel chemical composition with desired finished-product qualities
- ✓ Multiple quality-assurance checks during manufacturing
- ✓ X-ray fluorescence verification of copper coatings and lubricants
- ✓ Expert on-site analysis/verification of stick electrode coatings, submerged arc fluxes and cored wire fill mix chemical composition
- ✓ Production halts if quality metrics approach specification limits
- ✓ Proprietary high-tech application of copper coating on wire
- ✓ Full-time steel analyst to audit/monitor supplier steel mills
- ✓ Backed and supported by Lincoln's industry-leading R&D
- ✓ Superior system of manufacturing traceability/accountability



Corsa Performance, Inc. uses Lincoln Electric consumables exclusively in the manufacture of its stainless steel marine exhaust components. The weld quality has significantly reduced preparation time for polishing.



You're depending on
the quality of your
welding consumables.
So, you're depending
on the company that
makes those
consumables.

Choose wisely.

The key to quality welding consumables

is chemical composition control.

Choose Wisely

A critical ingredient in welding electrode is steel. So it follows that the chemical composition of that steel is critical to the way the electrode performs.

Most manufacturers of welding consumables rely on a heat certification (cert) from the steel mill as verification of the chemical composition of their steel.

Most, but not Lincoln Electric. At Lincoln, every coil of incoming rod (typically 2,500-4,500 pounds of raw steel wire) is tested twice for chemical composition before it's put into production. Then, the properties in specific coils of steel are matched with qualities that are desirable in specific electrodes and the steel is put into production accordingly — an important extra step that helps ensure performance and consistency.



tain steel that has an accumulation of residuals and elements (carbon and silicon) that are not indicative of the rest of the heat. This is called "tailing off". It is caused by the tendency of the unwanted residuals and elements to rise to the surface of the molten steel during the typical one hour cast time. Steel is cast or poured from the bottom of the ladle into a tundish, which in turn flows into the casting molds.

- Because a heat cert is typically an average of the start, middle and end of the heat, there is a high probability that the end of the heat may contain steel that does not meet AWS requirements. It's not that steel mills produce badly — some variation from top to bottom of the ladle is part of the steel making process.
- As different orders are melted at the mill, materials with different chemical compositions can get mixed together. This "transitional material" can alter — sometimes significantly — the nature of the steel.
- While AWS provides chemical composition requirements for the finished product, there is no system of monitoring or policing compliance. Thus, heat certs offer no real assurance that the chemical composition of welding electrode is within the spec.
- As careful as most steel mills are, human error can be a factor. Sometimes steel is mislabeled, for instance. Mixed steel is a major concern.
- We purchase from the best steel mills in the world. However, steel making, by its very nature, does include variation. Lincoln Quality Manufacturing System processes ensure your consumables are consistent.

Unreliable chemical composition can lead to unreliable welding consumables. Unreliable welding consumables can rob your company of productivity and profits.



"The enemies of profit are variance and down-time. Keep both in check, and you control your ability to stay competitive and profitable."

— Doug Lance, Superintendent
Lincoln Electric Mentor Plant

Changing contact tips. Unsnarling wire tangles. Resetting power sources. Cleaning spatter. Repairing or replacing bad welds. They're efficiency-killers and profit-eaters. And often they're the direct result of inferior welding consumables. The consistent use of quality electrodes, fluxes and filler materials translates to less down-time and stronger profits.

Why doesn't Lincoln simply rely on heat certs like other manufacturers?

Here's what's behind a typical heat certification:

- At the mill, a small sample is taken from a "heat" of molten steel.
- The sample is tested to determine what adjustments in the chemical composition are required and elements may be added.
- The resulting heat certification indicates that the chemical composition of the heat of steel is within AWS specs for its intended use.

The problems with relying on heat certs:

- A small mill test sample represents the chemical composition in a huge quantity — often hundreds of thousands of pounds — of molten steel. Typically, three test samples are averaged and reported as the ladle chemical composition representing over 250,000 pounds.
- During the continuous casting of steel, segregation of elements occurs in the ladle from bottom to top as the heat is being cast. Typically, the end of the heat (top of the ladle) will con-

Your choice of welding consumables can dramatically impact your production efficiency and your profits.

Choose wisely.

A Q-Cert from Lincoln Electric isn't just as good as a heat cert. It's significantly better.

Choose Wisely

A Lincoln Electric Quality Certificate Number — Q-Cert, for short — is the industry's premier quality indicator for welding consumables. Only Lincoln Electric consumables can carry the Q-Cert designation, because only Lincoln consumables meet the rigorous requirements of chemical composition control and Six Sigma manufacturing standards.

A Q-Cert is your assurance of:

- Controlled chemical composition
- Industry-leading manufacturing standards
- Quality, reliability, consistency
- Improved operational efficiencies

**AWS A5.01
recognizes and
supports lot control
of welding material
by Controlled
Chemical
Composition.**



The chemical composition, coating levels and surface treatment on Lincoln Electric consumables is tested 10 to 50 times more than many other consumables.

You can rely on
heat certs and hope
for the best.

Or, you can insist
on Q-Certs, and be
confident in the quality
of your welding
consumables.

Choose wisely.

You decide which level of certification best meets your requirements.

Choose Wisely

Lincoln offers three levels of Q-Certification. And while each is indicative of a unique set of tests, traceabilities and records, all Q-Certs share a common heritage grounded in chemical composition control and Lincoln's Six Sigma driven production system. No matter which Q-Cert you require — from our standard Q-1 Cert to our comprehensive and exacting Q-3 Cert, you get the peace-of-mind that comes from knowing that you can count on the performance of your welding consumables.

	Q1	Q2	Q3
Lincoln standard ISO manufacturing system	■	■	■
Certificates of conformance	■	■	■
Lincoln Q-Lot number on product meets AWS A5.01 lot definition requirements	■	■	■
Link Q-Lot number to certificate of conformance	■	■	■
Traceable to Lincoln manufacturing date, shift and operator	■	■	■
Recorded flux/mix chemistry	■	■	■
Items below represent additional agency requirements for testing and traceability			
Independent verification of records		■	■
Recorded steel chemistry		■	■
Lot control number per a specification (ASME code, for instance)		■	■
Testing per specification (when required)		■	■
Independent verification of all tests		■	■
Test results traceable to Lincoln archived records		■	■
Certification with test results issued to customer			■
Certification with test results traceable from Lincoln to customer			■
Lincoln Electric keeps records on file			■
Certification issued to customer			■

Q1 Lot – Identification for a quantity of consumable material run under one production schedule using Controlled Chemical Composition of materials. Traceable with the Lincoln QA System to date of manufacture, operator, line, and shift.

Examples: standard commercial products plus the certificate of conformance.

Q2 Lot – Q1 Lot plus archived records of in-process testing and manufacturing as well as any testing of finished product.

Examples: *Blue Max, Red Baron, Pipeliner,* and AASHTO/FCM certification.

Q3 Lot – Q2 Lot plus archived records tying material to a specific shipment and customer.

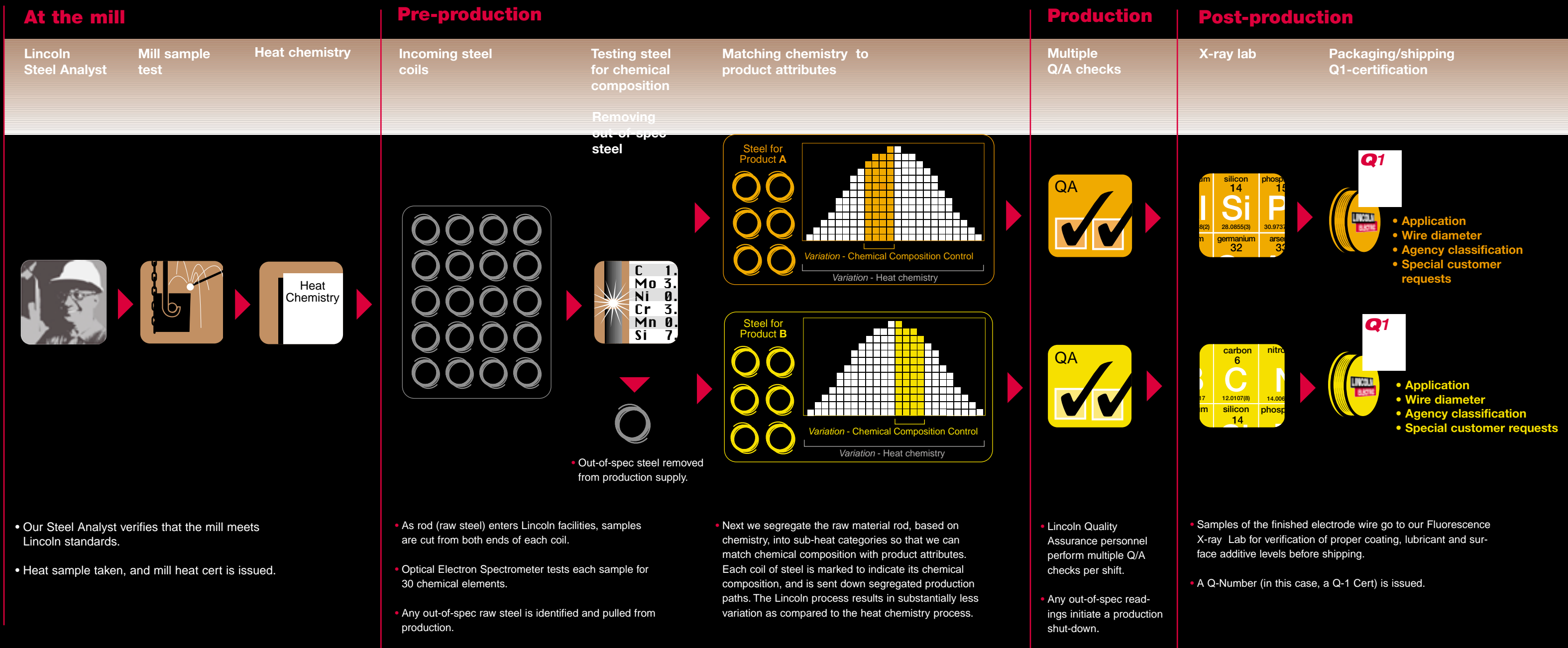
Examples: military and nuclear certification.

What's behind a Lincoln Electric Q-Cert?

Open this page for a quick overview of our consumable manufacturing quality process.

Here's a look at how Lincoln's Six Sigma-driven production system delivers tighter chemical composition and production controls, resulting in a Q1-Cert. The example on the diagram is ER70S-6 (Lincoln's SuperArc L-56) wire, but these same processes and controls apply to the production of all Lincoln welding consumables.

SuperArc® L-56 (ER70S-6) Wire (Q-1)



Other ER70S-6 Wires

By comparison, many other ER70S-6 wires supported by only a heat cert offer:

- NO non-mill chemistry verification
- NO segregation by chemistry
- NO way to identify and remove out-of-spec or mixed steel
- Less rigorous controls and Q/A checks
- NO fluorescence X-ray checks

**Lincoln's Quality Manufacturing System
produces the world's leading welding
products every day.**

Choose Wisely

SuperArc® L-50, L-54 and L-56

Respected by welding professionals all over the globe for its exceptional performance.



Pipeliner®

Our premium pipewelding electrode with industry-leading arc performance. All Pipeliner products carry Q2 certification as your guarantee of quality.



Lincolnweld® Submerged Arc Consumables

Our 860 and 780 fluxes, for instance — valued for consistent flux particle composition and weld deposit chemistry.



Innershield®, Outershield® and Metalshield® cored electrodes

The world's performance and consistency leaders among flux-cored electrodes.



Blue Max®

Blue Max premium stainless steel electrodes are Q2 Lot Certified – standard with every package.



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