

# Quality

The Market Leader: Yesterday, Today and Tomorrow

## “Crosby: There is No Equal”

When you read on a contract the statement “Crosby or Equal”, you owe it to yourself and the personnel that will be using the product to understand that there is no equal to Crosby. The following information has been designed to help you determine the many “Value Added” features of Crosby products that are the foundation for the performance characteristics and technical support required from a quality manufacturer. You will see from the following information that **“When buying Crosby, you’re buying more than product, you’re buying Quality”**.

### Engineering Excellence

The majority of Crosby’s products are “Heat Treated”. The “Heat Treatment” allows the product to deform if overloading occurs, giving warning before ultimate failure. An “As-Forged”, or non-heat treated product, will break with little or no warning. This is called a “Catastrophic Failure”, and is a result of brittleness or lack of toughness in the non-heat treated product as compared to the “Heat Treated” product.

### Quality Control

The majority of the steel purchased by Crosby is isolated from production until approved by our metallurgical lab. Each product is individually “PIC Coded” (Product Identification Code) to allow traceability to its respective date of production and material certification.

### Durability

Competitor’s products cannot be substituted in place of Crosby’s just because they look alike. Crosby products are manufactured with the highest design factors in the industry. Crosby’s products are better able to withstand abusive field conditions because of the improved impact and fatigue characteristics designed into each item of our line.

Crosby recognizes the importance of all four of these essential properties in its products.

- Working Load Limit
- Ductility
- Fatigue
- Toughness

### Recognized Dependability

Crosby is considered the standard of the industry, both nationally and internationally. This can be drawn from the fact that most contracts involving rigging products, in the U.S. and around the world, read “Crosby Only” or “Crosby or Equal”.

### Industry Education

Crosby has always been concerned that our users are knowledgeable with the installation, use, inspection, and maintenance of our products. Crosby offers a formal product instruction and warning program which includes such “Value Added” features as instruction sheets attached to individual items, comprehensive literature, and a video training program. A Technical Support Team is also ready to answer any questions in regard to our products or services. This instruction can be provided through training seminars and on-site engineering applications. These services provide important benefits, such as accident prevention which results in lower costs of doing business for our customers.

### Customer Service

The phrase Customer Service at Crosby means more than just having the product available when you need it. Customer Service also means having a full time, knowledgeable District Sales Representative available to serve you. It also means having a well trained and fully equipped Customer Service Department, a broad product line offering, 3200 Authorized Crosby distributors worldwide, and a Technical Support Team second to none. Finally, Customer Service means having a management team dedicated to ensure the previously mentioned services run smoothly so that your needs are met.

IF YOU NEED MORE INFORMATION ABOUT THESE VALUE ADDED BENEFITS, PLEASE CONSULT YOUR SAFETY AND RIGGING DEPARTMENT, YOUR LOCAL CROSBY DISTRIBUTOR, OR A CROSBY REPRESENTATIVE BEFORE MAKING YOUR DECISION!

**SELBY ENGINEERING & LIFTING SAFETY LTD.**  
 Lifting Equipment and Height Safety Specialists  
[www.liftingsafety.co.uk](http://www.liftingsafety.co.uk) [sales@liftingsafety.co.uk](mailto:sales@liftingsafety.co.uk)  
 Tel: +44 (0) 1977 684 600 Fax: +44 (0) 1977 685 300



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# The Quality Continuum



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Crosby’s Quality Continuum is a symbol identifying six segments of our business, that when viewed as one, differentiates us in the marketplace.

The Quality Continuum	The Value Added Features
<p><b>MANUFACTURING</b> Manufacturing is the process of turning a raw material into a finished product. When it comes to manufacturing, The Crosby Group has extensive and unique capabilities that equip it with the tools needed to provide the quality and type of fittings and blocks needed by our customers. Modern facilities and up to date processes support the manufacturing of our products within Crosby, by Crosby employees. Our Product Identification Code traces the manufacturing process from raw material to production, helping to insure that the proper controls are maintained.</p>	<ul style="list-style-type: none"> <li>• Modern facilities and state of the art processes that support the manufacture of our products.</li> <li>• Extensive and unique capabilities that equip us with the tools needed to provide the quality and type of fittings and blocks needed by you, the customer.</li> <li>• Traceability of each product through the manufacturing process (from raw material to production) with our Product Identification Code (P.I.C.) System which helps to insure that the proper controls are maintained.</li> </ul>
<p><b>RISK MANAGEMENT</b> Risk management is the practice of controlling or managing the factors of uncertain hazards. To Crosby, risk management requires that the risks of doing business must be reduced by concrete steps that have an impact throughout the business, from the manufacturer to user. Training and formal Product Warnings are major tools that Crosby has made available to support this effort.</p>	<ul style="list-style-type: none"> <li>• Comprehensive product literature.</li> <li>• Formal product instruction and warning program available to all users of Crosby products.</li> <li>• Many products are individually bagged or tagged with product warning and proper application information.</li> <li>• Training videos are available on several subjects.</li> <li>• Crosby Product Training Seminars are available to users.</li> </ul>
<p><b>RESEARCH AND DEVELOPMENT</b> Research and Development is the ongoing effort to realize the potential of improved products resulting from scholarly and scientific investigation. At Crosby, our research and development is focused by our staff who draw upon the state of the art facilities available in our centralized laboratory in Tulsa, OK.</p>	<ul style="list-style-type: none"> <li>• Development of manufacturing processes for improved product performance.</li> <li>• Enhanced material toughness and properties through the selection of raw material and proper metallurgical processing.</li> <li>• Support of the effort to provide more efficient product design utilizing less raw material and common design.</li> </ul>
<p><b>COMPLETE PRODUCT LINE</b> Crosby is a world wide company that is the premier source of blocks and fittings for the lifting and material handling industries. As a single source, Crosby offers a full line of products that is the broadest selection available to the lifting and materials handling industries.</p>	<ul style="list-style-type: none"> <li>• Scaffold pulleys to the largest lifting tackle in the world.</li> <li>• Forged Wire Rope Clips from 1/8" to 3".</li> <li>• Shackles from 1/3 tons to 1200 tons.</li> <li>• A variety of hooks from 1/3 ton to 300 tons.</li> <li>• A complete assortment of links, rings, forged swivels and thrust bearing swivels.</li> <li>• Product available in both carbon steel and alloy steel.</li> <li>• Roll Forged sheaves to “Cold Tuff” sleeves and other swaging products.</li> <li>• Custom designed products to meet your specific needs.</li> </ul>
<p><b>CUSTOMER SERVICE</b> “Customer Service is what the customer says it is.” Crosby takes this definition seriously. We recognize that customer service begins with availability of product, order placement and tracking, and accurate information. But at Crosby we KNOW that Customer Service is more than just having the product available when you need it. It is the company wide effort required to drive the organization to discover and meet our customer’s expectations.</p>	<ul style="list-style-type: none"> <li>• Full time, knowledgeable District Sales Representatives.</li> <li>• A well trained and fully equipped Customer Service Department which can address standard products.</li> <li>• An Engineered Products Group that coordinates customer’s special needs from design through manufacturing and application.</li> <li>• A Technical Support Team ready to explain our products and service.</li> <li>• A Management Team dedicated to the principle that “Customer Service is what the customer says it is.”</li> </ul>
<p><b>ENGINEERING</b> Engineering is the application of scientific principles to practical ends in the design, construction and use of equipment and systems. Crosby engineers its products to perform. The application of finite element analysis is but one example of the engineering expertise available at Crosby that has resulted in Crosby being considered the standard of the industry, nationally and internationally.</p>	<ul style="list-style-type: none"> <li>• Proper selected material and heat treatment process that allows for superior strength and impact and fatigue performance.</li> <li>• Active participants in professional societies and committees including ASTM, CVSA, API, ASME/ANSI.</li> <li>• Extensive expertise in computer aided design (CAD), Finite Element Analysis, Non-destructive Testing and Failure Analysis of Products.</li> <li>• ISO 9001 Certified.</li> </ul>



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## Questions and Answers

### What is the Crosby Quality Continuum?

- The Crosby Quality Continuum is a symbol that identifies six segments of Crosby's business, that when viewed as one, differentiates Crosby from the competition in the marketplace. The six (6) segments are Customer Service, Engineering, Manufacturing, Risk Management, Research and Development and a Complete Product Line.

### What is the Communication System?

- The Crosby Communication System is a systematic effort to convey the positive aspects, or Value Added features of the Quality Continuum (big red Q), to the marketplace.

### Who is the audience for the Crosby Communication system?

- The Crosby Communication System recognizes its audience as including: Crosby employees, Authorized Crosby Distributors, End Users of Crosby, and Institutional buyers or standards setting organizations.

### What are some of the resources available?

- The Crosby Communication System can successfully draw upon the many skilled and knowledgeable people within Crosby, our Video Training Programs, the product bulletins, Crosby product literature, and the product presentations that have been prepared.

### What type of training is available?

- Comprehensive product training is available on nearly all Crosby product lines. Customized training on other products can also be made available. In addition, training is available on the fundamentals that support Crosby's product performance, including product warnings, heat treatment, materials, and product identification.

### How can this help the user of Crosby products?

- Crosby's users can benefit from the Crosby Communication System by recognizing the impact that Crosby's Value Added features can have on employee skills, employee safety, worker compensation costs, productivity, insurance premiums, and the ability to meet OSHA and others standards.

### How did these concepts develop through the years?



- Crosby has always been concerned that our users be knowledgeable about the installation, use, inspection, and maintenance of our products. It was in 1987 that Crosby developed the theme "If it's Crosby, It's Quality" to highlight the Quality built into the full line of products. This evolved into the Quality Continuum concept in 1988 and 1989, when we recognized that: "When buying Crosby, you're buying more than product, you're buying Quality," and in 1990 the Crosby Communication System was formalized.



# World Standards

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CROSBY ISO 9001	COMPETITION	CROSBY
<p>The International Standardization Organization (ISO) brought standardization to the international level in 1987 by defining three levels of quality assurance. These are ISO 9001, ISO 9002, and ISO 9003. ISO 9001 is the most comprehensive level. This level involves design, development, production, and shipping. A total of 20 quality system elements apply to ISO 9001. ISO 9001 requires that all procedures, work instructions, processes and related activities be documented. Certification to ISO 9001 requires a “third party” audit of all facilities prior to attainment and ongoing auditing every six months.</p> <p>Certification to ISO 9001 is a solid foundation on which to build and clear evidence that the organization “does what it says.” Attainment of ISO 9001 forms the basis for meeting other world standards and provides customers with documented proof of the organization’s ability to consistently provide product quality and performance. Adherence to ISO 9001 is rapidly becoming a major element of purchasing contracts throughout the world.</p>	<p><i>Ask: Do they meet ISO 9001 standards?</i></p> <p><i>Ask: Are they an ISO 9001 certified company?</i></p> <p><i>Ask: If not, do they plan to, and do they have an implementation schedule?</i></p> <p><i>Ask: If not, how will they support the future needs of international companies and the Department of Defense?</i></p> <p><i>Ask: What other “world standards” of performance do they meet?</i></p>	<p>Crosby is proud to have all of our facilities, Worldwide, awarded certification for our Quality Assurance Program according to ISO 9001 by DET NORSKE VERITAS (DNV). The criteria outlined by ISO 9001 have been adopted by the company and its employees over the years at Crosby through our ongoing quality programs. Quality has been built into our products and corporate philosophy from the beginning. “This internationally accredited certification is a true measurement of Crosby’s Quality leadership, and its commitment and leadership in Quality.” Crosby made the commitment and investment needed to attain ISO 9001 certification for one reason, to support the future needs of our distributors and end users worldwide.</p> 
<p><b>AMERICAN PETROLEUM INSTITUTE (API)</b> The American Petroleum Institute provides third party certification for products used in the oilfield and other petroleum related activities. They provide quality assurance certification under the API-Q1 program. Manufacturers who meet their criteria qualify to manufacture under the API-Q1 program and to utilize the API monogram. API also provides two design and manufacturing criteria, API-8A and API-8C. All oilfield blocks should meet API-8A criteria. Many international users require API-8C oilfield blocks.</p>	<p><i>Ask: Are they certified to API-Q1?</i></p> <p><i>Ask: Do their standard oilfield blocks meet API-8A?</i></p> <p><i>Ask: Do they have capability to meet API-8C when required?</i></p>	<p>McKissick is certified under API-Q1 to manufacture blocks and sheaves for use in the oilfield. All oilfield blocks are designed and manufactured to API-8A requirements. Upon request McKissick does provide oilfield blocks designed and manufactured to API-8C requirements.</p>  <p><small>Licensed Under API Spec 8A-0023 and 8C-0021</small></p>
<p><b>OTHER WORLD STANDARDS</b> American Bureau of Shipping (A.B.S.) Lloyds Register of Shipping (Lloyd’s) DET NORSKE VERITAS (DNV) Association of Belgian Industry for Safety and Health (AIB-VINÇOTTE), (AV), (VGS) Control Organization of German Industry for Safety and Health (DIN) Netherlands Labor Inspection (AI) Nuclear Regulatory Commission (NRC) Defense Contract Administration Services Management Area (DCAS) Registro Italiano Navale (RINA)</p>	<p><i>Ask: What world standards are they familiar with?</i></p> <p><i>Ask: Can they demonstrate the ability to meet these standards when needed?</i></p> <p><i>Ask: Do they have quality systems and product performance needed to document adherence to these standards?</i></p>	<p>Crosby has demonstrated capability in various countries and with many products. Crosby actively participates in standards setting committees in both the United States and Europe. Crosby has frequently certified shackles, sheaves, blocks, and hooks to various world standards when required.</p>



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# Certification

## Third Party Certification By Product

Third Party certification provides one or more of the following services:

- Inspection
- Certification Service
- Testing Service

This Certification can be confirmed to their standards, the customer’s standards, or the manufacturer’s own standards. Crosby, if requested at time of order, will work with you to certify any of our products to any third party organization.

### ISO 9001 CERTIFICATION PROVIDES YOU:

- **THIRD PARTY CERTIFICATION** that the Crosby Group meets the rigorous requirements of ISO 9001.
- **THIRD PARTY PROOF** that Crosby’s Quality Assurance System is ongoing through a comprehensive audit program.
- **THIRD PARTY PROOF** that Crosby meets the high standards of design, manufacture and service now demanded by world markets.
- **MANUFACTURING ACCOUNTABILITY.** ISO 9001 certification assures you that at Crosby, “WE DO WHAT WE SAY WE DO” at all of our manufacturing facilities. This, coupled with Crosby’s comprehensive tracability system (P.I.C.) and our Material Verification Program provides total accountability.
- **AUDIT SAVINGS** – Sourcing from Crosby enables you the opportunity to reduce your time and cost associated with your audits or third party audits. This is due to the fact, that by being ISO 9001 certified, Crosby is regularly audited by a third party.
- **WORLD COMPETITIVENESS** – Sourcing from Crosby will allow you to participate and be competitive in more markets throughout the world. Many major end users, who operate on a worldwide level, have already begun to require their suppliers by ISO 9000 certified or offer products that are produced by an ISO 9001 certified source.
- **A LONG TERM PARTNER** - Crosby’s ability to meet ISO 9001 standards and to maintain third party certification makes it clear that the Crosby Group is a long term partner you can depend on to provide the needed product at required performance levels. The ISO 9001 certification forms a solid foundation from which we deliver all of the value added features represented by our Quality Continuum.
- **SUPPORT** – Crosby will support committed distributors in their efforts to define and accomplish what is needed for them to attain ISO 9002 certification.




*McKissick Products, Tulsa, Ok  
Lebus Manufacturing, Longview, TX  
National Swage, Jacksonville, AR  
Crosby Canada, Brampton, Ontario  
N.V. Crosby Europe, Putte, Belgium*



# Identification

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PRODUCT IDENTIFICATION	COMPETITION	CROSBY
<p>The most effective method of assuring that the product you are purchasing is as reliable as possible is to purchase components supplied by companies of known reputation who maintain consistent and adequate quality. The company should clearly mark its components and finished products with the company name or logo, the component size or working load limit, and a code that is actively used by the manufacturer to control material and processes.</p>	<p><b>Ask:</b> Do they have a traceability system?</p> <p><b>Ask:</b> If yes, is their traceability system also utilized for cast fittings, swage fittings and all load-bearing components?</p>	<p>Crosby forges the Product Identification Code (PIC), each item's size or Working Load Limit (or a cross-reference code to working load limit) and “Crosby” or its logo into each product.</p> <p style="text-align: center;"><b>Load Rated</b></p>
<p><b>MATERIAL TRACEABILITY</b> A forged in identification code should be used to record the material grade and origin. This record should trace the material to the heat lot of material of steel as rolled at the supplying mill. Verification checks of all materials purchased for forging must be done to insure that the steel supplied meets the specifications required. This verification should be traceable by a forged in product identification code. In summary, the source and verification of material actually used in each forging must be able to be determined through appropriate documentation.</p>	<p><b>Ask:</b> Do they have a permanently marked code in each product that traces material back to a verified certification?</p> <p><b>Ask:</b> Do they test each heat of steel with their own testing facilities?</p>	<p>Crosby uses the Product Identification Code (PIC) to maintain material control from the steel mill, to receipt at our plant, to verification, and throughout the manufacturing process. Crosby can provide certified material analysis for each production lot, traceable by the Product Identification Code (PIC). Crosby, through its own laboratory, verifies the analysis of each heat of steel. Crosby purchases only special bar forging quality steel with specific cleanliness requirements and guaranteed hardenability.</p>
<p><b>MANUFACTURING CONTROL</b> The permanent identification code should be used to maintain a record of which manufacturing facility produced the product as well as the approximate production dates. All quality records should reference the product identification code so that a history can be maintained. All product performance testing for audit and engineering purposes should also reference the product identification code.</p>	<p><b>Ask:</b> Do their products have a permanent code that is used to maintain control as product is manufactured?</p>	<p>Crosby uses the Product Identification Code (PIC) to maintain control of its products as they are manufactured.</p>
<p><b>PERFORMANCE AND APPLICATION DATA</b> Detailed performance, application, and warning information will assist you in the proper use of products. This information is most effective when provided in supporting brochures and engineering information. An identification marking must be used to reference this information by use of a cross-reference between the product code and the literature.</p> <p>Proper performance data should include each item's working load limit, proof load and design factor. It should also include the item's manufacturing processes, such as heat treatment and galvanizing, and list any specification the product meets or exceeds.</p>	<p><b>Ask:</b> What performance and application information do they provide?</p> <p><b>Ask:</b> Are there markings in products to aid in the proper use of the fitting?</p> <p><b>Ask:</b> Is a comprehensive product warning system provided?</p> <p><b>Ask:</b> What training support is provided?</p>	<p>Crosby provides a detailed catalog that comprehensively describes each product's performance. The Crosby Product Warning System provides detailed application and warning information on selected products. In addition, training seminars and videos are also available. Selected products incorporate markings forged into the product to aid in the proper use of the fitting.</p> <p style="text-align: right;"><b>QUIC-CHECK®</b> </p>

**the Crosby group inc.**

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# Crosby Value Added

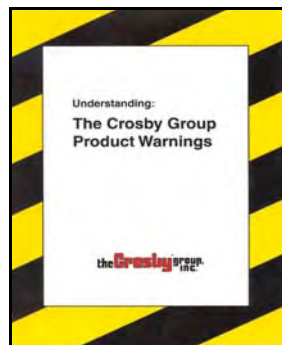
## IDENTIFICATION AND LABELING ON THE PRODUCT by PRODUCT GROUPS

	Crosby Logo	Size	Working Load Limit	Rated in Metric Tons (t)	Product Identification Code	Serial Number	QUIC-CHECK® Markings	QUIC-CHECK® RFID Equipped
SHACKLES	X	X	X	X	X		X	25t and larger
SHANK HOOKS	X	Both size and working load limit are identified with a frame size that can be referenced back to our literature.		X	X			
EYE HOOKS	X	X	X	X	X			
OTHER FORGED HOOKS	X	X			X		S-322	
SNATCH BLOCKS	X	X	X	X	X*			4-1/2" and larger
CROSBY CLIPS	X	X			X*			
FIST GRIPS CLIPS	X	X			X			
TURNBUCKLES	X	X			X			
LOAD BINDERS	X	X	X		X			
EYE BOLTS	X	X			X			
LINKS	X	X			X		X	
TAPERED SWIVEL BEARINGS	X	X		X	X			
CHAIN COMPONENTS	X	X			X			
SWAGE SOCKETS	X	X			X		X	
SLEEVES & BUTTONS	X	X			X			
380 BLOCK	McKissick	X	X		X	X		X
680 BLOCK	McKissick	X	X		X	X		X
OIL FIELD	McKissick	X	X		X	X		X
750 BRIDGE CRANE BLOCKS	McKissick	X	X	X		X		X
SHACKLES CT & 2160	X	X	X	X	X	X	CT Only	X
SWIVEL HOIST RINGS	X	X	X	Selected Sizes	X			X
ELIMINATOR CHAIN	X	X			X		X	
LIFTING CLAMPS	X	X	X	X		X		X
ANGULAR CONTACT SWIVEL BEARINGS	X	X	X		X			

\* Forged Components  
NOTE: For CE-LABEL: Inquire for full details.

### Product Warning Brochure

This brochure available only in .PDF format at [www.thecrosbygroup.com](http://www.thecrosbygroup.com) contains important information concerning the product warning instruction program being used by Crosby. The brochure includes actual instructions as well as an explanation of how colors and symbols are used to get the attention of the user.



### General Catalog

Our most comprehensive piece of literature. The Crosby general catalog contains detailed engineering specifications as well as definitions, illustrations, and drawings to assist in selecting the proper equipment for the job.



# Heat Treatment

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## “Crosby: There is No Equal”

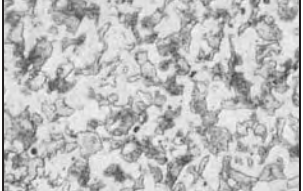
HEAT TREATMENT	COMPETITION	CROSBY
<p>The heat treatment of steel is an ancient art science that dates back to the Iron Age. When strength and hardness of steel were needed, heat treatment provided the answer. Today the heat treatment of steel has been refined to a sophisticated science. It is now possible to greatly enhance the strength, ductility, and resilience of steel through a properly controlled heat treatment process. The “as forged” fitting results in variability that is detrimental in applications that require toughness. Normalizing, spheroidized annealing, and quench and tempering are heat treat processes.</p> <p>Proper heat treatment eliminates the risk of cooling variation at the forging process. This is true of all steels regardless of material grades.</p>	<p><b>Ask:</b> Are load bearing fittings heat treated?</p> <p><b>Ask:</b> If so, what type of heat treat process is used?</p> <p>Some supply critical fittings in an “as forged” or “as cast” condition.</p>	<p>Crosby has fully qualified heat treat operations at its plants. Utilizing these facilities, Crosby heat treats all fittings that are load bearing components. Crosby minimizes risk by the effective heat treatment of its fittings. Heat treatment is an essential element of Crosby’s Risk Management Program. We do not take shortcuts for the sake of cutting cost. For the benefit of reducing cost, a non heat treated product compromises the performance ability of the product. In addition, Crosby’s metallurgical laboratory provides the support needed to assure the results.</p>
<p><b>QUENCHED AND TEMPERED</b> Quenching and Tempering of steel has been found to be the heat treatment best suited to fully develop the strength and enhance the grain flow of carbon and alloy forgings. The quenched and tempered product will deform before ultimate failure, thus giving warning. The quenching process is rapid cooling in water or oil, after heating, to form a strong but brittle structure. The tempering process is the reheating of the steel to obtain the desired strength while increasing the ductility and toughness. Quench and tempering provides the consistency of performance needed by all critical applications, especially overhead lifting.</p>	<p><b>Ask:</b> What products do they quench and temper?</p> <p><b>Ask:</b> Are their products that are exposed to high stress quenched and tempered?</p> <p><b>Ask:</b> If not, why are they willing to accept inferior impact and toughness properties of non quenched and tempered products.</p> <p>Many normalize their forgings, but do not quench and temper.</p>	<p>Crosby fittings which are exposed to high stress applications and designed as load bearing elements are quenched and tempered. The Quench and Tempering process is the most consistent method of assuring that every fitting performs as needed, especially in overhead lifting.</p> 
<p><b>MATERIAL CONTROL</b> The proper heat treatment of forged fittings depends on the appropriate selection of materials and use of heat treat procedures. Fine grained, special bar forging quality steel of specific cleanliness requirements and guaranteed hardenability in the appropriate grades must be used. Proper selection of steel is NOT ENOUGH, however. The control and management of these steels, from purchase through the entire manufacturing process, is essential to assure that the proper results are attained in the designated product. This control should utilize a production traceability program.</p>	<p><b>Ask:</b> Do they have identification code forged into the product that traces material back to verified certification?</p> <p><b>Ask:</b> Are all heat records maintained by the traceability code?</p> <p>Most do not provide traceability of material.</p>	<p>Crosby uses the Product Identification Code (P.I.C.) for material control from receipt and verification of steel, and throughout the entire manufacturing process. Crosby can provide certified material analysis for each production lot.</p> <p style="text-align: center;"><b>PIC</b> <b>Product Identification Code</b></p>
<p><b>ULTIMATE STRENGTH, DUCTILITY, IMPACT, AND FATIGUE PROPERTIES</b> The mechanical properties of steel when a load is very rapidly applied is known as its <i>impact</i> strength. Forged fittings must be able to have impact strengths that match the requirements of their application, especially in cold temperatures. The ability of a steel to withstand repeated applications of a load is measured by fatigue testing. The proper heat treatment of forgings, which includes quenching and tempering, can develop these properties to their desired level in a consistent and reliable manner. The ability to perform when overloaded is known as <i>ductility</i>.</p>	<p><b>Ask:</b> Are the products designed and manufactured with considerations for strength, fatigue, impact, and ductility?</p> <p>Some do not utilize materials that have good impact and fatigue properties.</p>	<p>Crosby’s product line benefits from the selection of steel and the heat treatment process that allows for superior strength, ductility, impact, and fatigue performance. The product deforms if overloaded, giving warning before ultimate failure. All of these properties are essential if the product is to perform time after time. They are also important to assure that the inspection criteria set forth by ANSI will effectively monitor the ability of the fitting to continue in service.</p>



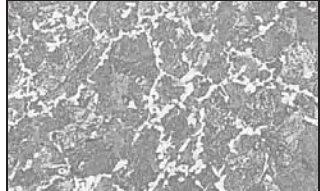
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# Crosby Value Added

<b>Heat Treatment BY PRODUCT GROUPS</b>	
PRODUCT	HEAT TREATMENT
SHACKLES	Bows - Quenched and Tempered Pins - Quenched and Tempered
EYE HOOKS	Quenched and Tempered
SHANK HOOKS	Quenched and Tempered
LINKS	Quenched and Tempered
RINGS	Quenched and Tempered
SWIVELS	Quenched and Tempered
TURNBUCKLES	All ends are Quenched and Tempered Bodies Normalized
PAD EYES	Quenched and Tempered
EYE BOLTS	Quenched and Tempered
LOAD BINDERS	Quenched and Tempered
SWAGE SOCKETS	Spheroidized Annealed
SWAGE SLEEVES	Cold Tuff A proprietary heat treat process that maximizes swageability of the sleeve at low temperatures.
SPELTER SOCKETS	Normalized



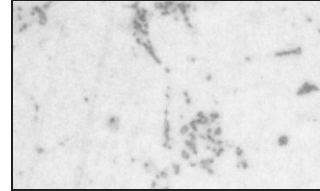
As Forged



Normalized



Quenched and Tempered



COLD TUFF®



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# Material Properties

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## “Crosby: There is No Equal”

PROCESS IS IMPORTANT	COMPETITION	CROSBY
<p>The material used in a forged fitting, such as carbon or alloy steel, determines the potential properties. The manufacturing processes determine what the properties will actually be. The material must be special bar forging quality steel and fine grained. The heating of steel to forging temperature must be properly controlled to insure that the steel is not “injured” by overheating. Proper forging equipment and techniques must be employed to assure proper material flow in the dies and tooling. The heat treatment process must be well defined and precisely controlled.</p>	<p><b>Ask:</b> <i>What processes do they consider important?</i>  <b>Ask:</b> <i>How do they select their material?</i>  <b>Ask:</b> <i>Is the steel fine grained?</i>  <b>Ask:</b> <i>Are standards established to insure sufficient cleanliness of the steel?</i></p>	<p>Crosby’s attention to material selection, forging techniques, machining, and heat treatment processes assures the properties required will be attained, thus providing superior performance of the product. Crosby has specific and demanding cleanliness requirements. Crosby provides a video on metallurgy that highlights these facts.</p>
<p><b>TENSILE STRENGTH AND DUCTILITY</b>  The mechanical properties that are important when lifting a load under normal conditions are tensile strength and ductility. The ability to carry a load increases with the tensile (pulling) strength of the steel. The ability of steel to deform in an overload condition is known as its ductility. Both of these factors enter greatly into determining the working load limit of a forging. Ductility is measured by standard engineering tests of elongation and reduction of area. It is also measured by how much deformation the fitting incurs when overloaded. The tensile strength determines the actual working load, while ductility allows the product to deform significantly when overloaded, thus giving warning before ultimate failure.</p>	<p><b>Ask:</b> <i>Do they have an active program to determine tensile and ductility properties?</i>  <b>Ask:</b> <i>Are testing audits performed continuously on all products?</i>  <b>Ask:</b> <i>Is the actual deformation of a fitting when overloaded a major consideration for their shackles?</i></p>	<p>Crosby has an active program to determine tensile and ductility properties. Testing audits are continuously performed on all products. Crosby’s design philosophy considers the deformation of a fitting when loading is a key requirement.</p>
<p><b>FATIGUE PROPERTIES</b>  The mechanical properties of steel when a load is repeatedly applied is known as its fatigue strength. Fatigue testing determines the ability of a material to withstand repeated applications of a load. The load by itself may be too small to produce a failure. There are three factors involved when considering fatigue strength. They are: the number of cycles at which a crack initiates, the number of cycles at which the crack starts to grow, and the number of cycles at which the fitting fails. One accepted method of fatigue rating fittings is to test them to 1-1/2 times the working load limit for 20,000 cycles, without failure. This standard test is accepted as indicating indefinite life when used within the working load limit under normal circumstances.</p>	<p><b>Ask:</b> <i>Does the material selection process recognize fatigue properties?</i>  <b>Ask:</b> <i>Do they have an active program to “design in” and test fatigue properties?</i>  <b>Ask:</b> <i>Is there a program in place to fatigue rate all load bearing products that are used in critical applications?</i></p>	<p>Crosby has an active program to determine fatigue properties. Included in this program is the use of finite element design methods to predict possible weak areas, which in turn allows us to design in superior fatigue properties. Crosby specifies material of specific cleanliness and guaranteed hardenability which enhances fatigue.</p> <p>Crosby designs and manufactures its products with fatigue in mind. Crosby has a program in place that will result in all load bearing products used in critical applications being fatigue rated.</p>
<p><b>IMPACT PROPERTIES</b>  The mechanical properties of steel when a load is very rapidly applied is known as its impact strength. Impact tests are made by applying a sudden load to a test piece and measuring the energy absorbed when the specimen breaks. The “tougher” the material the greater the energy required to break the piece. A brittle piece can absorb virtually no energy upon breaking. The Charpy V Notched Impact test is one common method of performing the testing and measurement. Fittings must be able to have impact strengths that match the requirements of their application at all temperatures, even low temperatures commonly found in winter conditions. The difficulty of crack initiation and crack growth under impact is an important consideration.</p>	<p><b>Ask:</b> <i>Does the material selection process recognize impact properties?</i>  <b>Ask:</b> <i>Do they have an active program to perform actual testing of impact properties?</i>  <b>Ask:</b> <i>Do they recognize the need for good impact properties, i.e., the need for crack initiation and growth to be difficult throughout the normal operating temperature of 0° to 75° F (-20°C + 25°C)?</i></p>	<p>Crosby recognizes the importance of impact properties and has an active program to determine impact properties at various temperatures of each material used in the various heat treat conditions. Crosby products are designed to be used in a wide range of temperatures. Crosby specifies material of specific cleanliness and guaranteed hardenability which enhances fatigue and impact properties.</p>
<p><b>PERFORMANCE</b>  Performance of a fitting requires a tensile strength that meets working load limits, ductility that allows deformation when overloaded, fatigue properties that support use time after time and impact properties that provide toughness. All of these properties are essential if the product is to perform time after time in adverse conditions. They are also important to assure that the inspection criteria set forth by ANSI will effectively monitor the ability of the fitting to continue in service.</p>	<p><b>Ask:</b> <i>Does the fitting have required tensile strength, ductility, fatigue and impact properties?</i>  <b>Ask:</b> <i>Are all the material properties met?</i></p>	<p>Crosby designs its fittings to include required working load limits and design factors. Equally important are the ductility, fatigue, and impact properties. Crosby provides you with material properties that minimize the risk of failure. No shortcuts in processing are made to save cost while sacrificing any of these performance elements.</p>



Remember, “When buying Crosby, you’re buying more than product, you’re buying Quality.”

# Crosby Value Added

Material Properties by Product Group		
PROPERTY	DESCRIPTION	PRODUCT GROUP*
Tensile Strength	Crosby can provide typical hardness, tensile, and typical yield strength values.	Hooks, Shackles, Turnbuckles, and Chain Fittings
Ductility	Crosby can provide typical reduction of area and elongation values upon special request.	Hooks, Shackles, Turnbuckles, and Chain Fittings
Impact Properties	Crosby's quenched and tempered products have enhanced impact properties for greater toughness at all temperatures. If requested at the time of order, Crosby can provide Charpy impact properties.	Hooks, Shackles, Turnbuckles, and Chain Fittings
Fatigue Properties	Crosby products are being designed to meet specific fatigue performance levels. If requested at the time of order, these fatigue properties can be provided.	Hoist Hooks, Shackles, Eye Bolts, Turnbuckles, Swivel Hoist Rings, Chain Fittings and Snatch Blocks are Fatigue rated to 20,000 cycles at 1-1/2 times the Working Load Limit.
Proof Testing	Proof testing and certification are furnished standard with some products. If requested at the time of order, proof testing certification can be provided on most of Crosby's remaining product line, with the exception of products such as swage sockets and sleeves, spelter sockets, thimbles, etc.	All Products
QC 1400 Audits	Crosby's QC 1400 program provides reduction of area, elongation values, as well as hardness, tensile, and yield strength values for each production lot of hoist hooks. These factors are traceable by the Product Identification Code (PIC) program.	Hoist Hooks Only
Mag Certification, Ultra Sonic, X-ray, and Dye Penetrant Testing	If requested at the time of order, different non-destructive testing and certification is available.	All Products
Chemistry Analysis	Each heat of steel is individually verified to confirm chemical analysis prior to manufacturing.	All Products

\* Products listed are those most commonly requested to be provided with specified properties. The material properties may also be available on other products upon request.

