

Material Properties

The Market Leader: Yesterday, Today and Tomorrow

“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><i>Ask: What processes do they consider important?</i></p> <p><i>Ask: How do they select their material?</i></p> <p><i>Ask: Is the steel fine grained?</i></p> <p><i>Ask: 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>TENSILE STRENGTH AND DUCTILITY 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><i>Ask: Do they have an active program to determine tensile and ductility properties?</i></p> <p><i>Ask: Are testing audits performed continuously on all products?</i></p> <p><i>Ask: 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>FATIGUE PROPERTIES 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><i>Ask: Does the material selection process recognize fatigue properties?</i></p> <p><i>Ask: Do they have an active program to “design in” and test fatigue properties?</i></p> <p><i>Ask: 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>IMPACT PROPERTIES 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><i>Ask: Does the material selection process recognize impact properties?</i></p> <p><i>Ask: Do they have an active program to perform actual testing of impact properties?</i></p> <p><i>Ask: 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>PERFORMANCE 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><i>Ask: Does the fitting have required tensile strength, ductility, fatigue and impact properties?</i></p> <p><i>Ask: 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.”