

Rochester Wire & Cable, LLC

Wireline Bending Considerations

Recommended bending diameters are provided on our DATALINE specification sheets to assure customer expectations for cable life. "The larger the better" approach applies to bend diameters when it comes to prolonged cable service. Naturally, limitations on space restrict the operation of some cables to bend diameters smaller than recommended. Attached is a graph that depicts the effect bend diameters play on cable serviceability. It is recognized that the data was obtained from wire rope structures; however it is assumed that a correlation exists between the electromechanical type cable and wire rope.

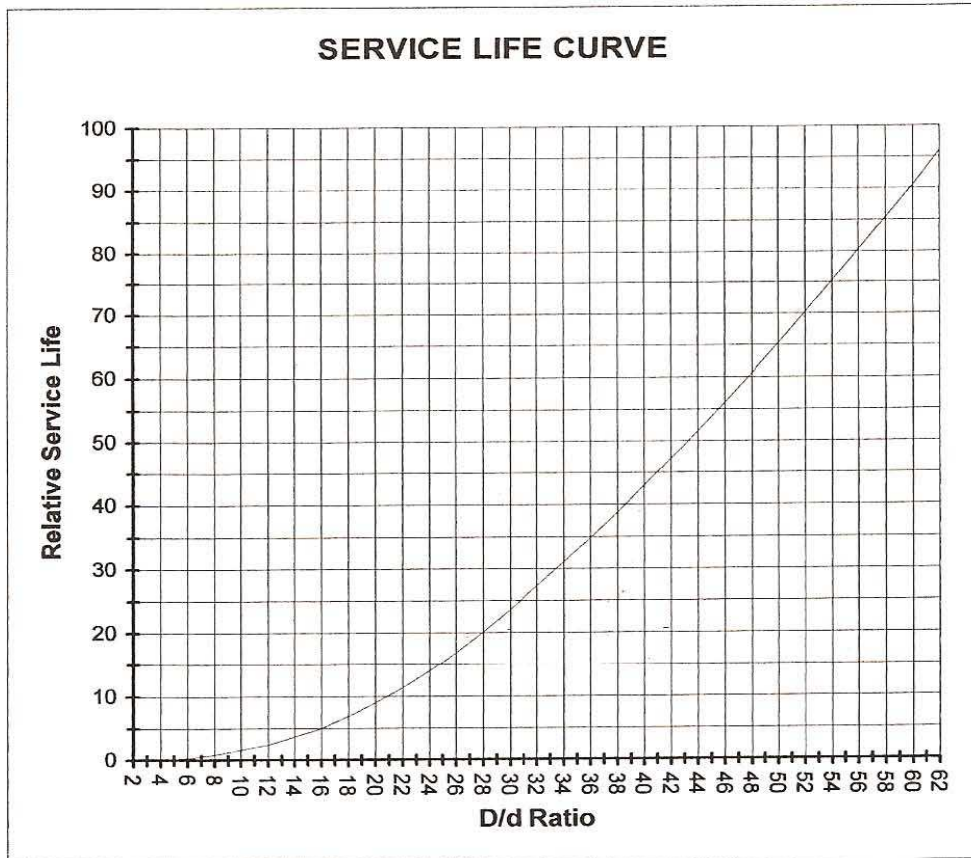
Rochester Wire & Cable, LLC specifies on its DATALINE a bend diameter that is intended to yield good performance and service. If a sheave is used that is smaller than that specified, degradation to cable components will accelerate. On the other hand, larger sheaves will provide the opposite action resulting in prolonged life and service. Our recommendations are based on factors that have been proven to provide adequate cable life, life that is acceptable to most cable users.

It is not our intent to restrict cables from running over smaller than recommended sheaves, but to inform the user that his action may deviate from our standard and accepted practice. Selection of smaller sheaves will accelerate the degradation process. Again, the customer must decide if the loss in service merits the reduction in sheave diameter.

It is preferable to have a cable take a single deflection than several along its path. Regardless of the length of contact, once a cable takes the shape of its support member and conforms to the circumference, it has experienced the effects associated from it. Only if the load is such that the cable does not take the shape of each individual member (a point contact) is this method an improvement. Many times reeving will contain small idler rollers and guides to control the path of a cable. Even though the main sheaves may be of adequate size, if these smaller guides cause the cable to take their shape, damage occurs and the goal of using larger sheaves is compromised. To limit space required to deflect a cable, roller bridges are sometimes constructed. Again, if the cable conforms to the radius of the small rollers (used to create a larger arc), damage from flex induced fatigue will result.

Often space available for the winch and handling system is limited causing compromises in the cable path. Reducing, preferably eliminating, any reverse bending along the cable path will further enhance the life of the product. Fleet angles between rollers and sheaves should also be kept to a minimum recognizing that angles of 1.5 or less are desirable. Angles greater than 1.5 have been used with success, but can accelerate cable degradation resulting in reduced life cycles. To enhance cable performance due to space limitations and increased fleet angles, sheaves should be mounted such that they self-center to the cable axis. Poorly aligned sheaves will cause accelerated wear and often induces unwanted twist in the product.

RELATIVE SERVICE CURVE OVER SHEAVES
(Laboratory testing on Wire Rope Constructions)



How used: Graph shows the effect of sheave size on the service received from the product. Assume that a 1" cable is used over a 16" sheave. This would be a D/d of 16:1 = 16. On graph, a D/d of 16 gives a relative service life of 5.0. Now assume that the same 1" cable is to be used with a 24" sheave (D/d = 24:1 = 24). From graph, a D/d of 24 gives a relative service life of 14. This means that changing from a 16" to a 24" sheave will produce an increase in service of 14:5 = 2.8. The larger sheave will provide approximately 2.8 times as much service as the 16" sheave (a 180% increase in life).

Data was taken on various wire rope constructions and laboratory data based on bending stresses that were introduced by a specially designed machine. The curve is a simple parabola having an equation of $X^2=39y$. Similar curves can be found in various wire rope publications. Only laboratory testing conducted on the specific cable in question will provide more meaningful data. This chart is provided as a reference only. Data was obtained from an unknown source; although we believe it to be accurate information to the best of our knowledge, no warranty is given with respect to such information.