GATOR-FLEX SLINGS
V
CABLE-LAID, HAND-TUCKED SLINGS
&
9-PART, HAND-BRAIDED SLINGS

The Gator-Flex sling, along with the newer companion Gator type slings, is a patented product from the Slingmax organization, and was developed during the era when braided slings were being made by many sling fabricators around the world. Multipart, braided slings had been used for many years, especially in heavy lifting systems. As these slings became larger in diameter for increased lifting capacity, flexibility became almost as important as strength in order to facilitate manufacturing, transporting and employing of these slings on hooks of cranes and around loads connections. Because of this, the more flexible cable-laid, hand-tucked slings made their way onto the scene, offering both high lifting capacity and flexibility. The added flexibility of the cable-laid slings did come with one disadvantage….less efficiency in realizing the strength of the individual wire rope parts.

The introduction of the Gator-Flex sling resolved most of the concerns of reduced sling strength and reduced flexibility. This innovative approach in bringing together three individual wire ropes laid into a multiple-part sling resulted in achieving greater overall strength than a cable-laid and hand-braided slings. This was achieved through the unique splicing of the sling brought about by the patented Gator-Flex sling technology which provides more strength from the individual wire rope components because of greater efficiency.

The design and fabrication techniques of the Gator-Flex sling also results in the desired flexibility, especially n noticeable in large diameter, high capacity slings.

The following synopsis provides the engineering principles behind the success of the Gator-Flex sling, and presents a comparative example of the Gator-Flex sling to both the cable-laid, hand-tucked sling and the 9-part, hand- braided sling.

CABLE-LAID, HAND-TUCKED SLING

In building a cable-laid sling, individual wire ropes are closed or laid around an independent wire rope core of the same construction. Because of the loss in closing or spinning efficiency when laying wire ropes around a wire rope core, the finished cable-

laid fabric has less overall strength than the sum of its components. From past testing data, the average efficiency loss is approximately 15% for a wide range of wire rope sizes. Thus the cable-laid material will have only 85% strength of the component wire ropes.

If the cable-laid fabric is fabricated into a finished sling by hand-tucking, an additional efficiency loss is realized due to the splicing technique. The Wire Rope Technical Board Sling Users Manual lists the efficiency of hand-tucked splices as 80% of sling body strength. This correlates to a loss in the final sling strength of 20% as compared to the strength of the cable-laid material.

As an example in building a cable-laid, hand-tucked sling, and in determining its rated capacity, the following example is presented:

a. Basic wire rope component – 1", 6x36 Classification, EIP, IWRC
b. Minimum Breaking Force of this 1" wire rope = 56.9 tons
c. Strength of cable-laid material fabricated from 7, 1" wire rope components = (7)x(56.9 tons)x(.85) = 338.6 tons
d. Final strength of hand-tucked sling = (338.6 tons)x(.80) = 270.9 tons
e. Based upon a Design Factor of 5/1, Rated Capacity of finished sling = (270.9 tons) / (5) = 54.2 tons

9-PART, HAND-BRAIDED SLING

If the same size and strength of wire rope that was used in the cable-laid sling is incorporated into a 9-part, hand-braided sling, the following example calculates a rated capacity for this sling. However, in this type of sling, the efficiency, as established by the Wire Rope Technical Board, is 65% of the combined wire rope strengths.

a. Basic wire rope component – 1", 6x36 Classification, EIP, IWRC
b. Minimum breaking force of this 1" wire rope = 56.9 tons
c. Combined strength of 9 parts of wire rope = (9)x(56.9 tons) = 512.1 tons
d. Final strength of 9-part, hand-braided sling = (512.1 tons)x(.65) = 332.9 tons
e. Based upon a Design Factor of 5/1, rated Capacity of the finished sling = (332.9 tons) / (5) = 66.6 tons

GATOR-FLEX SLING

A Gator-Flex sling achieves a higher strength using the same component wire rope size than either the cable-laid, hand-tucked sling or the 9-part, hand-braided sling. In addition to the placement of three individual wire ropes into a 9 part body, there is no hand-tucked splice to reduce the overall strength of the sling body, thus eliminating the loss due to splicing. Testing reveals that the total efficiency loss of the Gator-Flex sling is only 10% as compared to the combined strength of the nine wire rope components. As a comparison of the strength of a Gator-Flex sling to the cable-laid, hand-tucked sling and the 9-part, hand-braided sling, the following example is offered:

a. Basic wire rope component – 1”, 6x36 Classification, EIP, IWRC
b. Minimum Breaking Force of this 1” wire rope = 56.9 tons
c. Combined strength of 9 parts of wire rope = (9)x(56.9 tons) = 512.1 tons
d. Final strength of Gator-Flex sling = (512.1)x(.90) = 460.9 tons
e. Based upon a Design Factor of 5/1, the Rated Capacity of the finished sling = (460.9) / (5) = 92.2 tons
e. Weight of this Gator-Flex sling per foot is 16.7 pounds

These three examples reveal the dramatic strength difference of the Gator-Flex sling over the other two types when employing the same size of wire rope.

The second series of examples show what sizes of wire ropes are required to meet the 92.2 ton capacity of the Gator-Flex sling.

A cable-laid, hand-tucked sling with a rated capacity of 92.2 tons requires 7 component parts of 1 ½”, 6x36 Classification, EIP, IWRC wire rope. The efficiencies involved in calculating the component wire rope size are included in the following:

a. Sling rated capacity = 92.2 tons
b. Required breaking strength of sling with Design Factor of 5/1 = (5)x(92.2 tons) = 461 tons
c. Required combined strength of 7 wire ropes including 80% & 85% efficiencies = (461 tons) / (.80) x(.85) = 677.9 tons
c. Required breaking force of each wire rope = (677.9 tons) / (7) = 96.8 tons
d. Required size of wire rope is 1 ½”, 6x36, EIP, IWRC
e. Weight of cable laid fabric per foot is 29.1 pounds

A 9-part hand-braided sling with a rated capacity of 92.2 tons requires 9 component parts of 1 ¼” 6x36 Classification, EIP, IWRC wire rope. The efficiency of a 9-part sling incorporating 1 ¼” wire rope is 65%. To obtain a 92.2 ton rated capacity with this 9-part sling, the wire rope component size is:

a. Desired Rated Capacity = 92.2 tons
b. Required breaking strength of sling with Design Factor of 5/1 = (92.2 tons)x(5) = 461 tons
c. Required combined strength of 9 wire ropes including 65% efficiency = (461) / (.65) = 709.2 tons
d. Required breaking force of each wire rope = (709.2) / (9) =78.8 tons
e. Required size of wire rope is 1 ¼”, 6x26, EIP, IWRC
f. Weight of sling per foot = 26.0#

The other advantages of the Gator-Flex sling over cable-laid, hand-tucked and 9-part, braided slings are:

1. The Gator –Flex sling has 12 parts of wire rope in the eye, as compared to 7 parts for the cable laid sling and 10 parts for the 9-part braided sling. The additional number of parts of wire rope in the eye provides additional strength to the sling and is one reason that the efficiency of the Gator-Flex sling is superior to the other two.
2. The greater number of parts in the eye of the Gator-Flex sling, resulting in higher strength, also allows it to be used on smaller diameter pins than the cable-laid and 9-part braided slings.
3. The rated capacity of multiple-part slings in a basket hitch is based upon a minimum D/d ratio of 25 times the component wire rope size. Because the Gator-Flex sling has smaller component wire rope sizes for comparable rated capacities, it can be used around smaller diameter loads.
4. Many of the hand-braided slings require that the eyes be served to contain the eyes which involves extra costs and time, and limits the ability to inspect the eyes for broken wires or damaged sections.
5. Based upon the same rated capacity of 92.2 tons, the Gator-Flex sling weighs 42% less than the cable-laid, hand-tucked sling and 36% less than the 9-part, hand-braided sling.

Donald L. Pellow – P.E.
Engineering Consultant
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