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TECHNICAL NOTE TN-13

SHORT LONG SPLICE - ACCELERATED WEAR AND TENSILE STRENGTH TEST

INTRODUCTION

The short long splice is used to join two lines of the same diameter and lay. It can be completed by a number of methods. Two popular methods of short long splicing, Method A and Method B (Figures 1 and 2) were evaluated to find answers to the following questions:

- which is the easiest method to perform for a novice?
- are there any differences in tensile strength?
- will one method perform better than the other under extreme wear?

Method A married alternate strands out to appropriate intervals, while Method B married three adjacent strands up the body of the rope dropping single strands at required intervals. Both methods used the same tucking sequence.

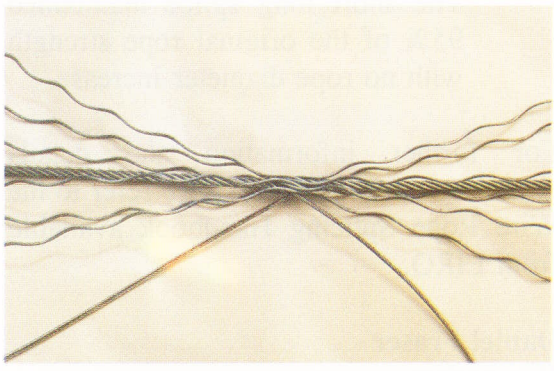

Figure 1 - Method A

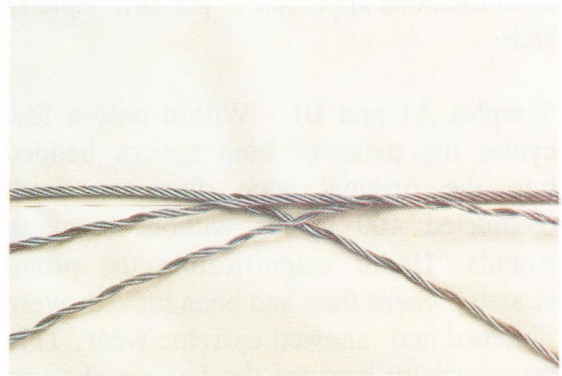

Figure 2 - Method B

TEST PROCEDURE

Three splices of each method were made using new 16mm 6/31, ordinary lay, preformed wire rope and were then subjected to an accelerated wear test. This involved running the spliced length of rope backwards and forwards through a series of reverse bends for 400 cycles with a 4,000 kg load imposed (Figure 3).

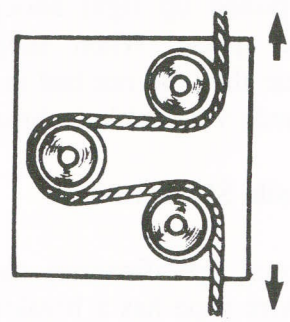

Figure 3 - Accelerated wear test rig

Six splices were made, the first three (A 1,2,3) were spliced using the same method as in Figure 1, whilst the second set (B 1,2,3) were spliced using the same method as in Figure 2. Samples were tested in the following order. A1, B1, A2, B2, A3, B3.

The same samples were then put through a tensile strength test, to the point of destruction.

TEST RESULTS

Accelerated Wear

Both methods appeared to perform equally well.

Samples A1 and B1 - Within only a few cycles the tucks of both splices bedded into the original rope diameter. Both completed 400 cycles without breaking strands. Under magnification the proud strands, where they had been tucked, were flattened and showed extreme wear. This was partially because the test rig sheaves were 19mm which accelerated the wear to the crown of the 16mm rope.

Samples A2 and B2 - Similar result as A1 and B1, completed 400 cycles, showing wear to crown of ropes.

Sample A3 completed 400 cycles but strands started breaking, showing extreme wear by 250-300 cycles.

Sample B3, completed 400 cycles but strands started breaking showing extreme wear by 350 cycles. This was due to tucks not being pulled up tight enough when making the splice. When subjected to extreme wear they did not bed in properly leaving strands vulnerable to breakage.

Direct Tensile Strength Test

Manufacturers' specifications say 16mm 6/31 new wire rope has a breaking strain of 16400 kg. At point of failure all ropes broke within the tucking area proving it to be the weakest point although still maintaining 95% of the original rope strength, even after extreme wear.

Method A -Broke at:

1	17590 kg	172.5	kN
2	18050 kg	177	kN
average =	17,590kg	172.5	kN
3	17130 kg	168	kN

Method B -Broke at:

1	17538 kg	172	kN
2	18150 kg	178	kN
average =	17,946kg	176	kN
3	18150 kg	178	kN

CONCLUSIONS

- Method B was faster to perform and less confusing in the early stages of marrying the ropes together
- Results from the tensile strength test showed no significant difference between methods
- The accelerated wear test showed the importance of tucking the strands tight along the body of the rope
- At point of failure all ropes broke within the tucking area proving it to be the weakest point
- The short long splice maintained 95% of the original rope strength with no rope diameter increase.

For further information and details regarding the short long splice refer to the Wire Rope Splicing Handbook available from LIRO.

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