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O T T A W A October 6th, 1943.

R E P O R T

of the

ORE DRESSING AND METALLURGICAL LABORATORIES.

Investigation No. 1510.

Endurance Tests on Aircraft Control Cable to Specification AN-RR-C43.

(Copy No. 10.)

Bureau of Mines
Division of Metallic
Minerals

Ore Dressing
and Metallurgical
Laboratories

CANADA
DEPARTMENT
OF
MINES AND RESOURCES
Mines and Geology Branch

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Origin of Request and Purpose of Investigation:

On September 28th, 1943, F/L E. R. Cook, for Commanding Officer, No. 11 A.I. District, Royal Canadian Air Force, Montreal, Quebec, sent in two samples of 1/8", 7x19 aircraft cable manufactured by Anglo-Canadian Wire Rope Company Limited, Montreal, Quebec, and requested (letter, File No. 1029-T1(6AID-47)) that the cables be endurance-tested to Specification AN-RR-C43. It was stated that the sample marked No. 1 had less tru-lay built into it and was somewhat lower in tensile strength in the individual strands than rope previously supplied but was identical with the 100-foot sample recently submitted (see P.M. Lab. Report No. 6555, September 11th, 1943).

Endurance Tests and Residual Breaking Strength:

Seven endurance tests were carried out on each sample. The following results were obtained:

SAMPLE NO. 1

Test No.	Number of reversals	Residual Breaking Load, in pounds	
		Top	Bottom
1	70,000	1,412	1,310
2	"	990	1,040
3	"	1,154	1,092
4	"	1,202	1,060
5	"	1,356	900
6	"	926	1,050
7	"	1,402	1,220

SAMPLE NO. 2

1	70,000	885	1,000
2	"	680	650
3	"	557	980
4	"	744	734
5	"	1,194	836
6	"	833	954
7	"	950	1,192

Tensile Tests:

Tensile tests were carried out on each sample in the "as received" condition and the following breaking load results were obtained:

Sample No.	Condition	Breaking Load, in pounds
1	As received	2,340
1	" "	2,280
1	" "	2,300
2	" "	2,200
2	" "	2,080
2	" "	2,100

Rope Construction:

A visual inspection of Sample No. 1 (100 feet) showed that there were no broken wires or splices in it. In Sample No. 2 (150 feet), two broken wires, two splices, and six other winding flaws such as "looped" loose wires, etc.,

(Rope Construction, cont'd) -

were found.

	Sample No. 1	Sample No. 2
Lay of rope, inches -	15/16 right	29/32 right.
Lay of outer strand (12 wires), inches -	3/8 left	3/8 left.
" " " (6 "), " -	3/16 "	3/16 "
" " core strand (12 "), " -	3/8 right	3/8 right.
" " " " (6 "), " -	1/4 "	3/16 "

Discussion of Results:

1) All test specimens of the two sample cables ran the 70,000 reversals in the Warner cable fatigue testing machine without breaking.

2) Sample No. 1 had the specified breaking strength after being endurance-tested except three sections in Tests Nos. 2, 5 and 6; the breaking strengths of these three were slightly under the 1,000 pounds specified.

3) Sample No. 2, except for three sections in Tests Nos. 1, 5 and 7, failed to meet the breaking load requirements of the specification after being endurance-tested.

4) Both samples had the specified breaking strength in the "as received" condition.

5) The rope construction of the two cables conformed to the requirements of the specification, except the lay of the inner six wires in the core strand of Sample No. 1. The length of lay of these inner six wires was greater than specified.

CONCLUSIONS:

1. Cutting tests confirm the fact that Sample No. 2 contains more tru-lay than Sample No. 1; the former sample does not open up on sectioning, while the latter springs to a

(Conclusions, cont'd) -

considerable extent.

2. The claim that mid-wire strands of Sample No. 1 were of lower strength than the mid-wire strands of rope formerly supplied was not checked. The tensile strength of Sample No. 1 was fairly high and similar to the strength of ropes previously received from this company, which indicates that the strengths of the centre strands had not been altered to any great extent.

3. The test described above should not be used as an argument to support the use or non-use of completely 'tru-laid' cable, because the cable which had been preformed to a greater extent was in a much poorer condition. One might logically expect, however, that the completely preformed cable might have, if anything, the higher fatigue strength, as its internal tension might possibly be lower.

4. The tests would indicate that rope represented by Sample No. 1 is satisfactory (ignoring some slightly lower fatigue values, expansion requirements on cutting, and some slight deviation from length-of-lay requirements; such deviations from specification are definitely considered to be minor, as the important requirement would appear to be to pass the endurance test). Rope represented by Sample No. 2 would appear to be not satisfactory.

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