Serial No. 1388 Document No. 92

ANNUAL MEETING - JUNE 1964

The relation between mesh measurements made with the ICNAF gauge at 12 lbs. pressure and the ICES gauge at 4 kg

by

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It is generally agreed that if a given mesh be measured by both the ICNAF and ICES gauges at their prescribed loadings, different answers will be obtained, with the ICNAF gauge almost always reading higher. The object of this note is to see whether any clear statement can be made about the magnitude of this difference and, more specifically, to comment upon the difference, if any, that exists between a mesh measured as four and a half inches with the ICNAF gauge at 12 lbs. and one measured as 120 mm with the ICES gauge at 4 kg.

Of the published results of mesh gauge tests that the author has examined only three can be considered to be relevant to these questions in that they are concerned with large mesh sizes and heavy twines. These are:-

(1) May and Hodder - ICNAF Redbook 1962

(2) German Tests - ICES Mesh Gauge Prospectus;

(3) Hodder - MS ICNAF Annual Meeting 1963.

In all these the material used is double Manila with mesh sizes in the range 110-130 mm. In addition Skerry and Hennemuth (Document 75 ICNAF Annual Meeting 1963) report on comparisons done on nylon meshes.

Unfortunately very few direct comparisons of the ICNAF and ICES gauges have been done. In (1) and (3) above only the ICNAF and Westhoff (1959 model) gauges are compared. These results can be coupled with those obtained from the German tests in which all three gauges were used. It is appreciated that this is not the ideal way of comparing the ICNAF and ICES gauges but it constitutes the best available information at the moment.

Summarising the results obtained from (1), (2) and (3) above:-

(1) May and Hodder. Redbook 1962: "Comparison of ICNAF and Westhoff gauges under field conditions".

Gauges tested - ICNAF at 12 lbs. vs Westhoff at 12 lbs.

Material - Double manila, runnage 50/4

Mesh size - Approximately 120 mm.

Results - The ICNAF gauge read higher than the Westhoff by 11 mm. From Sandeman and May (Redbook 1962) the regression of mean pressure against mesh elongation gives the adjustment needed for a change of gauge pressure for both ICNAF and Westhoff gauges over a wide range of pressures. On this evidence a decrease in pressure from 12 lbs. to 4 kg for the Westhoff gauge would result in a measurement about 3 mm smaller. Hence the total difference between ICNAF at 12 lbs. and Westhoff at 4 kg can be estimated as 11 + 3 = 14 mm.

(2) German Tests - ICES Gauge Prospectus.

Gauges tested - ICNAF at 3.5 kg vs Westhoff at 4 kg vs ICES at 4 kg.

Material - Double manila, runnage unstated.

Mesh size - Approximately 130 mm.

Results - The ICNAF gauge read higher than the the Westhoff by 5 mm. To adjust the ICNAF loading from 3.5 kg to 12 lbs. requires an addition of 5 mm to the mesh size. The total difference then between ICNAF at 12 lbs. and Westhoff at 4 kg is therefore estimated as 5 + 5 = 10 mm.

(3) Hodder. MS ICNAF Annual Meeting 1963

Gauges tested - ICNAF at 12 lbs. vs Westhoff at 12 lbs. and 4 kg under field conditions.

Material - Double manila, runnage 50/4.

Mesh size - 110-120 mm.

Results - At equal pressure of 12 lbs. the ICNAF gauge read higher than the Westhoff by 7 mm. With the Westhoff at 4 kg the difference was 10 mm.

The differences then, in these three separate comparisons of the ICNAF gauge at 12 lbs. and the Westhoff at 4 kg are 14 mm, 10 mm and 10 mm, an average of 11 mm. To convert this into terms of the ICES gauge reference can be made again to the German tests of the ICES gauge which show it to read 3 mm higher than the Westhoff. Hence the final conclusion is that the ICNAF gauge reads higher than the ICES by 8 mm for double manila of 50/4 runnage and a mesh size of approximately 120 mm.

This is a difference of approximately 7% and applying corrections on this basis the 120 mm ICES measurement is equivalent to 129 mm (5 inches) with the ICNAF gauge and the four and a half inches (114 mm) ICNAF measurement is equivalent to 107 mm with the ICES gauge.

Two things should be emphasised in connection with this conclusion.

(1) The figure of 7% can at best be only approximate, bearing in mind the high variability and operator bias of the ICNAF gauge. It is also worth bearing in mind that in theory the Westhoff and ICES gauges should give the same result, in that they are both of the direct pull type and both operate at 4 kg. The difference shown in the German tests may well be a chance result, in which case the figure of 7% should really be about 10%.

(2) These results can only be applied to one material, i.e. double manila with a runnage of 50/4.

In other materials the only recorded direct comparison with the gauges at their prescribed loads is that of Skerry and Hennemuth, (Document 75 ICNAF Annual Meeting 1963). This showed the ICNAF gauge to read approximately 5 mm higher when used on nylon meshes of 100 mm. It is not stated whether this is for double or single twine, neither is the runnage stated.

The results of May and Hodder (1962) and Hodder (1963) have been obtained under field conditions. To supplement them some results are given below of comparisons made at Lowestoft under laboratory conditions on wet used meshes from four codends of different materials. The single test on manila involved the measurement of 48 meshes; the two tests on each of the remaining materials involved the measurement of 54 meshes on two occasions three weeks apart.

The ICNAF gauge was operated by resting the handle against the operator's stomach and drawing the mesh squarely onto the blade with both hands, care being taken to ensure that the time taken to reach the operating pressure of 12 lbs. was as constant as possible.

Material	Mesh size	Runnage	Average amount in mm by which the ICNAF gauge read higher than the ICES
Double Manila	110 mm	50/4	4.4 mm
Double Nylon	70 mm	210/3 (approx.)	5.0 mm and 6.5 mm
Double Sisal	90 mm	100/3	3.0 mm and 3.4 mm
Double Ulstron	90 mm	250/3	0.2 mm and 1.6 mm

The results for manila show a difference of less than half that recorded above. However, Hodder (MS 1963) has shown that larger measurements are invariably obtained with the ICNAF gauge under field conditions than in carefully controlled laboratory tests, and this is probably the explanation of the discrepancy. Certainly, the method of using the gauge in the above tests is seldom practical in the field where only one hand is usually available to guide the mesh onto the gauge. Sandeman and May (1962) also set out the criteria which should be observed if the ICNAF gauge is to be used for precise measurements.

While these laboratory tests cannot therefore be taken as reliable evidence of the performance of the ICNAF gauge under field conditions, they serve to illustrate the existence of appreciable differences due to the type of material, which are likely to occur in the field. Particularly noticeable in this respect is the difference between nylon (5.7 mm) compared with ulstron (polypropylene; 0.9 mm) which differ widely in their elasticity.

It is impossible to compare the results for nylon with those of Skerry and Hennemuth since the runnage is not specified in their results. However, nylon is well known as one of the more elastic synthetics and differences of 5% to 8%, or perhaps more, seem likely for this material.

References

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