RESEARCH RECORD NO: 252

IIC/CI STARFISH DATABASE EXPANSION 1987

SINGLE JERSEY : RINGSPUN YARNS

Part 2 : Some Observations on the Influence of Different Preparation/ Dyeing and Final Finishing Operations on the Dimensions and Properties of the Finished Fabric.

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AUTHOR: JILL C. STEVENS

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1. INTRODUCTION

In Part 1 (Research Record No. 251) the results of the interlaboratory comparison for the ring spun series of fabrics were reported. These showed that, on average, agreement between laboratories for the measurement of stitch length, courses, wales and weight was very good and that the two data sets were highly correlated. For these properties therefore there is justification for averaging the data obtained by each laboratory in order to provide a more secure data set on which to carry out further comparisons and analysis.

For yarn count measured on yarns extracted from the grey fabric, however, there was an indication that a significant difference may exist between laboratories. This could neither be confirmed nor refuted with data from finished fabrics, as yarn count results on the processed fabrics were not made available by CI. Therefore, in the absence of a complete set of results for yarn count it was decided to proceed using only the IIC data. For stitch length, courses, wales and weight, however, average values were calculated and these are recorded in this report.

One of the main objectives of this series of trials was to provide data from fabrics produced from US yarns, finished through 'typical' US finishing routes, for the development of STARFISH equations. Before embarking on a STARFISH analysis of the data however, it is useful to establish some general trends regarding the influence of the different preparation/dyeing routes and the different final finishing operations on the dimensions and properties of these fabrics.

For example, the fabrics included in these trials were processed through 3 different preparation/dyeing routes at two different finishing mills. After dyeing and drying the fabrics from each route were divided to enable the effect of different final finishing variables to be studied, e.g. mechanical (calendering vs compacting) and chemical (no resin vs resin).

Previous trials carried out by IIC, predominantly on 1 x 1 rib and interlock constructions, have shown that there are no significant differences in reference state dimensions between calendered fabrics compared to compacted fabrics of similar construction and wet processing history. Other trials have shown that fabrics which have been resin finished can have very different dimensions in the reference state compared to similarly processed fabrics finished without resin. In addition, they have also shown that, the details of the resin finishing procedure, e.g. concentration of crosslinking chemicals, % pick-up, degree of curing etc. can also influence the final reference state dimensions of the fabric.

The design of this current series of trials carried out by Cotton Incorporated allow the influence of different preparation/dyeing routes and different final finishing procedures on the finished reference dimensions of single jersey fabrics to be evaluated.

In this report, the influence of the major finishing variables is discussed in terms of their effect on the main STARFISH parameters, e.g. tex, stitch length, courses, wales and weight. However for additional information some preliminary observations have also been made regarding the effect of certain of these variables on other fabric properties, e.g. shrinkage, spirality and strength.

2. PRESENTATION OF RESULTS

The individual data (tables and figures) used for the various comparisons and for illustration are arranged in separate appendices at the end of this report. Summary tables are included, where appropriate, at the end of the main text.

Detailed comparisons between individual samples have not been attempted, at this stage, but average trends have been established over all the samples contained within each processing group. This means that although overall trends can be distinguished, the detailed variation or differences between individual samples has tended to become obscured.

The data values which form the basis of the main comparisons are those obtained by averaging the IIC and CI results. The exceptions to this are the values for yarn tex, spirality, strength and shrinkage which are those recorded by IIC only.

3. INFLUENCE OF FINAL FINISHING OPERATIONS ON FABRIC DIMENSIONS

3.1. Mechanical Finishing : Calendering vs Compacting

The averaged data obtained for each finishing route are included in Appendices 1 to 3. For each route the data for the non-resin finished sets 1 and 2 and the resin finished sets 3 and 4 have been tabulated together. Plots of the calendered vs compacted data follow each section. Before wash and reference state data are treated separately.

Tables 2-5, at the end of the main text summarise the results of the statistical analysis. Table 1 contains an outline flowchart of the finishing routes followed.

3.1.1. Pure Finish (no resin) : Set 1 vs Set 2

Before Wash Summary Table 2

In the 'as delivered' or before wash state significant differences are recorded in average courses and weight between calendered and compacted fabrics. That is, the compacted fabrics were delivered with more courses than the calendered fabrics and in consequence are also heavier.

A comparison of the average wale densities in the two fabric sets however indicates that with the exception of the route 1 fabrics where the compacted fabrics were delivered slightly wider than the calendered fabrics, the fabrics from routes 2 and 3 were on average delivered to the same widths.

The % mean difference in fabric weight recorded between the two fabric sets follows the % mean differences recorded in courses and wales.

On average there is no practical difference in measured tex and stitch length between the two fabric sets and correlation overall is very high. The r^2 values range between 0.99 and 1.00.

Reference State Summary Table 3

In the reference state, similarly to the before wash fabrics, there are no practical differences in tex and stitch length between the two fabric sets.

Statistically significant differences are calculated, on average, for courses (routes 2 and 3), wales (route 1) and weight (routes 2 and 3), but in all cases the average percentage differences are within practical testing accuracy and can therefore probably be ignored.

Correlation between the two data sets is excellent; r^2 values range between 0.998 and 1.00.

3.1.2 Resin Finish : Set 3 vs Set 4

Before Wash Summary Table 4

In the 'as delivered' or before wash state the resin finished fabrics show similar trends to the non-resin finished fabrics. That is the resin + compacted fabrics were on average delivered with more courses and are heavier than the resin + calendered fabrics. In addition there is also an indication that on average all the resin + compacted fabrics were delivered narrower (more wales) than the calendered fabrics.

The % mean difference in measured weights between the two fabric sets also reflect the % mean differences in courses and wales.

Similarly to the non-resin finished fabrics there is no difference on average, in tex and stitch length between the two fabric sets, and the data is perfectly correlated.

Correlation for courses, wales and weight is also good, r^2 values range between 0.974 and 0.999.

Reference State Summary Table 5

In the reference state, once again, there are no practical differences between the major properties of the two fabric sets. Mean % differences are within $\pm$ 1% and correlation between the two sets of results is excellent, r^2 values range between 0.996 and 1.00.

3.1.3 Summary and Conclusions

1. On the evidence of these data, there is on average no practical difference in the reference dimensions of calendered fabrics compared to compacted fabrics. This confirms for single jersey what has previously been shown for rib and interlock fabrics.

2. In the 'as delivered' or before wash state however, the fabrics which have been compacted have on average more courses and are therefore heavier than the calendered fabrics.

   In addition the resin finished and compacted fabrics have also been delivered slightly narrower (more wales) than the resin finished and calendered fabrics. This means that on average both the resin and non-resin compacted sets will have lower length shrinkages than the equivalent calendered sets. In addition, the resin and compacted sets will also have slightly less width shrinkage than the resin and calendered sets.

3. From these data there is an indication that on average it may be possible to achieve a greater level of improvement in length shrinkage by compacting non-resin finished fabrics than can be achieved by compacting resin finished fabrics. On average 14.3% more courses were achieved after compacting in the before wash non-resin finished sets compared to the calendered fabrics.

For the resin finished samples, however, on average only a 5% increase in delivered courses was achieved.

In both cases, the mean % differences in delivered weights between the calendered and compacted sets followed the % mean differences in courses and wales.

4. Individual results on individual samples will obviously vary in accordance with the specific running/operating conditions of the individual compactors/calenders used in these trials, e.g. the amount of overfeed attainable, width settings, etc.. In addition also, the level of improvement in course density will depend on the fabric construction (yarn count, stitch length) and the level of length shrinkage in the samples prior to final finishing. However, if the data obtained from these trials are typical then it appears that on average a relatively greater increase in course density (reduction in length shrinkage) can be achieved by compacting non-resin finished fabrics compared to resin finished fabrics.

3.2 Chemical Finishing : Resin vs No Resin

On the evidence of the results discussed in 3.1 above the reference state data for the calendered and compacted sets for both the resin finished and non-resin finished fabrics were averaged for each preparation/dyeing route. These were then compared in order to establish the overall average influence of the various resin finishing treatments on the dimensions of the fabrics.

Details of the individual resin finishing recipes and processing conditions used in the two mills were not available, therefore the observations which are made cannot be related to the influence of other resin finishing procedures carried out in other mills. The only detail concerning the resin finishing carried out in these mills is the % nominal concentrations of resin used. These were notified as 8% for route 1, and 6% for routes 2 and 3. However, how these nominal values relate to the actual level of resin applied (% pick-up on weight of fabric) or degree of curing achieved is speculative.

Tables and plots illustrating the data used for this comparison are included in Appendix 4. A summary of the results of the statistical analysis is given in Table 6 at the end of the main text.

3.2.1 Route 1 - E.J. Snyder

The main effect of the resin finish applied to the route 1 processed fabrics has been to reduce the level of courses, wales and weight in the reference state compared to the non-resin finished fabrics.

Courses have been reduced by 13.2%, wales by 2.2% and weight by 12.6% on average. The change in weight which would have been expected purely from the reduction in stitch density has been offset by the fact that the yarn count has been increased by 3.2%. There is also an indication of a marginal increase in stitch length by 0.65%. This suggests that

yarn shrinkage during final finishing and relaxation of the finished fabrics may have been inhibited by the resin finish.

Although the difference in stitch length is small and may not have a practical influence, the result is probably statistically significant because the data used is the average of two independent estimates (IIC & CI) and two replications (calendered & compacted).

3.2.2 Routes 2 & 3 - Burlington, Wake

The resin finish applied to these fabrics is presumably the same as both routes were processed in the same mill using a resin finish of nominal concentration 6%. The effect on fabric dimensions is similar to that found for the route 1 fabrics although in both cases the % mean difference between sets is much smaller.

Courses have been reduced by approximately 4% and weight by approximately 3% on average. Wales have increased slightly, 0.6% on average, but the difference in stitch length is marginal.

For yarn count, the effect of the resin finish appears to have been slightly different for each route although the average % mean difference of 0.9% is reflected, with the change in courses, in the difference in fabric weight.

3.2.3 Summary and Conclusions

1. The main effect of the resin finishes applied to these fabrics is to make them on average longer and lighter in the reference state. The implication of these results is therefore that if both resin and non-resin finished fabrics were delivered to the same dimensions (courses and wales) then the application of resin 1 would reduce length shrinkage by approximately 13%, width shrinkage by approximately 2% and weight by approximately 12%.

   Under the same conditions the application of resin 2 would reduce length shrinkage by approximately 4% and weight by approximately 3% but may slightly increase width shrinkage.

2. The specific effect of resin finishing on fabric dimensions depends on, for example, the concentration of resin finishing chemicals in the finishing liquor, the % pick up of the fabric and the degree of cure, amongst others. Previous trials carried out by IIC on interlock and 1 x 1 rib qualities, have shown that, all things being equal, on average an increase in nominal resin concentration will also cause an increased effect on fabric reference dimensions. These results appear to confirm this trend for single jersey fabrics. The resin finish using 8% nominal resin concentration has on average had a much more drastic influence on fabric reference dimensions, compared to the non-resin finished fabrics, than the resin finish having 6% nominal resin concentration.

4. INFLUENCE OF PREPARATION/DYEING ROUTE ON FABRIC REFERENCE STATE DIMENSIONS.

The data obtained by averaging the reference state results from sets 1 and 2, and sets 3 and 4 for each of the three finishing routes were used for these comparisons. These can be found in Appendix 4 with the exception that the tex averaged over stitch lengths was used in these comparisons, not the individual values. Tables 7 and 8 summarise the results of the statistical analysis which was carried out, comparing the averaged data from each route, both with and without resin.

4.1. Pure Finish

The 3 different preparation and dyeing routes are outlined in Table 1. From previous trials and evaluations carried out by IIC the influence of different extraction and drying machines on the reference dimensions of finished fabrics has been found to be very small - usually not of commercial significance. If this is also true for these fabrics then the three routes represented in these trials consist of two different preparation systems and two different dyeing systems, although the processing was in fact carried out in two different mills. A comparison between the routes may therefore be used not only to distinguish differences between the routes but also to give an indication of the influence of preparation and or dyeing separately, e.g. routes 1 and 2 are dyed in the same type of machine but are prepared in a different way. Routes 2 and 3 share the same preparation but are dyed in different machines.

One might therefore expect that the biggest differences in dimensions would be found between routes 1 and 3 which should show the combined influence of different preparation and dyeing systems while the differences between routes 1 and 2 should show the effect of preparation and routes 2 and 3 the effect of dyeing.

The influence of the different types of dyestuff used (Direct route 1, Reactive routes 2 and 3) and the different nominal concentrations of dyestuff (1.5%-3.25%) are not expected to significantly influence dimensions although they may influence yarn tex and/or fabric weight.

4.1.1 Route 1 vs Route 2

The continuously prepared fabrics of route 2 have fewer courses (-1.6%) and more wales (1.6%) than the winch prepared fabrics of route 1. That is they are on average slightly longer and narrower in the reference state. Yarn tex is also marginally less (-0.5%) and this is also reflected in the difference in fabric weight (-0.5%). There is a very small difference in stitch length.

4.1.2 Route 2 vs Route 3

The jet dyed fabrics (route 3) have on average more courses (1.3%) and marginally more wales (0.6%) on average than the winch dyed fabrics. This means that the jet dyed fabrics are shorter and slightly narrower in the reference state than the winch dyed fabrics. Fabric weight is

also increased by approximately the same amount (1.7%). There is no difference in tex, and the difference in stitch length is very small.

4.1.3 Route 1 vs Route 3

The continuously prepared and jet dyed fabrics (route 3) are marginally longer (-0.4% fewer courses) but significantly narrower (2.1% more wales) than the winch prepared and dyed fabrics. Yarn tex is also less (-0.5%) and these differences are reflected in the weight. Route 3 fabrics are on average 1.2% heavier than route 1 fabrics.

4.1.4 Summary and Conclusions

The influence of the various combinations of preparation and dyeing routes are from these result on average quite small. This has confirmed the trends observed in trials carried out in Europe where on average the influence of different wet processing conditions on reference dimensions is much less marked for single jersey fabrics than for 1 x 1 rib and interlock constructions.

The size of the differences not withstanding however, these results were obtained from a comparison of averaged data obtained by two independent laboratories (IIC and CI) and two replicate data sets (calendered and compacted) and must therefore be considered to be indicative of real differences between processes.

In general terms therefore continuous preparation has the effect of lengthening the fabric and reducing the width compared to preparation in a winch. Jet dyeing has the effect of shortening and narrowing the fabric compared to winch dyeing. When continuous preparation is followed by jet dyeing the opposing influences in the length direction almost cancel each other out but the influences on the width are additive and the fabrics are on average narrower still.

If these differences are considered in terms of their potential influence on fabric shrinkage, then if fabrics from all 3 routes were delivered to the same dimensions (courses and wales) then the absolute differences in reference state dimensions will be reflected as variations in length and width shrinkage between the different routes, e.g. Route 1 fabrics would exhibit less length shrinkage than Route 2 fabrics. Route 2 fabrics would have more length shrinkage than Route 3 fabrics. Route 3 fabrics would have more width shrinkage than Route 1 fabrics

4.2. Resin Finish

The influence of resin finishing has been discussed in Section 3.2 compared to the non-resin finished fabrics and differences between the resin applied in route 1 compared to routes 2 and 3 have already been identified. For completeness however, the same comparisons as made previously for the non-resin finished fabrics, have also been carried out for the resin finished sets.

4.2.1 Route 1 vs Route 2

The route 2 resin finished fabrics have on average more courses (8.8%) and more wales (4.7%) than the route 1 resin finished fabrics. They are also heavier (11%) but not by as much as suggested by the differences in stitch density because the yarn tex is also lighter by 3.1% compared to the route 1 resin finished fabrics. There is no difference in stitch length.

4.2.2 Route 1 vs Route 3

The comparison between the route 3 resin finished fabrics and route 1 shows similar results to those discussed in 4.2 above. The route 3 fabrics are shorter (9.9% more courses) and narrower (4.8% more wales) than the route 1 fabrics and are also heavier by 11.8%. Yarn tex is also lighter (-2.4%) and there is no difference in stitch length.

4.2.3 Route 2 vs Route 3

The differences between the route 2 and route 3 fabrics after resin finishing are small, although the trend for more courses seen in the route 3 non-resin finished fabrics is maintained.

4.2.4 Summary and Conclusions

The differences in reference state dimensions brought about by resin finishing depend on the severity of the resin finish applied. The route 1 resin fabrics which have previously been shown to exhibit the largest changes compared to non-resin finished fabrics, are also shown to be significantly different from those fabrics resin finished in a different mill and with a different nominal concentration of resin applied.

Differences between fabrics which have received a similar application of resin finish are on average small and probably reflect the differences already established by the different preparation/dyeing routes through which the fabrics were previously processed.

However if similar fabrics had been delivered to the same dimensions (courses and wales) after the different resin finishes, then differences in fabric shrinkage would have been apparent. The route 1 fabrics with fewer courses and wales in the reference state would have exhibited lower length and width shrinkages than those fabrics resin finished after routes 2 and 3.

5. SHRINKAGE

5.1 1 cycle vs 5 cycles Washing/Rinsing and Tumble Drying

In the context of STARFISH, fabric shrinkage is the difference between the dimensions of a fabric 'as delivered' or before wash, and the dimensions it will attain after relaxation to the reference state, i.e. after 5 cycles of washing/rinsing and tumble drying. This gives a reasonably good approximation of the potential total shrinkage which may be developed in a fabric or garment after several laundering/wear cycles.

For most commercial quality control testing, however, following a 5 cycle relaxation procedure is both time consuming and expensive. Therefore usually only one cycle is carried out in order to obtain an approximation of the potential final shrinkage in the fabric or garment. However, the rate at which knitted fabrics relax over multiple laundering cycles may vary according to the details of their construction and processing history. In order to obtain an indication of the rate of relaxation of the fabrics included in these trials therefore, during evaluation in the IIC laboratory, measurements of shrinkage after 1 cycle of washing and tumble drying were made as well as after five cycles.

The individual results obtained from all the samples are included in Appendix 5. For each set the % shrinkage after 1 cycle has been subtracted from the % shrinkage after 5 cycles for both length and width and the values for each yarn count averaged. These mean values are summarised in Table 9.

These results show that on average for the non-resin finished fabrics a 1 cycle shrinkage test underestimates 5 cycle shrinkage values by about 2.4% in length but there is no difference in the width shrinkage results. For the resin finished samples the 1 cycle test underestimates 5 cycle length shrinkage by about 1.3% and again there is no difference in the width shrinkage results.

5.2. Effect of Dyeing/Finishing Route on Fabric Shrinkage

The potential influence on fabric shrinkage of the various preparation, dyeing and finishing operations included in these trials has been discussed in earlier sections. These have related the effect these processes have had on fabric reference dimensions and therefore fabric shrinkage if similar samples had been delivered to the same dimensions (courses and wales).

In practice, however, each one of the samples included will have been delivered slightly differently and therefore an examination of the individual results is not very helpful. For each yarn count however, the same four fabric qualities were knitted and processed through each of the different finishing variables. Therefore an indication of the trends in shrinkage can be obtained by taking the average shrinkage values for each yarn count and comparing them across the various preparation/dyeing and finishing routes followed. These mean values

have been calculated on the tables in Appendix 5 and are summarised in Table 10.

These show that, taken overall, the non-resin finished fabrics which were compacted had 10% less length shrinkage than the calendered fabrics. The compacted fabrics from route 1 also had higher width shrinkages, but there was no difference in width shrinkage between the fabrics from routes 2 and 3.

For the resin finished fabrics there is a marked difference in the shrinkage results for the route 1 fabrics compared to those from routes 2 and 3. For route 1 the effect of the resin finish has been to reduce length shrinkage by approximately 8%, compared to the non-resin finished fabrics, and compacting has improved this by a further 4.2%. The reduction in width shrinkage is much smaller, approximately 2%, which is improved by a further 1.4% after compacting.

For the route 2 and 3 resin finished fabrics there is, on average, no difference in either length or width shrinkage compared to the non-resin calendered fabrics.

After compacting, length shrinkage was improved by approximately 4% but this is a much smaller improvement than was achieved on the non-resin finished fabrics. In fact, for these fabrics, the resin and compacted sets had more length shrinkage on average than the non-resin and compacted sets.

Width shrinkage after compacting was marginally improved compared to the calendered fabrics but was not significantly different from the width shrinkage found in the non-resin finished sets. This presumably reflects small differences in the delivered widths between the individual samples.

6. SPIRALITY

One of the main disadvantages of single jersey fabrics produced from singles yarns is that during relaxation of the fabric, e.g. during a laundering/drying process, torsional forces in the yarns cause the loops to distort and twist out of the plane of the fabric. This has the effect of causing the fabric to twist or spiral.

Fabric spirality is caused almost entirely by the residual twist liveliness of the yarns from which it is knitted. For yarns produced by similar spinning systems and to similar counts the potential twist liveliness of a yarn can be related to the amount of twist put into the yarn during spinning. Yarns spun with more turns per metre will cause higher spirality than yarns spun with fewer turns per metre.

The amount by which a particular yarn will cause a fabric to spiral is however modified by the tightness to which the fabric is knitted. That is, the shorter the stitch length (higher tightness) the less spirality will develop relative to longer stitch lengths (lower tightness).

During wet processing some of the torsional forces in the yarn are relaxed and therefore finished fabrics tend to exhibit less spirality than their equivalent grey fabrics. In addition, resin finishing is also claimed to cause a reduction in the amount of spirality which is developed compared to similar fabrics finished without resin.

In the IIC laboratory, spirality is defined as the angle made between the wales and a line drawn perpendicular to the line of courses. Positive spirality inclines to the right (Z twist yarns), negative spirality inclines to the left (S twist yarns). The spirality angles measured on the fabrics in those trials are included in Appendix 6 along with plots of the spiral angles vs tightness factor. The most noticeable results from these plots is the significantly lower levels of spirality in the very coarse count fabrics compared with the fabrics produced from the other 3 yarns. This is a reflection both of the low number of turns per metre in the Ne 1/6 yarn, but may also be the result of a relative lack of movement within the structure due to the coarseness of the yarn.

In addition to this specific observation however, similarly to the observations made for fabric shrinkage, general trends in spirality can be obtained by taking the average levels measured for each yarn count and comparing them between sets. The average values are calculated on the tables included in Appendix 6 but the mean values for each yarn are summarised in Table 11. By averaging across yarn counts within sets and across routes, an indication of the average influence of the different processing conditions can be obtained.

This shows that on average there is no difference in spirality between either the calendered or compacted fabrics or between processing routes for non resin finished fabric, although there has been a reduction from that found in the grey fabrics. Average spirality grey

reference = 16.8 degrees, after finishing 13.1 degrees, difference - 3.7 degrees.

For the resin finished fabrics there is no difference between the calendered and compacted sets but there is a marked difference between the route 1 resin finished fabrics compared to the route 2 and 3 resin finished fabrics. For Route 1 after resin, spiral angles are 6.8 degrees, for Routes 2 and 3, 11.5 degrees.

Resin finishing has therefore reduced spirality compared to non-resin finished fabrics by an additional 1.6 degrees for Routes 2 and 3 and 6.3 degrees for Route 1. The influence of the different resin finishes is approximately 5 degrees.

These observations therefore confirm that wet processing reduces potential spirality compared to grey fabrics and that resin finishing can offer further improvements. However, the size of the improvement depends on the precise conditions of the resin finishing process.

7. INFLUENCE OF RESIN FINISHING ON FABRIC/YARN STRENGTH

Although resin finishing can have beneficial effects on both fabric shrinkage and spirality it also has a detrimental effect on the strength of the fabric. Some of the reduction in strength is accounted for by the fact that resin finished fabrics have fewer courses and wales and are therefore lighter in the reference state compared to equivalent fabrics which have not been resin finished. However, not all of the differences in strength can be accounted for in this way.

The fabrics included in these trials were evaluated for fabric burst strength using a Heals model III tester with a diaphragm of 3cm diameter. The units of measurement are kN/m^2. In addition, yarns were extracted from the finished fabric and evaluated for single end strength (g) using an Instron. An indication of the influence of the resin finishing process applied to the fabrics in these trials can be obtained by comparing the average % change in fabric burst strength and yarn strength of the resin finished fabrics compared to the non-resin finished fabrics.

A summary of the results obtained for the reference state fabrics averaged across yarn counts is given in Table 12.

For route 1 resin finished fabrics the average loss in fabric strength was 41% compared to the non-resin finished fabrics. The loss in yarn strength was 53%. For route 2 the values are 6.5% and 11% and for route 3, 3.5% and 13%.

In order to take into account the change in fabric weight between the non-resin and resin finished samples, the strength/weight ratios have also been calculated. These indicate that on average the actual loss in fabric strength caused by the resin finish applied to the route 1 fabrics was 33.3%, while only 5.4% was lost on the route 2 fabrics. For the route 3 resin finished fabrics there was on average a 2.9% loss in fabric strength when weight changes are taken into account.

8. OVERALL SUMMARY AND CONCLUSIONS

The main purpose of this report has been to identify the major trends in the data obtained from this present series of trials on single jersey fabrics. In particular the effect of final finishing operations (mechanical and chemical) and the influence of different preparation and dyeing routes on fabric dimensions have been discussed in some detail. In addition a provisional examination of the data concerning fabric shrinkage, spirality and fabric strength has also been carried out.

The analysis presented in this report is by no means comprehensive, and the approach taken is in some ways simplistic as many aspects of the available results have for the time being been ignored, and only average trends discussed.

The information derived on general fabric characteristics and trends in behaviour should however provide some useful guidelines for use in discussion with the industry.

The main conclusions derived from this examination of the data are therefore summarised below:

1. In the reference state, there is no significant difference in the dimensions of similarly processed fabric which have been compacted compared to those which have been calendered.

2. Compacting increases the courses in 'as delivered' fabrics and increases the fabric weight compared to calendered fabrics.

3. Compacting has potentially a greater effect on the reduction of length shrinkage of non-resin finished fabrics than resin finished fabrics.

4. Resin finishing reduces the courses and weight of similarly processed fabrics compared to those which have not been resin finished but the effect on wales is much smaller.

5. The size of the effect of resin finishing on fabric dimensions and weight in the reference state depends on the particular resin finish applied. For example the more resin which is applied (and fixed) the greater the influence on fabric dimensions.

6. The influence of different preparation and dyeing routes on the reference dimensions of single jersey fabrics is small but probably significant. Continuous preparation produces a longer and narrower fabric compared to winch preparation. Jet dyeing produces a shorter fabric compared to winch dyeing.

7. Resin finished fabrics are lighter in the reference state compared to non-resin finished fabrics; compacted fabrics are heavier than calendered fabrics as delivered but not in the reference state.

8. Compacting reduces length shrinkage but differences in width shrinkage are a reflection of differences in delivered widths. For these fabrics, on average, there is little or no difference in width shrinkage.

9. Resin finishing can reduce both length and width shrinkage but the size of the reduction in length shrinkage brought about as a result of resin finishing depends on the detail of the resin system applied. A low level of resin application (or imperfectly cured resin) may not improve shrinkage at all.

10. Compacting resin finished fabrics reduces length shrinkage but the size of the improvement is less than for non-resin finished fabric. In fact, the resin and compacted fabrics from routes 2 and 3 had more length shrinkage on average than the equivalent non-resin and compacted fabrics.

11. Length shrinkage after one cycle of washing and tumble drying is less than after 5 cycles of washing and tumble drying.

    For non-resin finished fabrics the difference is approximately 2.4%, for resin finished fabrics 1.3%. There is no difference in width shrinkage between 1 and 5 cycles for both the non-resin and resin finished fabrics.

12. Fabric spirality is reduced by wet procesisng compared to grey but is not influenced by mechanical finishing.

13. Fabric spirality can be further reduced by resin finishing but the size of the improvement depends on the severity of the resin finish.

14. Finished fabric burst strength is reduced by resin finishing, as also is yarn strength. When changes in fabric weight are taken into account, the size of the reduction in fabric strength is reduced.

15. The amount by which fabric strength is affected by resin finishing depends on the severity of the resin finish applied. In these trials, loss in fabric strength adjusted for weight change was 33.3% for route 1, 5.4% for route 2, and 2.9% for route 3.

Table 1

IIC/CI STARFISH DATABASE EXPANSION 1987

SINGLE JERSEY : RING SPUN YARNS

FINISHING PLAN FLOWCHART

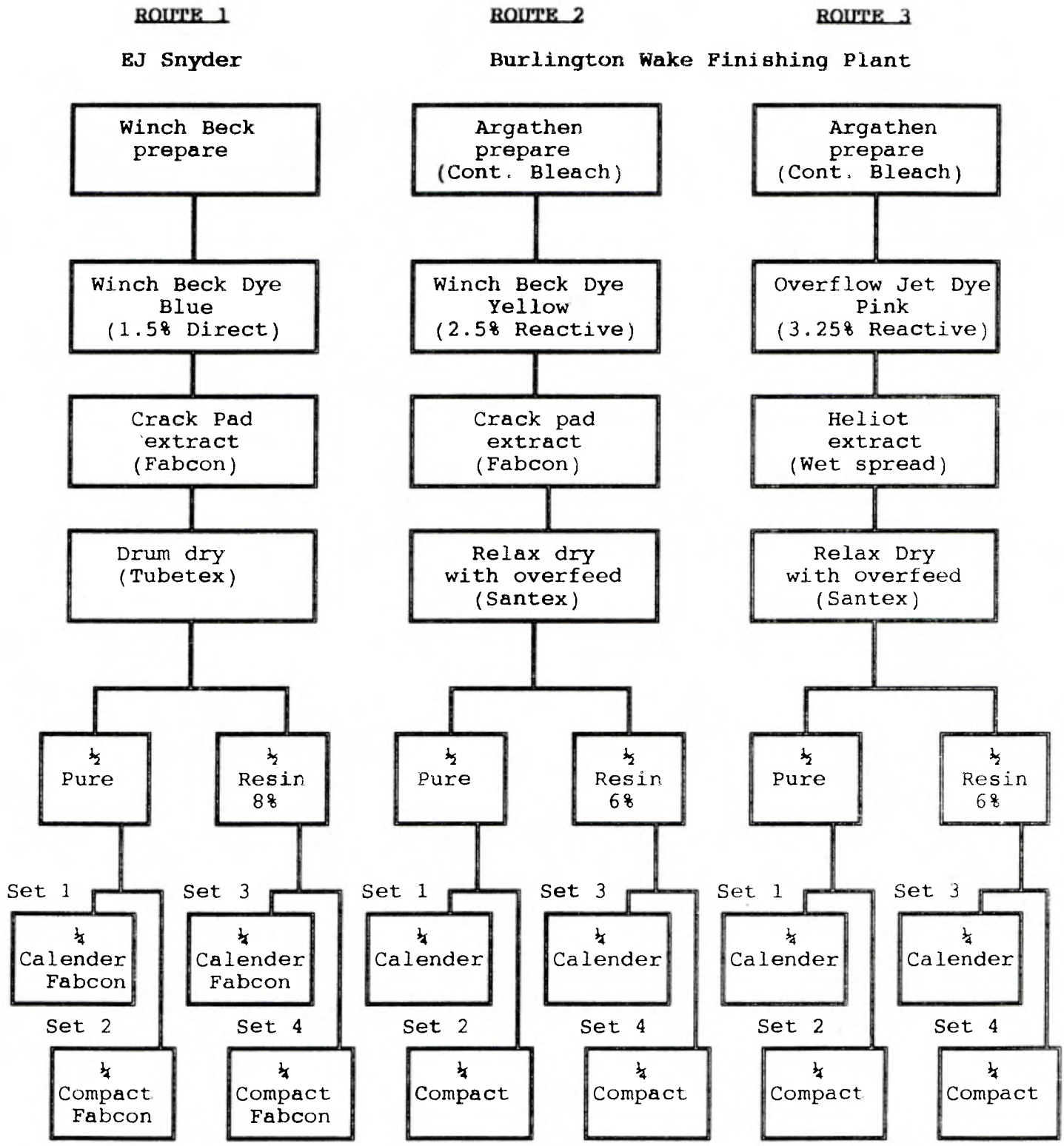


TABLE 2

IIC/CI STARFISH DATABASE EXPANSION 1987

SINGLE JERSEY FABRIC : RING SPUN YARNS
IIC/CI TEST DATA : SUMMARY STATISTICS

Set 1 Calender Vs Set 2 Compact : As Delivered

Process	N	Mean Difference	%Mean Difference	sd of Differences	t		r sq
TEX							
R1	16	0.29	0.6	0.538	2.09		1
R2	14	0.06	0.1	0.6	0.36		1
R3	16	-0.18	-0.4	0.847	0.84		0.999
STITCH LENGTH CM							
R1	16	0.002	0.4	0.0024	2.93	*	1
R2	14	-2.0E-4	-0.04	0.0035	0.25		1
R3	16	1.0E-4	0.02	0.0024	0.15		1
COURSES/CM							
R1	16	1.31	12.5	0.347	14.62	***	0.993
R2	14	1.46	15.3	0.37	14.2	***	0.995
R3	16	1.55	14.9	0.41	14.6	***	0.997
WALES/CM							
R1	16	-0.32	-3.6	0.164	7.53	***	0.999
R2	14	0.04	0.4	0.19	0.67		0.996
R3	16	0.03	0.3	0.19	0.58		0.997
MEASURED WEIGHT GSM							
R1	16	11.63	7.6	4.753	9.47	***	0.997
R2	14	26.1	17.1	8.841	10.64	***	0.99
R3	16	23.35	15.4	6.821	13.26	***	0.994

[-] Compacted less than Calendered; [+] Compacted more than Calendered

STUDENTS t STATISTIC [Xi - Yi] = 0
N=16 DOF(N-1)=15 : N=14 DOF(N-1)=13
* = Significant at 95% level
** = Significant at 99% level
*** = Significant at 99.9% level

TABLE 3

IIC/CI STARFISH DATABASE EXPANSION 1987

SINGLE JERSEY FABRIC : RING SPUN YARNS
IIC/CI TEST DATA : SUMMARY STATISTICS

Set 1 Calender Vs Set 2 Compact : Reference State

Process	N	Mean Difference	%Mean Difference	sd of Differences	t		r sq
TEX							
R1	16	0.12	0.3	0.601	0.8		1
R2	14	-0.08	-0.2	1.001	0.27		0.999
R3	16	-0.45	-1	1.257	1.38		0.999
STITCH LENGTH CM							
R1	16	-1.0E-4	-0.02	0.002	0.24		1
R2	14	0.002	0.38	0.002	2.98	*	1
R3	16	-1.0E-3	-0.1	0.003	0.55		1
COURSES/CM							
R1	16	-0.02	-0.2	0.083	1.02		1
R2	14	0.19	1.6	0.126	5.36	***	1
R3	16	0.14	1.1	0.205	2.68	*	0.999
WALES/CM							
R1	16	-0.11	-1.1	0.095	4.61	***	0.999
R2	14	-0.002	-0.02	0.117	0.07		0.999
R3	16	0.04	0.4	0.105	1.33		0.999
MEASURED WEIGHT GSM							
R1	16	0.32	0.2	1.699	0.72		0.999
R2	14	2.22	1.1	2.309	3.47	**	0.998
R3	16	1.69	0.8	1.801	3.63	**	0.999

[-] Compacted less than Calendered; [+] Compacted more than Calendered

STUDENTS t STATISTIC [Xi - Yi] = 0
N=16 DOF(N-1)=15 : N=14 DOF(N-1)=13
* = Significant at 95% level
** = Significant at 99% level
*** = Significant at 99.9% level

TABLE 4

IIC/CI STARFISH DATABASE EXPANSION 1987

SINGLE JERSEY FABRIC : RING SPUN YARNS
IIC/CI TEST DATA : SUMMARY STATISTICS

Set 3 Resin + Calender Vs Set 4 Resin + Compact : As Delivered

Process	N	Mean Difference	%Mean Difference	sd of Differences	t	r sq
TEX						
R1	16	0.26	0.5	0.667	1.52	1
R2	16	-0.13	-0.3	0.702	0.72	1
R3	16	-0.1	-0.2	0.539	0.73	1
STITCH LENGTH CM						
R1	16	-3.0E-4	-0.1	0.003	0.48	1
R2	16	-2.0E-4	-0.04	0.002	0.37	1
R3	16	-3.0E-4	-0.1	0.002	0.59	1
COURSES/CM						
R1	16	0.56	5.5	0.203	10.59 ***	0.998
R2	16	0.59	6	0.311	7.37 ***	0.994
R3	16	0.34	3.4	0.27	4.86 ***	0.996
WALES/CM						
R1	16	0.1	1.1	0.144	2.76 *	0.999
R2	16	0.17	1.8	0.222	2.88 *	0.996
R3	16	0.25	2.8	0.42	2.33 *	0.987
MEASURED WEIGHT GSM						
R1	16	11.98	7.7	4.372	10.62 ***	0.991
R2	16	9.14	6.3	5.778	6.13 ***	0.974
R3	16	10.66	7.4	4.406	9.38 ***	0.985

[-] Compacted less than Calendered; [+] Compacted more than Calendered

STUDENTS t STATTISTIC [Xi - Yi] = 0
N=16 DOF(N-1)=15
* = Significant at 95% level
** = Significant at 99% level
*** = Significant at 99.9% level

TABLE 5

IIC/CI STARFISH DATABASE EXPANSION 1987

SINGLE JERSEY FABRIC : RING SPUN YARNS
IIC/CI TEST DATA : SUMMARY STATISTICS

Set 3 Resin + Calender Vs Set 4 Resin + Compact : Reference State

Process	N	Mean Difference	%Mean Difference	sd of Differences	t	r sq
TEX						
R1	16	0.21	0.4	0.704	1.14	1
R2	16	-0.23	-0.5	0.568	1.54	1
R3	16	0.25	0.5	1.02	0.93	0.999
STITCH LENGTH CM						
R1	16	-4.0E-4	-0.1	0.006	0.28	0.999
R2	16	-1.0E-3	-0.2	0.002	1.29	1
R3	16	-1.0E-3	-0.1	0.006	0.4	0.999
COURSES/CM						
R1	16	0.09	0.9	0.15	2.41 *	0.999
R2	16	0.08	0.7	0.15	2.08	0.999
R3	16	-0.01	-0.1	0.14	0.3	0.999
WALES/CM						
R1	16	-0.08	-0.9	0.13	2.53 *	0.999
R2	16	0.07	0.6	0.16	1.56	0.998
R3	16	0.003	0.02	0.16	0.06	0.998
MEASURED WEIGHT GSM						
R1	16	0.51	0.3	3.57	0.55	0.996
R2	16	-0.67	-0.3	2.36	1.1	0.999
R3	16	1.33	0.7	2.89	1.78	0.998

[-] Compacted less than Calendered; [+] Compacted more than Calendered

STUDENTS t STATISTIC [Xi - Yi] = 0
N=16 DOF(N-1)=15
* = Significant at 95% level
** = Significant at 99% level
*** = Significant at 99.9% level

TABLE 6

IIC/CI STARFISH DATABASE EXPANSION 1987

SINGLE JERSEY FABRIC : RING SPUN YARNS
IIC/CI TEST DATA : SUMMARY STATISTICS

Pure Finish Vs Resin Finish : Reference State

Process	N	Mean Difference	%Mean Difference	sd of Differences	t		r sq
TEX							
R1	16	1.47	3.15	0.9	6.31	***	0.999
R2	16	0.21	0.45	0.53	1.53		1
R3	16	0.58	1.26	0.782	2.9	*	1
STITCH LENGTH CM							
R1	16	0.003	0.65	0.003	4.21	***	1
R2	16	2.0E-4	0.04	0.0015	0.56		1
R3	16	0.002	0.42	0.0022	3.43	**	1
COURSES/CM							
R1	16	-1.66	-13.17	0.532	12.06	***	0.992
R2	16	-0.49	-3.92	0.256	7.35	***	0.999
R3	16	-0.53	-4.19	0.146	13.97	***	0.999
WALES/CM							
R1	16	-0.22	-2.16	0.254	3.31	**	0.997
R2	16	0.08	0.82	0.14	2.31	*	0.999
R3	16	0.04	0.36	0.138	1.03		0.999
MEASURED WEIGHT GSM							
R1	16	-25.97	-12.6	5.666	17.75	***	0.995
R2	16	-4.99	-2.43	1.66	11.65	***	0.999
R3	16	-7.17	-3.44	3.311	6.38	***	0.999

[-] Resin less than Pure ; [+] Resin more than Pure

STUDENTS t STATISTIC [Xi - Yi] = 0
N=16 DOF(N-1)=15
* = Significant at 95% level
** = Significant at 99% level
*** = Significant at 99.9% level

TABLE 7

IIC/CI STARFISH DATABASE EXPANSION 1987

SINGLE JERSEY FABRIC : RING SPUN YARNS
IIC/CI TEST DATA : SUMMARY STATISTICS

Pure Finish (Averaged Sets 1 and 2) : Reference State

Property	N	Mean Difference	%Mean Difference	sd of Differences	t		r sq
ROUTE 1 (Sets 1+2) Vs ROUTE 2 (Sets 1+2)							
Tex	16	-0.225	-0.18	0.366	2.38	*	1
St.Length cm	16	0.0018	-0.38	0	2.473	*	0.9999
Courses/cm	16	-0.2073	-1.64	0.146	5.486	***	0.9992
Wales/cm	16	0.1561	1.56	0.107	5.66	***	0.9993
Weight gsm	16	-1.1092	-0.54	2.276	1.887		0.9991
Stitches/sqc	16	-0.193	-0.14	1.393	0.537		0.9998
[-] Route 2 less than Route 1							
ROUTE 1 (Sets 1+2) Vs ROUTE 3 (Sets 1+2)							
Tex	16	-0.2425	-0.52	0.385	2.437	*	1
St.Length cm	16	0	0	0.002	0.073		0.999
Courses/cm	16	-0.0524	-0.42	0.119	1.711		0.9997
Wales/cm	16	0.2141	2.13	0.124	6.671	***	0.999
Weight gsm	16	2.3816	1.16	3.777	2.442	*	0.9958
Stitches/sqc	16	2.1287	1.53	1.133	7.279	***	0.9999
[-] Route 3 less than Route 1							
ROUTE 2 (Sets 1+2) Vs ROUTE 3 (Sets 1+2)							
Tex	16	-0.0175	-0.04	0.098	0.689		1
St.Length	16	-0.0018	-0.38	0.002	3.933	**	1
Courses/cm	16	0.1549	1.25	0.107	5.623	***	0.9993
Wales/cm	16	0.0581	0.57	0.052	4.309	***	0.9998
Weight gsm	16	3.4907	1.7	4.197	3.221	**	0.9972
Stitches/sqc	16	2.3217	1.67	1.603	5.61	***	0.9998
[-] Route 3 less than Route 2							

STUDENTS t STATTISTIC [X_1 - Y_1] = 0
N=16 DOF(N-1)=15
* = Significant at 95% level
** = Significant at 99% level
*** = Significant at 99.9% level

TABLE 8

IIC/CI STARFISH DATABASE EXPANSION 1987

SINGLE JERSEY FABRIC : RING SPUN YARNS
IIC/CI TEST DATA : SUMMARY STATISTICS

Resin Finish (Averaged Sets 3 and 4) : Reference State

Property	N	Mean Difference	%Mean Difference	sd of Differences	t		r sq
ROUTE 1 (Sets 3+4) Vs ROUTE 2 (Sets 3+4)							
Tex	16	-1.4825	-3.09	1.078	5.324	***	1
St.Length cm	16	-1.0E-3	-0.21	0.003	1.271		0.9997
Courses/cm	16	0.9635	8.8	0.341	10.951	***	0.9924
Wales/cm	16	0.4569	4.65	0.344	5.137	***	0.9956
Weight gsm	16	19.8713	11.03	4.848	15.874	***	0.9923
Stitches/sqc	16	16.3854	13.86	9.671	6.562	***	0.9984
[-] Route 2 less than Route 1							
ROUTE 1 (Sets 3+4) Vs ROUTE 3 (Sets 3+4)							
Tex	16	-1.125	-2.35	0.58	7.509	***	1
St.Length cm	16	-0.0011	-0.23	0.004	1.241		0.9996
Courses/cm	16	1.0785	9.85	0.381	10.958	***	0.9926
Wales/cm	16	0.468	4.77	0.348	5.202	***	0.9952
Weight gsm	16	21.188	11.76	5.127	16.006	***	0.9928
Stitches/sqc	16	18.0202	15.24	11.556	6.039	***	0.9984
[-] Route 3 less than Route 1							
ROUTE 2 (Sets 3+4) Vs ROUTE 3 (Sets 3+4)							
Tex	16	0.3575	0.77	0.536	2.585	*	1
St.Length	16	-1.0E-4	-0.02	0.002	0.223		0.9999
Courses/cm	16	0.115	0.97	0.179	2.488	*	0.9985
Wales/cm	16	0.011	0.11	0.119	0.359		0.9989
Weight gsm	16	1.3167	0.66	2.165	2.355	*	0.9984
Stitches/sqc	16	1.6349	1.21	2.739	2.312	*	0.9995
[-] Route 3 less than Route 2							

STUDENTS t STATTISTIC [Xi - Yi] = 0
N=16 DOF(N-1)=15
* = Significant at 95% level
** = Significant at 99% level
*** = Significant at 99.9% level

IIC/CI STARFISH DATABASE EXPANSION 1987

SINGLE JERSEY FABRIC : RING SPUN YARNS
IIC TEST DATA : % SHRINKAGE after Washing/Rinsing and Tumble Drying

Mean Difference (5 cycles - 1 cycle)

Yarn Ref/Ne	N	Set 1 LS%	Set 1 WS%	Set 2 LS%	Set 2 WS%	Set 3 LS%	Set 3 WS%	Set 4 LS%	Set 4 WS%
ROUTE 1									
A Ne 1/6	4	2.93	0.21	2.43	0.61	1.29	0.84	0.42	0.5
B Ne 1/14	4	2.41	-0.12	2.82	0.42	0.77	0.27	-0.15	0.26
C Ne 1/18	4	2.75	0.16	2.09	0.47	0.5	0.25	0.71	0.83
D Ne 1/30	4	2.43	0.16	1.01	-0.19	0.69	0.54	0.17	0.24
mean		2.63	0.1	2.09	0.33	0.81	0.47	0.29	0.46
ROUTE 2									
A Ne 1/6	4	2.94	0.03	2.46	0.21	0.91	-0.01	2.27	0.65
B Ne 1/14	4	2.51	-0.22	2.62	-0.36	1.48	0.03	2.73	-0.22
C Ne 1/18	4	2.42	-0.72	1.45	-1.18	1.85	-0.9	2.61	0.24
D Ne 1/30	4	1.82	-0.09	2.24	0.22	1.35	0.01	1.83	0.38
mean		2.42	-0.25	2.19	-0.28	1.4	-0.22	2.36	0.26
ROUTE 3									
A Ne 1/6	4	2.71	-0.63	3.18	-0.13	1.4	0.66	1.31	-0.05
B Ne 1/14	4	2.77	-0.19	2.72	0.13	1.26	0.14	1.44	-0.26
C Ne 1/18	4	2.48	-0.62	1.67	-0.32	2.02	0.42	2.4	0.77
D Ne 1/30	4	1.94	-0.25	2.12	0.6	1.01	-0.53	0.66	-0.34
mean		2.47	-0.42	2.42	0.07	1.42	0.17	1.45	0.02
mean 1+2+3		2.51	-0.19	2.23	0.04	1.21	0.14	1.37	0.25

[-] 1 cycle more than 5 cycles; [+] 5 cycles more than 1 cycle

IIC/CI STARFISH DATABASE EXPANSION 1987

SINGLE JERSEY FABRIC : RING SPUN YARNS
IIC TEST DATA : % SHRINKAGE after Washing/Rinsing and Tumble Drying

Average % Shrinkage after 5 cycles

Yarn Ref/Ne	N	Set 1 LS%	Set 1 WS%	Set 2 LS%	Set 2 WS%	Set 3 LS%	Set 3 WS%	Set 4 LS%	Set 4 WS%
ROUTE 1									
A Ne 1/6	4	19.24	15.09	4.84	21.47	13.46	13.01	7.63	12.45
B Ne 1/14	4	18.43	7.86	9.12	11.2	10.86	7.69	5.73	6.14
C Ne 1/18	4	19.46	12.45	9.52	13.43	9.55	9.06	5.91	7.18
D Ne 1/30	4	14.53	10.45	7.37	11.12	6.32	6.75	4.28	5
mean		17.91	11.46	7.71	14.3	10.05	9.13	5.89	7.69
ROUTE 2									
A Ne 1/6	4	20.85	11.79	8.39	12.72	17.99	16.36	16.53	15.76
B Ne 1/14	4	22.55	7.24	9.86	7.85	19.6	8.44	13.28	7.28
C Ne 1/18	4	17.44	11.95	9.78	10.07	22.65	9.89	15.67	9.95
D Ne 1/30	4	15.21	11.65	8.14	9.89	16.59	9.23	10.79	9.34
mean		19.01	10.66	9.04	10.13	19.21	10.98	14.07	10.58
ROUTE 3									
A Ne 1/6	4	18.59	12.11	9.75	13.12	16.66	18.63	14.49	17.56
B Ne 1/14	4	19.69	7.58	9	7.89	18.5	6.56	16.37	6.02
C Ne 1/18	4	17.63	11.88	5.74	11.74	19.08	11.96	16.42	11.23
D Ne 1/30	4	14.82	10.92	5.75	10.23	14.19	12.22	13.4	8.94
mean		17.68	10.62	7.56	10.74	17.11	12.34	15.17	10.94

IIC/CI STARFISH DATABASE EXPANSION 1987

SINGLE JERSEY FABRIC : RING SPUN YARNS
IIC TEST DATA : REFERENCE STATE

Mean Fabric Spirality Angles, averaged over yarn counts

Yarn Ref/Ne		Grey	Finished Set 1	Set 2	Set 3	Set 4
ROUTE 1						
A Ne 1/6		14.55	12.3	12.34	7.21	6.37
B Ne 1/14		16.58	13.03	13.69	7.78	7.57
C Ne 1/18		21.78	15.46	15.66	6.55	7.06
D Ne 1/30		14.23	11.61	11.85	6.23	5.38
	mean	16.78	13.1	13.38	6.94	6.59
	sd	3.49	1.68	1.7	0.69	0.95
ROUTE 2						
A Ne 1/6		14.55	9.74	13.21	10.03	11.07
B Ne 1/14		16.58	13.6	14.09	12.57	11.04
C Ne 1/18		21.78	15.37	12.76	12.23	13.46
D Ne 1/30		14.23	10.09	10.37	10.58	10.52
	mean	16.78	12.2	12.61	11.35	11.52
	sd	3.49	2.74	1.59	1.24	1.32
ROUTE 3						
A Ne 1/6		14.55	12.64	12.68	12.17	10.45
B Ne 1/14		16.58	13.17	14	11.89	12.19
C Ne 1/18		21.78	16.78	15.7	13.9	12.47
D Ne 1/30		14.23	11.85	11.1	9.64	9.17
	mean	16.78	13.61	13.37	11.9	11.07
	sd	3.49	2.18	1.95	1.75	1.55

Angle of Spirality = the angle in degrees between Wales and a line drawn perpendicular to Courses

IIC/CI STARFISH DATABASE EXPANSION 1987

SINGLE JERSEY FABRIC : RING SPUN YARNS
IIC TEST DATA : REFERENCE STATE

Change in Yarn and Fabric Strength : Resin Vs No Resin

Yarn Ref/Ne	Weight gsm	Burst kN/sqm	SES g	Weight gsm	Burst kN/sqm	SES g	%Change Weight	%Change Burst	%Change SES	Brst/Wt ratioNR	Brst/Wt ratio R
ROUTE 1											
A Ne 1/6	284	910	1521	250	537	691	-11.9	-41	- 55	3.2	2.1
B Ne 1/14	214	770	689	190	485	365	-11.1	-37	- 47	3.6	2.5
C Ne 1/18	170	651	538	144	363	243	-15.4	-44	- 55	3.8	2.5
D Ne 1/30	156	616	345	136	354	158	-12.8	-43	- 54	3.9	2.6
mean	206	736.8	773.3	180	434.8	364.3	-12.8	-41.2	- 52.8	3.6	2.4
ROUTE 2											
A Ne 1/6	281	946	1609	275	830	1310	-2.2	-12.3	- 19	3.4	3
B Ne 1/14	213	753	696	208	728	666	-1.9	-3.3	- 4	3.5	3.5
C Ne 1/18	171	647	556	167	635	500	-2.5	-1.9	- 10	3.8	3.8
D Ne 1/30	156	622	339	151	570	298	-3.5	-8.4	- 12	4	3.8
mean	205.3	742	800	200.3	690.8	693.5	-2.5	-6.5	- 11.3	3.7	3.5
ROUTE 3											
A Ne 1/6	290	906	1546	278	870	1317	-4	-4	- 15	3.1	3.1
B Ne 1/14	215	727	692	208	702	620	-4	-3.4	- 10	3.4	3.4
C Ne 1/18	173	637	549	167	604	472	-3.1	-5.2	- 14	3.7	3.6
D Ne 1/30	157	580	338	153	571	290	-2.9	-1.6	- 14	3.7	3.7
mean	208.8	712.5	781.3	201.5	686.8	674.8	-3.5	-3.5	- 13.3	3.5	3.4

A P P E N D I X 1

ROUTE 1 : WINCH BECK PREPARE AND DYE

Set 1 Calender vs Set 2 Compact

Before Wash	A1/1 - A1/4
Reference State	A1/5 - A1/8

Set 3 Resin, Calender vs Set 4 Resin, Compact

Before Wash	A1/9 - A1/12
Reference State	A1/13- A1/16

IIC/CI STARFISH DATABASE EXPANSION 1987

SINGLE JERSEY : RING SPUN YARNS : FINISHED FABRIC
ROUTE 1 : Winch Beck prepare, Winch Beck dye
Set 1 Calender : Set 2 Compact

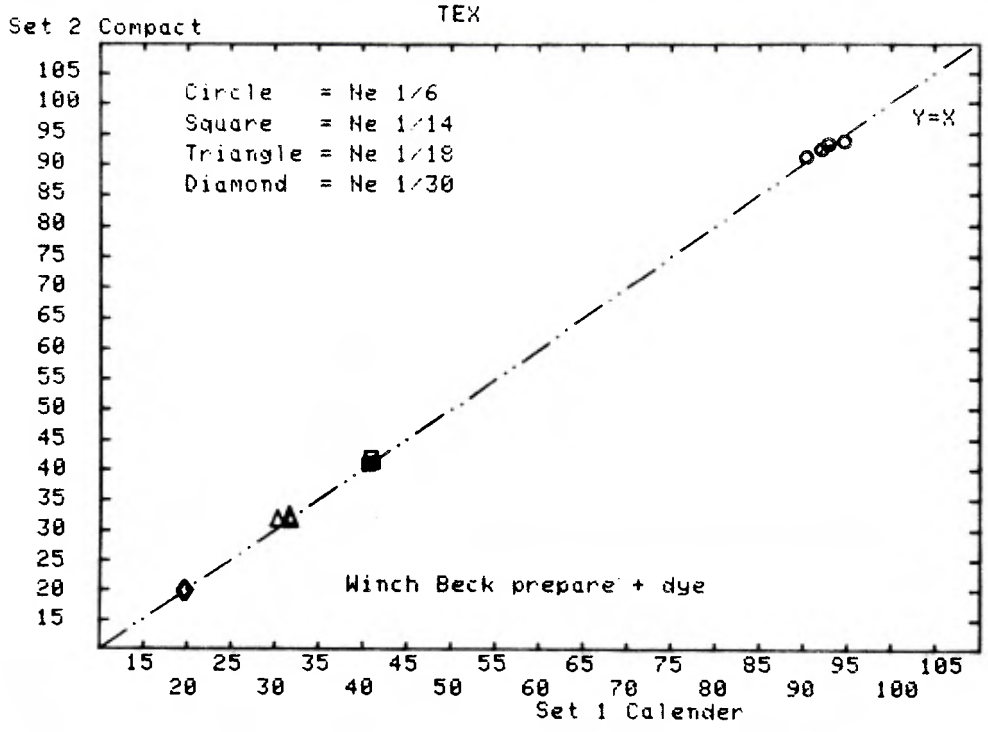
Averaged IIC/CI Test Data : As Delivered

Sample Ref No		Set 1 Tex	SL cm	C/cm	W/cm	Wtgsm	Set 2 Tex	SL cm	C/cm	W/cm	Wtgsm
A-1		92.93	0.684	7.16	4.66	215.4	93.29	0.6924	8.58	4.24	236.2
A-2		92.17	0.724	6.8	4.5	210.5	92.47	0.7252	7.88	4.22	226.2
A-3		94.72	0.7875	5.51	4.79	195.1	93.74	0.7853	6.47	4.32	210
A-4		90.4	0.8138	5.12	4.74	180	91.17	0.8131	6.39	4.08	194.3
	mean	92.55					92.67				
	sd	1.79					1.13				
B-1		40.89	0.4168	11.56	8.82	173.3	41.96	0.4182	12.69	8.58	186.7
B-2		40.68	0.4391	10.51	8.77	160.8	40.75	0.4414	11.62	8.4	179.1
B-3		41.14	0.4589	9.6	8.81	160.1	41.11	0.4611	10.9	8.38	174.7
B-4		40.79	0.4842	8.88	8.5	148	41.06	0.485	10.01	8.17	162.8
	mean	40.87					41.22				
	sd	0.2					0.52				
C-1		31.67	0.3963	11.61	8.94	133.5	32.04	0.4007	12.61	8.71	142.5
C-2		31.58	0.4172	9.43	8.92	129.3	32.21	0.4204	11.75	8.55	138.6
C-3		31.76	0.4404	9.69	8.66	121.5	31.58	0.4431	10.9	8.43	128.6
C-4		30.25	0.4637	8.78	8.75	117.6	31.64	0.4672	10.06	8.29	124.8
	mean	31.32					31.87				
	sd	0.71					0.31				
D-1		19.66	0.27	18.24	13.17	131	19.74	0.2715	20.17	12.83	139.5
D-2		19.89	0.2871	16.36	13.09	125.6	19.81	0.2862	17.55	13.1	131.8
D-3		19.61	0.2979	15.01	12.97	118.8	19.82	0.2986	16.34	12.93	124.1
D-4		19.65	0.3117	13.85	13.09	114.5	20.02	0.3129	15.14	12.85	121.3
	mean	19.7					19.85				
	sd	0.13					0.12				

N.B. Tex results are IIC only

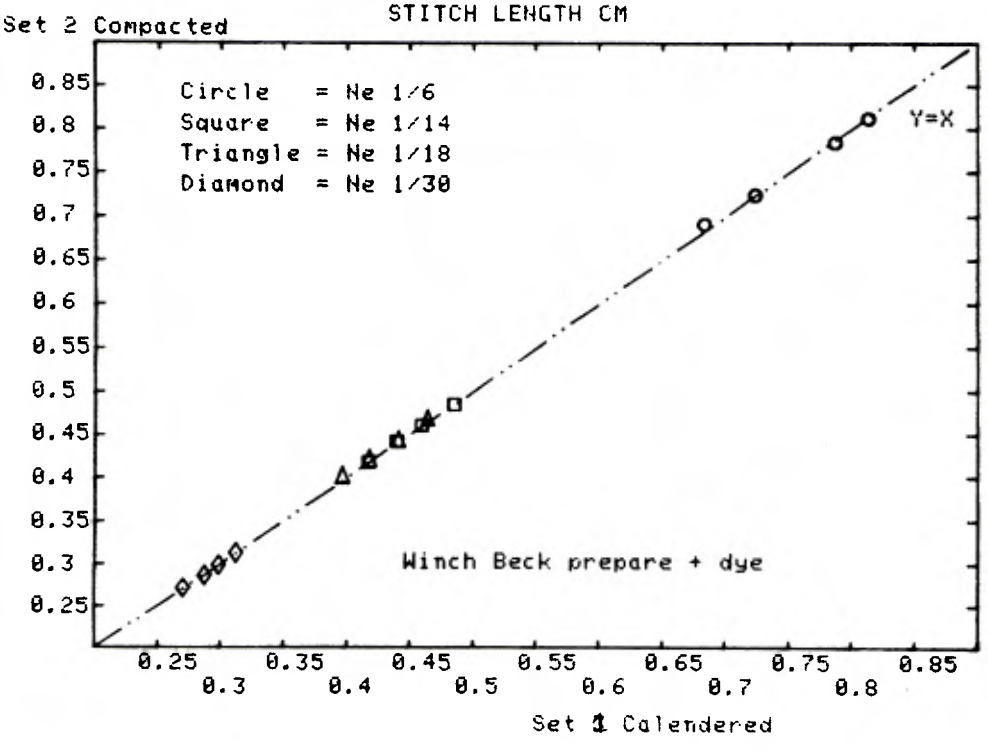
IIC/CI : SINGLE JERSEY : FINISHED FABRIC : AS DELIVERED

TEX



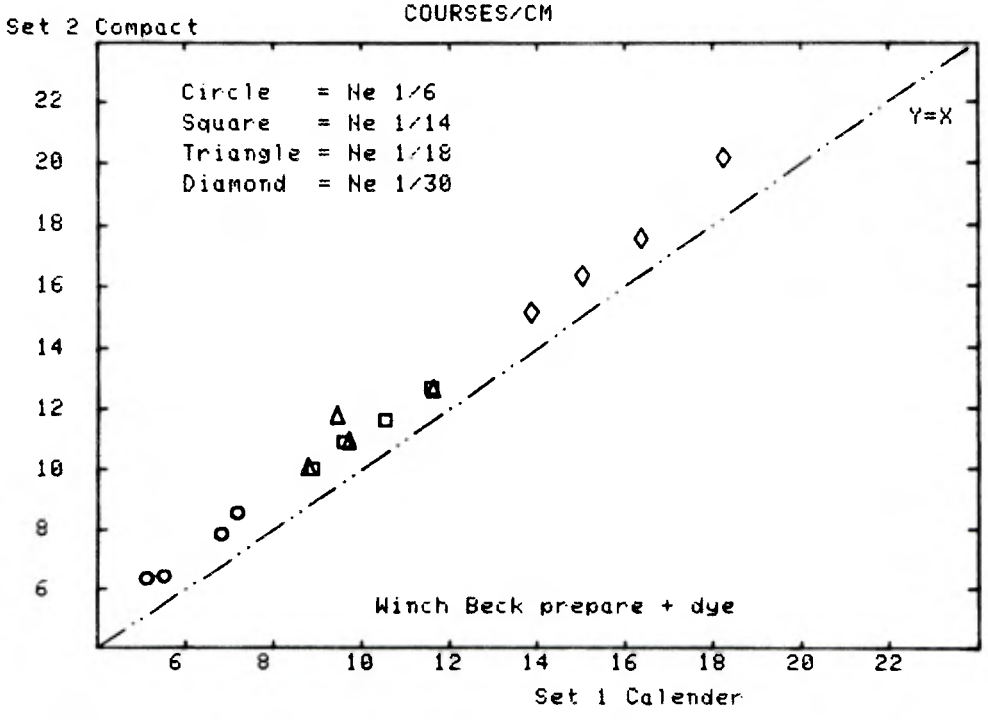
IIC/CI : SINGLE JERSEY : FINISHED FABRIC : AS DELIVERED

STITCH LENGTH CM



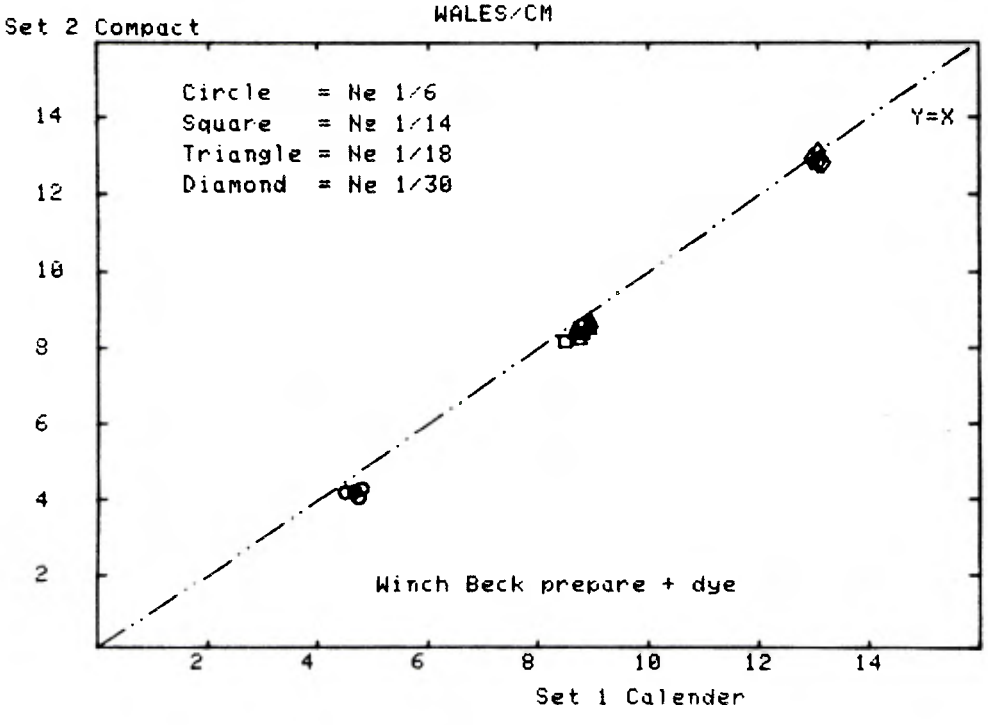
IIC/CI : SINGLE JERSEY : FINISHED FABRIC : AS DELIVERED

COURSES/CM



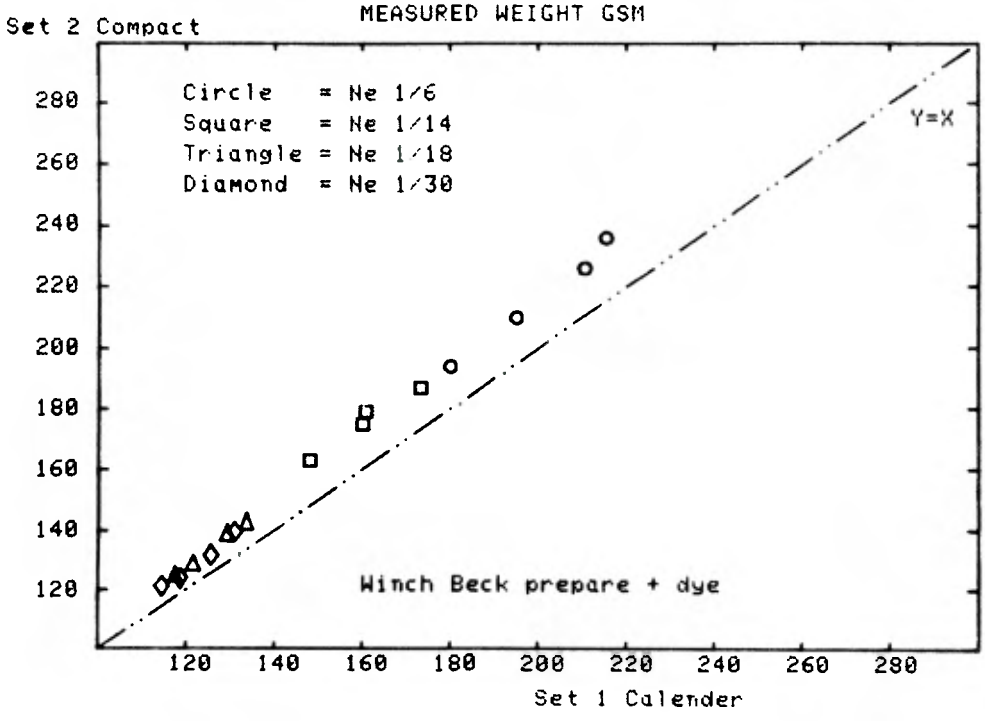
IIC/CI : SINGLE JERSEY : FINISHED FABRIC : AS DELIVERED

WALES/CM



IIC/CI : SINGLE JERSEY : FINISHED FABRIC : AS DELIVERED

MEASURED WEIGHT GSM



IIC/CI STARFISH DATABASE EXPANSION 1987

SINGLE JERSEY : RING SPUN YARNS : FINISHED FABRICS
ROUTE 1 : Winch Beck prepare, Winch Beck dye
Set 1 Calender : Set 2 Compact

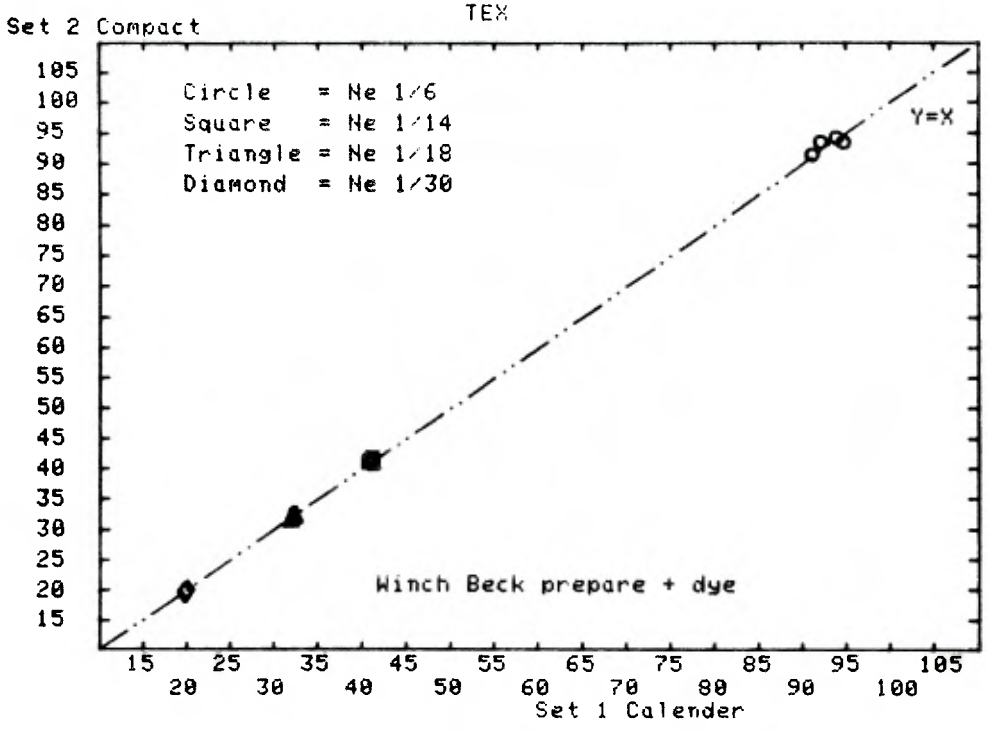
Averaged IIC/CI Test Data : Reference State

Sample Ref.No.		Set 1 Tex	SL cm	C/cm	W/cm	Wtgsm	Set 2 Tex	SL cm	C/cm	W/cm	Wtgsm
A-1		93.9	0.6915	8.15	5.85	303.2	94.38	0.6883	8.31	5.77	305.5
A-2		92.11	0.7228	7.9	5.54	291.4	93.69	0.7213	7.89	5.58	295.7
A-3		94.77	0.7822	7.12	5.37	278.3	93.62	0.7811	7.09	5.4	278.3
A-4		91.14	0.8102	6.77	5.29	260.5	91.62	0.8069	6.84	5.22	260.9
	mean	92.98					93.32				
	sd	1.65					1.19				
B-1		40.63	0.4139	13.45	10.13	227.9	41.19	0.4137	13.28	9.88	224.6
B-2		40.71	0.4368	12.49	9.8	216	41.22	0.4334	12.46	9.63	217.2
B-3		41.05	0.4558	11.97	9.58	210.5	41.74	0.4555	11.94	9.33	212.4
B-4		41.18	0.4784	11.33	9.25	202.2	40.82	0.4838	11.18	9.06	202.2
	mean	40.89					41.24				
	sd	0.26					0.38				
C-1		32.44	0.3933	13.54	10.67	181	32.12	0.3945	13.45	10.6	180.2
C-2		32.08	0.4151	12.68	10.58	175.4	32.01	0.4127	12.71	10.31	174.3
C-3		31.84	0.4378	11.96	10.1	165.3	31.56	0.4387	11.97	9.93	164.4
C-4		31.77	0.4601	11.13	9.94	159.5	31.72	0.4604	11.04	9.89	160.6
	mean	32.03					31.85				
	sd	0.3					0.26				
D-1		19.59	0.2671	20.27	15.38	165.4	19.65	0.2675	20.31	15.23	165.8
D-2		19.79	0.283	18.63	15.03	158.4	19.65	0.2869	18.66	14.96	158.3
D-3		19.78	0.2952	17.67	14.57	153.1	19.68	0.2959	17.58	14.5	152.5
D-4		19.93	0.3065	16.78	14.38	148.6	20.03	0.3068	16.78	14.34	148.8
	mean	19.77					19.75				
	sd	0.14					0.19				

N.B. Tex results are IIC only

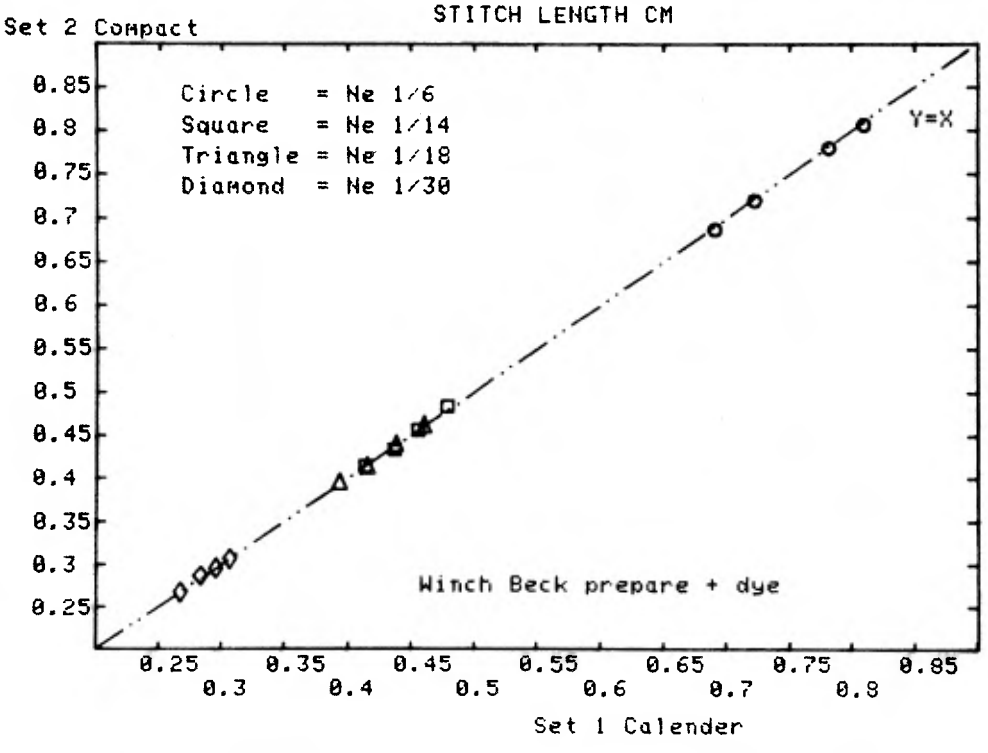
IIC/CI : SINGLE JERSEY : FINISHED FABRIC : REFERENCE STATE

TEX

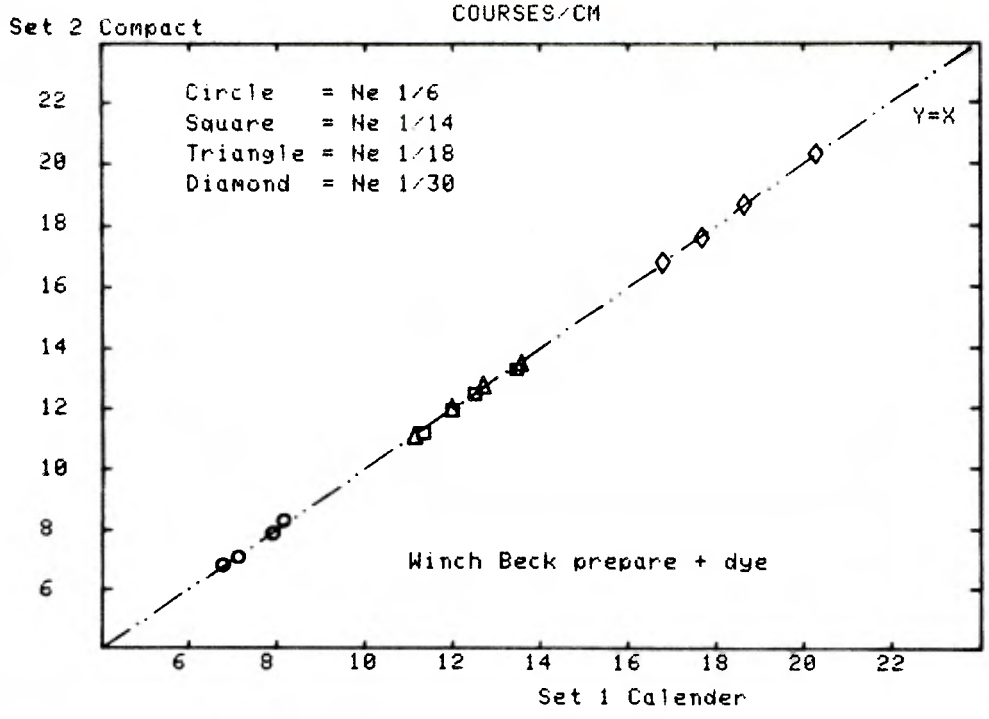


IIC/CI : SINGLE JERSEY : FINISHED FABRIC : REFERENCE STATE

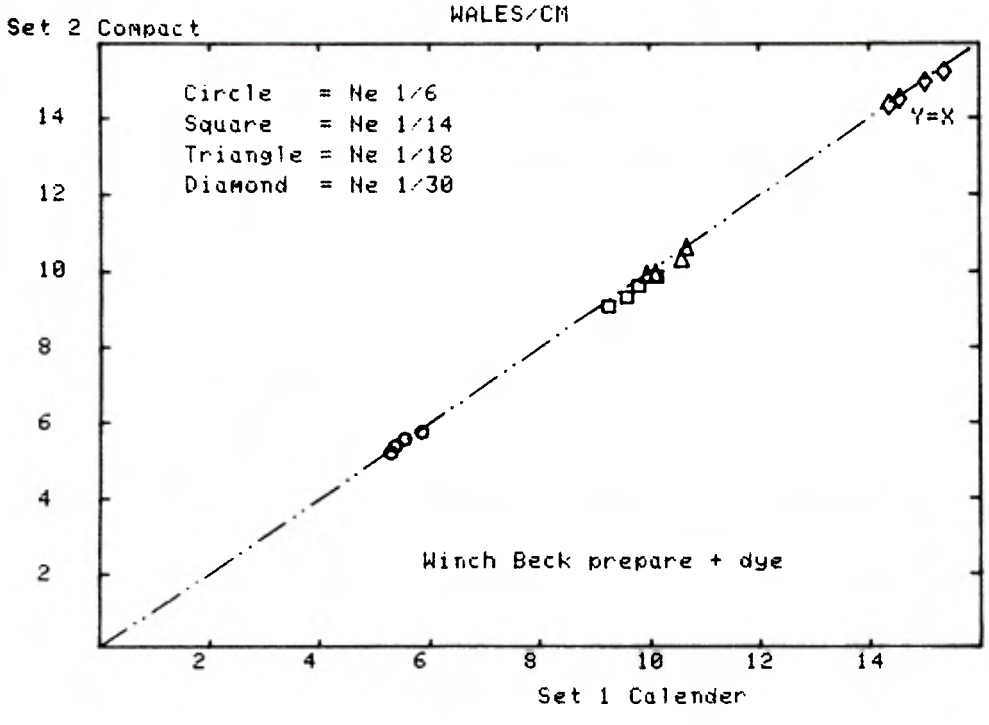
STITCH LENGTH CM



IIC/CI : SINGLE JERSEY : FINISHED FABRIC : REFERENCE STATE

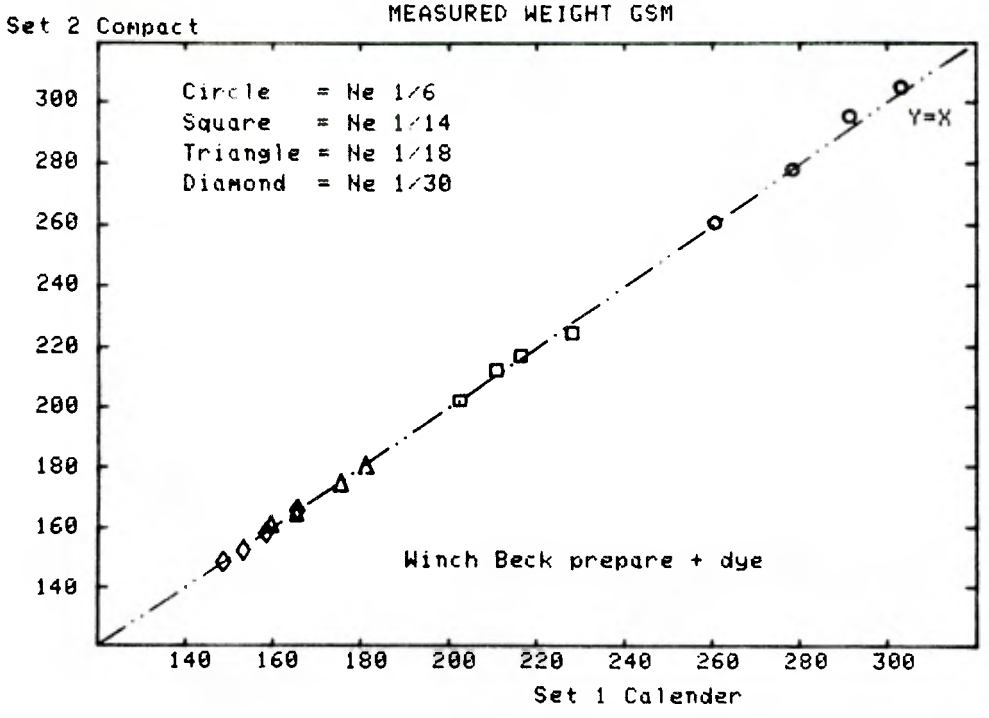


IIC/CI : SINGLE JERSEY : FINISHED FABRIC : REFERENCE STATE



IIC/CI : SINGLE JERSEY : FINISHED FABRIC : REFERENCE STATE

MEASURED WEIGHT GSM



IIC/CI STARFISH DATABASE EXPANSION 1987

SINGLE JERSEY : RING SPUN YARNS : FINISHED FABRICS
ROUTE 1 : Winch Beck prepare, Winch Beck dye
Set 3 Resin + Calender : Set 4 Resin + Compact

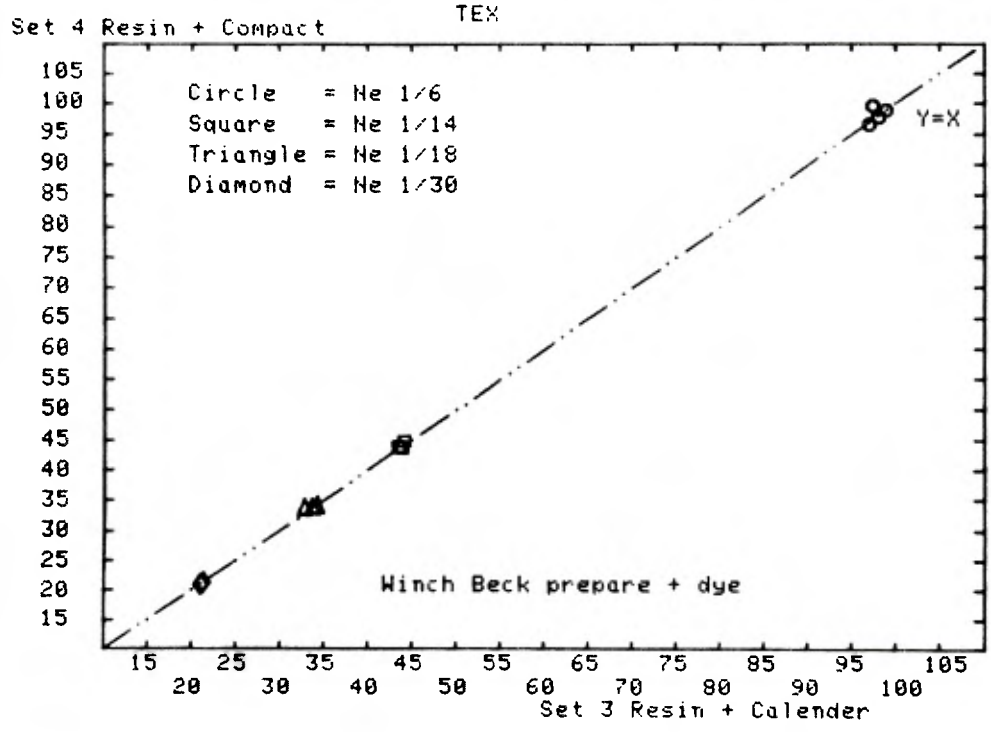
Averaged IIC/CI Test Data : As Delivered

Sample Ref.No.		Set 3 Tex	SL cm	C/cm	W/cm	Wtgsm	Set 4 Tex	SL cm	C/cm	W/cm	Wtgsm
A-1		98.15	0.6992	6.66	4.92	221.5	97.9	0.6956	7.4	4.78	232.1
A-2		97.45	0.7277	6.35	4.8	209.4	99.77	0.7221	6.73	4.77	223.4
A-3		98.97	0.7842	5.33	4.81	193.2	99.02	0.7867	5.57	4.74	209.8
A-4		97.03	0.8153	5.08	4.83	185.3	96.7	0.8125	5.19	4.76	197.5
	mean	97.9					98.35				
	sd	0.85					1.34				
B-1		43.75	0.4181	10.96	8.97	177.4	43.63	0.4179	11.71	9.09	196.7
B-2		43.6	0.44	9.84	8.89	166.4	43.92	0.439	10.48	9.06	186.2
B-3		44.05	0.4596	9.17	8.75	164.8	44.75	0.4603	9.76	8.98	179.4
B-4		43.48	0.4858	8.35	8.69	154.5	43.82	0.4846	8.9	8.94	169.3
	mean	43.72					44.03				
	sd	0.25					0.5				
C-1		33.67	0.3945	10.97	9.4	135.6	33.68	0.3987	11.81	9.39	146.9
C-2		32.8	0.4179	10.02	9.38	129.2	33.59	0.4168	10.67	9.44	141.9
C-3		32.8	0.4389	9.19	9.26	123.4	33.65	0.437	9.81	9.25	133.2
C-4		34.21	0.462	8.36	9.22	119.6	33.91	0.4662	8.78	9.33	129
	mean	33.37					33.71				
	sd	0.69					0.14				
D-1		20.99	0.2703	17.39	13.59	134.6	20.93	0.2702	18.19	13.83	143.1
D-2		21.26	0.2834	15.61	13.47	129.5	21.27	0.2857	16.18	13.79	135.9
D-3		21.08	0.2985	14.26	13.43	122.2	21.04	0.2986	14.89	13.72	128.7
D-4		21.2	0.3131	13.3	13.24	117.4	21.09	0.3111	13.68	13.41	122.7
	mean	21.13					21.08				
	sd	0.12					0.14				

N.B. Tex results are IIC only

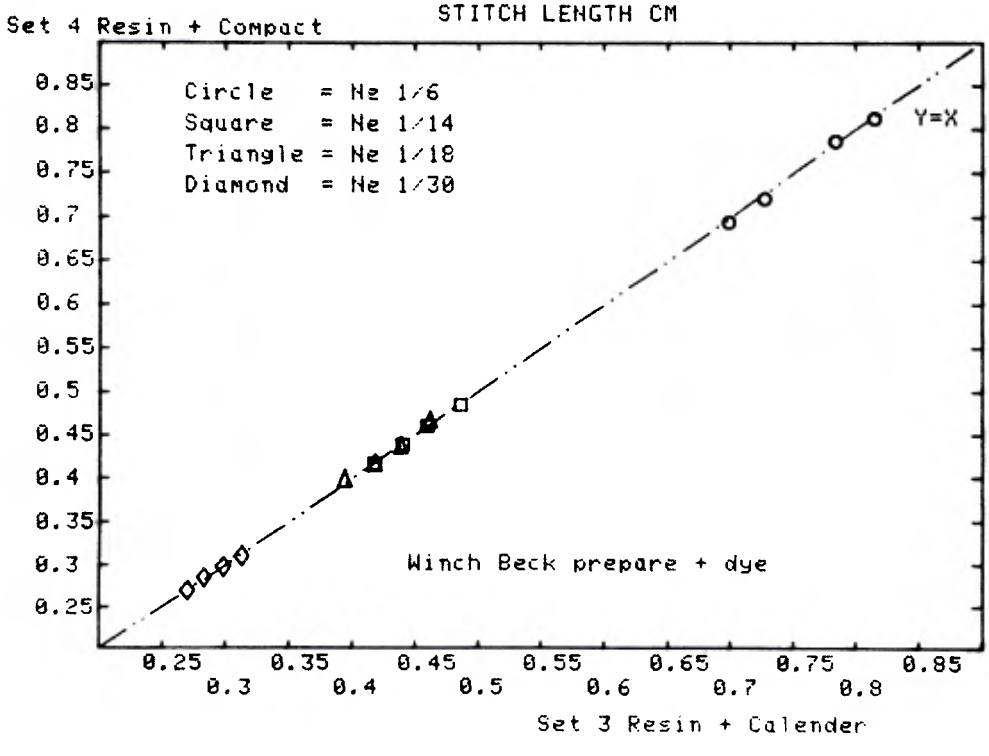
IIC/CI : SINGLE JERSEY : FINISHED FABRIC : AS DELIVERED

TEX



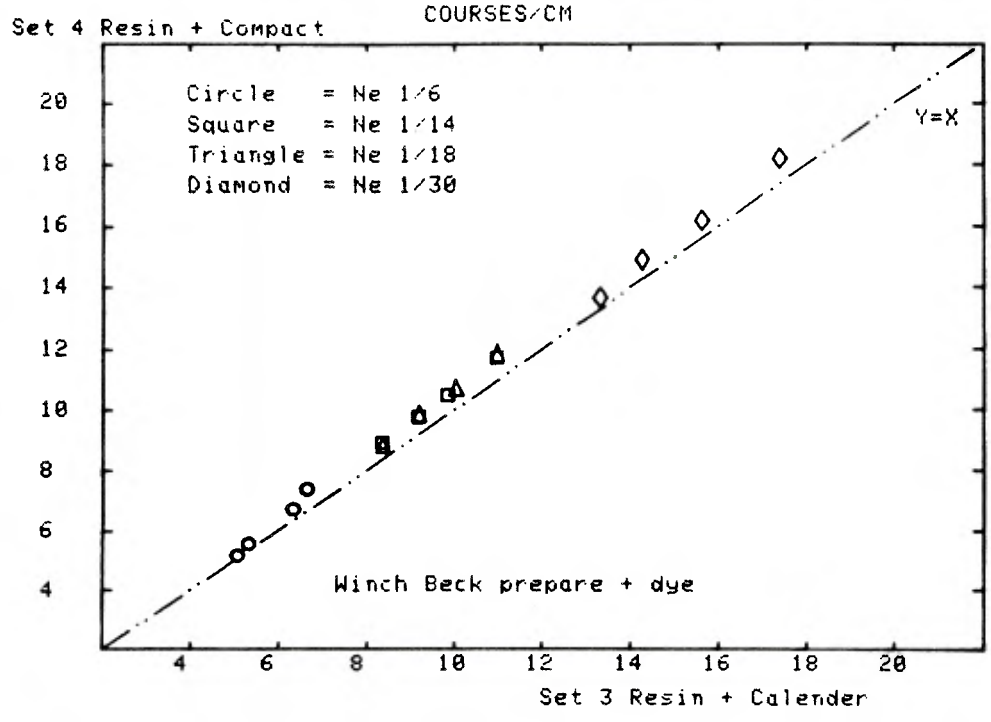
IIC/CI : SINGLE JERSEY : FINISHED FABRIC : AS DELIVERED

STITCH LENGTH CM



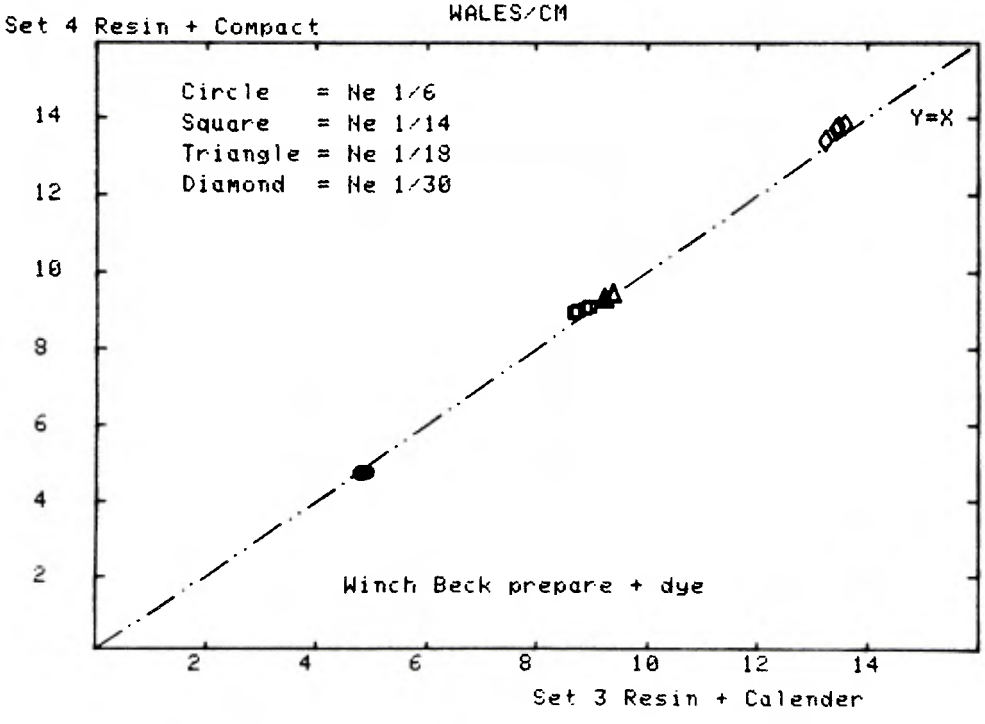
IIC/CI : SINGLE JERSEY : FINISHED FABRIC : AS DELIVERED

COURSES/CM



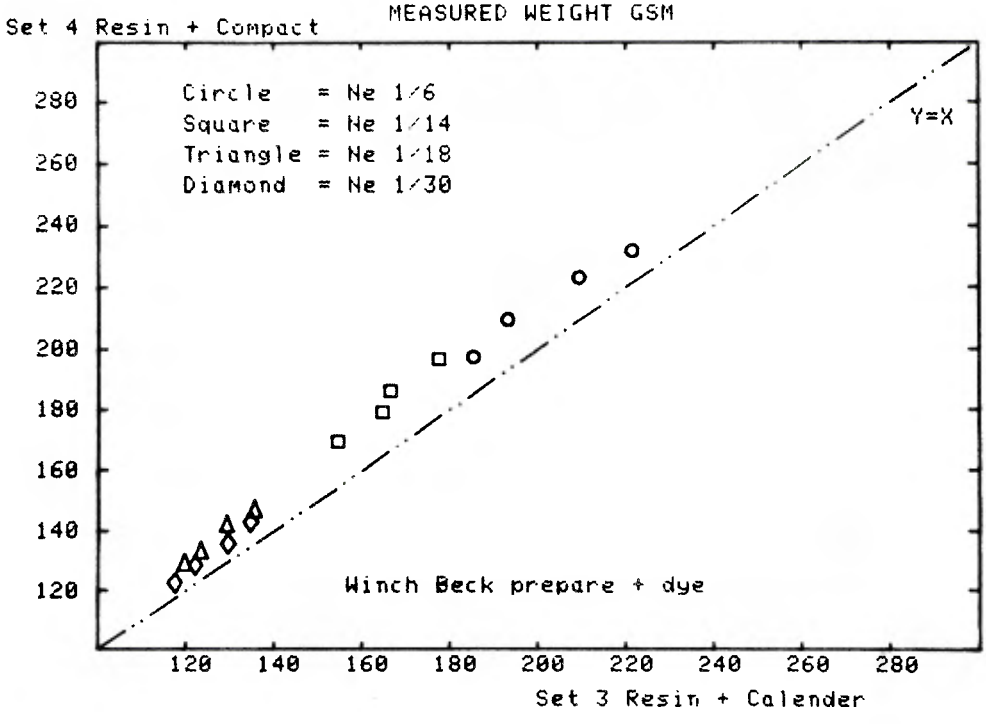
IIC/CI : SINGLE JERSEY : FINISHED FABRIC : AS DELIVERED

WALES/CM



IIC/CI : SINGLE JERSEY : FINISHED FABRIC : AS DELIVERED

MEASURED WEIGHT GSM



IIC/CI STARFISH DATABASE EXPANSION 1987

SINGLE JERSEY : RING SPUN YARNS : FINISHED FABRICS
ROUTE 1 : Winch Beck prepare, Winch Beck dye
Set 3 Resin + Calender : Set 4 Resin + Compact

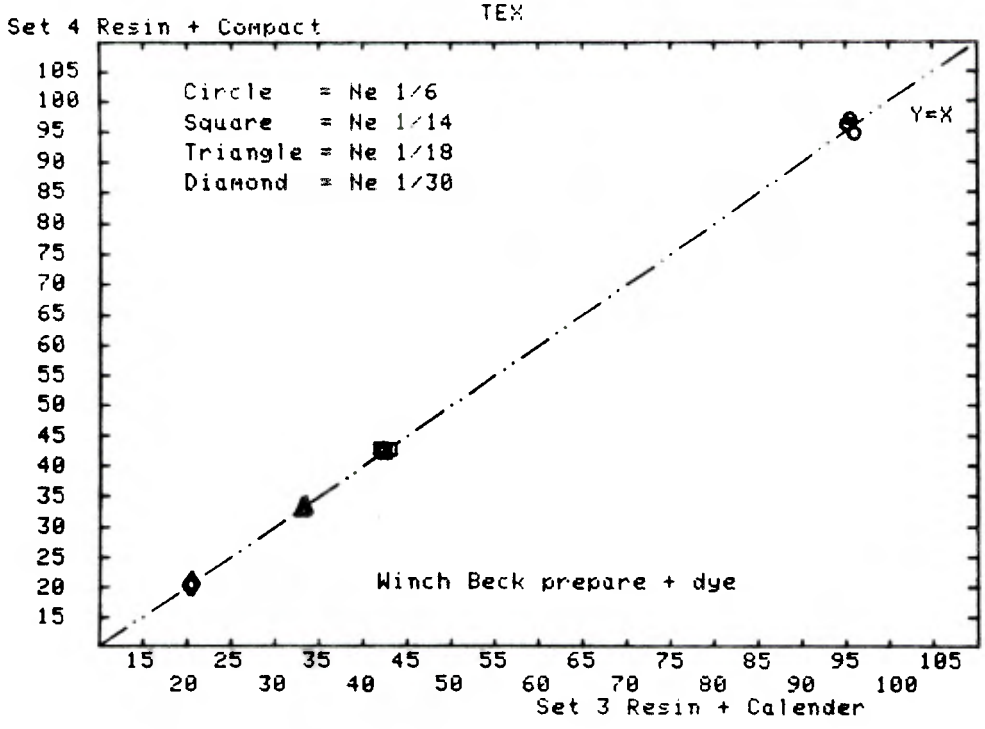
Averaged IIC/CI Test Data : Reference State

Sample Ref.No.		Set 3 Tex	SL cm	C/cm	W/cm	Wtgsm	Set 4 Tex	SL cm	C/cm	W/cm	Wtgsm
A-1		95.53	0.6968	7.67	5.73	280.6	97.14	0.692	7.52	5.37	268.7
A-2		95.18	0.7245	7.07	5.41	254.4	96.33	0.7271	7.06	5.25	256.3
A-3		95.17	0.7918	6.07	5.48	242.7	96.21	0.7892	6.08	5.27	241.9
A-4		96	0.8183	5.73	5.44	227.8	94.75	0.8076	5.61	5.29	229.7
	mean	95.47					96.11				
	sd	0.39					1				
B-1		42.33	0.416	11.91	9.8	203.7	42.1	0.4159	12.12	9.68	205.3
B-2		41.9	0.4395	10.82	9.67	192	42.79	0.4398	10.91	9.59	194.2
B-3		42.96	0.4586	10.05	9.58	184.7	42.58	0.4566	10.26	9.47	188.4
B-4		42.34	0.4947	9.48	9.33	177.7	42.68	0.4826	9.39	9.28	176.9
	mean	42.38					42.54				
	sd	0.44					0.31				
C-1		32.96	0.3985	11.65	10.25	151.7	33.09	0.3988	11.96	10.03	154.2
C-2		32.95	0.4052	10.8	10.07	146.4	32.8	0.4172	10.94	10.03	148.3
C-3		33.09	0.4382	9.95	9.98	140.1	33	0.444	10.08	9.91	140.7
C-4		33.36	0.4616	9.07	9.81	133.1	33.3	0.4644	9.25	9.91	136.7
	mean	33.09					33.05				
	sd	0.19					0.21				
D-1		20.21	0.2675	18.15	14.75	147.2	20.26	0.2688	18.53	14.61	148.2
D-2		20.6	0.2839	16.51	14.27	138	20.32	0.286	16.68	14.34	137.7
D-3		20.5	0.2984	15.29	14.11	131.8	20.5	0.2967	15.26	14.24	132.8
D-4		20.42	0.3077	14.19	14.07	127.7	20.96	0.3076	14.28	14.12	127.7
	mean	20.43					20.51				
	sd	0.16					0.32				

N.B. Tex results are IIC only

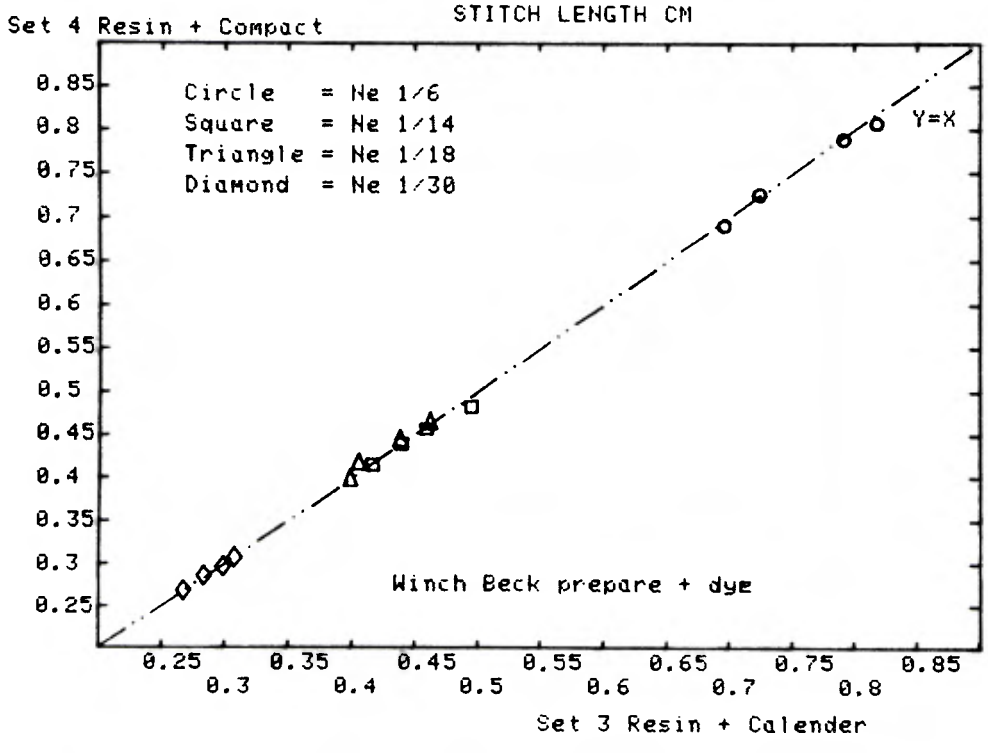
IIC/CI : SINGLE JERSEY : FINISHED FABRIC : REFERENCE STATE

TEX

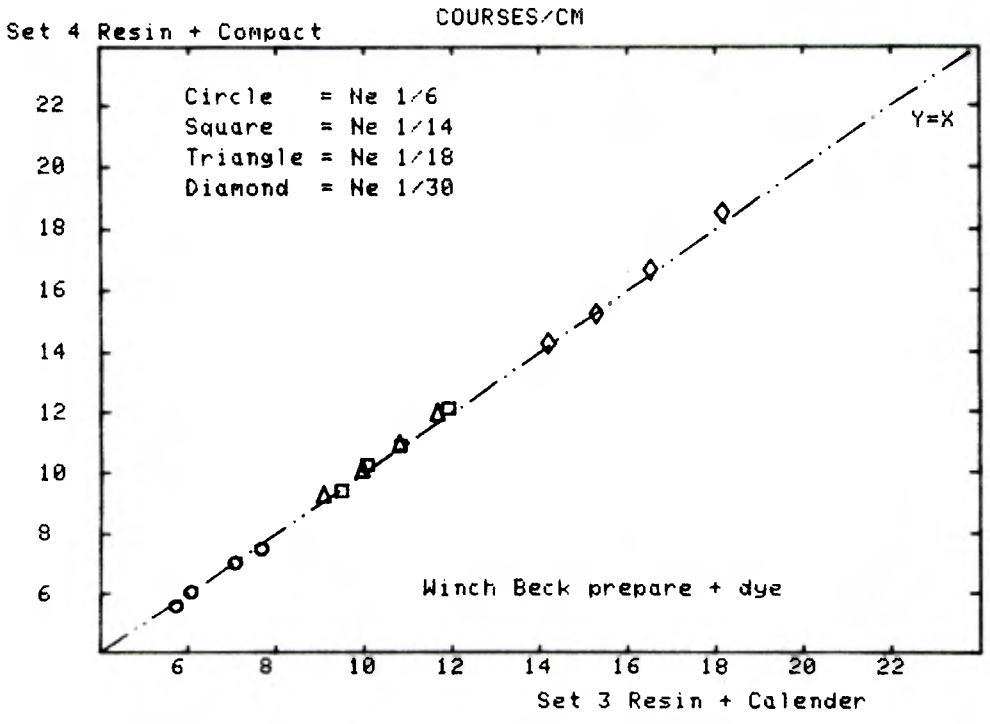


IIC/CI : SINGLE JERSEY : FINISHED FABRIC : REFERENCE STATE

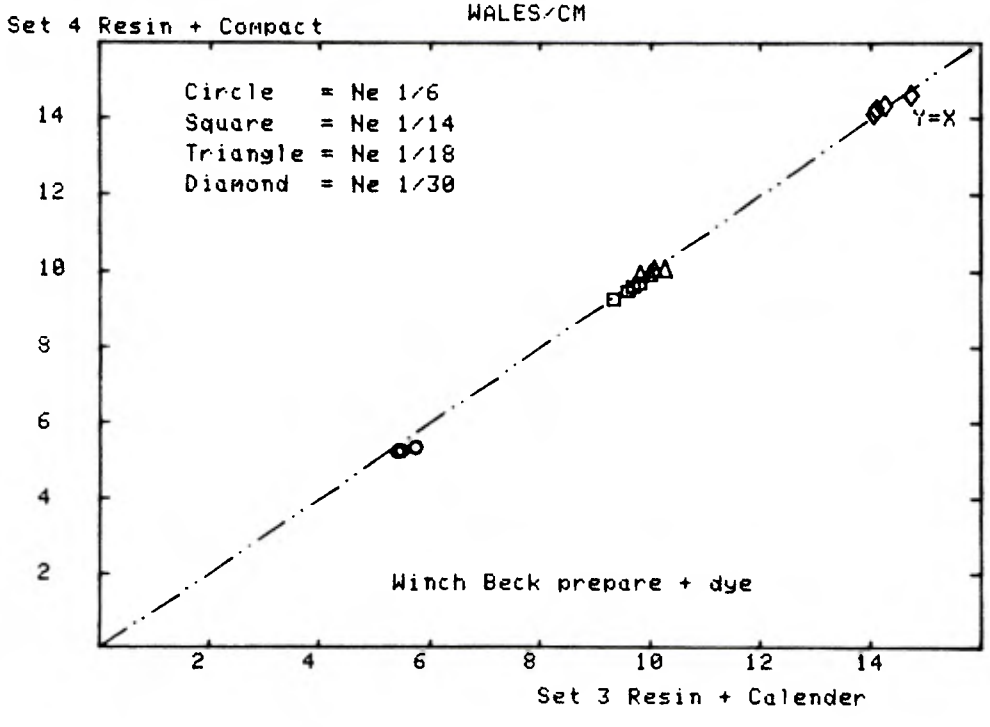
STITCH LENGTH CM



IIC/CI : SINGLE JERSEY : FINISHED FABRIC : REFERENCE STATE

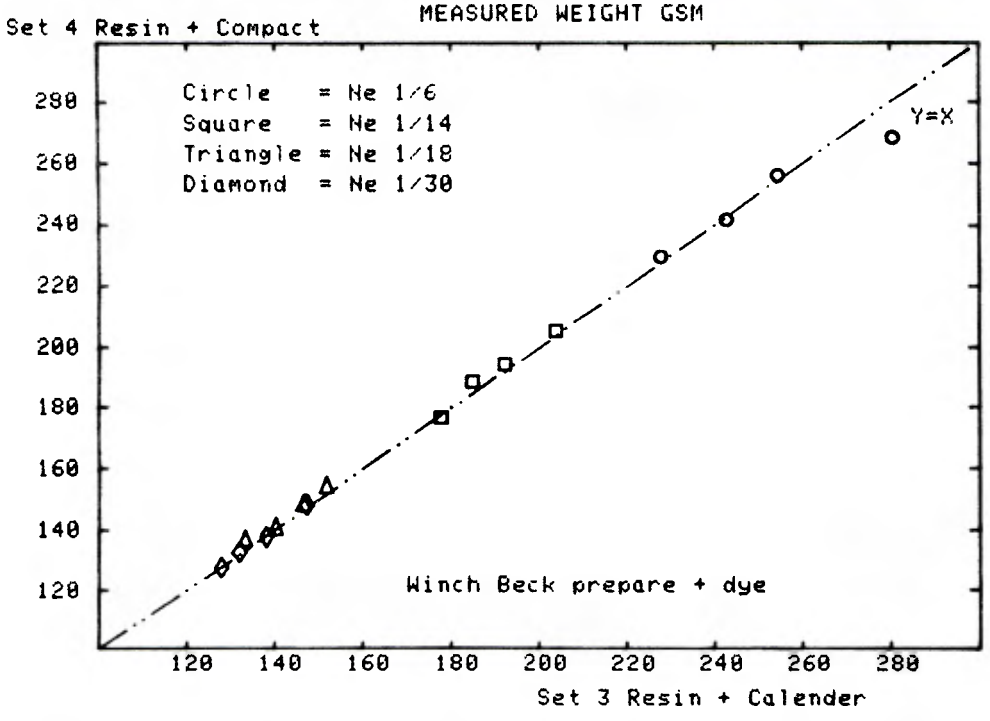


IIC/CI : SINGLE JERSEY : FINISHED FABRIC : REFERENCE STATE



IIC/CI : SINGLE JERSEY : FINISHED FABRIC : REFERENCE STATE

MEASURED WEIGHT GSM



A P P E N D I X 2

ROUTE 2 : ARGATHEN PREPARE, WINCH BECK DYE

Set 1 Calender vs Set 2 Compact

Before Wash	A2/1 - A2/4
Reference State	A2/5 - A2/8

Set 3 Resin, Calender vs Set 4 Resin, Compact

Before Wash	A2/9 - A2/12
Reference State	A2/13- A2/16

IIC/CI STARFISH DATABASE EXPANSION 1987

SINGLE JERSEY : RING SPUN YARNS : FINISHED FABRICS
FINISH 2 : Argathen prepare, Winch Beck dye
Set 1 Calender : Set 2 Compact

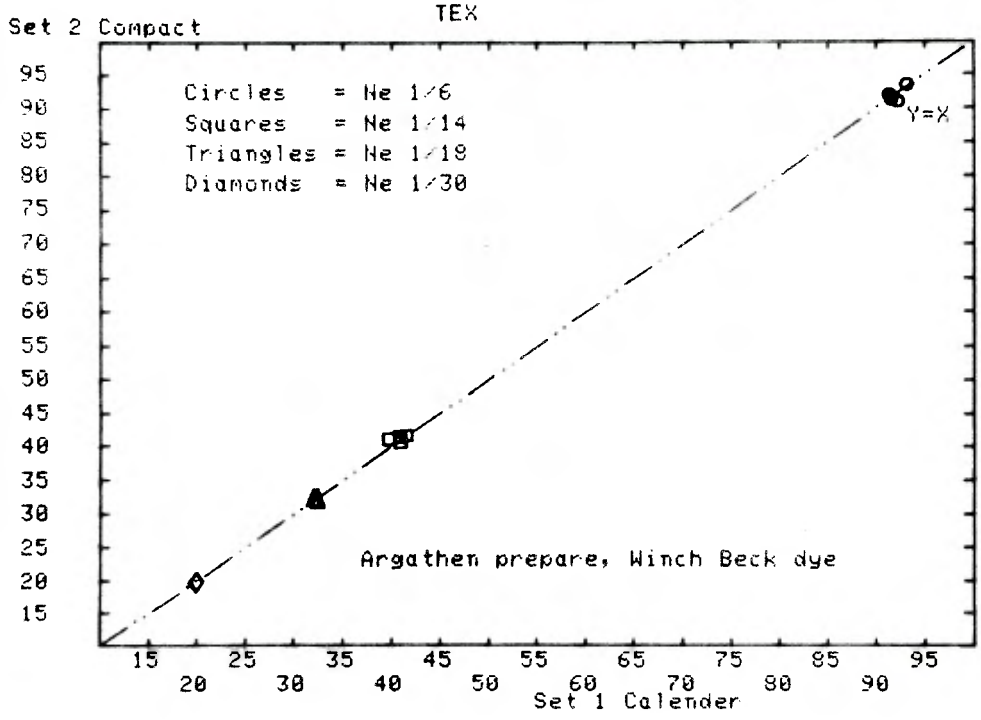
Averaged IIC/CI Test Data : As Delivered

Sample Ref.No.		Set 1 Tex	SL cm	C/cm	W/cm	Wtgsm	Set 2 Tex	SL cm	C/cm	W/cm	Wtgsm
A-1		91.6	0.7015	6.63	4.83	208.2	91.39	0.6987	7.85	4.98	251.3
A-2		92.24	0.7293	6.32	4.86	208	91.08	0.7252	7.24	4.98	237.3
A-3		93.19	0.7888	5.37	4.8	192.2	93.61	0.7841	6.61	4.8	233.7
A-4		91.36	0.816	5.2	4.77	182.3	92.01	0.8141	6.12	4.77	212.4
	mean	92.1					92.02				
	sd	0.82					1.13				
B-1		40.72	0.4135	10.86	9.13	165.1	41.37	0.4185	12.5	9.04	195.6
B-2		39.67	0.4373	9.58	9.03	155.7	41.01	0.4406	11.36	8.92	180.7
B-3		41.43	0.4585	9.02	8.95	151.4	41.61	0.4591	10.83	8.76	182.1
B-4		40.85	0.4773	8.43	8.92	144.2	40.64	0.4844	10.24	8.6	170.1
	mean	40.67					41.16				
	sd	0.74					0.42				
C-1		32.15	0.399	11.11	9.14	128.6	32.06	0.3987	12.74	9.22	151.7
C-2		32.31	0.4193	10.71	8.96	130.4	32.19	0.417	11.78	9.2	146.4
C-3		32.36	0.441	9.36	8.96	118.8	31.83	0.4428	10.82	8.94	139.2
C-4		31.93	0.4668	8.64	8.74	112.6	32.18	0.4638	9.78	8.84	129.6
	mean	32.19					32.06				
	sd	0.19					0.17				
D-1		19.82	0.2709	17.02	13.52	123	19.67	0.269	19.02	13.61	139.7
D-2		19.95	0.2863	15.42	13.17	115.9	19.77	0.2863	17.24	13.63	131.9
D-3		n.a.	n.a.	n.a.	n.a.	n.a.	19.84	0.2983	16.09	13.51	130.3
D-4		19.76	0.3108	13.57	12.95	112.1	n.a.	n.a.	n.a.	n.a.	n.a.
	mean	19.84					19.76				
	sd	0.1					0.09				

N.B. Tex results are IIC only
Set 1 : Sample D-3 Data not available
Set 2 : Sample D-4 Data not available

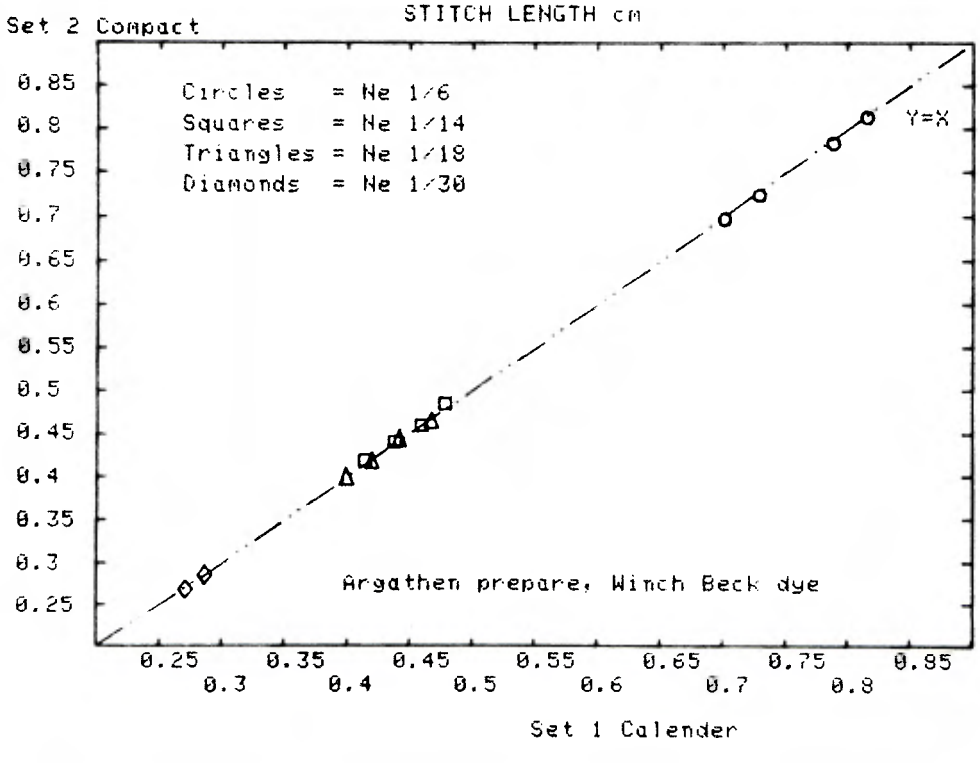
IIC/CI : SINGLE JERSEY : FINISHED FABRICS : AS DELIVERED

TEX

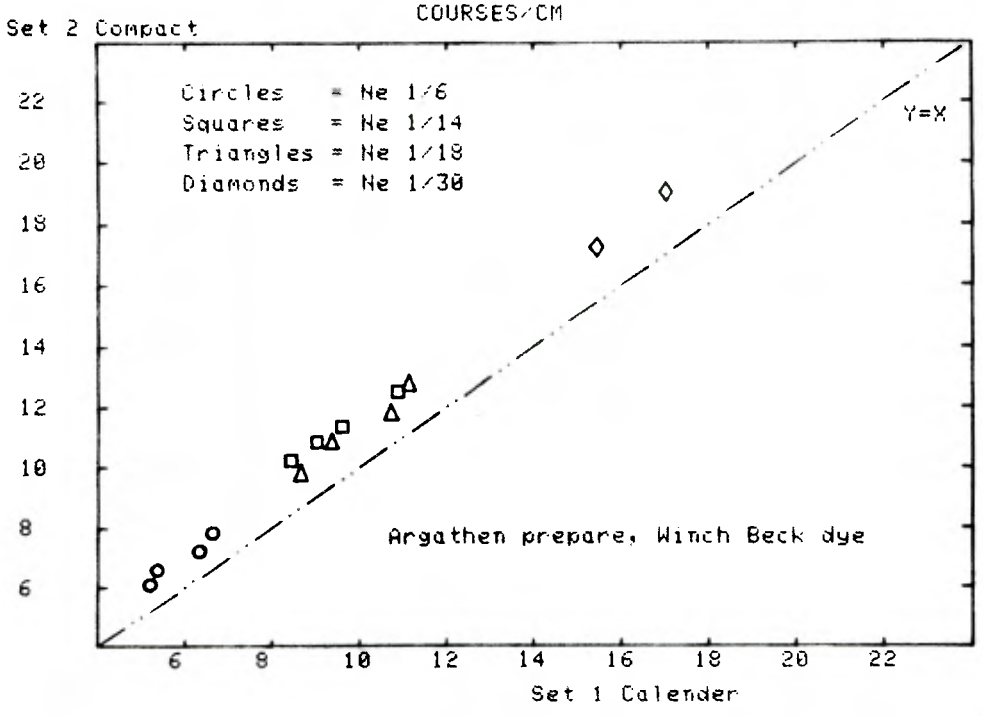


IIC/CI : SINGLE JERSEY : FINISHED FABRICS : AS DELIVERED

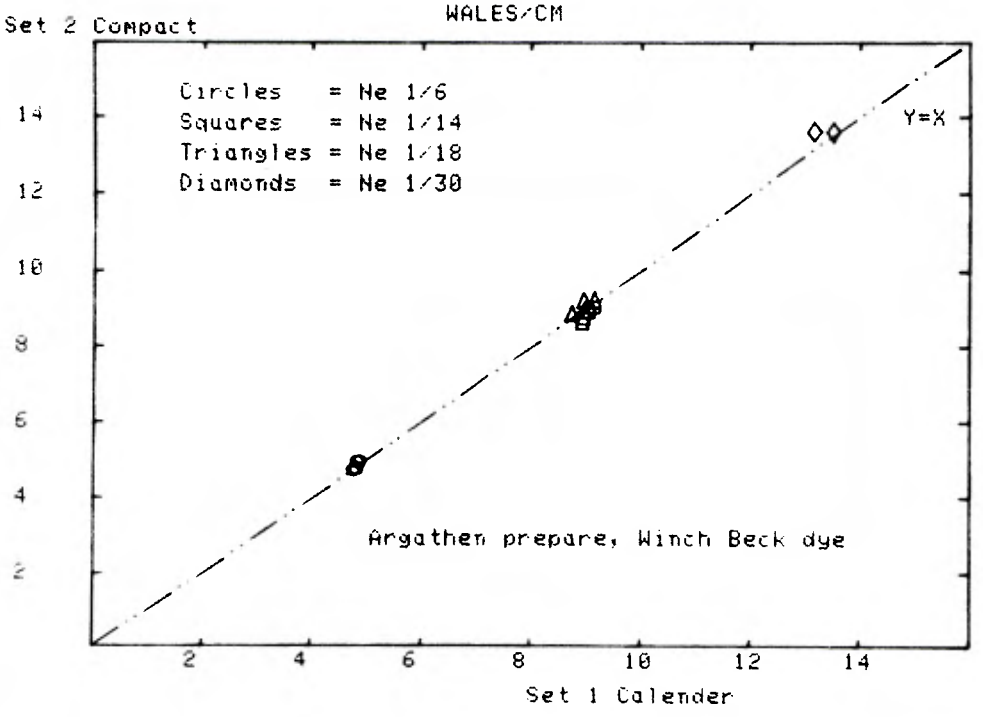
STITCH LENGTH cm



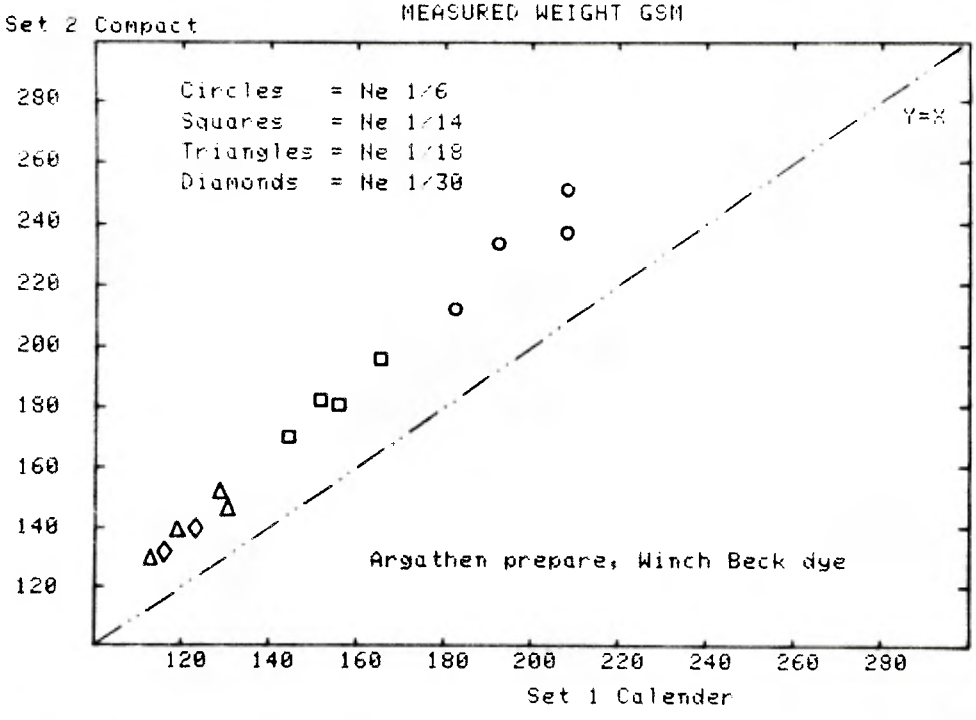
IIC/CI : SINGLE JERSEY : FINISHED FABRICS : AS DELIVERED
COURSES/CM



IIC/CI : SINGLE JERSEY : FINISHED FABRICS : AS DELIVERED
WALES/CM



IIC/CI : SINGLE JERSEY : FINISHED FABRICS : AS DELIVERED
MEASURED WEIGHT GSM



IIC/CI STARFISH DATABASE EXPANSION 1987

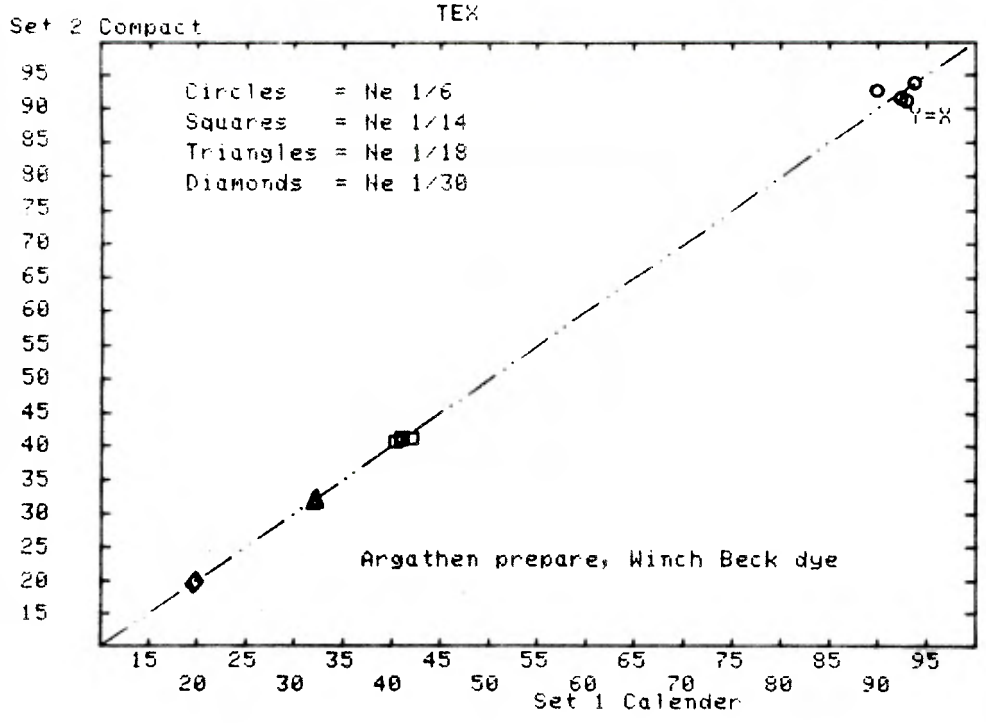
SINGLE JERSEY : RING SPUN YARNS : FINISHED FABRICS
ROUTE 2 : Argathen prepare, Winch Beck dye
Set 1 Calender : Set 2 Compact

Averaged IIC/CI Test Data : Reference State

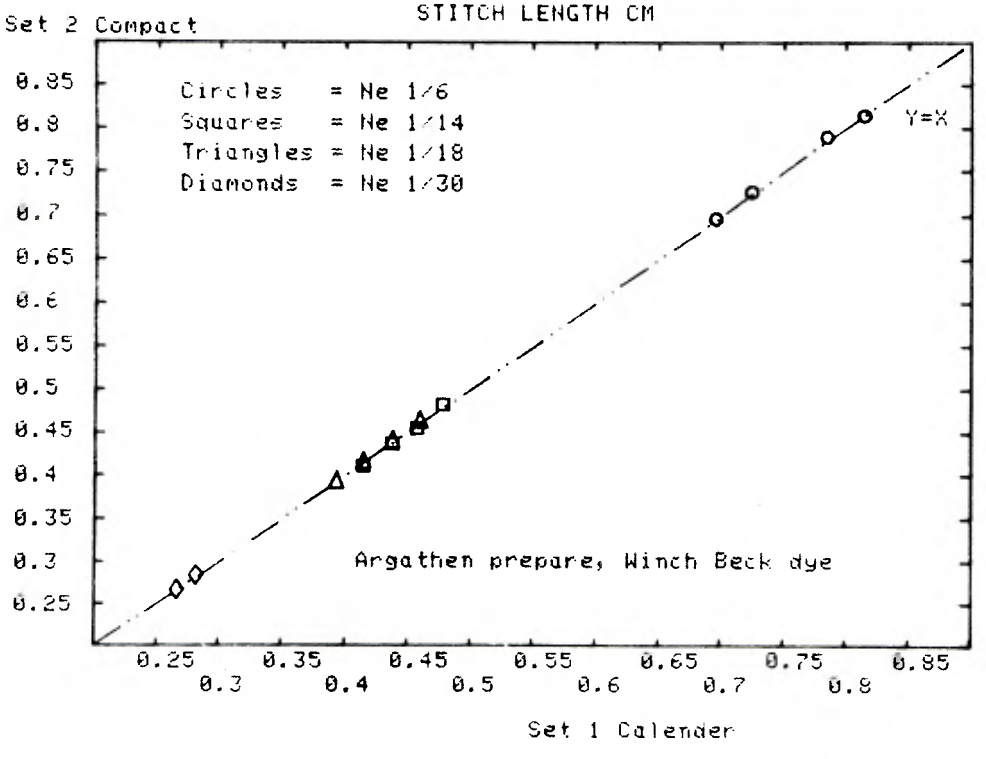
Sample Ref.No.		Set 1 Tex	SL cm	C/cm	W/cm	Wtgsm	Set 2 Tex	SL cm	C/cm	W/cm	Wtgsm
A-1		92.95	0.6963	8.04	5.86	300.3	91.25	0.6985	8.12	5.94	302.5
A-2		92.4	0.7249	7.67	5.67	290.7	91.63	0.7282	7.79	5.75	287.8
A-3		93.76	0.785	7.08	5.33	270	93.89	0.7908	7.08	5.44	275.3
A-4		89.9	0.8147	6.8	5.18	256.2	92.76	0.8155	6.82	5.42	261.1
	mean	92.25					92.38				
	sd	1.66					1.19				
B-1		40.89	0.4141	12.94	10.22	225.9	40.94	0.4121	13.23	10.19	227.7
B-2		40.28	0.4371	12.15	9.93	211.8	40.64	0.4372	12.36	9.89	216.6
B-3		40.93	0.4572	11.67	9.58	206.8	41.16	0.4551	11.85	9.58	211.4
B-4		41.94	0.4772	11.06	9.31	199.7	41.01	0.4821	11.29	9.23	199.7
	mean	41.01					40.94				
	sd	0.69					0.22				
C-1		32.17	0.3932	12.98	11.01	180.2	31.87	0.3942	13.3	10.85	183.8
C-2		32.26	0.4146	12.38	10.59	173.7	32.1	0.416	12.47	10.58	175.6
C-3		32.27	0.4377	11.57	10.41	168.3	31.83	0.4403	11.73	10.19	168.2
C-4		31.93	0.4596	10.91	10.01	159.1	31.66	0.4628	11.07	9.91	161.8
	mean	32.16					31.86				
	sd	0.16					0.18				
D-1		19.89	0.2666	19.63	15.68	165.5	19.84	0.2684	19.95	15.76	166.6
D-2		19.58	0.2821	18.06	15.14	156.8	19.52	0.2853	18.5	15.14	157.8
D-3		n.a.	n.a.	n.a.	n.a.	n.a.	19.71	0.2972	17.62	14.72	153.4
D-4		19.75	0.307	16.48	14.43	147.6	n.a.	n.a.	n.a.	n.a.	n.a.
	mean	19.74					19.69				
	sd	0.15					0.16				

N.B. Tex results are IIC only
Set 1 : Sample D-3 Data not available
Set 2 : Sample D-4 Data not available

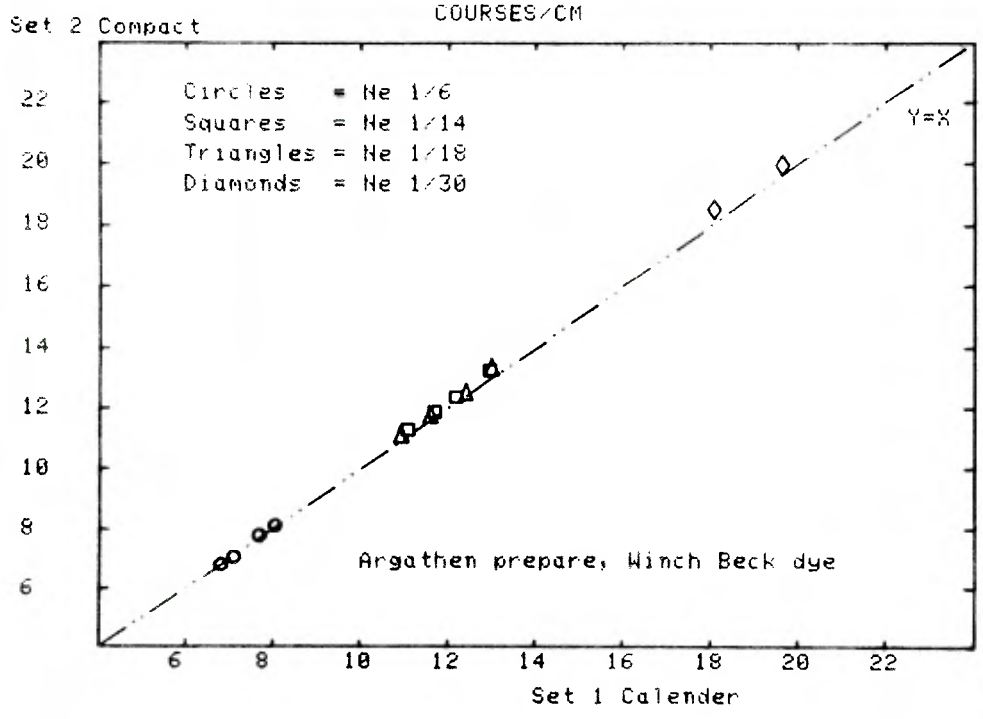
IIC/CI : SINGLE JERSEY : FINISHED FABRICS : REFERENCE STATE
TEX



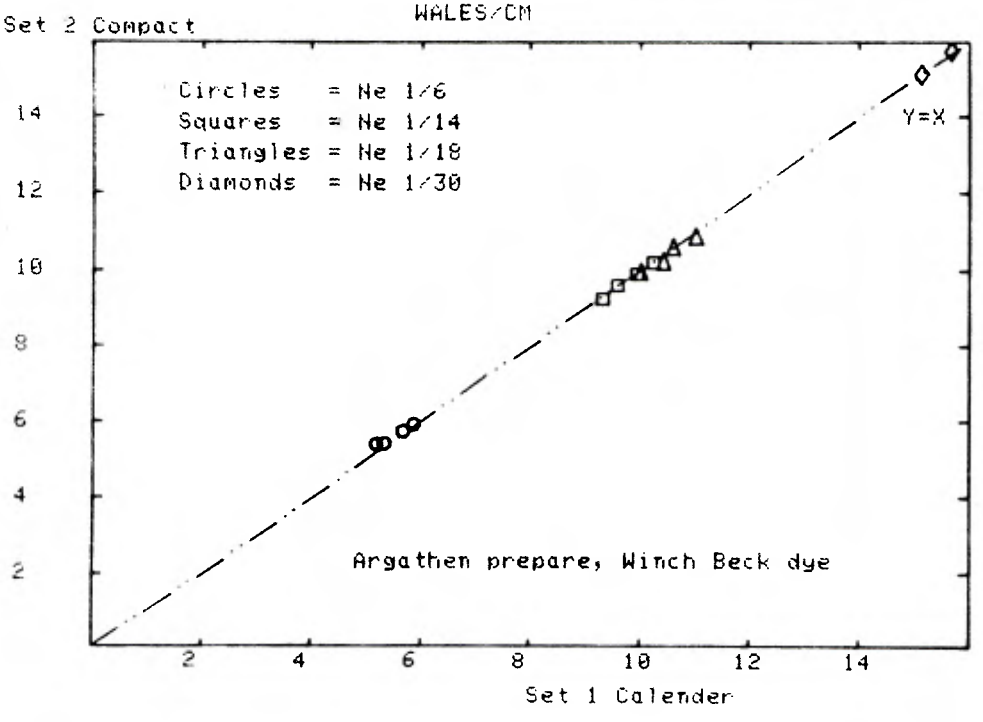
IIC/CI : SINGLE JERSEY : FINISHED FABRICS : REFERENCE STATE
STITCH LENGTH CM



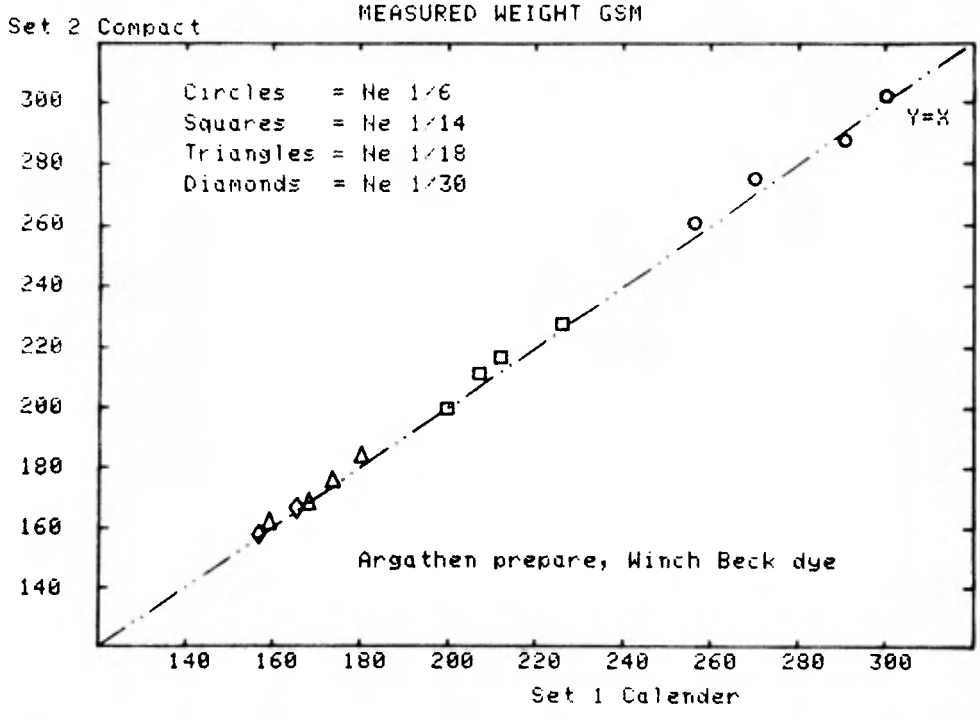
IIC/CI : SINGLE JERSEY : FINISHED FABRICS : REFERENCE STATE



IIC/CI : SINGLE JERSEY : FINISHED FABRICS : REFERENCE STATE



IIC/CI : SINGLE JERSEY : FINISHED FABRICS : REFERENCE STATE
MEASURED WEIGHT GSM



IIC/CI STARFISH DATABASE EXPANSION 1987

SINGLE JERSEY : RING SPUN YARNS : FINISHED FABRICS
ROUTE 2 : Argathen prepare, Winch Beck dye
Set 3 Resin + Calender : Set 4 Resin + Compact

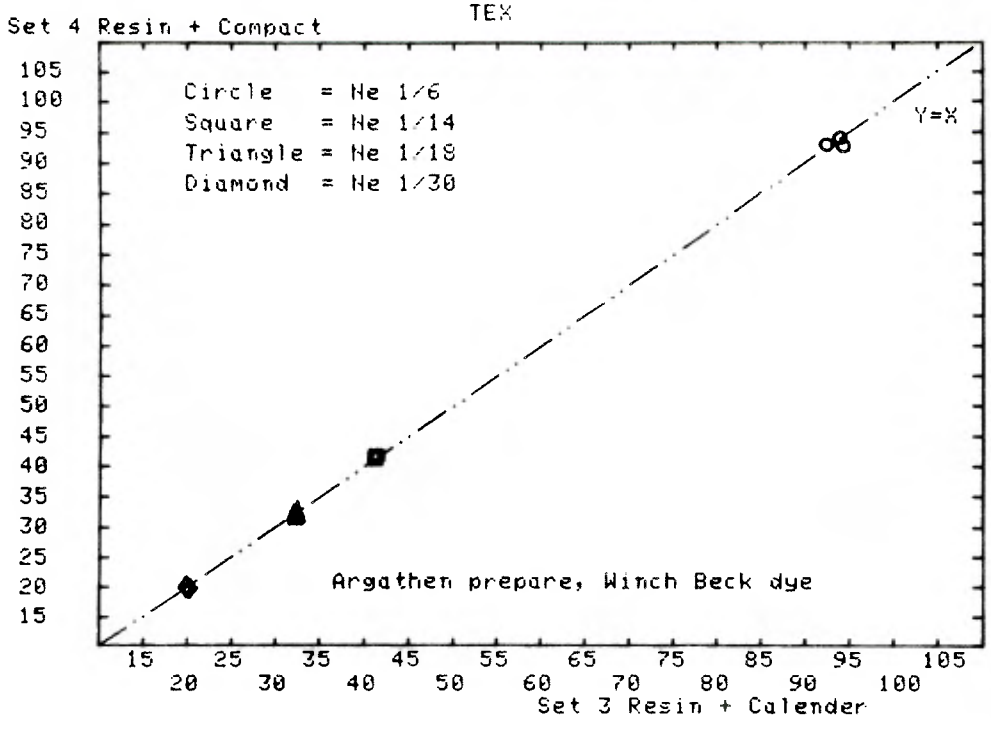
Averaged IIC/CI Test Data : As Delivered

Sample Ref.No.		Set 3 Tex	SL cm	C/cm	W/cm	Wtgsm	Set 4 Tex	SL cm	C/cm	W/cm	Wtgsm
A-1		92.45	0.6984	6.62	4.93	207.5	92.98	0.6933	6.88	4.69	206.4
A-2		94.37	0.7282	6.08	4.94	206.4	92.73	0.73	6.44	4.7	202.1
A-3		93.98	0.7878	5.69	4.35	183.3	94.07	0.7887	5.73	4.63	192.2
A-4		94.37	0.8155	5.3	4.26	175.9	92.74	0.8207	5.3	4.59	180.5
	mean	93.79					93.13				
	sd	0.91					0.63				
B-1		41.02	0.4169	10.94	9	164.7	41.32	0.4163	11.5	9.19	180.2
B-2		41.18	0.4393	9.74	8.81	156.9	41.06	0.4393	10.57	9.15	175
B-3		41.1	0.4601	9	8.81	153.7	41.84	0.46	9.83	8.92	168.7
B-4		41.36	0.4872	8.23	8.77	147.6	41.71	0.4837	9.04	8.82	162.3
	mean	41.17					41.48				
	sd	0.15					0.36				
C-1		32.41	0.3994	10.22	9.54	127.4	32.54	0.3995	11.2	9.75	137.1
C-2		32.06	0.4198	9.45	9.38	119.1	32.12	0.4192	10.14	9.6	128.9
C-3		32.23	0.4411	8.7	9.27	113.7	31.58	0.4408	9.56	9.42	123.6
C-4		32.47	0.4656	8.09	9.09	108.8	31.91	0.4653	8.82	9.1	120.1
	mean	32.29					32.04				
	sd	0.18					0.4				
D-1		19.85	0.2701	16.38	13.76	120.3	20.01	0.2685	17.39	14.02	129.2
D-2		19.85	0.2864	15.17	13.4	117	20.21	0.288	15.7	13.76	126.1
D-3		19.8	0.298	14.37	13.87	113.4	20.11	0.2978	14.76	13.87	121.3
D-4		20.26	0.3094	13.07	13	108.6	19.75	0.3085	13.63	13.65	117
	mean	19.94					20.02				
	sd	0.22					0.2				

N.B. Tex results are IIC only

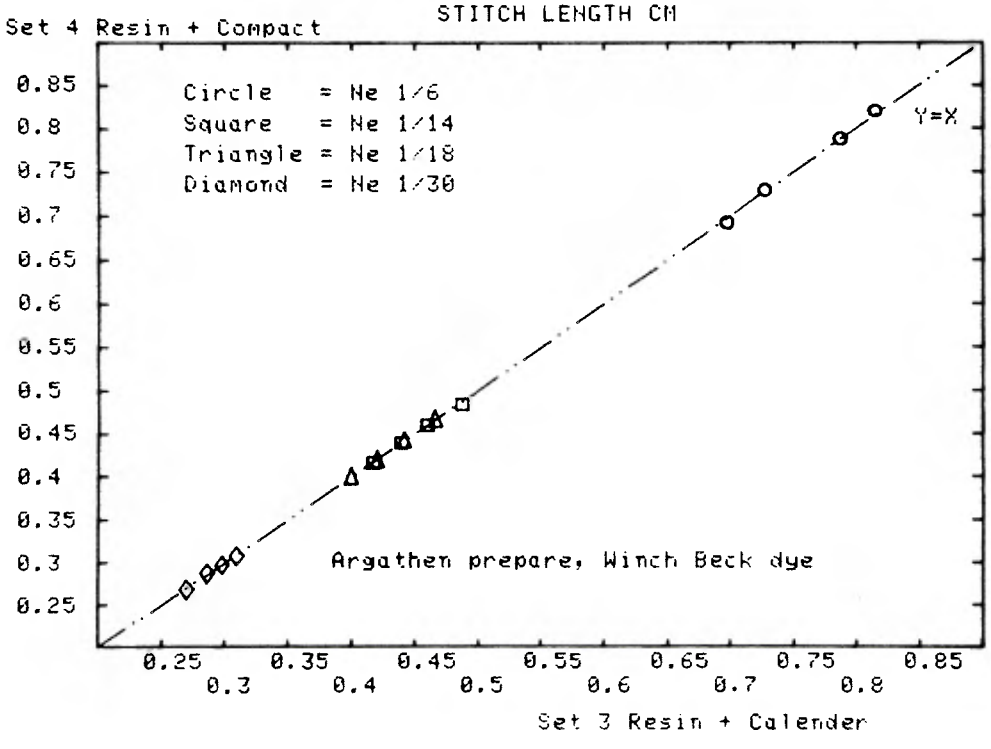
IIC/CI : SINGLE JERSEY : FINISHED FABRICS : AS DELIVERED

TEX



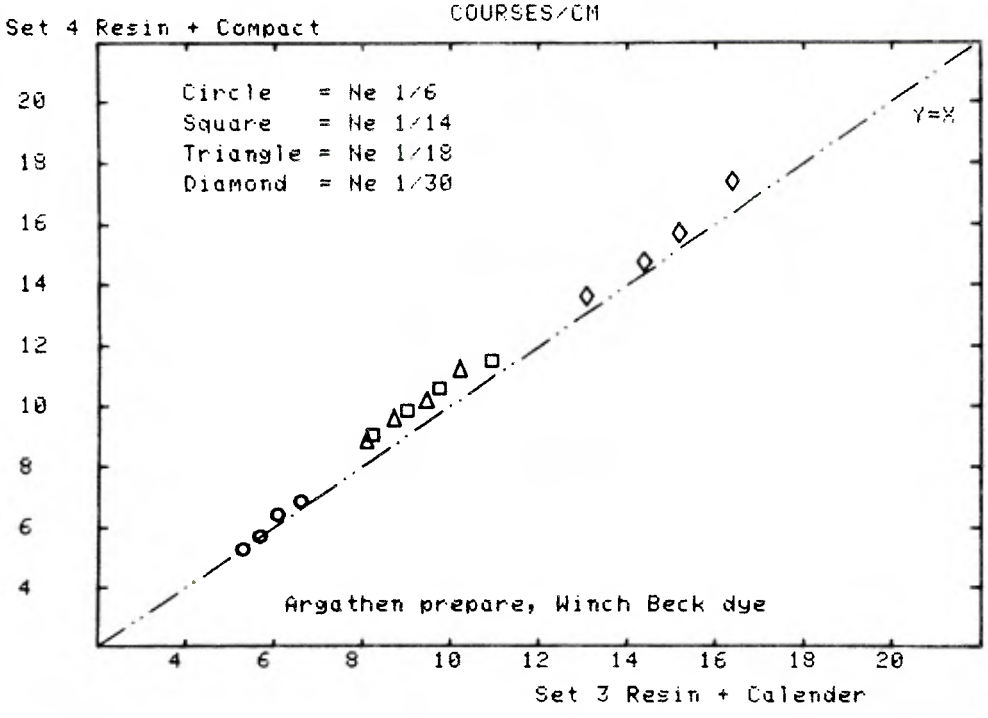
IIC/CI : SINGLE JERSEY : FINISHED FABRICS : AS DELIVERED

STITCH LENGTH CM



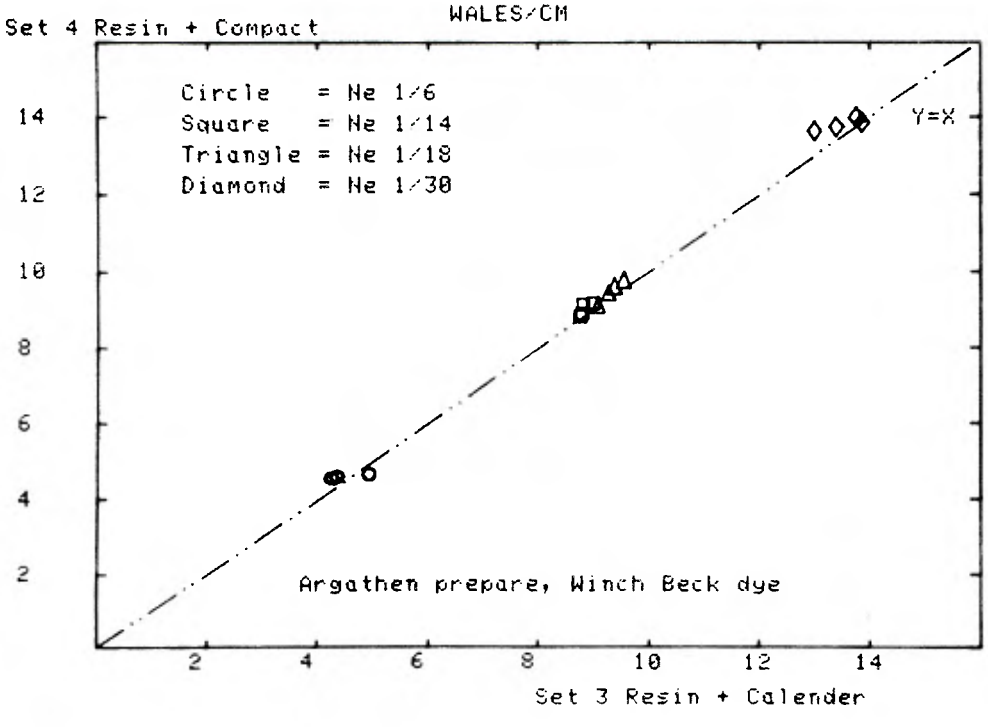
IIC/CI : SINGLE JERSEY : FINISHED FABRICS : AS DELIVERED

COURSES/CM



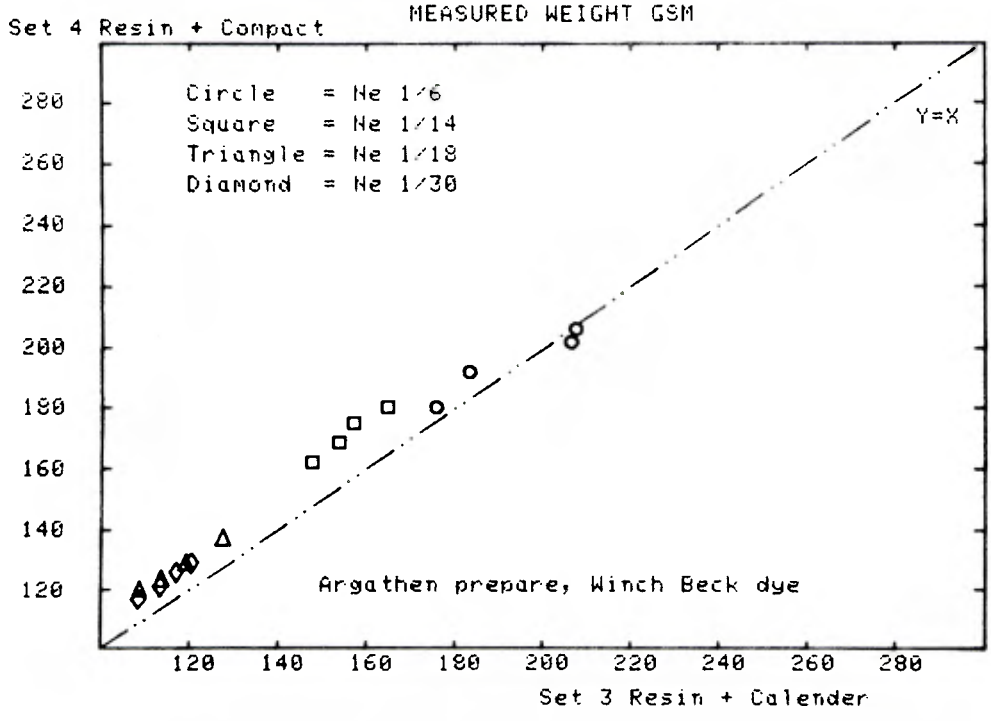
IIC/CI : SINGLE JERSEY : FINISHED FABRICS : AS DELIVERED

WALES/CM



IIC/CI : SINGLE JERSEY : FINISHED FABRICS : AS DELIVERED

MEASURED WEIGHT GSM



IIC/CI STARFISH DATABASE EXPANSION 1987

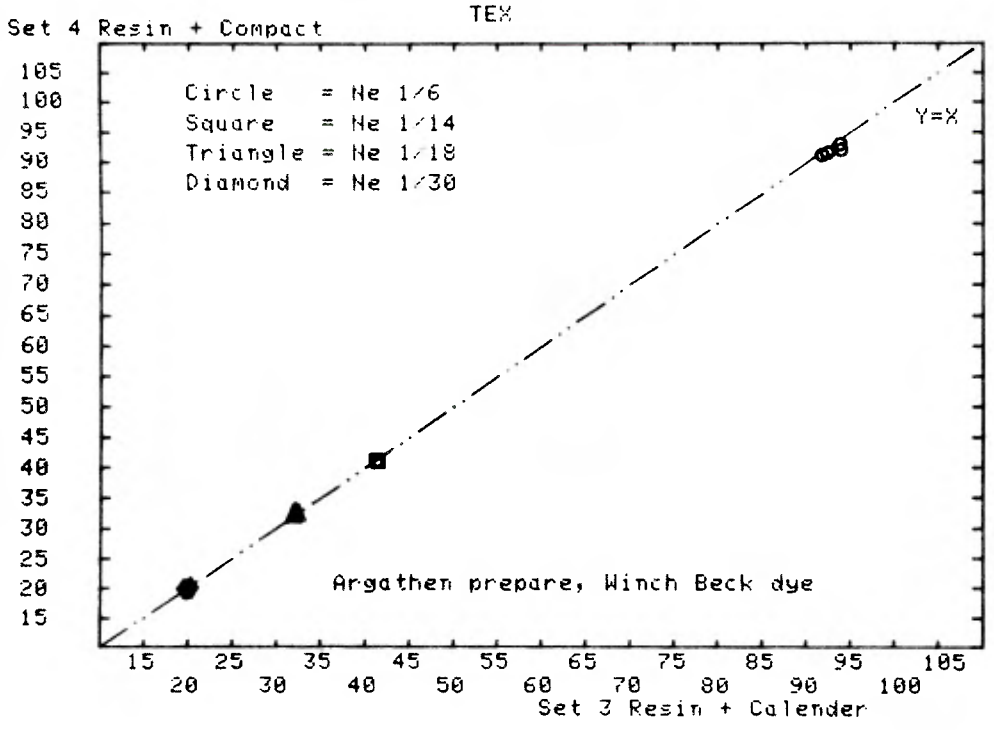
SINGLE JERSEY : RING SPUN YARNS : FINISHED FABRICS
ROUTE 2 : Argathen prepare, Winch Beck dye
Set 3 Resin + Calender : Set 4 Resin + Compact

Averaged IIC/CI Test Data : Reference State

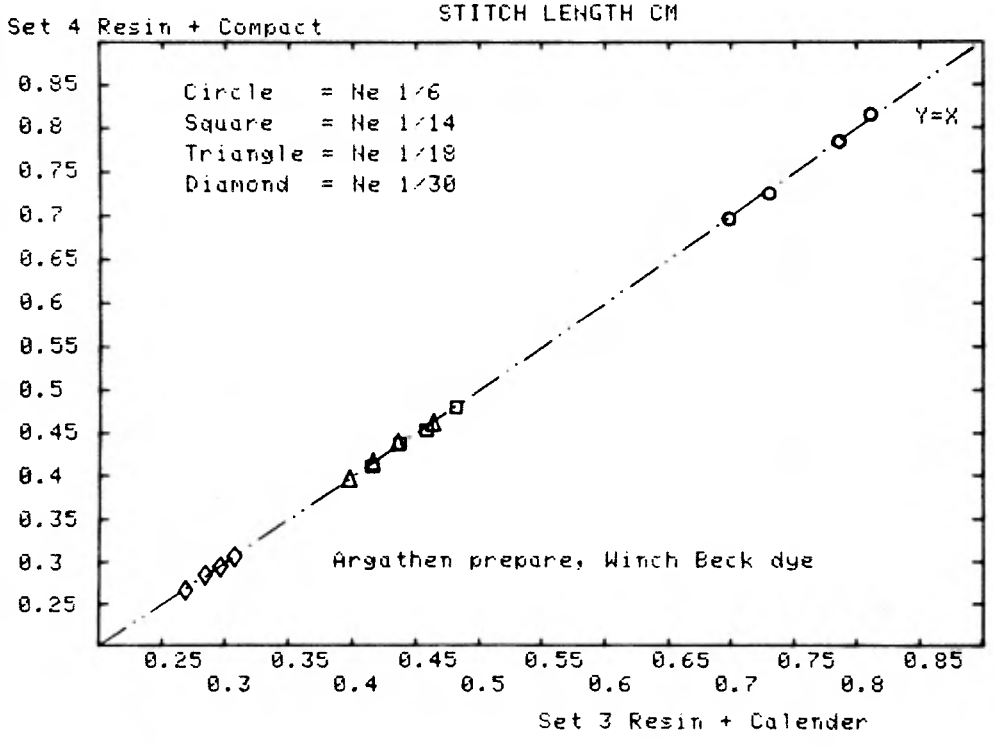
Sample Ref.No.		Set 3 Tex	SL cm	C/cm	W/cm	Wtgsm	Set 4 Tex	SL cm	C/cm	W/cm	Wtgsm
A-1		91.83	0.6992	7.87	5.81	293.2	91.33	0.698	7.86	5.91	291.9
A-2		92.45	0.731	7.43	5.65	286.8	91.7	0.7265	7.55	5.75	282.3
A-3		93.89	0.7865	6.77	5.42	265.5	93.15	0.7855	6.77	5.53	265.2
A-4		93.99	0.8115	6.5	5.28	259	92.18	0.8163	6.5	5.39	252.1
	mean	93.04					92.09				
	sd	1.07					0.79				
B-1		41.27	0.4154	12.68	10.14	220.1	41.33	0.4114	12.77	10.07	220.1
B-2		41.09	0.4371	11.9	9.79	210.9	41.21	0.4386	12.01	9.84	210.8
B-3		41.38	0.4578	11.3	9.53	205.1	40.93	0.4542	11.4	9.66	206
B-4		41.26	0.4814	10.67	9.29	197.2	41.04	0.4803	10.6	9.36	196.6
	mean	41.25					41.13				
	sd	0.12					0.18				
C-1		32.43	0.3975	12.77	11	177.7	32.33	0.3963	12.8	10.9	178.4
C-2		31.99	0.4157	12.11	10.75	170	32.57	0.4151	11.91	10.67	169.4
C-3		31.85	0.4353	11.41	10.47	164.4	32.18	0.4378	11.33	10.51	162.4
C-4		31.88	0.4631	10.32	10.56	157.7	31.95	0.4607	10.6	10.21	155.8
	mean	32.04					32.26				
	sd	0.27					0.26				
D-1		19.5	0.2688	18.99	15.6	159.3	19.88	0.2671	19.05	15.88	161.1
D-2		20.28	0.2844	17.3	15.28	151.7	20.01	0.2853	17.55	15.44	153.2
D-3		20.27	0.2959	16.45	14.62	146.7	20.07	0.2949	16.69	14.99	148.7
D-4		19.91	0.307	15.45	14.65	141.5	19.79	0.3068	15.81	14.78	142.4
	mean	19.99					19.94				
	sd	0.37					0.13				

N.B. Tex results are IIC only

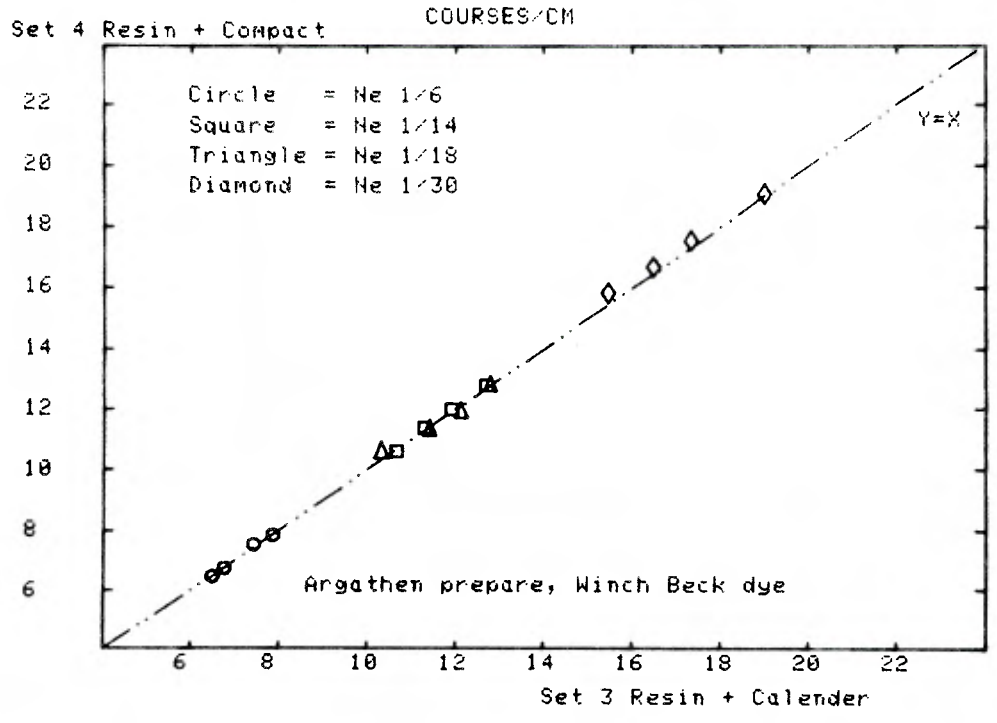
IIC/CI : SINGLE JERSEY : FINISHED FABRICS : REFERENCE STATE



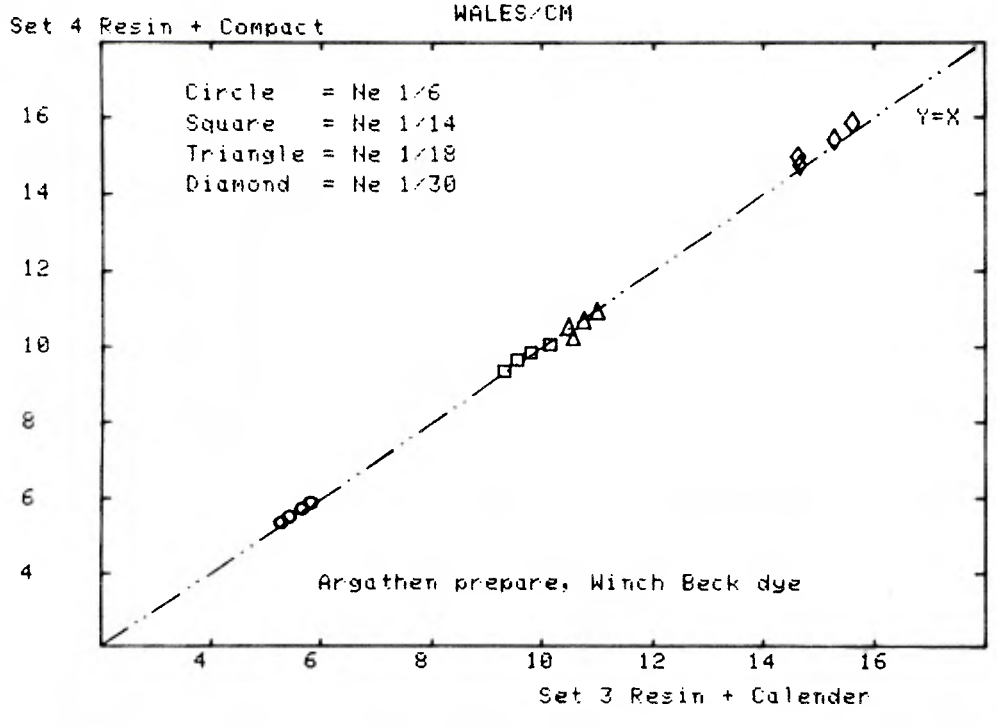
IIC/CI : SINGLE JERSEY : FINISHED FABRICS : REFERENCE STATE



IIC/CI : SINGLE JERSEY : FINISHED FABRICS : REFERENCE STATE

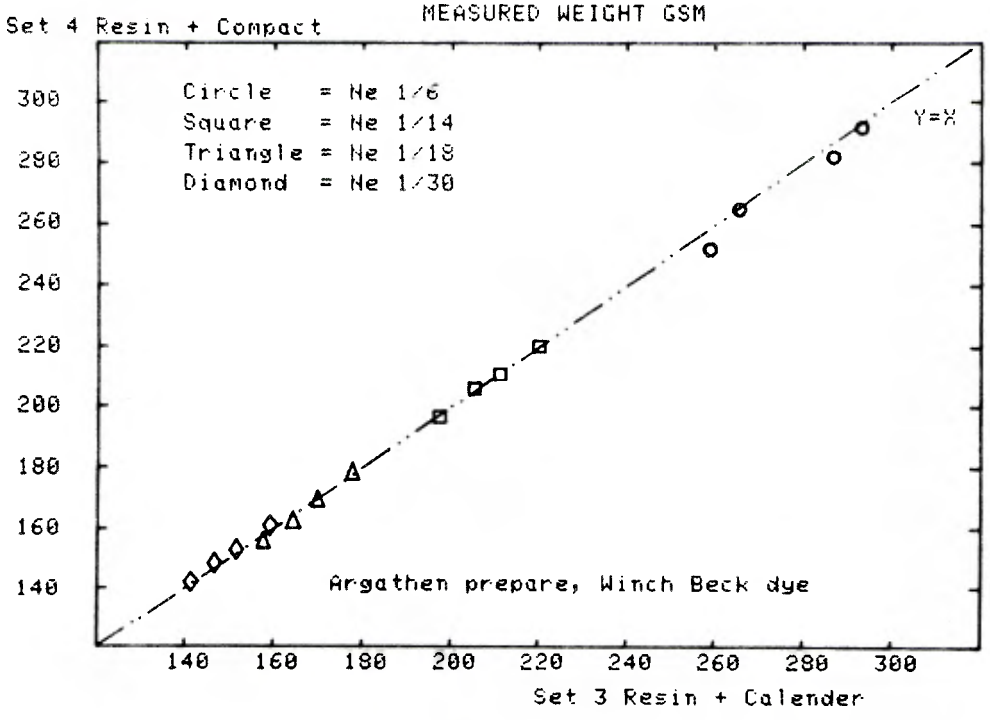


IIC/CI : SINGLE JERSEY : FINISHED FABRICS : REFERENCE STATE



IIC/CI : SINGLE JERSEY : FINISHED FABRICS : REFERENCE STATE

MEASURED WEIGHT GSM



A P P E N D I X 3

ROUTE 3 : ARGATHEN PREPARE, OVERFLOW JET DYE

Set 1 Calender vs Set 2 Compact

Before Wash	A3/1 - A3/4
Reference State	A3/5 - A3/8

Set 3 Resin, Calender vs Set 4 Resin, Compact

Before Wash	A3/9 - A3/12
Reference State	A3/13- A3/16

IIC/CI STARFISH DATABASE EXPANSION 1987

SINGLE JERSEY : RING SPUN YARNS : FINISHED FABRICS
ROUTE 3 : Argathen prepare, Overflow Jet dye
Set 1 Calender : Set 2 Compact

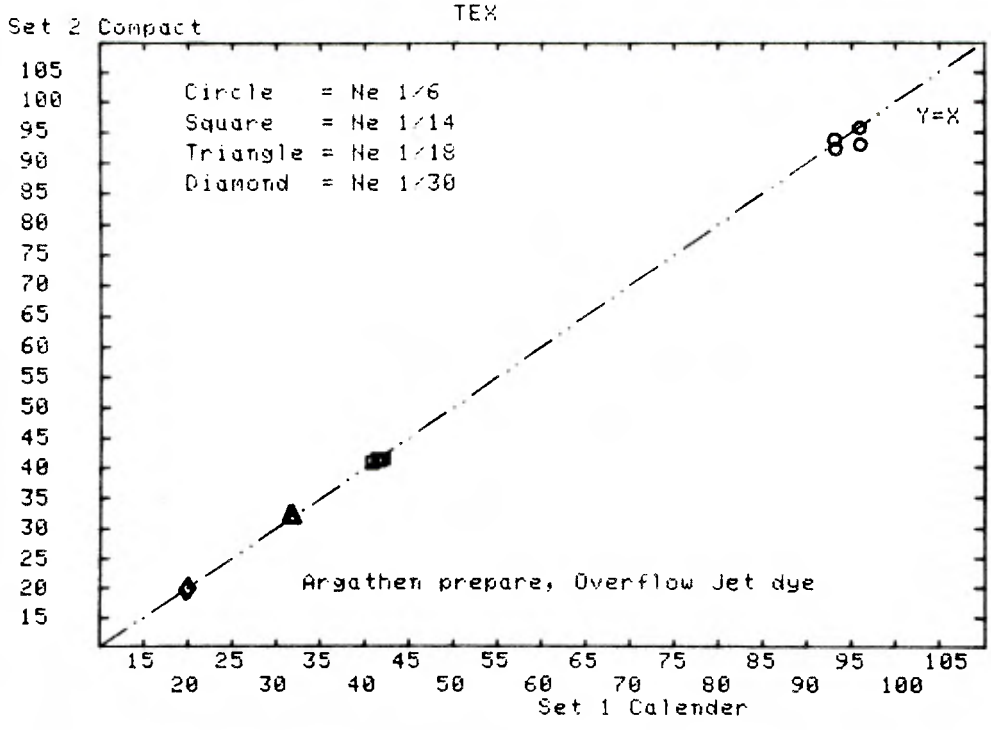
Averaged IIC/CI Test Data : As Delivered

Sample Ref.No.		Set 1 Tex	SL cm	C/cm	W/cm	Wtgsm	Set 2 Tex	SL cm	C/cm	W/cm	Wtgsm
A-1		93.13	0.6974	6.89	4.91	216.8	93.85	0.6938	7.85	5.02	251.7
A-2		93.22	0.7224	6.45	4.88	208.9	92.36	0.7265	7.52	4.88	242.2
A-3		96	0.7844	5.64	4.84	198	93.03	0.7801	6.69	4.72	228.2
A-4		95.95	0.8153	5.26	4.77	196.4	95.78	0.8143	6.28	4.74	230.5
	mean	94.57					93.75				
	sd	1.61					1.48				
B-1		41.95	0.4164	11.08	9	169.1	41.49	0.4187	12.5	9.12	195.8
B-2		40.81	0.4383	10.22	8.88	161.6	40.77	0.4392	11.63	8.92	183.1
B-3		41.3	0.4589	9.45	8.73	154.9	41.48	0.4601	10.98	8.61	180.2
B-4		41.46	0.4858	8.69	8.62	153.1	41.09	0.4843	10.11	8.46	169.7
	mean	41.38					41.21				
	sd	0.47					0.34				
C-1		31.83	0.3979	11.3	8.95	131.2	32.19	0.3987	13.02	9.34	148.5
C-2		31.92	0.4169	10.29	9.03	123.6	31.9	0.421	12.26	8.99	146.4
C-3		31.95	0.4392	9.47	9.01	119.5	31.94	0.4398	11.24	8.69	141.5
C-4		31.49	0.4638	8.63	8.99	112.2	32.28	0.4646	9.98	8.98	133.2
	mean	31.8					32.08				
	sd	0.21					0.18				
D-1		20.04	0.2694	17.42	13.57	127.5	19.91	0.2662	19.35	13.91	144.4
D-2		19.75	0.2851	16.07	13.44	121.5	19.65	0.2854	18.18	13.48	140.3
D-3		20	0.2981	14.78	13.15	114.6	20.12	0.2978	17.1	13.45	134.3
D-4		20.03	0.3087	14.02	13.35	116.6	20.06	0.3089	15.7	13.26	129
	mean	19.96					19.94				
	sd	0.14					0.21				

N.B. Tex results are IIC only

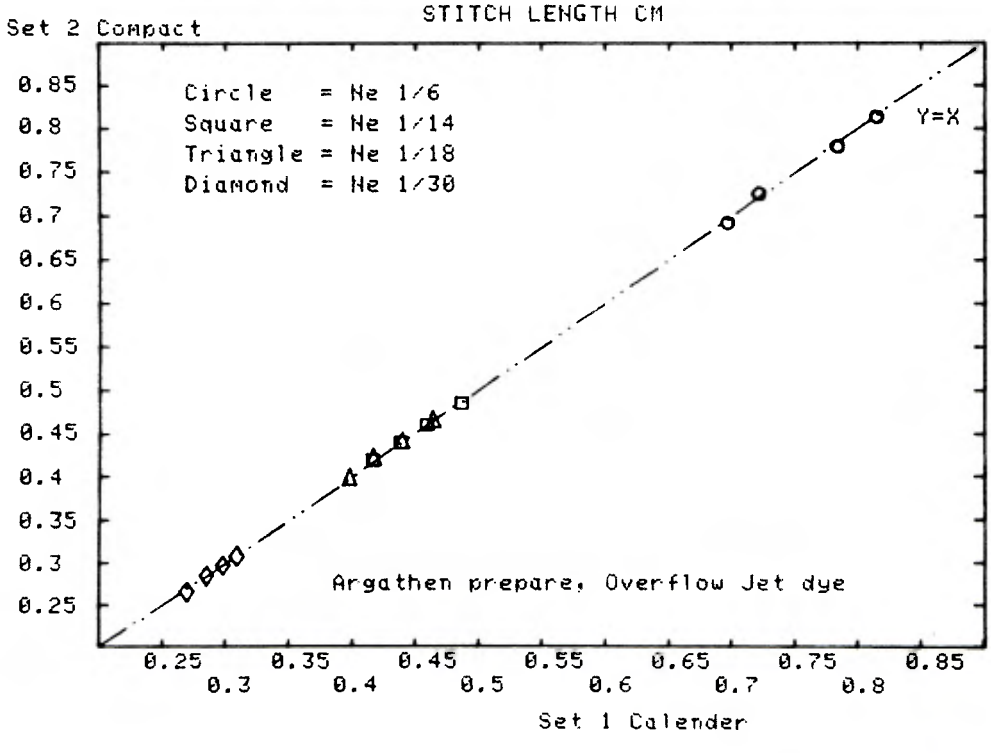
IIC/CI : SINGLE JERSEY : FINISHED FABRICS : AS DELIVERED

TEX

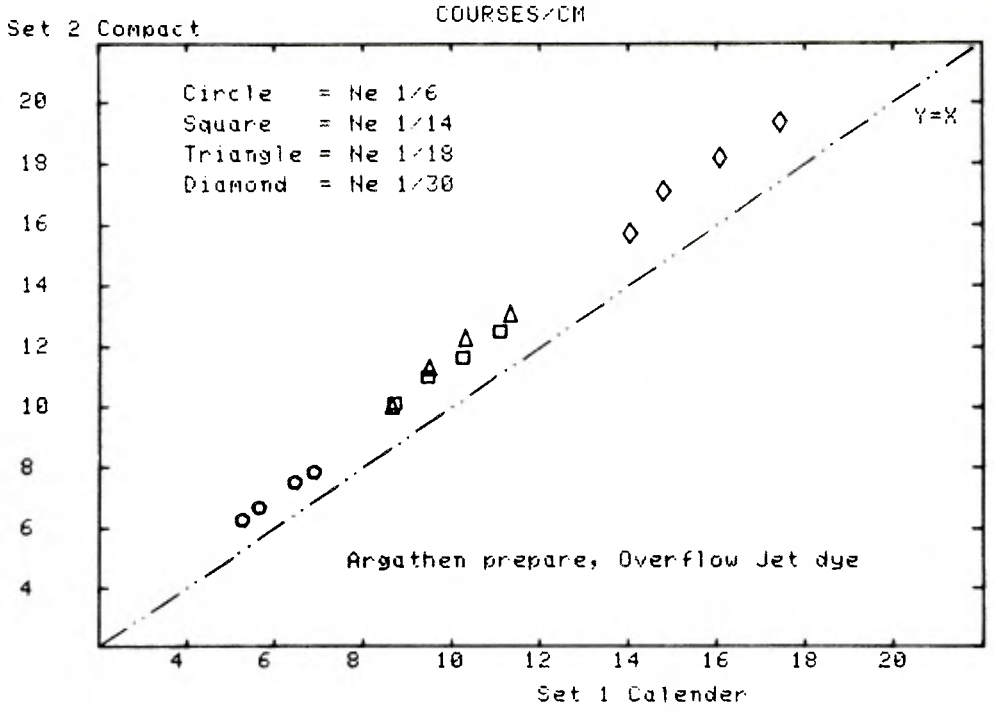


IIC/CI : SINGLE JERSEY : FINISHED FABRICS : AS DELIVERED

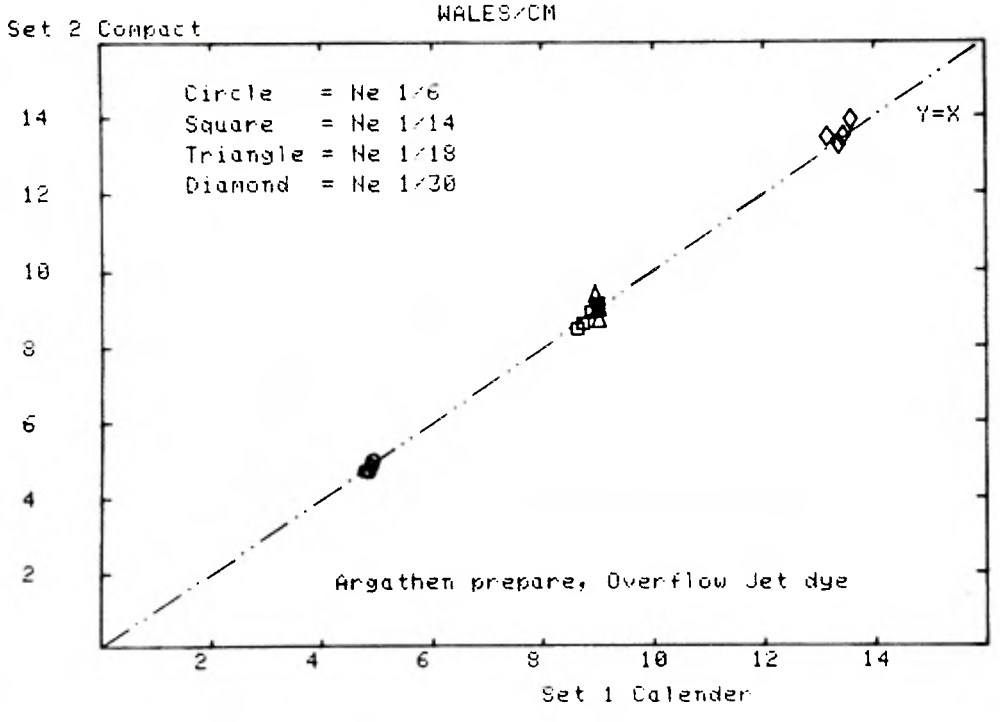
STITCH LENGTH CM



IIC/CI : SINGLE JERSEY : FINISHED FABRICS : AS DELIVERED

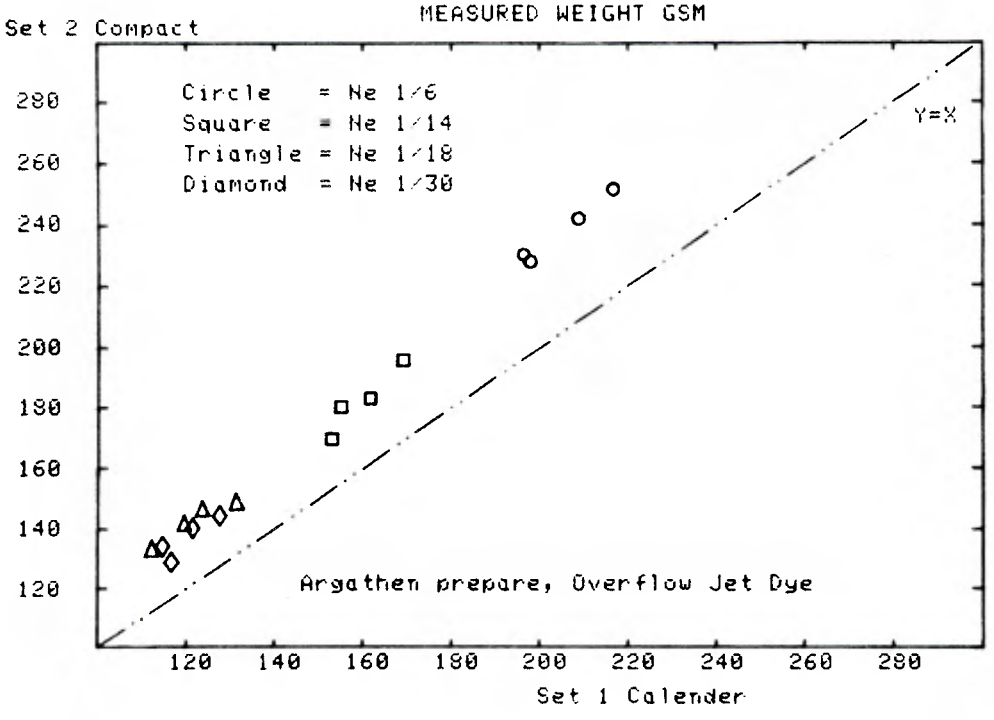


IIC/CI : SINGLE JERSEY : FINISHED FABRICS : AS DELIVERED



IIC/CI : SINGLE JERSEY : FINISHED FABRICS : AS DELIVERED

MEASURED WEIGHT GSM



IIC/CI STARFISH DATABASE EXPANSION 1987

SINGLE JERSEY : RING SPUN YARNS : FINISHED FABRICS
ROUTE 3 : Argathen prepare, Overflow Jet dye
Set 1 Calender : Set 2 Compact

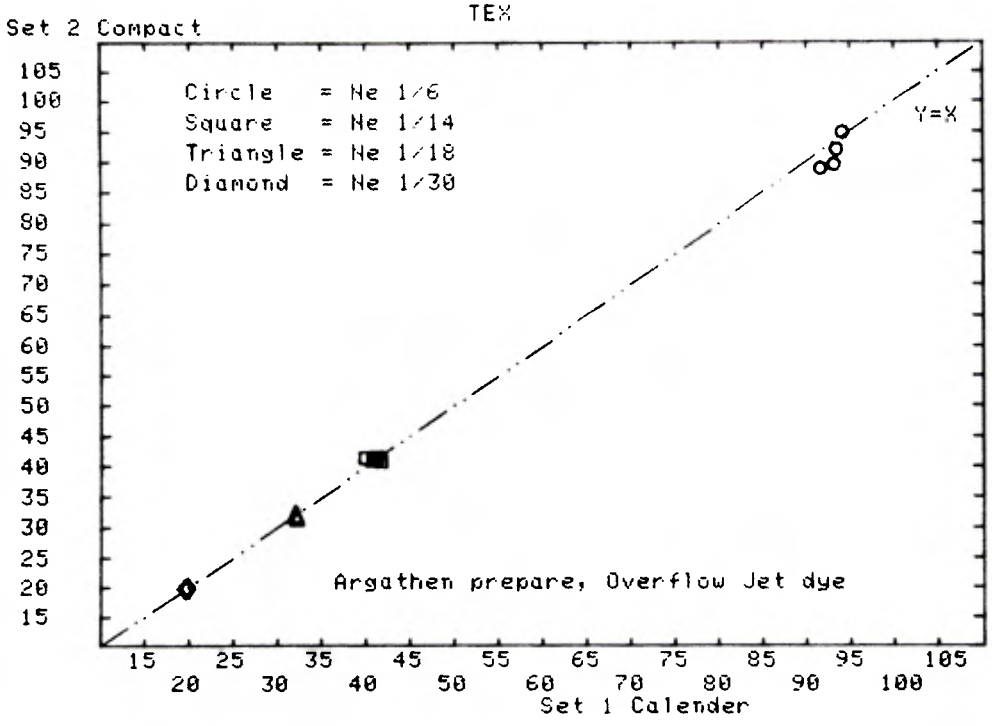
Averaged IIC/CI Test Data : Reference State

Sample Ref.No.		Set 1 Tex	SL cm	C/cm	W/cm	Wtgsm	Set 2 Tex	SL cm	C/cm	W/cm	Wtgsm
A-1		91.7	0.6966	8.22	6.04	308.4	88.92	0.694	8.25	6.04	313.1
A-2		93.24	0.7226	7.87	5.76	296.8	89.62	0.7229	7.95	5.85	295.5
A-3		93.52	0.7809	7.22	5.43	274.8	92.1	0.7856	7.2	5.46	277.4
A-4		94.19	0.8128	6.92	5.32	272.6	94.91	0.8054	6.95	5.28	277
	mean	93.16					91.39				
	sd	1.05					2.72				
B-1		40.77	0.413	13.18	10.22	227.5	40.89	0.4139	13.34	10.28	231.3
B-2		41.16	0.4369	12.57	9.9	217.3	41.5	0.4321	12.46	9.86	220.2
B-3		39.93	0.4562	11.9	9.58	208.8	41.31	0.4548	11.88	9.67	211.1
B-4		41.58	0.4758	11.13	9.21	202.9	40.81	0.4816	11.2	9.3	202.9
	mean	40.86					41.13				
	sd	0.7					0.33				
C-1		31.86	0.3937	13.3	11.05	183.8	31.88	0.3933	13.45	11.01	184.7
C-2		32.15	0.4143	12.55	10.7	176	31.43	0.4117	12.74	10.64	175.6
C-3		32.12	0.4366	11.87	10.3	168.3	31.64	0.4368	11.92	10.32	168.7
C-4		32.06	0.4587	11.09	10.09	160.9	31.75	0.4598	11.11	10	161.7
	mean	32.05					31.68				
	sd	0.13					0.19				
D-1		19.93	0.2669	19.54	15.77	165.8	19.84	0.2662	20.27	15.93	169
D-2		19.58	0.2832	18.39	15.19	158.7	19.81	0.2859	18.83	15.1	159.6
D-3		19.71	0.2967	17.36	14.63	153.3	19.87	0.295	17.64	14.95	154.7
D-4		19.91	0.307	16.58	14.49	147.9	19.96	0.3054	16.77	14.56	147.9
	mean	19.78					19.87				
	sd	0.17					0.07				

N.B. Tex results are IIC only

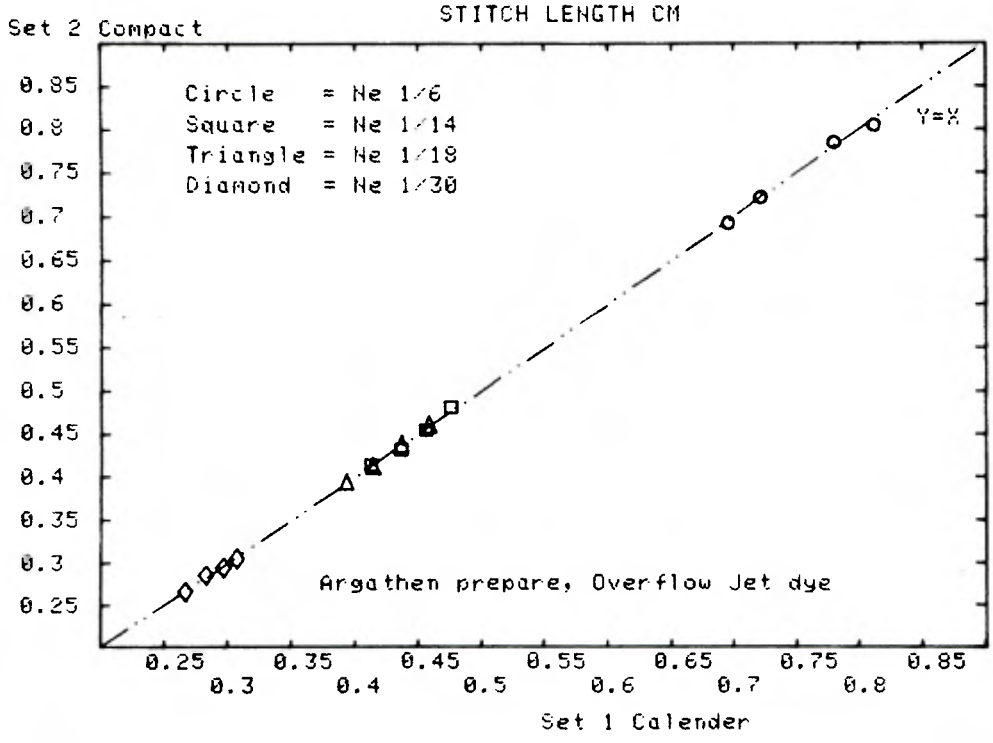
IIC/CI : SINGLE JERSEY : FINISHED FABRICS : REFERENCE STATE

TEX

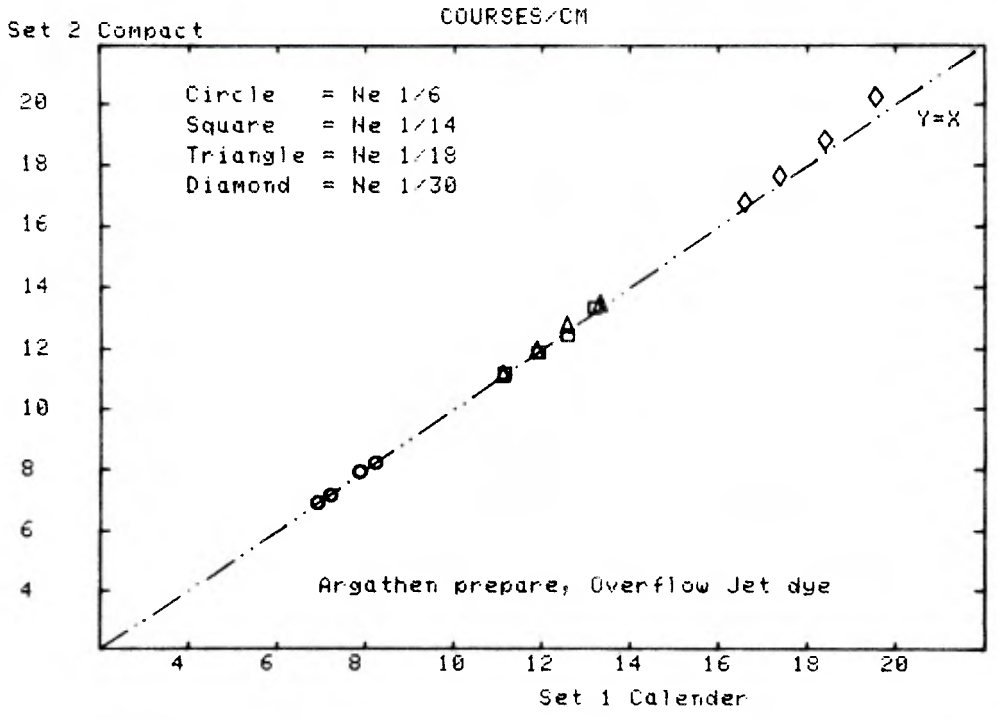


IIC/CI : SINGLE JERSEY : FINISHED FABRICS : REFERENCE STATE

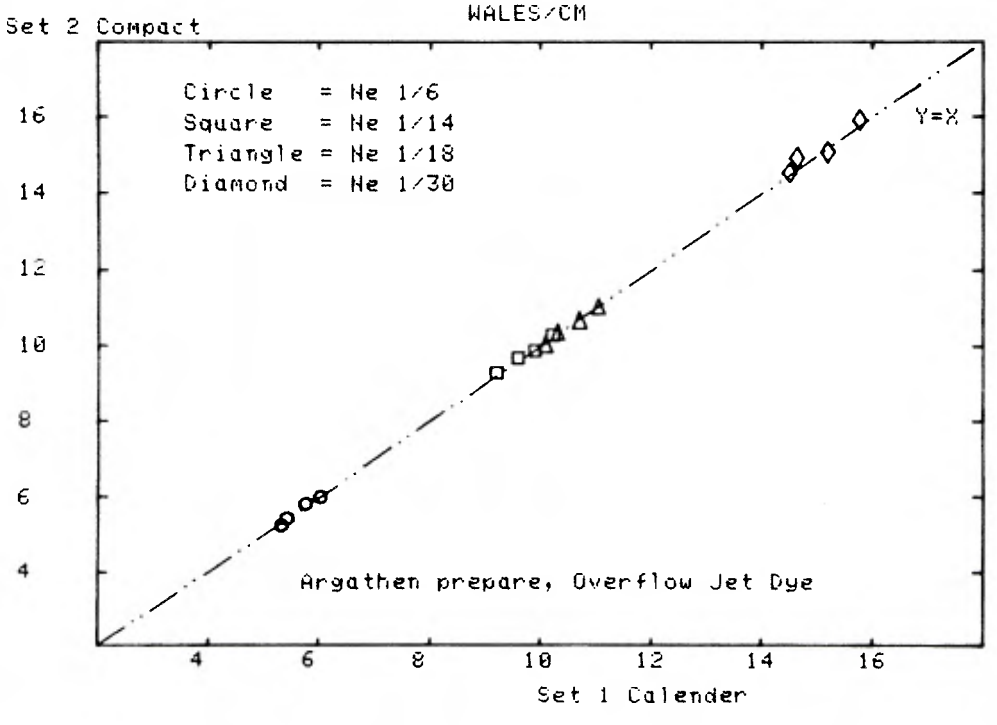
STITCH LENGTH CM



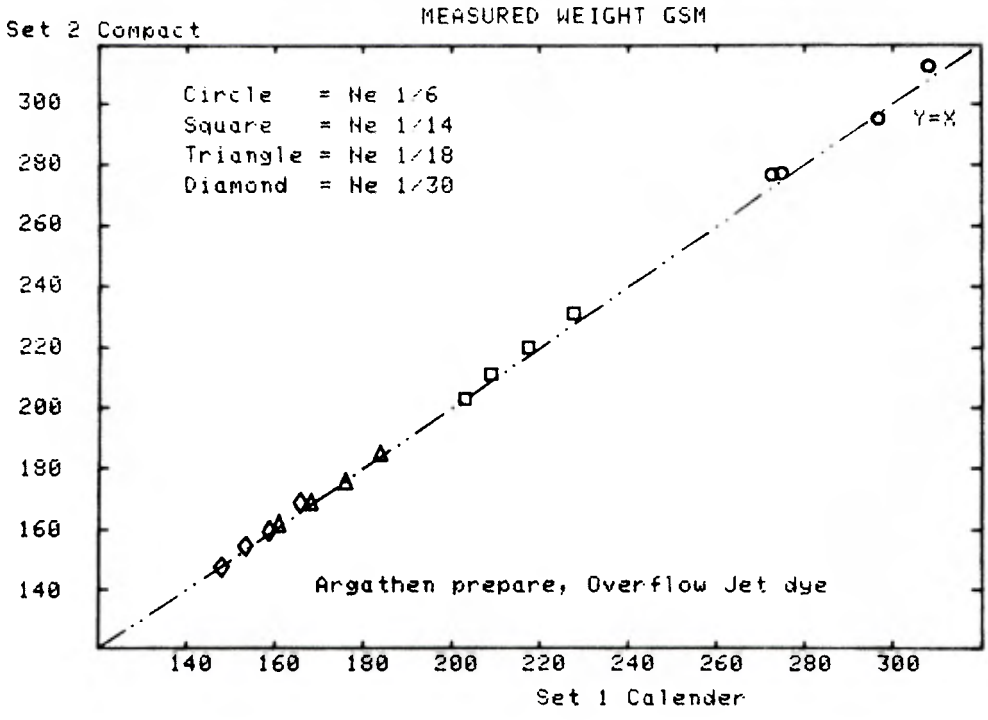
IIC/CI : SINGLE JERSEY : FINISHED FABRICS : REFERENCE STATE



IIC/CI : SINGLE JERSEY : FINISHED FABRICS : REFERENCE STATE



IIC/CI : SINGLE JERSEY : FINISHED FABRICS : REFERENCE STATE



IIC/CI STARFISH DATABASE EXPANSION 1987

SINGLE JERSEY : RING SPUN YARNS : FINISHED FABRICS
ROUTE 3 : Argathen prepare, Overflow Jet dye
Set 3 Resin + Calender : Set 4 Resin + Compact

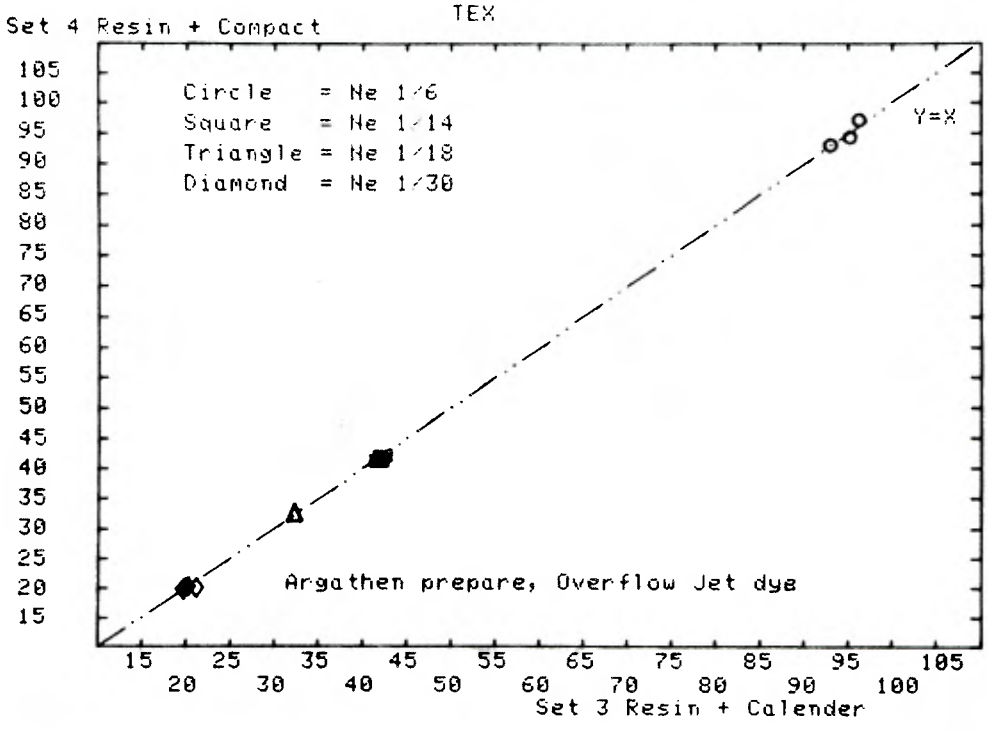
Averaged IIC/CI Test Data : As Delivered

Sample Ref.No.		Set 3 Tex	SL cm	C/cm	W/cm	Wtgsm	Set 4 Tex	SL cm	C/cm	W/cm	Wtgsm
A-1		93.03	0.6996	6.69	4.95	205.3	93.21	0.6993	7.09	4.72	220.1
A-2		93.01	0.7269	6.11	4.91	200.2	93.16	0.7251	6.58	4.69	210.5
A-3		95.23	0.787	5.76	4.28	180	94.45	0.784	5.74	4.53	195.1
A-4		96.26	0.8151	5.65	4.07	171.7	97.32	0.8158	5.46	4.41	190
	mean	94.38					94.54				
	sd	1.63					1.95				
B-1		41.45	0.4159	10.39	9.21	165.2	41.18	0.415	11.07	9.14	178.2
B-2		42.08	0.4388	9.9	8.7	156	41.12	0.4395	10.11	9.06	168.6
B-3		42.52	0.4603	9.28	8.9	161.4	41.88	0.4595	9.45	9.05	163.4
B-4		41.86	0.4865	8.44	8.68	152.2	41.85	0.4855	8.37	8.9	154.2
	mean	41.98					41.51				
	sd	0.45					0.41				
C-1		32.2	0.4003	10.4	10.07	128.4	32.23	0.4001	11.19	9.47	138.1
C-2		32.2	0.4195	9.84	9.53	120	32.4	0.4177	10.23	9.47	132.9
C-3		32.32	0.4359	9.08	8.84	112.1	32.39	0.4407	9.36	9.45	125.6
C-4		32.18	0.4656	8.38	8.53	110	32.38	0.4643	8.7	9.21	121.5
	mean	32.22					32.35				
	sd	0.06					0.08				
D-1		20.19	0.2706	17	13.62	124.8	20.2	0.2703	17.55	14.11	132.6
D-2		19.7	0.285	15.46	13.12	116.2	19.82	0.2869	15.94	13.42	123.9
D-3		19.91	0.2973	14.38	12.89	109.6	20.04	0.2973	14.75	13.77	120.4
D-4		21.15	0.3113	13.36	12.76	106.1	20.05	0.3101	13.9	13.69	114.7
	mean	20.24					20.03				
	sd	0.64					0.15				

N.B. Tex results are IIC only

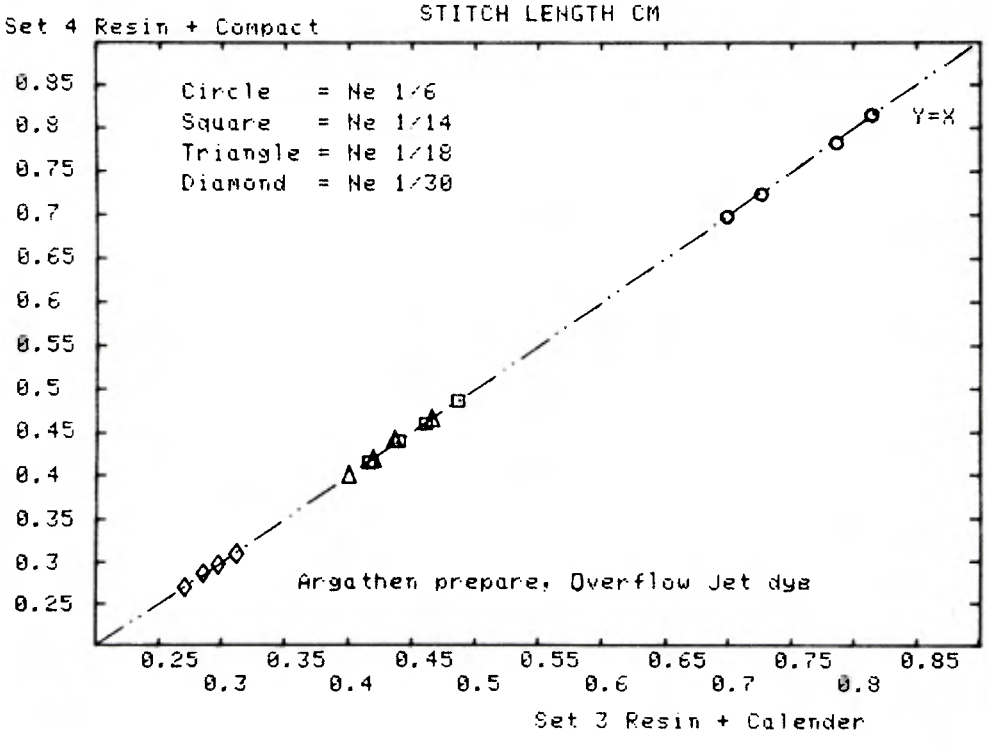
IIC/CI : SINGLE JERSEY : FINISHED FABRICS : AS DELIVERED

TEX

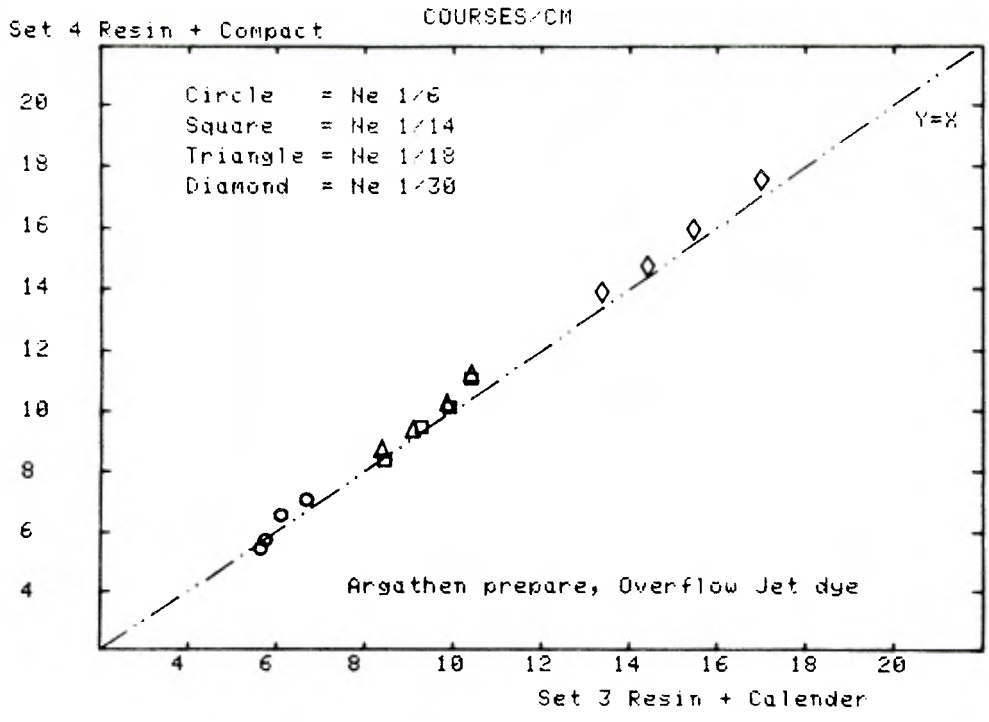


IIC/CI : SINGLE JERSEY : FINISHED FABRICS : AS DELIVERED

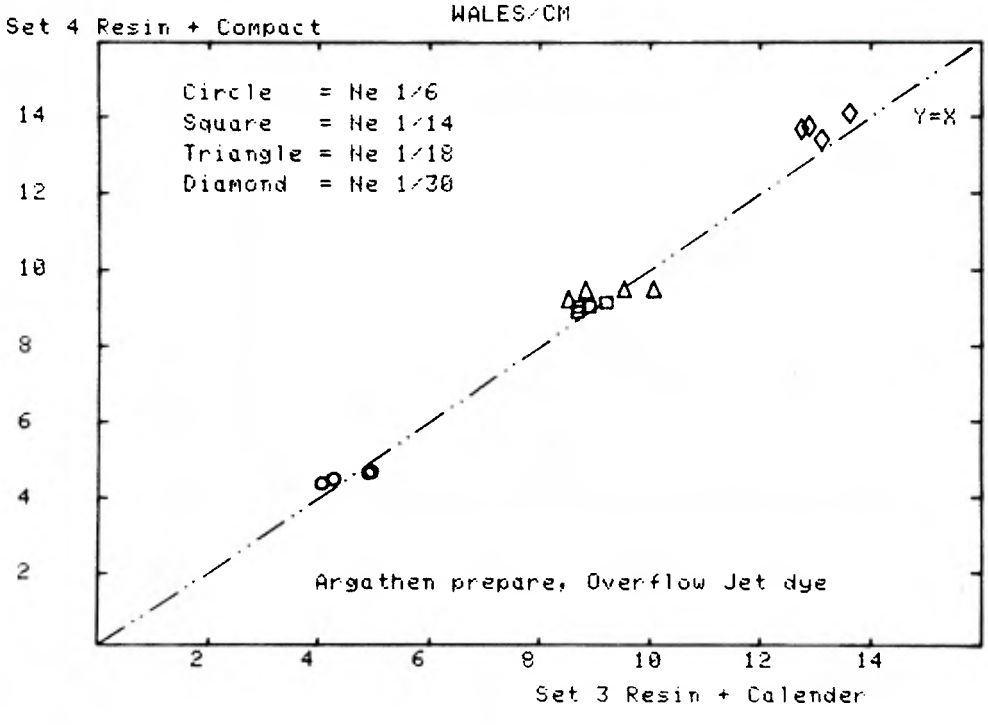
STITCH LENGTH CM



IIC/CI : SINGLE JERSEY : FINISHED FABRICS : AS DELIVERED

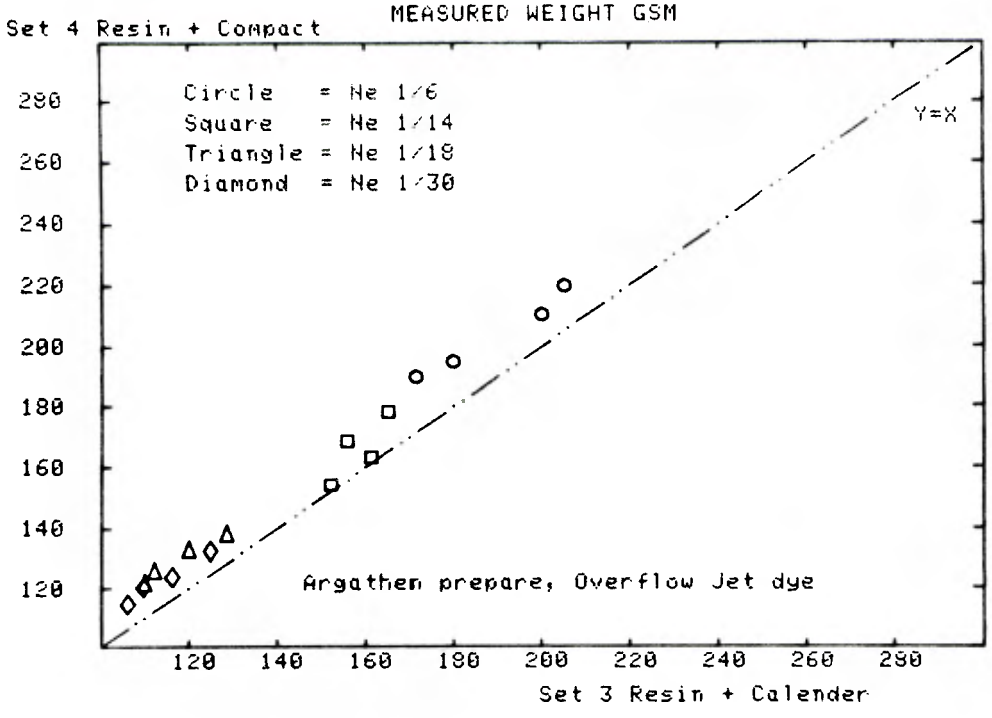


IIC/CI : SINGLE JERSEY : FINISHED FABRICS : AS DELIVERED



IIC/CI : SINGLE JERSEY : FINISHED FABRICS : AS DELIVERED

MEASURED WEIGHT GSM



IIC/CI STARFISH DATABASE EXPANSION 1987

SINGLE JERSEY : RING SPUN YARNS : FINISHED FABRICS
ROUTE 3 : Argathen prepare, Overflow Jet dye
Set 3 Resin + Calender : Set 4 Resin + Compact

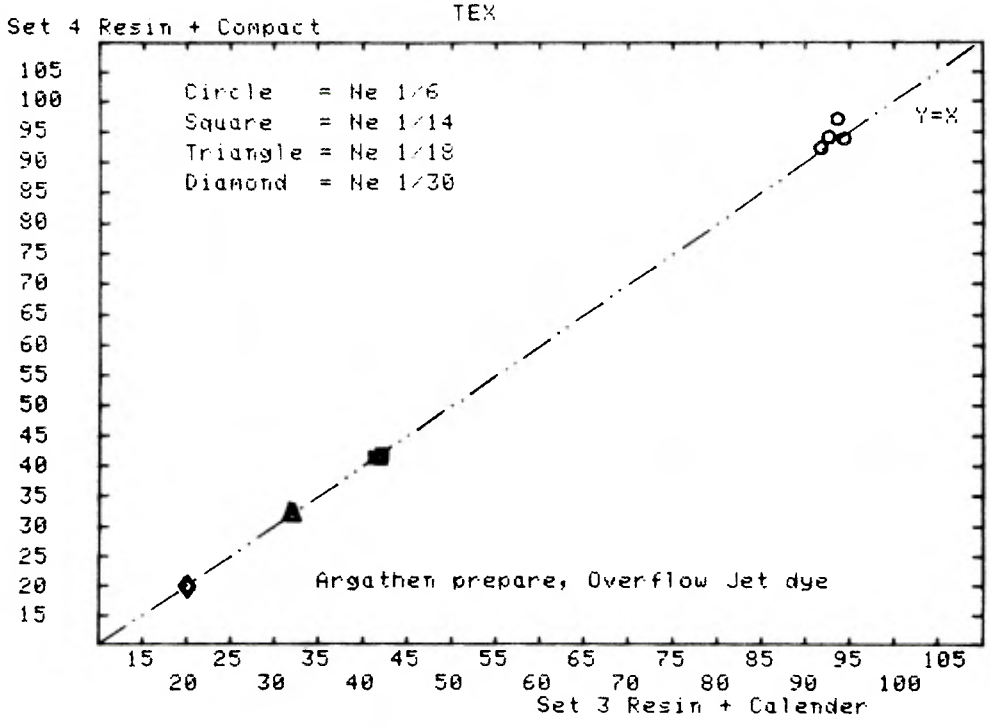
Averaged IIC/CI Test Data : Reference State

Sample Ref.No.		Set 3 Tex	SL cm	C/cm	W/cm	Wtgsm	Set 4 Tex	SL cm	C/cm	W/cm	Wtgsm
A-1		92.69	0.6965	7.95	5.91	293	94.22	0.6928	7.95	5.92	301.8
A-2		91.8	0.7298	7.55	5.75	281.8	92.37	0.7259	7.56	5.74	286
A-3		94.39	0.7825	7.02	5.39	269.6	93.94	0.7904	6.87	5.43	267.4
A-4		93.67	0.8131	6.55	5.33	259.2	97.18	0.811	6.62	5.37	264.1
	mean	93.14					94.43				
	sd	1.13					2.01				
B-1		41.24	0.4147	12.92	10.11	218	41.21	0.4172	12.71	10.26	220.8
B-2		41.38	0.4364	12.01	9.92	211.8	41.23	0.4383	11.89	9.89	211.2
B-3		41.82	0.4587	11.48	9.57	205.1	41.12	0.4589	11.3	9.65	204.9
B-4		41.95	0.4744	10.71	9.24	198.2	41.78	0.483	10.48	9.39	195.6
	mean	41.6					41.34				
	sd	0.34					0.3				
C-1		32.11	0.3974	12.65	11.09	176.5	31.8	0.3986	12.82	11.06	176.1
C-2		32.16	0.4186	11.97	10.72	170.9	32.09	0.4149	11.99	10.25	171.2
C-3		31.66	0.4412	11.15	10.72	163.4	32.25	0.4277	11.25	10.62	164.3
C-4		32.06	0.4625	10.5	10.31	156.8	32.05	0.4642	10.65	10.21	157.2
	mean	32					32.05				
	sd	0.23					0.19				
D-1		20.14	0.2656	19.19	15.67	163.1	19.57	0.2706	19.28	15.92	164.9
D-2		19.9	0.2842	17.83	15.16	153.1	20.04	0.2852	17.98	15.17	153.8
D-3		20.07	0.2981	17.02	14.91	147.7	20.21	0.2909	16.84	15.08	150.8
D-4		20.15	0.3105	16	14.74	143.8	20.06	0.3053	16.14	14.61	143.2
	mean	20.07					19.97				
	sd	0.12					0.28				

N.B. Tex results are IIC only

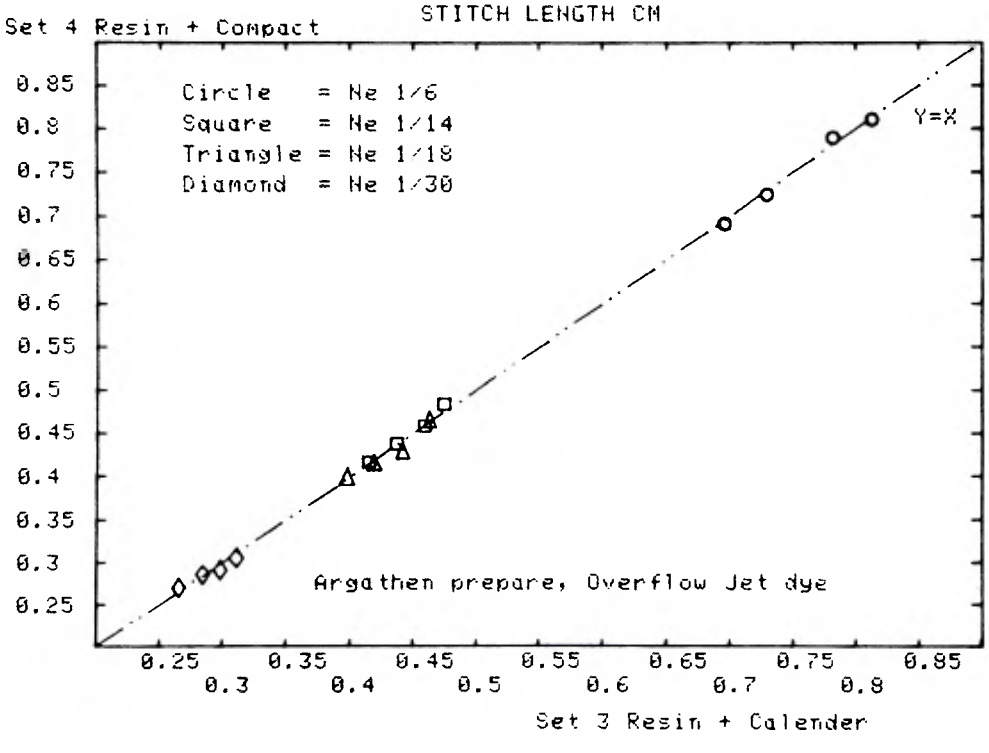
IIC/CI : SINGLE JERSEY : FINISHED FABRICS : REFERENCE STATE

TEX

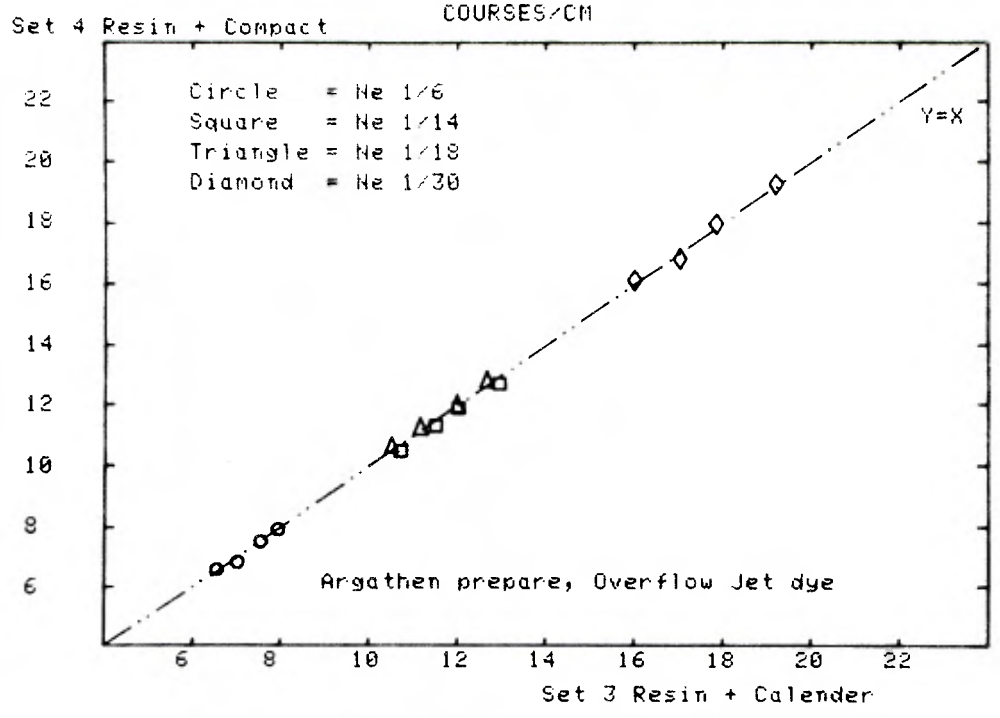


IIC/CI : SINGLE JERSEY : FINISHED FABRICS : REFERENCE STATE

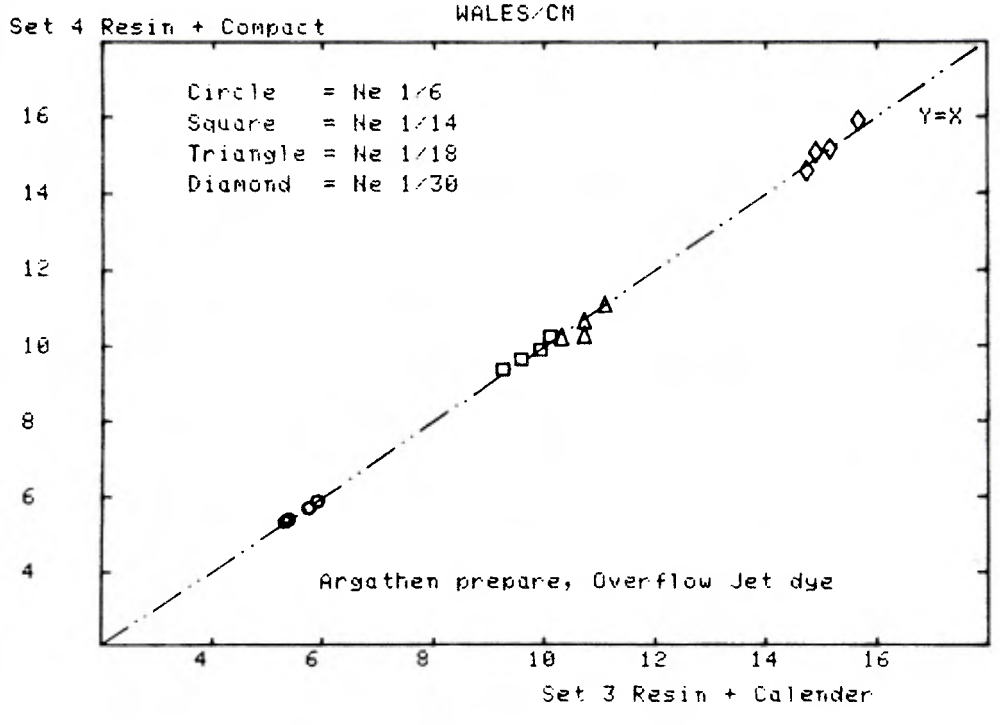
STITCH LENGTH CM

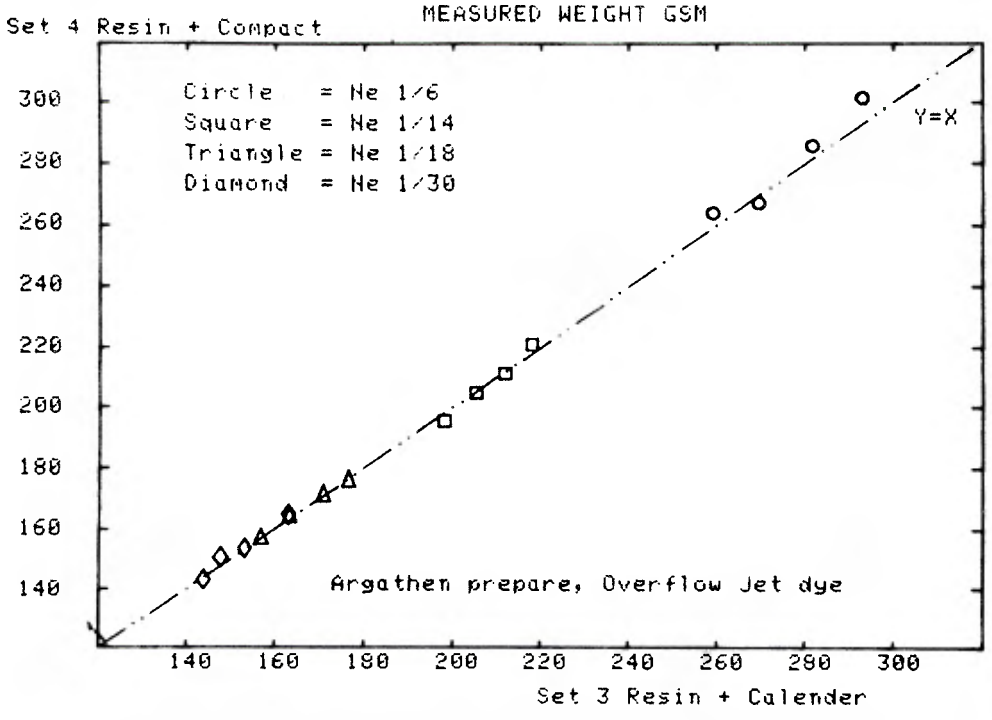


IIC/CI : SINGLE JERSEY : FINISHED FABRICS : REFERENCE STATE



IIC/CI : SINGLE JERSEY : FINISHED FABRICS : REFERENCE STATE




MEASURED WEIGHT GSM
Set 4 Resin + Compact
Circle = Ne 1/6
Square = Ne 1/14
Triangle = Ne 1/18
Diamond = Ne 1/30
Y=X
Argathen prepare, Overflow Jet dye
300
280
260
240
220
200
180
160
140
140 160 180 200 220 240 260 280 300
Set 3 Resin + Calender

A P P E N D I X 4

PURE FINISH (average sets 1 and 2) vs RESIN FINISH (average sets 3 and 4)

ROUTE 1	A4/1 - A4/4
ROUTE 2	A4/5 - A4/8
ROUTE 3	A4/9 - A4/12

IIC/CI STARFISH DATABASE EXPANSION 1987

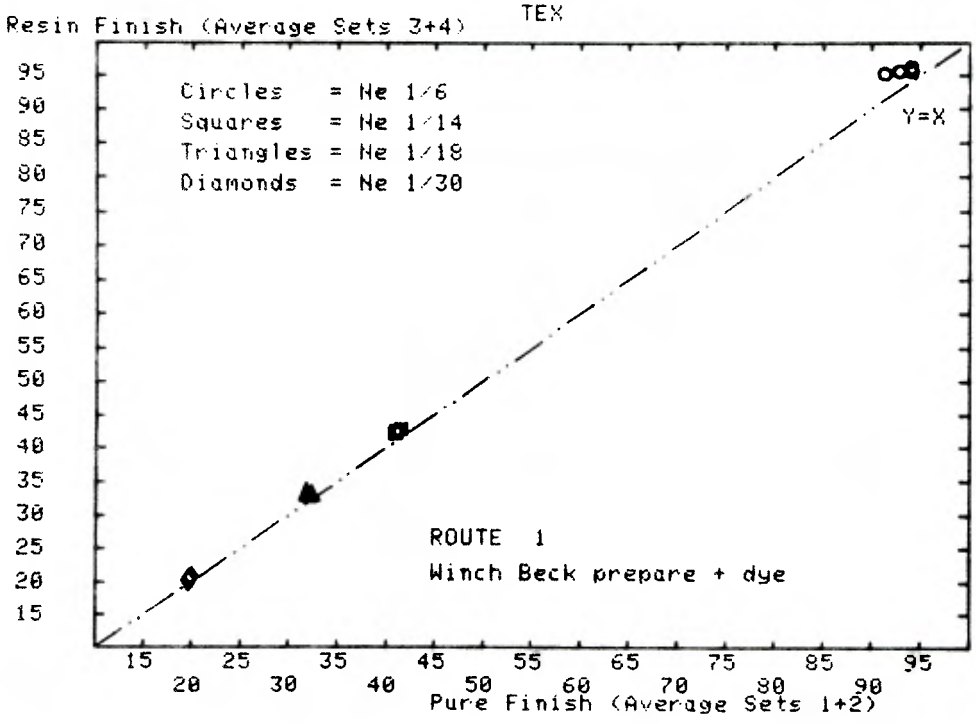
SINGLE JERSEY : RING SPUN YARNS : FINISHED FABRICS
ROUTE 1 : Winch Beck prepare, Winch Beck dye
Average Sets 1+2 Pure Finish : Average Sets 3+4 Resin Finish

Averaged IIC/CI Test Data : Reference State

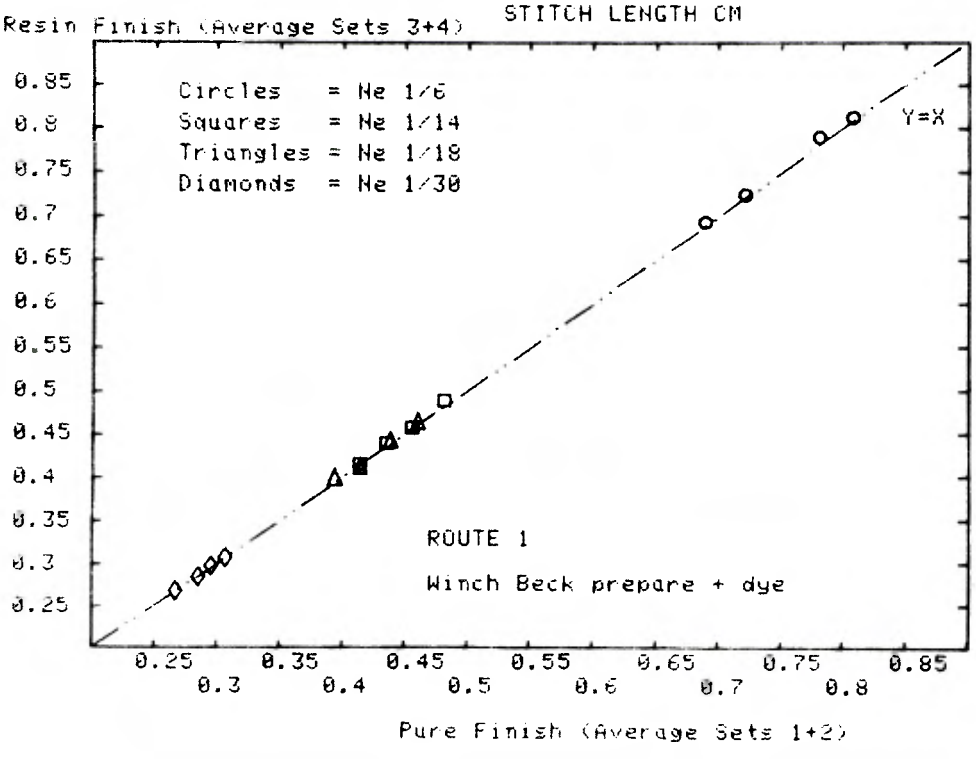
Sample Ref.No.		Pure Finish Average Sets 1+2 Tex	SL cm	C/cm	W/cm	Wtgsm	Resin Finish Average Sets 3+4 Tex	SL cm	C/cm	W/cm	Wtgsm
A-1		94.14	0.6899	8.23	5.81	304.3	96.33	0.6944	7.59	5.55	274.6
A-2		92.9	0.7221	7.89	5.56	293.5	95.76	0.7258	7.06	5.33	255.3
A-3		94.19	0.7816	7.11	5.38	278.3	95.69	0.7905	6.08	5.38	242.3
A-4		91.38	0.8086	6.8	5.25	260.7	95.37	0.8129	5.67	5.36	228.8
	mean	93.15					95.79				
	sd	1.32					0.4				
B-1		40.91	0.4138	13.36	10	226.2	42.22	0.4159	12.01	9.74	204.5
B-2		40.97	0.4351	12.48	9.71	216.6	42.35	0.4397	10.86	9.63	193.1
B-3		41.39	0.4556	11.96	9.46	211.4	42.77	0.4576	10.16	9.53	186.6
B-4		41	0.4811	11.25	9.16	202.2	42.51	0.4887	9.43	9.3	177.3
	mean	41.07					42.46				
	sd	0.22					0.24				
C-1		32.28	0.3939	13.49	10.63	180.6	33.02	0.3987	11.81	10.14	152.9
C-2		32.04	0.4139	12.7	10.44	174.8	32.87	0.4112	10.87	10.05	147.4
C-3		31.7	0.4383	11.97	10.01	164.9	33.04	0.4411	10.01	9.95	140.4
C-4		31.75	0.4603	11.08	9.91	160.1	33.33	0.463	9.16	9.86	134.9
	mean	31.94					33.07				
	sd	0.27					0.19				
D-1		19.62	0.2673	20.29	15.31	165.6	20.24	0.2682	18.34	14.68	147.7
D-2		19.72	0.285	18.65	15	158.4	20.46	0.2849	16.59	14.3	137.8
D-3		19.73	0.2956	17.62	14.53	152.8	20.5	0.2976	15.27	14.17	132.3
D-4		19.98	0.3067	16.78	14.36	148.7	20.69	0.3077	14.24	14.09	127.7
	mean	19.76					20.47				
	sd	0.15					0.19				

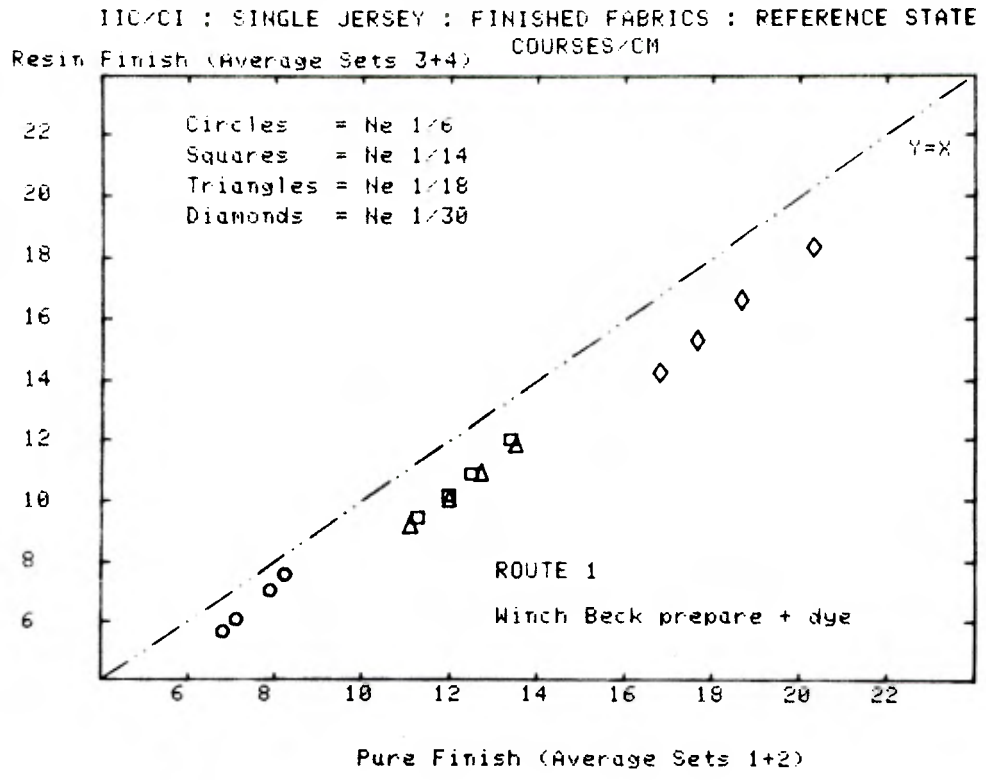
N.B. Tex results are IIC only

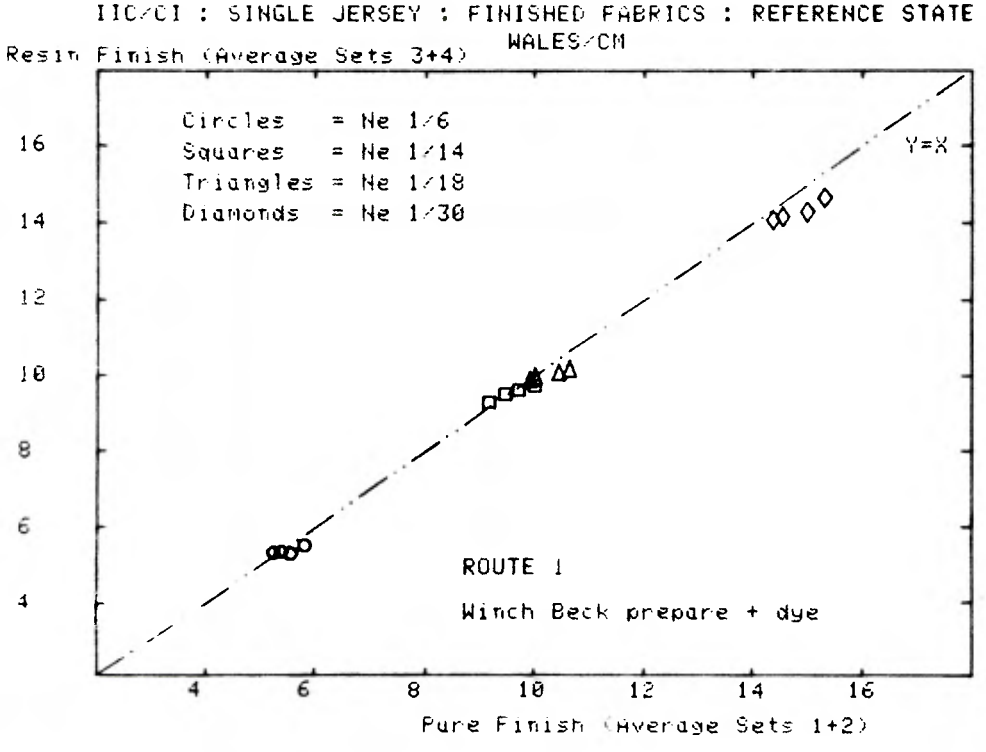
IIC/CI : SINGLE JERSEY : FINISHED FABRICS : REFERENCE STATE
TEX



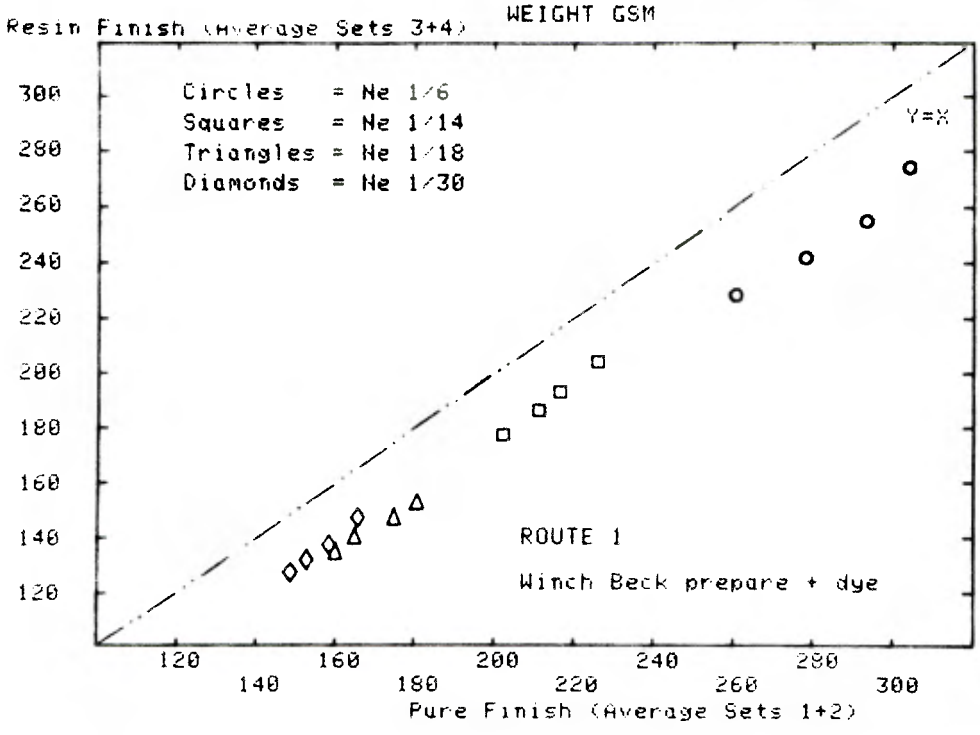
IIC/CI : SINGLE JERSEY : FINISHED FABRICS : REFERENCE STATE
STITCH LENGTH CM




IIC/CI : SINGLE JERSEY : FINISHED FABRICS : REFERENCE STATE
COURSES/CM
Resin Finish (Average Sets 3+4)
Circles = Ne 1/6
Squares = Ne 1/14
Triangles = Ne 1/18
Diamonds = Ne 1/30
Y=X
ROUTE 1
Winch Beck prepare + dye
Pure Finish (Average Sets 1+2)
6
8
10
12
14
16
18
20
22


IIC/CI : SINGLE JERSEY : FINISHED FABRICS : REFERENCE STATE
WALES/CM
Resin Finish (Average Sets 3+4)
Circles = Ne 1/6
Squares = Ne 1/14
Triangles = Ne 1/18
Diamonds = Ne 1/30
Y=X
ROUTE 1
Winch Beck prepare + dye
Pure Finish (Average Sets 1+2)
4
6
8
10
12
14
16

IIC/CI : SINGLE JERSEY : FINISHED FABRICS : REFERENCE STATE
WEIGHT GSM



IIC/CI STARFISH DATABASE EXPANSION 1987

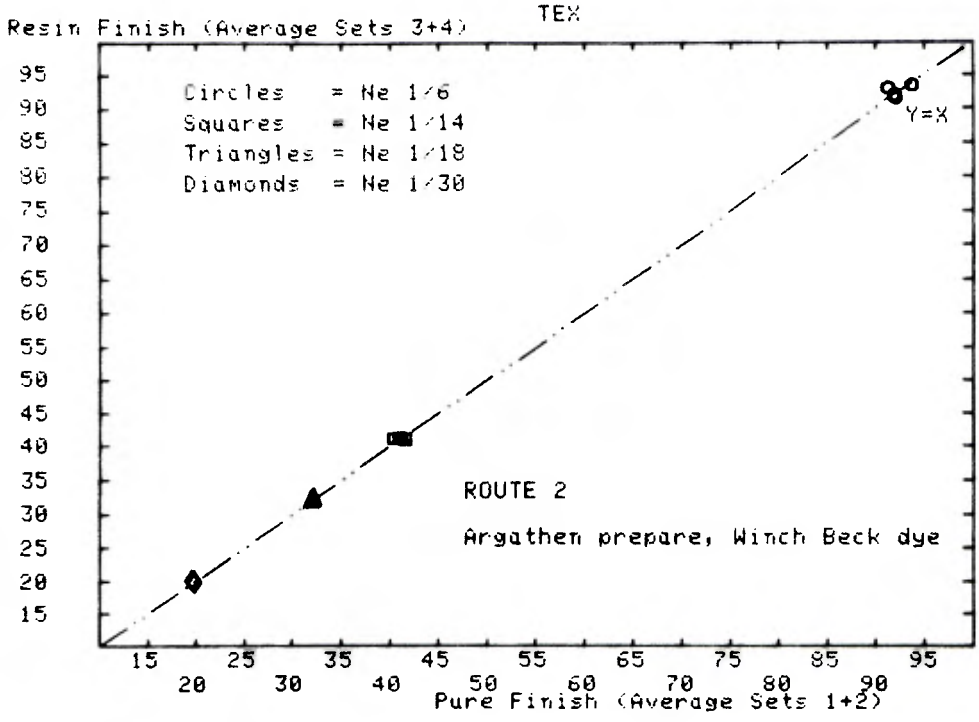
SINGLE JERSEY : RING SPUN YARNS : FINISHED FABRICS
ROUTE 2 : Argathen prepare, Winch Beck dye
Average Sets 1+2 Pure Finish : Average Sets 3+4 Resin Finish

Averaged IIC/CI Test Data : Reference State

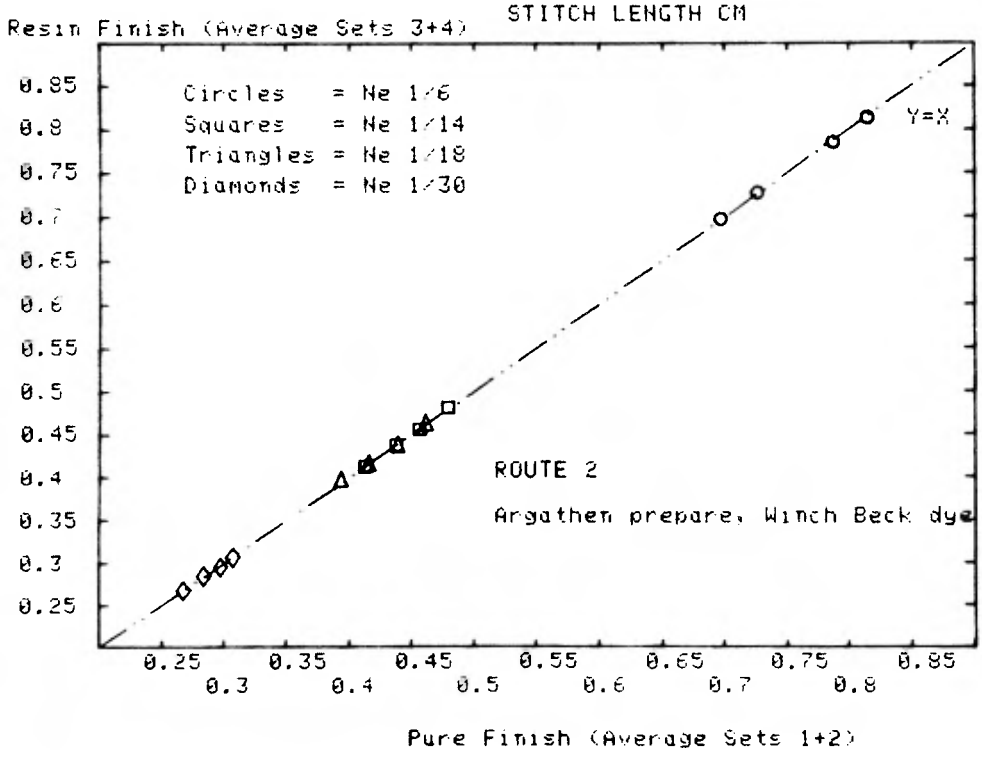
Sample Ref.No.		Pure Finish Average Sets 1+2 Tex	SL cm	C/cm	W/cm	Wtgsm	Resin Finish Average Sets 3+4 Tex	SL cm	C/cm	W/cm	Wtgsm
A-1		92.1	0.6974	8.08	5.9	301.4	91.58	0.6986	7.87	5.86	292.5
A-2		92.02	0.7265	7.73	5.71	289.2	92.08	0.7287	7.49	5.7	284.5
A-3		93.82	0.7879	7.08	5.38	272.7	93.52	0.786	6.77	5.48	265.4
A-4		91.33	0.8151	6.81	5.3	258.7	93.08	0.8139	6.5	5.33	255.6
	mean	92.32					92.56				
	sd	1.06					0.89				
B-1		40.92	0.4131	13.09	10.2	226.8	41.3	0.4134	12.73	10.1	220.1
B-2		40.46	0.4372	12.25	9.91	214.2	41.15	0.4378	11.96	9.82	210.8
B-3		41.04	0.4561	11.76	9.58	209.1	41.16	0.456	11.35	9.59	205.6
B-4		41.48	0.4797	11.17	9.27	199.7	41.15	0.4809	10.63	9.33	196.9
	mean	40.97					41.19				
	sd	0.42					0.07				
C-1		32.02	0.3937	13.14	10.93	182	32.38	0.3969	12.78	10.95	178.1
C-2		32.18	0.4153	12.43	10.58	174.6	32.28	0.4154	12.01	10.71	169.7
C-3		32.05	0.439	11.65	10.3	168.2	32.01	0.4365	11.37	10.49	163.4
C-4		31.79	0.4612	10.99	9.96	160.4	31.92	0.4619	10.46	10.39	156.8
	mean	32.01					32.15				
	sd	0.16					0.22				
D-1		19.86	0.2675	19.79	15.72	166.1	19.69	0.268	19.02	15.74	160.2
D-2		19.55	0.2837	18.28	15.14	157.3	20.14	0.2848	17.43	15.36	152.4
D-3		19.71	0.2972	17.62	14.72	153.4	20.17	0.2954	16.57	14.81	147.7
D-4		19.76	0.307	16.48	14.43	147.6	19.85	0.3069	15.64	14.71	141.9
	mean	19.72					19.96				
	sd	0.13					0.23				

N.B. Tex results are IIC only

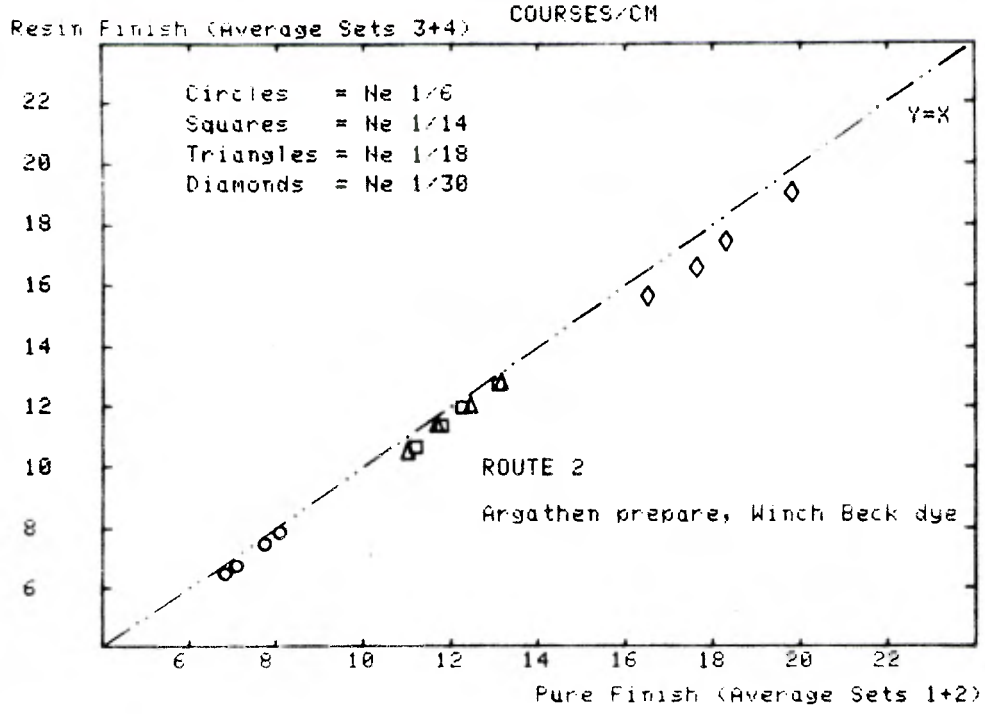
IIC/CI : SINGLE JERSEY : FINISHED FABRICS : REFERENCE STATE
TEX



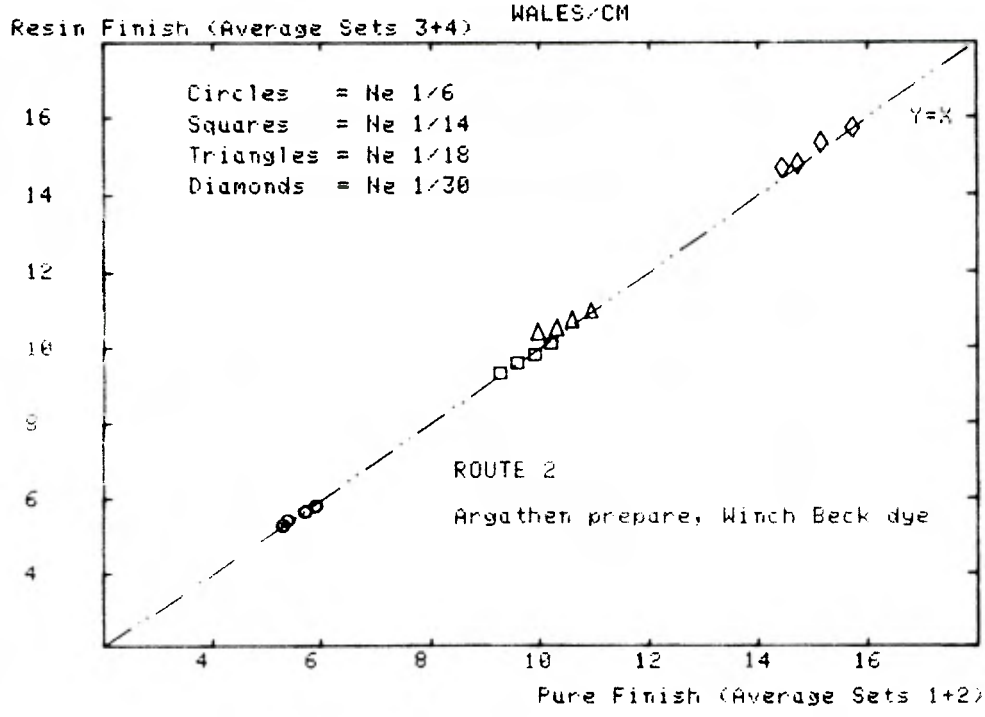
IIC/CI : SINGLE JERSEY : FINISHED FABRICS : REFERENCE STATE
STITCH LENGTH CM

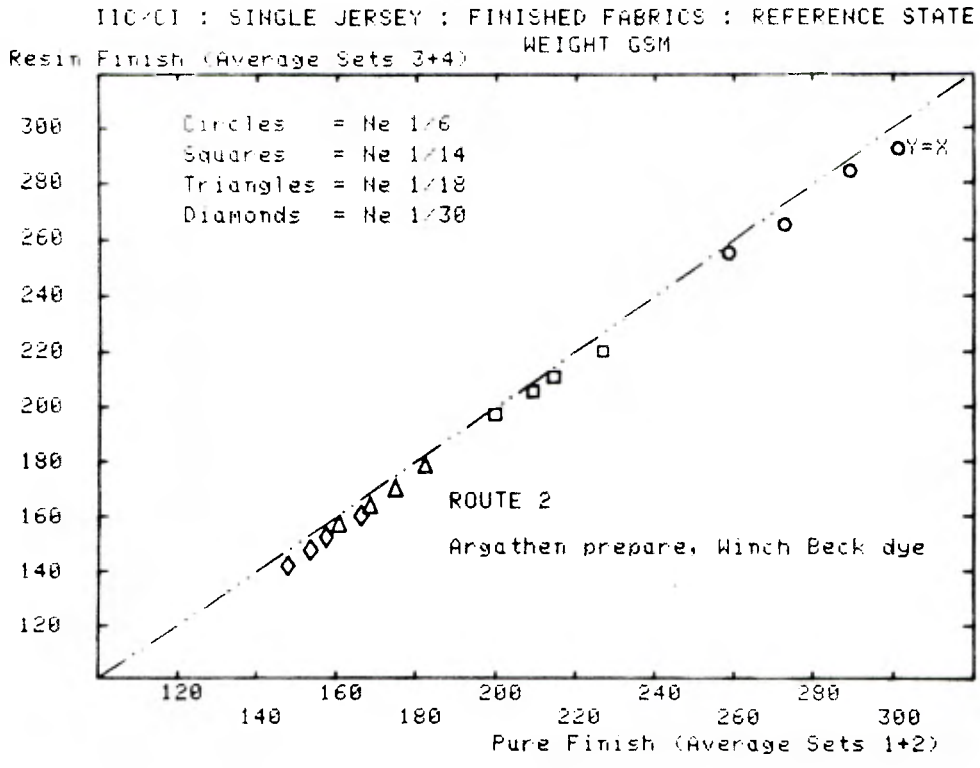


IIC/CI : SINGLE JERSEY : FINISHED FABRICS : REFERENCE STATE
COURSES/CM



IIC/CI : SINGLE JERSEY : FINISHED FABRICS : REFERENCE STATE
WALES/CM




IIC/CI : SINGLE JERSEY : FINISHED FABRICS : REFERENCE STATE
WEIGHT GSM
Resin Finish (Average Sets 3+4)
Circles = Ne 1/6
Squares = Ne 1/14
Triangles = Ne 1/18
Diamonds = Ne 1/30
Y=X
ROUTE 2
Argathen prepare, Winch Beck dye
300
280
260
240
220
200
180
160
140
120
120
140
160
180
200
220
240
260
280
300
Pure Finish (Average Sets 1+2)

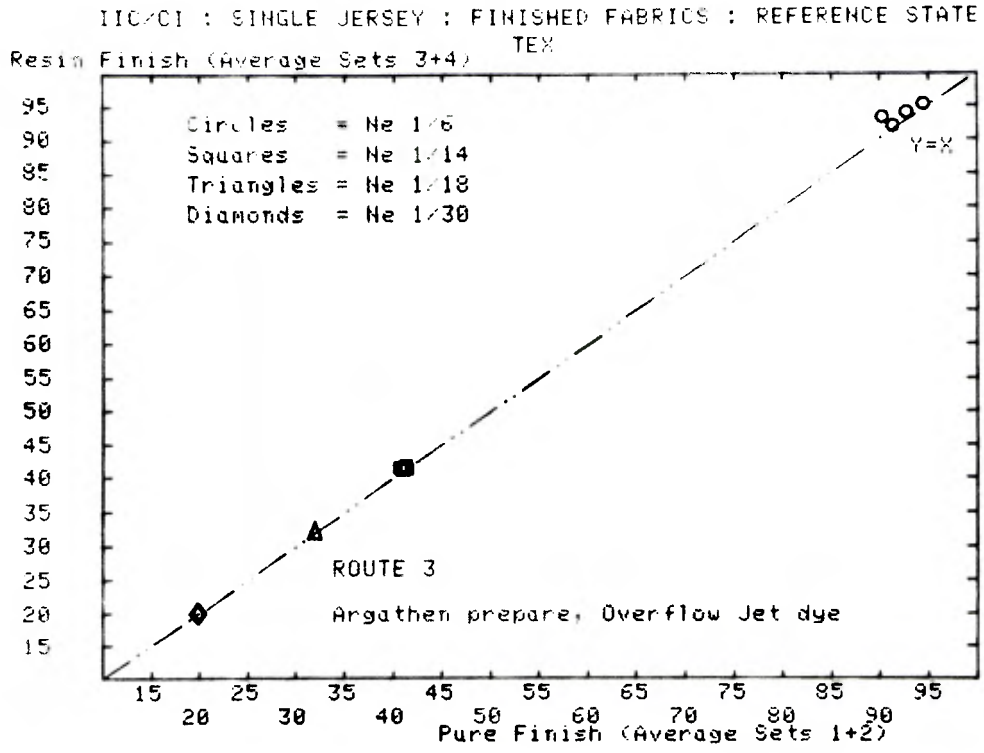
IIC/CI STARFISH DATABASE EXPANSION 1987

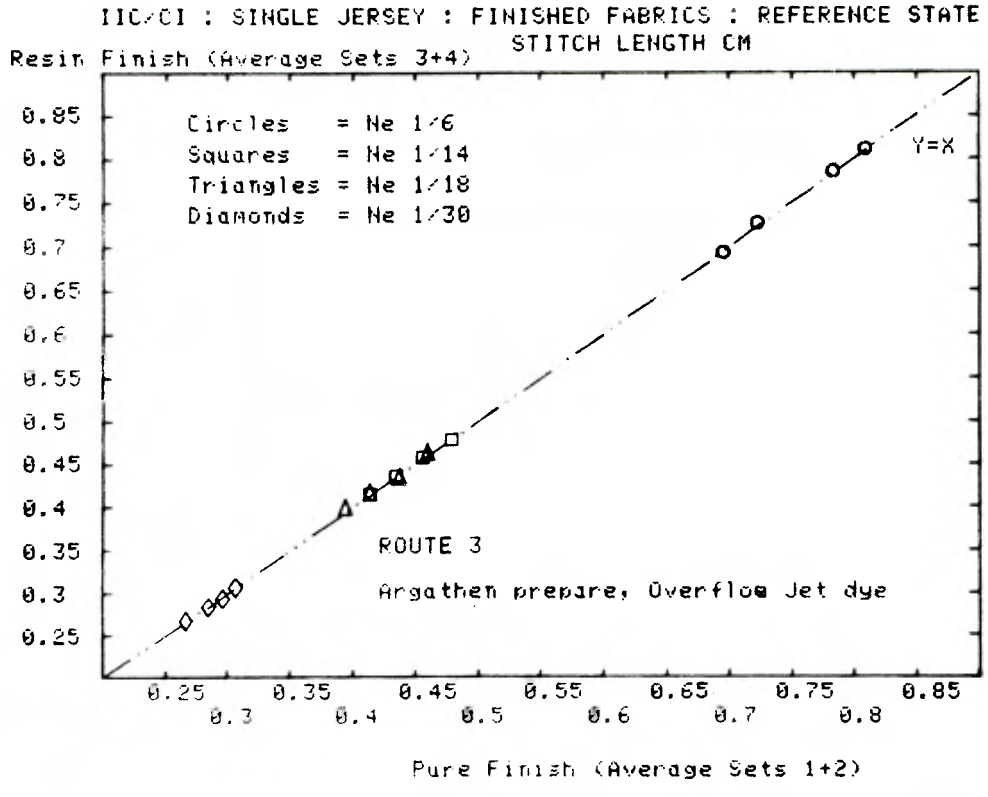
SINGLE JERSEY : RING SPUN YARNS : FINISHED FABRICS
ROUTE 3 : Argathen prepare, Overflow Jet dye
Average Sets 1+2 Pure Finish : Average Sets 3+4 Resin Finish

Averaged IIC/CI Test Data : Reference State

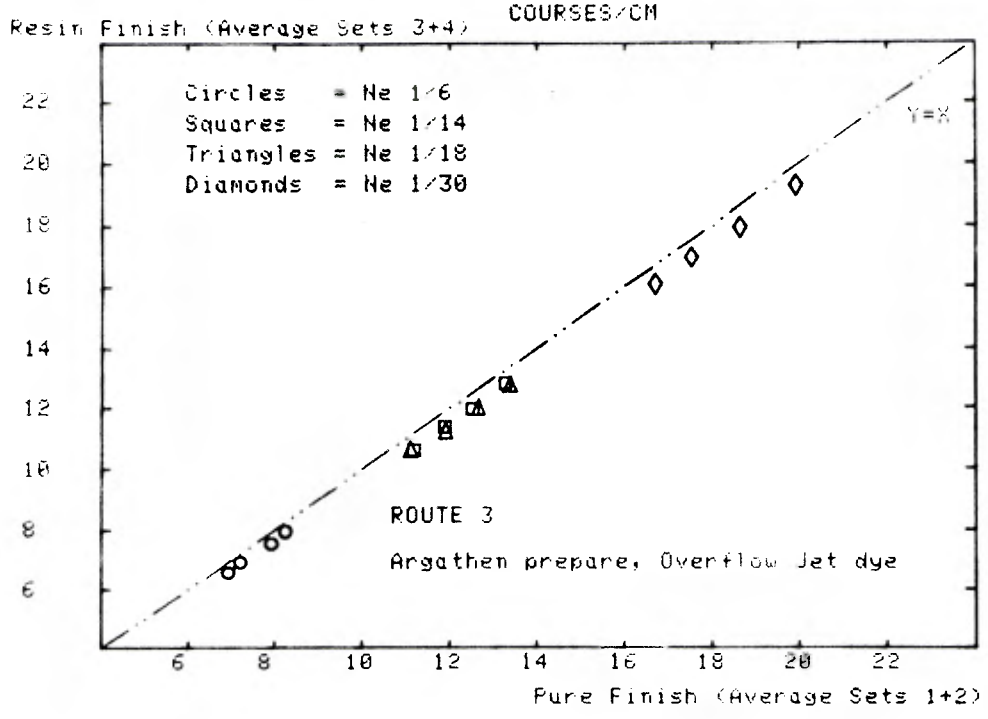
Sample Ref.No.		Pure Finish Average Sets 1+2 Tex	SL cm	C/cm	W/cm	Wtgsm	Resin Finish Average Sets 3+4 Tex	SL cm	C/cm	W/cm	Wtgsm
A-1		90.31	0.6953	8.24	6.04	310.8	93.45	0.6947	7.95	5.92	297.4
A-2		91.43	0.7227	7.91	5.81	296.2	92.09	0.7278	7.55	5.75	283.9
A-3		92.81	0.7832	7.21	5.45	276.1	94.17	0.7865	6.94	5.41	268.5
A-4		94.55	0.8091	6.93	5.3	274.8	95.43	0.812	6.59	5.35	261.7
	mean	92.27					93.78				
	sd	1.83					1.4				
B-1		40.83	0.4135	13.26	10.25	229.4	41.23	0.416	12.82	10.18	219.4
B-2		41.33	0.4345	12.52	9.88	218.8	41.31	0.4373	11.95	9.91	211.5
B-3		40.62	0.4555	11.89	9.63	210	41.47	0.4588	11.39	9.61	205
B-4		41.19	0.4787	11.17	9.25	202.9	41.86	0.4787	10.59	9.31	196.9
	mean	40.99					41.47				
	sd	0.33					0.28				
C-1		31.87	0.3935	13.37	11.03	184.3	31.96	0.398	12.73	11.07	176.3
C-2		31.79	0.413	12.64	10.67	175.8	32.13	0.4167	11.98	10.49	171.1
C-3		31.88	0.4367	11.9	10.31	168.5	31.96	0.4344	11.2	10.67	163.8
C-4		31.91	0.4593	11.1	10.05	161.3	32.05	0.4634	10.58	10.26	157
	mean	31.86					32.02				
	sd	0.05					0.08				
D-1		19.88	0.2666	19.9	15.85	167.4	19.86	0.2681	19.24	15.79	164
D-2		19.69	0.2846	18.61	15.14	159.2	19.97	0.2847	17.9	15.17	153.4
D-3		19.79	0.2958	17.5	14.79	154	20.14	0.2945	16.93	14.99	149.2
D-4		19.94	0.3062	16.67	14.53	147.9	20.1	0.3079	16.07	14.67	143.5
	mean	19.83					20.02				
	sd	0.11					0.13				

N.B. Tex results are IIC only

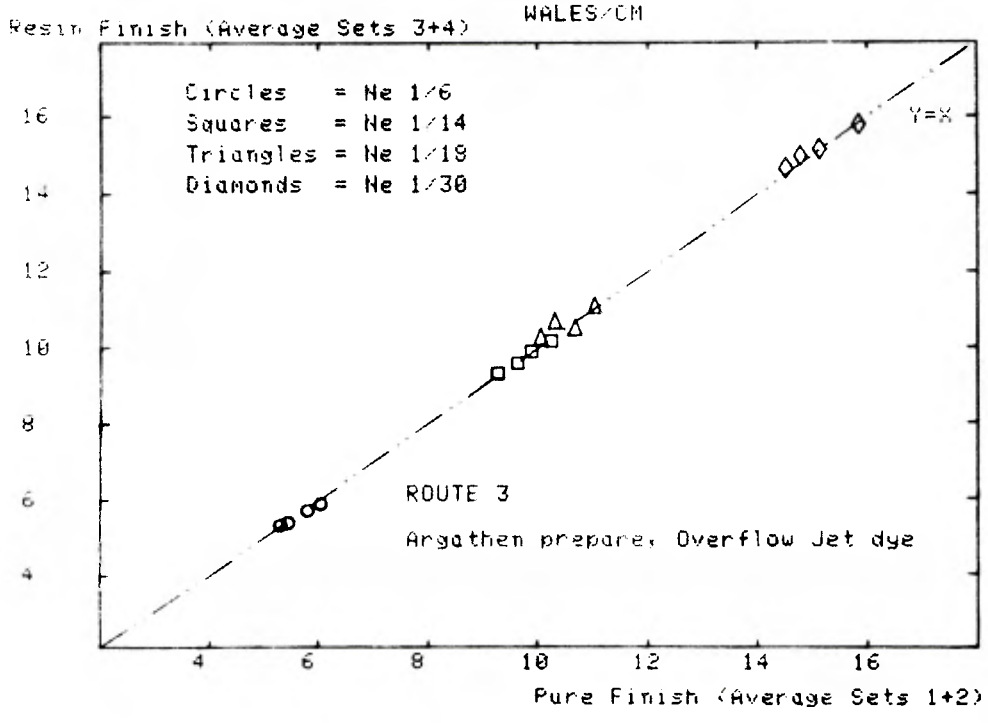

IIC/CI : SINGLE JERSEY : FINISHED FABRICS : REFERENCE STATE
TEX
Resin Finish (Average Sets 3+4)
Circles = Ne 1/6
Squares = Ne 1/14
Triangles = Ne 1/18
Diamonds = Ne 1/30
Y=X
ROUTE 3
Argathen prepare, Overflow Jet dye
Pure Finish (Average Sets 1+2)


IIC/CI : SINGLE JERSEY : FINISHED FABRICS : REFERENCE STATE
STITCH LENGTH CM
Resin Finish (Average Sets 3+4)
Circles = Ne 1/6
Squares = Ne 1/14
Triangles = Ne 1/18
Diamonds = Ne 1/30
Y=X
ROUTE 3
Argathen prepare, Overflow Jet dye
Pure Finish (Average Sets 1+2)

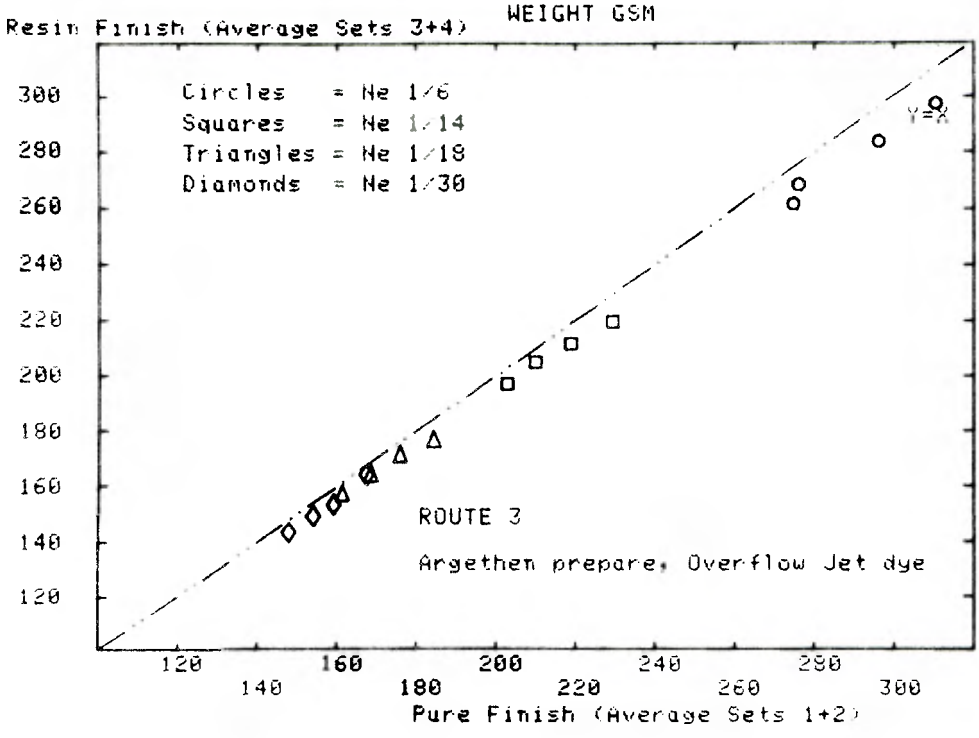
IIC/CI : SINGLE JERSEY : FINISHED FABRICS : REFERENCE STATE
COURSES/CM



IIC/CI : SINGLE JERSEY : FINISHED FABRICS : REFERENCE STATE
WALES/CM



ITC/CI : SINGLE JERSEY : FINISHED FABRICS : REFERENCE STATE
WEIGHT GSM



A P P E N D I X 5

FABRIC SHRINKAGE

GREY	A5/1
ROUTE 1	A5/2 - A5/3
ROUTE 2	A5/4 - A5/5
ROUTE 3	A5/6 - A5/7

IIC/CI STARFISH DATABASE EXPANSION 1987

SINGLE JERSEY : RING SPUN YARNS
SHRINKAGE

PROCESS : GREY

Sample Ref No		5*LS%	5*WS%
Ne 1/6			
A-1		8.54	9.77
A-2		11.15	8.59
A-3		13.48	5.96
A-4		17.06	2.94
	mean	12.56	6.82
	sd	3.62	3.03
Ne 1/14			
B-1		5.62	17.57
B-2		10.12	14.91
B-3		12.06	13.16
B-4		14.79	11.07
	mean	10.64	14.18
	sd	3.86	2.75
Ne 1/18			
C-1		3.54	21.99
C-2		7.89	18.39
C-3		10	16.02
C-4		13.03	12.02
	mean	8.62	17.1
	sd	3.99	4.19
Ne 1/30			
D-1		8.51	20.64
D-2		12.94	17.33
D-3		17.19	13.22
D-4		17.9	10.93
	mean	14.14	15.53
	sd	4.34	4.31

IIC/CI STARFISH DATABASE EXPANSION 1987

SINGLE JERSEY : RING SPUN YARNS
SHRINKAGE

PROCESS : ROUTE 1 : SET 1 and SET 2

Sample Ref No		Set 1 1*LS%	Set 1 5*LS%	Diff 5-1	Set 1 1*WS%	Set 1 5*WS%	Diff 5-1	Set 2 1*LS%	Set 2 5*LS%	Diff 5-1	Set 2 1*WS%	Set 2 5*WS%	Diff 5-1
Ne 1/6													
A-1		10.93	13.41	2.48	19.26	20.25	0.99	-3.77	-2.01	1.76	24.28	25.96	1.68
A-2		12.23	14.91	2.67	18.63	19.56	0.93	-0.97	1.13	2.1	22.39	23.3	0.91
A-3		20.53	23.73	3.2	11.68	11.63	-0.04	6.67	10.08	3.41	18.72	18.77	0.06
A-4		21.55	24.93	3.38	9.97	8.92	-1.05	7.68	10.15	2.47	18.06	17.86	-0.2
	mean	16.31	19.24	2.93	14.88	15.09	0.21	2.4	4.84	2.43	20.86	21.47	0.61
	sd	5.5	5.92	0.42	4.75	5.67	0.96	5.64	6.23	0.71	2.97	3.82	0.85
Ne 1/14													
B-1		11.61	13.4	1.79	11	11.63	0.63	3.52	5.93	2.41	13.21	14.28	1.07
B-2		15.16	17.57	2.42	8.81	8.92	0.1	5.95	8.81	2.86	11.37	11.94	0.57
B-3		17.63	20.1	2.47	6.35	6.37	0.02	7.54	10.39	2.86	9.53	9.6	0.08
B-4		19.68	22.66	2.98	5.78	4.53	-1.25	8.19	11.33	3.14	9.03	8.98	-0.05
	mean	16.02	18.43	2.41	7.99	7.86	-0.12	6.3	9.12	2.82	10.79	11.2	0.42
	sd	3.47	3.95	0.49	2.4	3.09	0.8	2.08	2.36	0.3	1.9	2.42	0.51
Ne 1/18													
C-1		13.1	15.43	2.34	15.37	16.08	0.71	5.59	7.57	1.98	15.08	15.9	0.82
C-2		15.25	17.77	2.52	13.44	13.27	-0.18	6.69	8.72	2.02	13.31	14.12	0.81
C-3		18.1	20.92	2.82	11.02	11.47	0.45	8.71	10.56	1.85	12.17	12.35	0.18
C-4		20.38	23.72	3.33	9.33	9	-0.33	8.76	11.25	2.49	11.28	11.34	0.06
	mean	16.71	19.46	2.75	12.29	12.45	0.16	7.44	9.52	2.09	12.96	13.43	0.47
	sd	3.19	3.62	0.44	2.66	2.98	0.5	1.56	1.69	0.28	1.64	2.01	0.4
Ne 1/30													
D-1		8.66	10.52	1.86	13.03	13.63	0.59	2.22	2.57	0.36	14.13	14.57	0.44
D-2		11.44	13.43	1.99	10.36	10.52	0.16	5.89	6.97	1.07	11.56	11.58	0.03
D-3		13.63	16.12	2.49	9.9	9.86	-0.04	7.61	9.11	1.49	9.99	9.69	-0.3
D-4		14.65	18.04	3.39	7.9	7.81	-0.08	9.71	10.83	1.11	9.59	8.65	-0.94
	mean	12.09	14.53	2.43	10.3	10.45	0.16	6.36	7.37	1.01	11.32	11.12	-0.19
	sd	2.65	3.27	0.69	2.11	2.41	0.31	3.17	3.56	0.47	2.06	2.6	0.58
	mean	15.28	17.92	2.63	11.36	11.47	0.1	5.63	7.71	2.09	13.98	14.31	0.33
	sd	3.95	4.37	0.52	3.85	4.33	0.63	3.69	3.95	0.82	4.63	5.04	0.63

(+) = Shrinkage; (-) = Extension or Growth

IIC/CI STARFISH DATABASE EXPANSION 1987

SINGLE JERSEY : RING SPUN YARNS
SHRINKAGE

PROCESS : ROUTE 1 : SET 3 and SET 4

Sample Ref No		Set 3 1*LS%	Set 3 5*LS%	Diff 5-1	Set 3 1*WS%	Set 3 5*WS%	Diff 5-1	Set 4 1*LS%	Set 4 5*LS%	Diff 5-1	Set 4 1*WS%	Set 4 5*WS%	Diff 5-1
Ne 1/6													
A-1		10.7	11.65	0.96	12.79	13.7	0.92	4.63	4.88	0.25	12.88	13.5	0.61
A-2		10.33	11.57	1.25	12.76	13.66	0.9	5.98	6.41	0.43	12.66	12.75	0.09
A-3		14.29	15.56	1.27	12.64	13.34	0.69	8.77	9.42	0.66	11.23	12.16	0.93
A-4		13.37	15.08	1.71	10.51	11.36	0.85	9.46	9.79	0.34	11.02	11.38	0.36
	mean	12.17	13.46	1.29	12.18	13.01	0.84	7.21	7.63	0.42	11.95	12.45	0.5
	sd	1.96	2.15	0.31	1.11	1.12	0.1	2.28	2.38	0.17	0.96	0.9	0.36
Ne 1/14													
B-1		8.84	9.35	0.51	8.34	8.68	0.34	4.49	4.45	-0.04	6.77	6.99	0.22
B-2		9.74	10.52	0.78	7.43	7.55	0.12	5.33	5.29	-0.04	6.12	6.32	0.2
B-3		10.32	11.63	1.32	7.15	7.48	0.33	6.11	5.95	-0.16	5.49	5.93	0.44
B-4		11.44	11.93	0.5	6.79	7.06	0.28	7.59	7.22	-0.37	5.15	5.34	0.2
	mean	10.08	10.86	0.77	7.43	7.69	0.27	5.88	5.73	-0.15	5.88	6.14	0.26
	sd	1.09	1.18	0.38	0.66	0.69	0.1	1.32	1.17	0.16	0.71	0.69	0.12
Ne 1/18													
C-1		7.71	7.72	0.01	9.32	9.75	0.42	3.53	3.99	0.46	6.92	7.55	0.63
C-2		8.76	9.17	0.41	8.92	9.28	0.36	5.08	5.99	0.91	6.29	7.2	0.91
C-3		9.74	10.52	0.78	8.48	8.79	0.3	5.48	6.07	0.59	6.1	6.94	0.84
C-4		10.01	10.79	0.79	8.51	8.42	-0.09	6.73	7.61	0.88	6.07	7.01	0.94
	mean	9.05	9.55	0.5	8.81	9.06	0.25	5.21	5.91	0.71	6.34	7.18	0.83
	sd	1.05	1.41	0.37	0.4	0.58	0.23	1.32	1.48	0.22	0.39	0.27	0.14
Ne 1/30													
D-1		4.58	5.13	0.54	7.72	8.22	0.5	2.99	2.91	-0.07	5.32	5.63	0.31
D-2		5.43	6.14	0.72	5.84	6.32	0.48	4.04	4.05	0	4.84	5.03	0.19
D-3		6.07	6.9	0.83	5.87	6.49	0.62	4.56	4.72	0.16	4.67	4.84	0.17
D-4		6.42	7.11	0.69	5.42	5.98	0.57	4.88	5.45	0.57	4.22	4.52	0.29
	mean	5.62	6.32	0.69	6.21	6.75	0.54	4.12	4.28	0.17	4.76	5	0.24
	sd	0.81	0.9	0.12	1.03	1	0.06	0.83	1.08	0.29	0.45	0.47	0.07
	mean	9.23	10.05	0.82	8.66	9.13	0.47	5.6	5.89	0.29	7.23	7.69	0.46
	sd	2.71	2.97	0.41	2.43	2.59	0.28	1.79	1.89	0.38	2.94	3	0.31

[+] = Shrinkage; [-] = Extension or Growth

IIC/CI STARFISH DATABASE EXPANSION 1987

SINGLE JERSEY : RING SPUN YARNS
SHRINKAGE

PROCESS : ROUTE 2 : SET 1 and SET 2

Sample Ref No		Set 1 1*LS%	Set 1 5*LS%	Diff 5-1	Set 1 1*WS%	Set 1 5*WS%	Diff 5-1	Set 2 1*LS%	Set 2 5*LS%	Diff 5-1	Set 2 1*WS%	Set 2 5*WS%	Diff 5-1
Ne 1/6													
A-1		15.08	17.77	2.69	14.8	16.28	1.48	2.82	4.96	2.14	15.36	16.25	0.89
A-2		17.2	20.5	3.3	11.27	11.44	0.16	5.53	8.21	2.68	13	13.27	0.27
A-3		19.62	22.5	2.88	10.85	10.2	-0.65	6.14	8.45	2.31	10.91	11.32	0.42
A-4		19.72	22.62	2.9	10.09	9.22	-0.87	9.2	11.93	2.73	10.76	10.02	-0.74
	mean	17.9	20.85	2.94	11.75	11.79	0.03	5.92	8.39	2.46	12.51	12.72	0.21
	sd	2.22	2.27	0.26	2.09	3.13	1.06	2.62	2.85	0.29	2.16	2.71	0.68
Ne 1/14													
B-1		14.54	17.1	2.55	11.03	11.24	0.21	4.55	6.93	2.38	10	9.97	-0.04
B-2		19.86	22.52	2.64	8.75	8.01	-0.75	7.19	10	2.81	9.16	8.65	-0.51
B-3		22.16	24.41	2.25	5.17	5.17	0	7.76	10.31	2.54	7.51	7.78	0.27
B-4		23.57	26.16	2.59	4.88	4.54	-0.34	9.46	12.2	2.74	6.16	5	-1.17
	mean	20.04	22.55	2.51	7.46	7.24	-0.22	7.24	9.86	2.62	8.21	7.85	-0.36
	sd	3.97	3.93	0.18	2.96	3.06	0.42	2.04	2.18	0.2	1.71	2.1	0.63
Ne 1/18													
C-1		13.37	15.19	1.82	15.17	15.33	0.16	4.3	5.96	1.66	13.3	13.54	0.29
C-2		12.3	14.97	2.66	13.28	13.06	-0.21	7.57	8.94	1.37	11.97	10.85	-1.12
C-3		15.21	17.9	2.69	12.07	11.29	-0.78	10.62	12.12	1.5	9.64	7.74	-1.9
C-4		19.2	21.7	2.5	10.13	8.1	-2.03	10.81	12.09	1.28	10.07	8.09	-1.98
	mean	15.02	17.44	2.42	12.66	11.95	-0.72	8.32	9.78	1.45	11.25	10.07	-1.18
	sd	3.04	3.14	0.41	2.11	3.05	0.96	3.07	2.95	0.16	1.7	2.73	1.05
Ne 1/30													
D-1		11.62	13.06	1.44	13.42	13.82	0.4	4.28	5.96	1.68	11.7	12.05	0.35
D-2		13.7	15.68	1.97	12.33	12.29	-0.04	6.14	8.38	2.25	9.75	10.11	0.36
D-3		n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	7.27	10.06	2.79	7.55	7.51	-0.04
D-4		14.83	16.88	2.05	9.49	8.85	-0.64	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
	mean	13.39	15.21	1.82	11.74	11.65	-0.09	5.9	8.14	2.24	9.67	9.89	0.22
	sd	1.63	1.95	0.33	2.03	2.55	0.52	1.51	2.06	0.55	2.08	2.28	0.23
	mean	16.8	19.26	2.46	10.85	10.59	-0.26	6.91	9.1	2.19	10.46	10.15	-0.31
	sd	3.68	3.92	0.48	3	3.38	0.78	2.41	2.42	0.55	2.41	2.88	0.89

[+] = Shrinkage; [-] = Extension or Growth

IIC/CI STARFISH DATABASE EXPANSION 1987

SINGLE JERSEY : RING SPUN YARNS
SHRINKAGE

PROCESS : ROUTE 2 : SET 3 and SET 4

Sample Ref No		Set 3 1*LS%	Set 3 5*LS%	Diff 5-1	Set 3 1*WS%	Set 3 5*WS%	Diff 5-1	Set 4 1*LS%	Set 4 5*LS%	Diff 5-1	Set 4 1*WS%	Set 4 5*WS%	Diff 5-1
Ne 1/6													
A-1		15.96	17.19	1.24	15.04	15.69	0.65	11.87	13.93	2.06	17.21	18.44	1.23
A-2		18.88	19.66	0.78	12.76	13.03	0.26	12.35	14.36	2.01	17.85	18.53	0.68
A-3		15.93	16.67	0.74	19.24	19.06	-0.19	14.84	17.69	2.85	13.06	13.52	0.46
A-4		17.55	18.44	0.89	18.45	17.67	-0.78	17.95	20.13	2.18	12.31	12.53	0.22
	mean	17.08	17.99	0.91	16.37	16.36	-0.01	14.25	16.53	2.27	15.11	15.76	0.65
	sd	1.42	1.34	0.23	3.02	2.62	0.61	2.79	2.93	0.39	2.82	3.18	0.43
Ne 1/14													
B-1		16.36	17.87	1.51	9.3	9.67	0.37	8.26	10.65	2.39	9.66	9.83	0.17
B-2		16.44	17.65	1.21	11.78	12.18	0.4	9.71	12.72	3.01	8.14	8.02	-0.12
B-3		18.83	20.43	1.6	7.77	7.89	0.12	10.82	13.71	2.89	6.11	5.88	-0.23
B-4		20.85	22.44	1.59	4.79	4.02	-0.77	13.43	16.05	2.62	6.13	5.41	-0.72
	mean	18.12	19.6	1.48	8.41	8.44	0.03	10.56	13.28	2.73	7.51	7.28	-0.22
	sd	2.15	2.28	0.18	2.92	3.43	0.55	2.18	2.24	0.28	1.72	2.04	0.37
Ne 1/18													
C-1		18.27	20.2	1.93	13.37	13.25	-0.12	11.01	12.85	1.85	11.56	12.38	0.82
C-2		22.9	24.29	1.39	8.84	8.1	-0.75	13.22	15.38	2.17	10.33	10.32	-0.01
C-3		22.66	24.2	1.54	9.72	8.6	-1.12	13.47	16.73	3.26	8.69	8.77	0.08
C-4		19.4	21.92	2.52	11.21	9.6	-1.6	14.55	17.72	3.17	8.26	8.35	0.09
	mean	20.81	22.65	1.85	10.79	9.89	-0.9	13.06	15.67	2.61	9.71	9.95	0.24
	sd	2.33	1.97	0.5	1.98	2.33	0.62	1.49	2.11	0.71	1.52	1.83	0.39
Ne 1/30													
D-1		15.42	16.87	1.45	9.55	10.04	0.49	6.27	7.75	1.48	11.49	12.19	0.71
D-2		13.37	15	1.63	9.77	9.61	-0.16	7.47	9.03	1.56	8.83	9.45	0.62
D-3		16.41	17.92	1.51	7.86	8.05	0.18	11.03	13.22	2.19	8.01	8.24	0.22
D-4		15.76	16.59	0.82	9.7	9.24	-0.46	11.06	13.15	2.09	7.52	7.48	-0.05
	mean	15.24	16.59	1.35	9.22	9.23	0.01	8.96	10.79	1.83	8.96	9.34	0.38
	sd	1.31	1.21	0.36	0.91	0.85	0.41	2.46	2.82	0.36	1.77	2.07	0.35
	mean	17.81	19.21	1.4	11.2	10.98	-0.22	11.71	14.07	2.36	10.32	10.58	0.26
	sd	2.66	2.81	0.46	3.84	3.94	0.64	2.96	3.25	0.55	3.48	3.86	0.48

[+] = Shrinkage; [-] = Extension or Growth

SINGLE JERSEY : RING SPUN YARNS
SHRINKAGE

PROCESS : ROUTE 3 ; SET 1 and SET 2

Sample Ref No		Set 1 1*LS%	Set 1 5*LS%	Diff 5-1	Set 1 1*WS%	Set 1 5*WS%	Diff 5-1	Set 2 1*LS%	Set 2 5*LS%	Diff 5-1	Set 2 1*WS%	Set 2 5*WS%	Diff 5-1
Ne 1/6													
A-1		12.97	15.58	2.61	16.34	16.25	-0.09	4.54	6.86	2.31	14.83	16.32	1.49
A-2		14.21	16.57	2.36	14.9	14.8	-0.1	5.1	6.94	1.84	14.94	15.29	0.36
A-3		17.31	20.79	3.48	10.49	9.57	-0.92	7.02	8.66	1.65	12.41	12.02	-0.4
A-4		19.03	21.43	2.4	9.23	7.83	-1.41	9.61	16.54	6.93	10.83	8.85	-1.98
	mean	15.88	18.59	2.71	12.74	12.11	-0.63	6.57	9.75	3.18	13.25	13.12	-0.13
	sd	2.78	2.94	0.52	3.42	4.05	0.65	2.29	4.6	2.51	1.99	3.36	1.45
Ne 1/14													
B-1		13.51	16.2	2.69	10.35	10.63	0.28	4.34	7.03	2.69	8.36	8.6	0.23
B-2		16.32	19.06	2.74	8.81	8.91	0.1	5.98	8.6	2.62	8.38	8.55	0.17
B-3		17.55	20.29	2.74	6.66	5.86	-0.8	6.71	9.23	2.52	8.33	8.59	0.26
B-4		20.29	23.2	2.91	5.26	4.9	-0.36	8.11	11.13	3.02	5.97	5.81	-0.16
	mean	16.92	19.69	2.77	7.77	7.58	-0.19	6.28	9	2.72	7.76	7.89	0.13
	sd	2.81	2.9	0.1	2.26	2.66	0.48	1.57	1.69	0.21	1.2	1.38	0.19
Ne 1/18													
C-1		12.26	14.71	2.45	16.65	16.75	0.1	2.62	4.26	1.64	13.56	13.83	0.27
C-2		14.3	16.62	2.32	13.76	12.88	-0.89	0.61	1.19	0.58	14.18	14.31	0.12
C-3		15.94	18.01	2.07	10.87	10.31	-0.56	4.07	6.32	2.24	11.73	11.4	-0.33
C-4		18.12	21.2	3.08	8.71	7.58	-1.13	8.97	11.19	2.22	8.81	7.44	-1.37
	mean	15.15	17.63	2.48	12.5	11.88	-0.62	4.07	5.74	1.67	12.07	11.74	-0.32
	sd	2.49	2.74	0.43	3.46	3.9	0.53	3.56	4.2	0.78	2.41	3.14	0.74
Ne 1/30													
D-1		11.11	11.93	0.82	13.16	13.18	0.02	3.26	4.99	1.73	10.84	11.76	0.92
D-2		12.61	14.59	1.98	11.71	11.51	-0.2	2.38	4.42	2.04	10.19	10.76	0.57
D-3		13.89	16.23	2.34	10.84	10.55	-0.29	2.5	4.8	2.3	9.87	10.52	0.65
D-4		13.92	16.51	2.6	9	8.47	-0.53	6.36	8.8	2.43	7.64	7.89	0.26
	mean	12.88	14.82	1.94	11.17	10.92	-0.25	3.63	5.75	2.12	9.63	10.23	0.6
	sd	1.33	2.1	0.78	1.74	1.97	0.23	1.87	2.04	0.31	1.39	1.65	0.27
	mean	15.21	17.68	2.47	11.05	10.62	-0.42	5.14	7.56	2.42	10.68	10.75	0.07
	sd	2.66	3.05	0.58	3.25	3.47	0.49	2.57	3.57	1.33	2.73	3.03	0.83

(+) = Shrinkage; (-) = Extension or Growth

SINGLE JERSEY : RING SPUN YARNS
SHRINKAGE

PROCESS : ROUTE 3 : SET 3 and SET 4

Sample Ref No		Set 3 1*LS%	Set 3 5*LS%	Diff 5-1	Set 3 1*WS%	Set 3 5*WS%	Diff 5-1	Set 4 1*LS%	Set 4 5*LS%	Diff 5-1	Set 4 1*WS%	Set 4 5*WS%	Diff 5-1
Ne 1/6													
A-1		15.1	16.87	1.76	14.38	15.52	1.14	9.22	10.3	1.08	20.14	20.76	0.62
A-2		17.83	19.25	1.42	13.78	14.3	0.52	11.92	13.04	1.13	18.92	19.14	0.22
A-3		14.94	16.08	1.14	20.36	20.97	0.6	15.59	17.38	1.8	15.43	15.13	-0.3
A-4		13.19	14.46	1.27	23.36	23.73	0.37	15.97	17.22	1.25	15.98	15.24	-0.74
	mean	15.27	16.66	1.4	17.97	18.63	0.66	13.17	14.49	1.31	17.62	17.56	-0.05
	sd	1.92	1.99	0.27	4.66	4.47	0.34	3.21	3.44	0.33	2.28	2.83	0.55
Ne 1/14													
B-1		18.26	19.48	1.22	6.96	6.97	0.01	11.98	13.44	1.46	8.8	8.76	-0.04
B-2		14.78	15.85	1.06	11.37	12.45	1.08	14.58	15.88	1.3	6.72	6.44	-0.29
B-3		16.93	18.59	1.66	5.37	5.66	0.29	14.81	16.44	1.62	5.76	5.49	-0.27
B-4		19	20.08	1.08	1.98	1.17	-0.81	18.32	19.73	1.4	3.93	3.42	-0.51
	mean	17.24	18.5	1.26	6.42	6.56	0.14	14.93	16.37	1.44	6.3	6.02	-0.28
	sd	1.85	1.87	0.28	3.9	4.65	0.78	2.6	2.59	0.14	2.03	2.22	0.19
Ne 1/18													
C-1		16.9	18.76	1.86	10.26	10.9	0.64	11.51	13.84	2.33	13.05	14.11	1.07
C-2		16.63	18.56	1.93	11.66	12.15	0.49	13.79	16.06	2.27	11.25	12.28	1.03
C-3		17.05	19.07	2.02	11.77	12.02	0.24	14.49	17.1	2.61	9.49	10.17	0.68
C-4		17.66	19.94	2.28	12.47	12.79	0.32	16.29	18.69	2.39	8.08	8.36	0.29
	mean	17.06	19.08	2.02	11.54	11.96	0.42	14.02	16.42	2.4	10.47	11.23	0.77
	sd	0.44	0.61	0.19	0.93	0.78	0.18	1.98	2.03	0.15	2.16	2.5	0.36
Ne 1/30													
D-1		12.54	13.09	0.56	11.91	11.62	-0.29	11.07	10.64	-0.43	11.2	11.22	0.02
D-2		11.88	13.16	1.28	13.74	13.61	-0.13	11.86	12.88	1.01	9.55	8.86	-0.69
D-3		13.52	14.73	1.21	12.59	11.86	-0.74	13.51	14.24	0.73	9.28	9.07	-0.21
D-4		14.78	15.78	1	12.76	11.8	-0.96	14.5	15.83	1.33	7.08	6.62	-0.46
	mean	13.18	14.19	1.01	12.75	12.22	-0.53	12.74	13.4	0.66	9.28	8.94	-0.34
	sd	1.26	1.3	0.32	0.75	0.93	0.38	1.55	2.2	0.76	1.7	1.88	0.31
	mean	15.69	17.11	1.42	12.17	12.34	0.17	13.71	15.17	1.45	10.92	10.94	0.02
	sd	2.15	2.41	0.46	5.07	5.3	0.63	2.33	2.69	0.75	4.63	4.88	0.57

[+] = Shrinkage; [-] = Extension or Growth

A P P E N D I X 6

SPIRALITY

Grey Fabric	A6/1 - A6/2
Route 1 Set 1 - Set 4	A6/3 - A6/7
Route 2 Set 1 - Set 4	A6/8 - A6/12
Route 3 Set 1 - Set 4	A6/13- A6/17

IIC/CI STARFISH DATABASE EXPANSION 1987

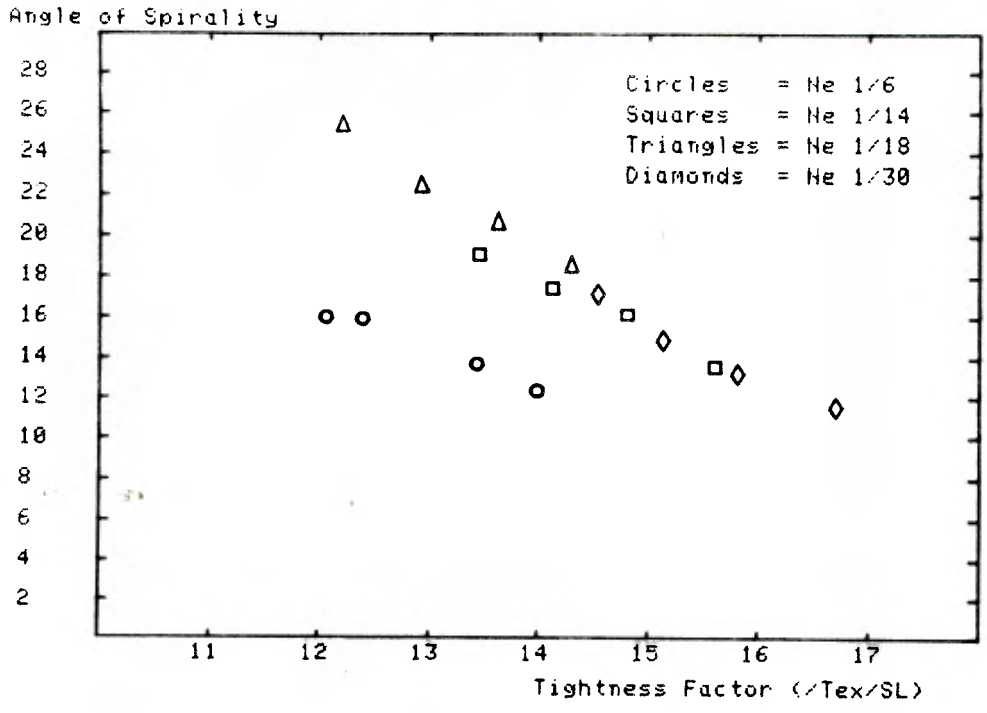
SINGLE JERSEY FABRIC : RING SPUN YARNS
SPIRALITY ANGLES

PROCESS : GREY

Sample Ref No		Tex AW	AvSLcm AW	TF AW	Spiral BW	Spiral AW
Ne 1/6						
A-1		95.89	0.7001	13.99	12.11	12.43
A-2		95.89	0.7291	13.43	14.07	13.74
A-3		95.89	0.7901	12.39	14.11	15.99
A-4		95.89	0.8125	12.05	17.65	16.06
	mean		0.758	12.97	14.48	14.55
	sd		0.0523	0.9	2.31	1.78
Ne 1/14						
B-1		42.02	0.4155	15.6	12.68	13.59
B-2		42.02	0.4381	14.8	16.61	16.17
B-3		42.02	0.4592	14.12	17.61	17.48
B-4		42.02	0.4821	13.45	18.84	19.1
	mean		0.4487	14.49	16.43	16.58
	sd		0.0285	0.92	2.66	2.33
Ne 1/18						
C-1		32.46	0.3987	14.29	15.71	18.58
C-2		32.46	0.4184	13.62	15.93	20.7
C-3		32.46	0.4411	12.92	18.11	22.47
C-4		32.46	0.4669	12.2	17.68	25.39
	mean		0.4313	13.26	16.86	21.78
	sd		0.0294	0.9	1.21	2.88
Ne 1/30						
D-1		20.39	0.2704	16.7	8.74	11.57
D-2		20.39	0.2856	15.81	9.66	13.27
D-3		20.39	0.2985	15.13	11.64	14.9
D-4		20.39	0.3107	14.53	15.34	17.17
	mean		0.2913	15.54	11.34	14.23
	sd		0.0173	0.93	2.93	2.39

TF = Tightness Factor (sq. root Tex/Stitch Length cm)
Spiral = Angle of Spirality in Degrees

IIC/CI : SINGLE JERSEY : RING YARNS : GREY REFERENCE



IIC/CI STARFISH DATABASE EXPANSION 1987

SINGLE JERSEY FABRIC : RING SPUN YARNS
SPIRALITY ANGLES

PROCESS : ROUTE 1 : Winch Beck prepare and dye

Sample Ref No		Av 1+2 Tex AW	Av 1+2 SLcmAW	TF AW	Set 1 BW	Set 1 AW	Diff AW-BW	Set 2 BW	Set 2 AW	Diff AW-BW
Ne 1/6										
A-1		93.15	0.6899	13.99	4.44	9.75	5.31	2.53	9.86	7.33
A-2		93.15	0.7221	13.37	5.07	11.19	6.12	4.02	11.08	7.06
A-3		93.15	0.7816	12.35	4.88	13.32	8.44	2.08	13.5	11.42
A-4		93.15	0.8086	11.94	3.13	14.94	11.81	2.57	14.91	12.34
	mean		0.7505	12.91	4.38	12.3	7.92	2.8	12.34	9.54
	sd		0.0542	0.94	0.87	2.29	2.91	0.84	2.29	2.73
Ne 1/14										
B-1		41.07	0.4138	15.49	2.12	10.51	8.39	2.27	10.94	8.67
B-2		41.07	0.4351	14.73	4.55	12.47	7.92	4.24	13.08	8.84
B-3		41.07	0.4556	14.06	5.05	13.91	8.86	4.72	14.4	9.68
B-4		41.07	0.4811	13.32	3.91	15.22	11.31	4.77	16.34	11.57
	mean		0.4464	14.4	3.91	13.03	9.12	4	13.69	9.69
	sd		0.0288	0.93	1.28	2.02	1.51	1.18	2.27	1.33
Ne 1/18										
C-1		31.94	0.3939	14.35	3.67	12.45	8.78	3.13	13.02	9.89
C-2		31.94	0.4139	13.65	5.31	14.16	8.85	2.11	14.77	12.66
C-3		31.94	0.4383	12.9	4.59	16.21	11.62	4.74	15.89	11.15
C-4		31.94	0.4603	12.28	4.93	19.02	14.09	4.82	18.96	14.14
	mean		0.4266	13.29	4.62	15.46	10.83	3.7	15.66	11.96
	sd		0.0289	0.9	0.7	2.83	2.54	1.32	2.5	1.84
Ne 1/30										
D-1		19.76	0.2673	16.63	3.6	9.2	5.6	3.26	10.17	6.91
D-2		19.76	0.285	15.6	4.73	11.44	6.71	2.41	11.9	9.49
D-3		19.76	0.2956	15.04	2.32	12.04	9.72	4.06	12.82	8.76
D-4		19.76	0.3067	14.49	4.69	13.76	9.07	5.07	12.5	7.43
	mean		0.2886	15.44	3.83	11.61	7.77	3.7	11.85	8.15
	sd		0.0168	0.91	1.14	1.88	1.94	1.13	1.18	1.19

TF = Tightness Factor (sq. root Tex/Stitch Length cm)
Spiral = Angle of Spirality in Degrees

IIC/CI STARFISH DATABASE EXPANSION 1987

SINGLE JERSEY FABRIC : RING SPUN YARNS
SPIRALITY ANGLES

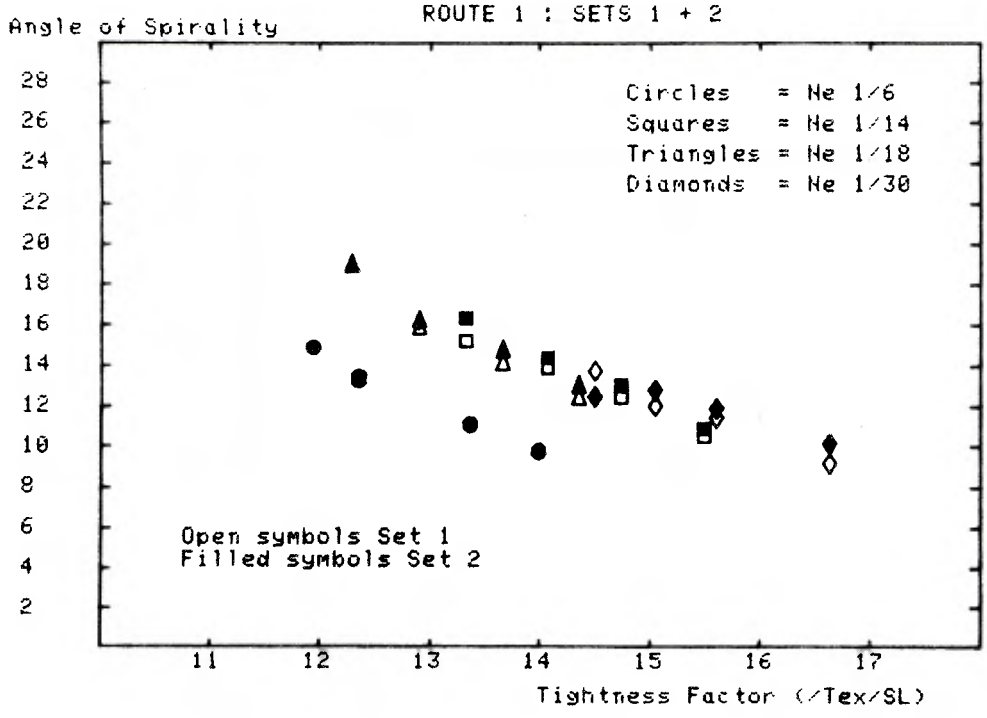
PROCESS : ROUTE 1 : Winch Beck prepare and dye

Sample Ref No	Av 3+4 Tex AW	Av 3+4 SLcmAW	TF AW	Set 3 BW	Set 3 AW	Set 3 Diff AW-BW	Set 4 BW	Set 4 AW	Set 4 Diff AW-BW
Ne 1/6									
A-1	95.79	0.6944	14.1	2.67	5.36	2.69	2.94	4.91	1.97
A-2	95.79	0.7258	13.48	3.38	6.07	2.69	2.93	5.55	2.62
A-3	95.79	0.7905	12.38	2.9	8.33	5.43	3.69	7.23	3.54
A-4	95.79	0.8129	12.04	2.52	9.1	6.58	4.14	7.8	3.66
mean		0.7559	13	2.87	7.21	4.35	3.42	6.37	2.95
sd		0.0552	0.96	0.38	1.78	1.97	0.59	1.36	0.8
Ne 1/14									
B-1	42.46	0.4159	15.67	3.64	6.91	3.27	2.95	5.76	2.81
B-2	42.46	0.4397	14.82	3.48	7.26	3.78	3.24	6.65	3.41
B-3	42.46	0.4576	14.24	5.38	9.28	3.9	4.12	8.28	4.16
B-4	42.46	0.4887	13.33	3.28	7.69	4.41	1.78	9.59	7.81
mean		0.4505	14.52	3.94	7.78	3.84	3.02	7.57	4.55
sd		0.0307	0.98	0.97	1.05	0.47	0.97	1.7	2.24
Ne 1/18									
C-1	33.07	0.3987	14.42	3.74	5.08	1.34	3.41	4.82	1.41
C-2	33.07	0.4112	13.99	2.94	6.09	3.15	4.22	6.93	2.71
C-3	33.07	0.4411	13.04	3.09	6.99	3.9	2.92	8.68	5.76
C-4	33.07	0.463	12.42	4.32	8.04	3.72	2.07	7.83	5.76
mean		0.4285	13.47	3.52	6.55	3.03	3.15	7.06	3.91
sd		0.0291	0.91	0.64	1.26	1.17	0.9	1.66	2.2
Ne 1/30									
D-1	20.47	0.2682	16.87	3.35	7.08	3.73	3.02	4.94	1.92
D-2	20.47	0.2849	15.88	2.37	4.25	1.88	3.22	5.71	2.49
D-3	20.47	0.2976	15.2	3.93	7.17	3.24	2.73	4.67	1.94
D-4	20.47	0.3077	14.7	4.03	6.44	2.41	2.9	6.19	3.29
mean		0.2896	15.66	3.42	6.23	2.81	2.97	5.38	2.41
sd		0.0171	0.94	0.76	1.36	0.83	0.21	0.7	0.64

TF = Tightness Factor (sq. root Tex/Stitch Length cm)
Spiral = Angle of Spirality in Degrees

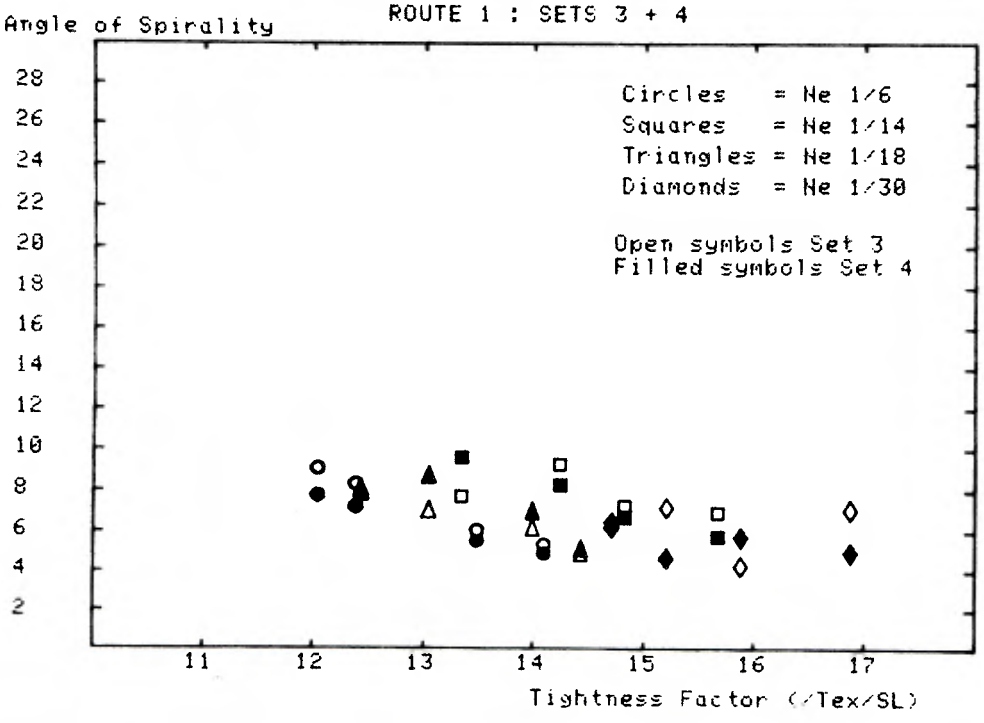
IIC/CI : SINGLE JERSEY : RING YARNS : FINISHED REFERENCE

ROUTE 1 : SETS 1 + 2



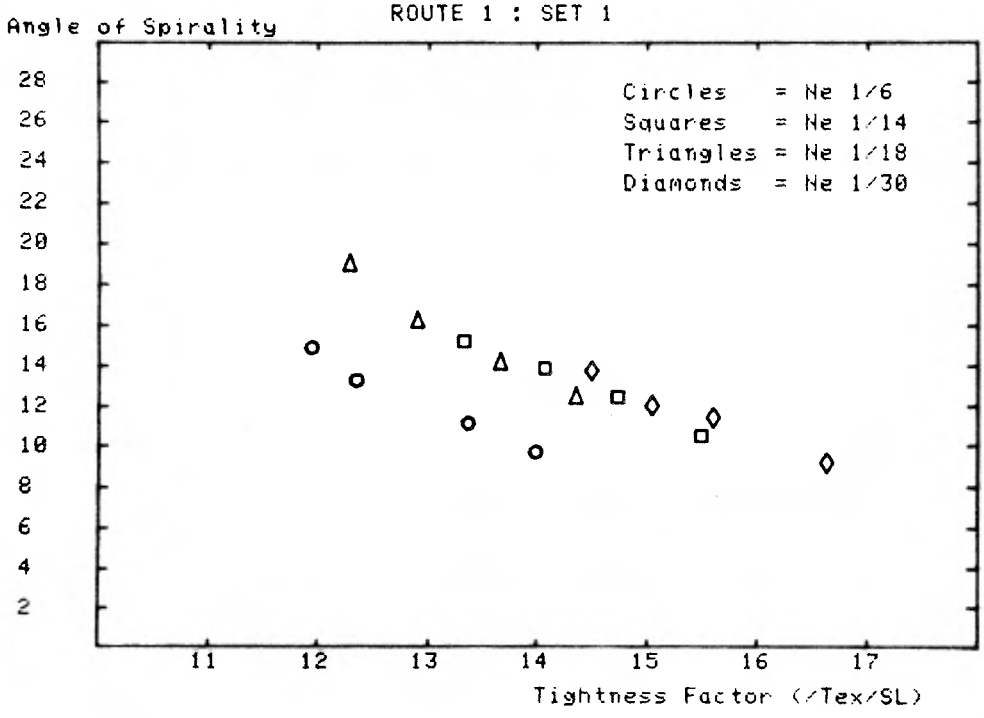
IIC/CI : SINGLE JERSEY : RING YARNS : FINISHED REFERENCE

ROUTE 1 : SETS 3 + 4



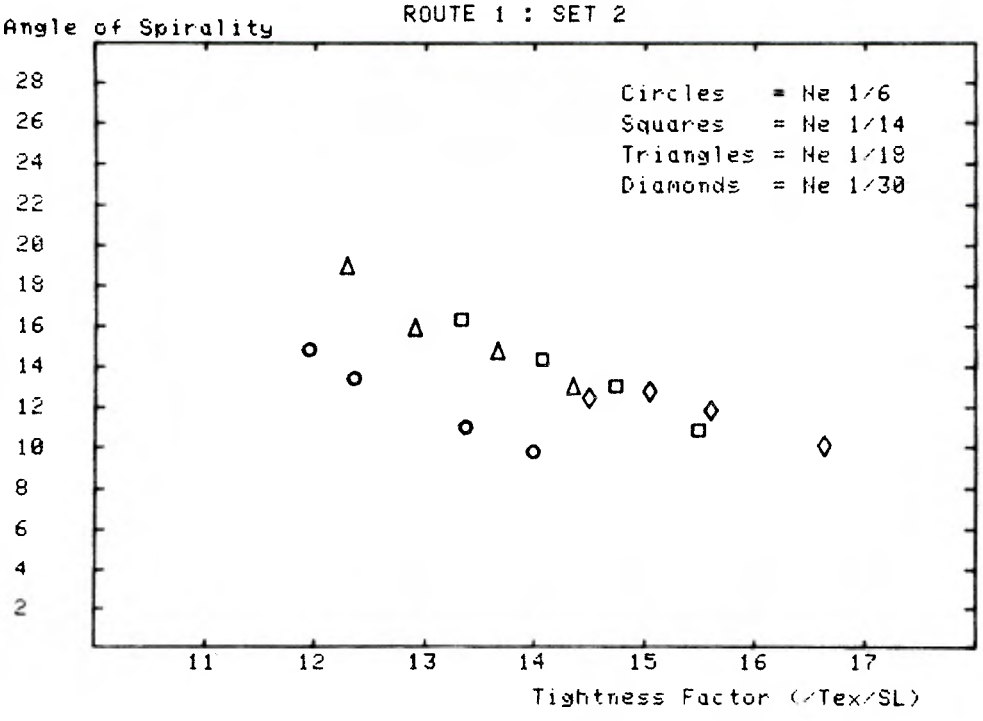
IIC/CI : SINGLE JERSEY : RING YARNS : FINISHED REFERENCE

ROUTE 1 : SET 1



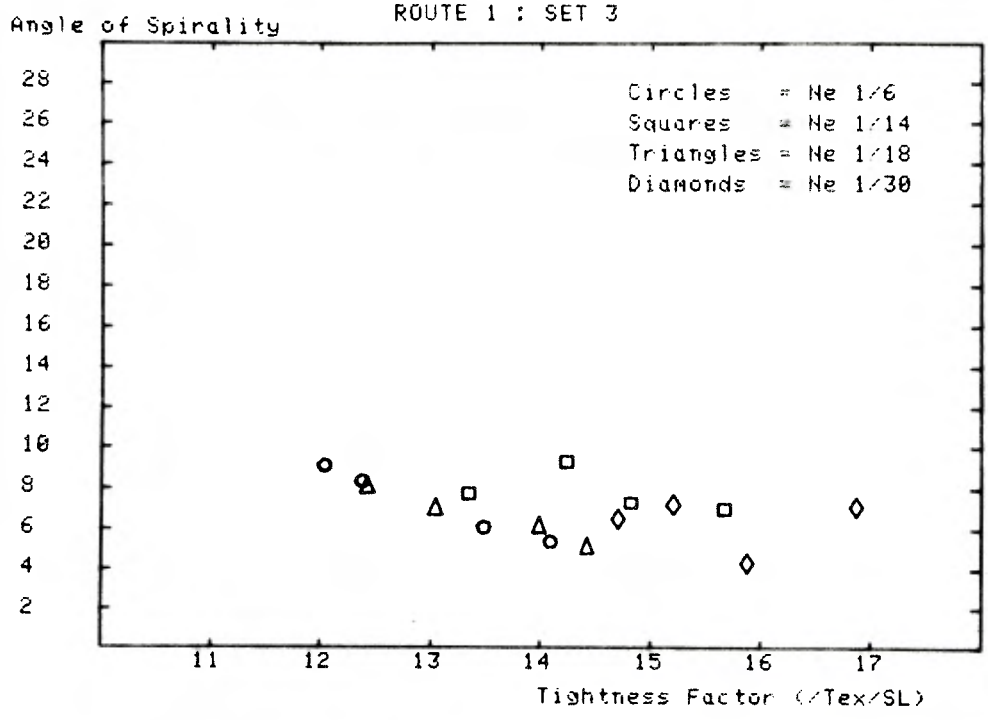
IIC/CI : SINGLE JERSEY : RING YARNS : FINISHED REFERENCE

ROUTE 1 : SET 2



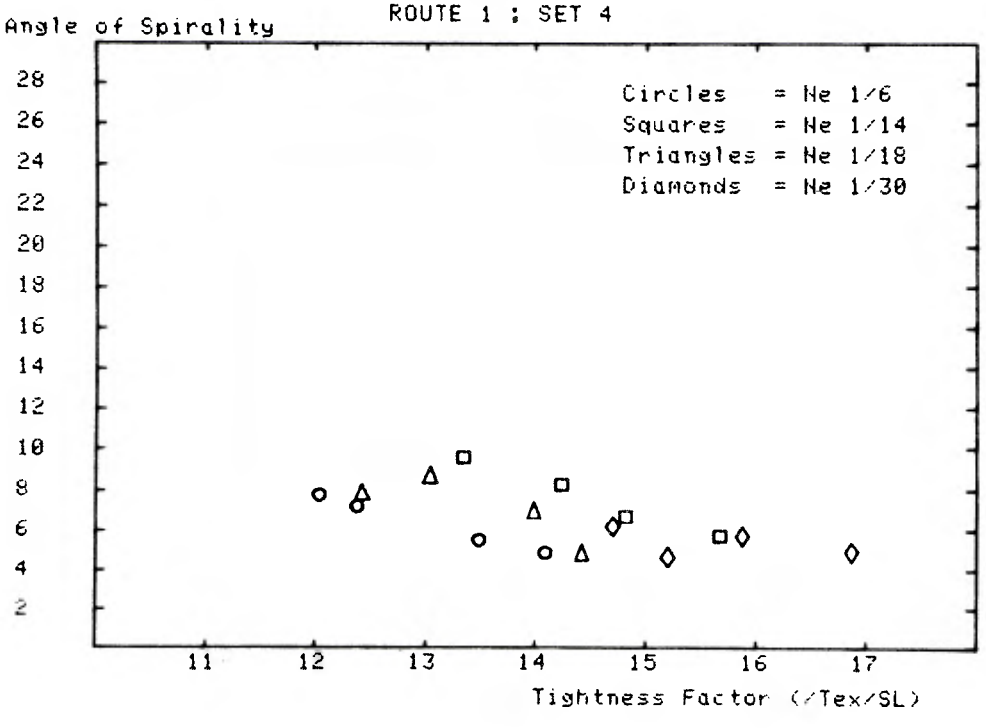
IIC/CI : SINGLE JERSEY : RING YARNS : FINISHED REFERENCE

ROUTE 1 : SET 3



IIC/CI : SINGLE JERSEY : RING YARNS : FINISHED REFERENCE

ROUTE 1 : SET 4



IIC/CI STARFISH DATABASE EXPANSION 1987

SINGLE JERSEY FABRIC : RING SPUN YARNS
SPIRALITY ANGLES

PROCESS : ROUTE 2 : Argathen prepare, Winch Beck dye

Sample Ref No		Av 1+2 Tex	AW AvSLcm	TF AW	Set 1 BW	Set 1 AW	Diff AW-BW	Set 2 BW	Set 2 AW	Diff AW-BW
Ne 1/6										
A-1		92.32	0.6974	13.78	5.18	8.07	2.89	6.18	10.17	3.99
A-2		92.32	0.7265	13.22	8.57	8.84	0.27	6.29	12.56	6.27
A-3		92.32	0.7879	12.2	3.69	11.2	7.51	7.88	14.25	6.37
A-4		92.32	0.8151	11.79	4.03	10.86	6.83	3.35	15.85	12.5
	mean		0.7567	12.75	5.37	9.74	4.37	5.92	13.21	7.28
	sd		0.0542	0.92	2.23	1.53	3.41	1.88	2.43	3.65
Ne 1/14										
B-1		40.97	0.4131	15.49	7.16	10.57	3.41	7.49	11.06	3.57
B-2		40.97	0.4372	14.64	2.76	13.97	11.21	5.27	14.22	6.95
B-3		40.97	0.4561	14.03	6.24	15.1	8.86	8.15	15.02	6.87
B-4		40.97	0.4797	13.34	6.49	14.75	8.26	5.9	16.06	10.16
	mean		0.4465	14.38	5.66	13.6	7.93	6.7	14.09	7.39
	sd		0.0283	0.91	1.97	2.07	3.27	1.34	2.16	2.88
Ne 1/18										
C-1		32.01	0.3937	14.37	5.37	12.44	7.07	5.6	10.66	5.06
C-2		32.01	0.4153	13.62	8.13	14.38	6.25	8.69	12.49	3.8
C-3		32.01	0.439	12.89	5.65	16.09	10.44	7.04	13.56	6.52
C-4		32.01	0.4612	12.27	6.11	18.57	12.46	7.05	14.33	7.28
	mean		0.4273	13.29	6.31	15.37	9.05	7.09	12.76	5.66
	sd		0.0292	0.91	1.25	2.6	2.91	1.26	1.59	1.55
Ne 1/30										
D-1		19.72	0.2675	16.6	7.23	8.55	1.32	5.88	9.94	4.06
D-2		19.72	0.2837	15.65	5.9	8.96	3.06	4.03	10.03	6
D-3		19.72	0.2972	14.94	n.a.	n.a.	n.a.	5.7	11.15	5.45
D-4		19.72	0.307	14.46	7.35	12.77	5.42	n.a.	n.a.	n.a.
	mean		0.2889	15.41	6.83	10.09	3.27	5.2	10.37	5.17
	sd		0.0171	0.93	0.8	2.33	2.06	1.02	0.67	1

TF = Tightness Factor (sq. root Tex/Stitch Length cm)
Spiral = Angle of Spirality in Degrees

IIC/CI STARFISH DATABASE EXPANSION 1987

SINGLE JERSEY FABRIC : RING SPUN YARNS
SPIRALITY ANGLES

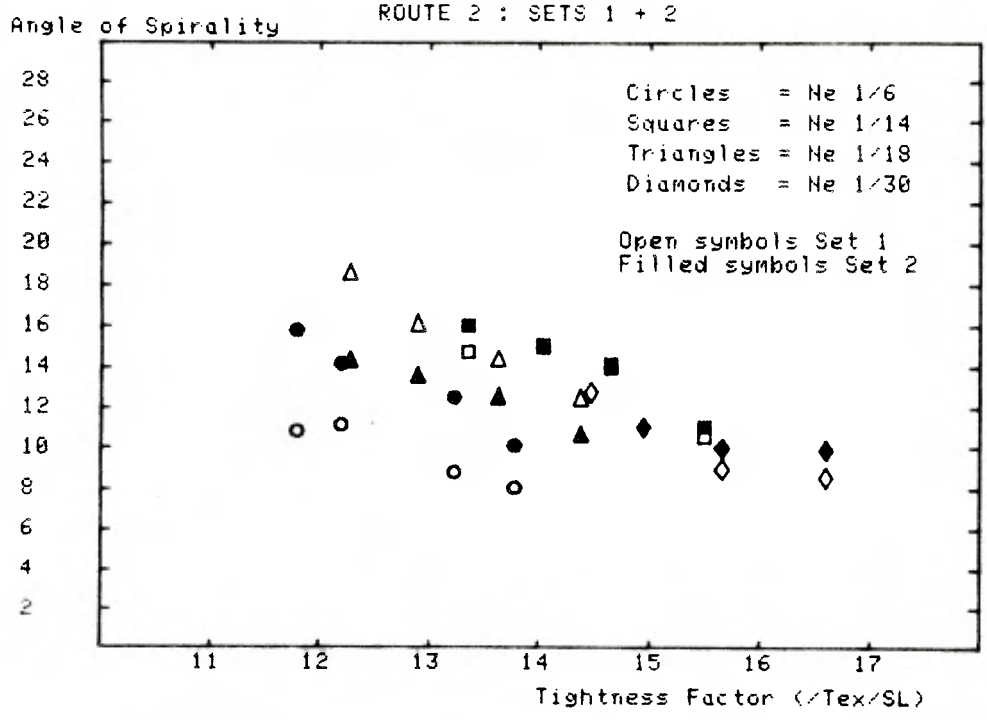
PROCESS : ROUTE 2 : Argathen prepare, Winch Beck dye

Sample Ref No	Av 3+4 Tex AW	Av 3+4 AvSLcm	TF AW	Set 3 BW	Set 3 AW	Diff AW-BW	Set 4 BW	Set 4 AW	Diff AW-BW
Ne 1/6									
A-1	92.56	0.6986	13.77	0.19	8.06	7.87	4.86	8.67	3.81
A-2	92.56	0.7287	13.2	5.99	8.3	2.31	5.41	8.97	3.56
A-3	92.56	0.786	12.24	3.12	11.37	8.25	7.98	13.25	5.27
A-4	92.56	0.8139	11.82	4.1	12.38	8.28	6.51	13.4	6.89
mean		0.7568	12.76	3.35	10.03	6.68	6.19	11.07	4.88
sd		0.0526	0.89	2.42	2.18	2.92	1.38	2.6	1.54
Ne 1/14									
B-1	41.19	0.4134	15.52	7.67	8.51	0.84	6.92	8.71	1.79
B-2	41.19	0.4378	14.66	8.24	12.07	3.83	5.38	12.33	6.95
B-3	41.19	0.456	14.07	5.9	14.29	8.39	1.71	11.59	9.88
B-4	41.19	0.4809	13.35	0.87	15.4	14.53	6.42	11.52	5.1
mean		0.447	14.4	5.67	12.57	6.9	5.11	11.04	5.93
sd		0.0285	0.92	3.35	3.04	5.96	2.35	1.59	3.39
Ne 1/18									
C-1	32.15	0.3969	14.29	4.61	8.75	4.14	5	12.66	7.66
C-2	32.15	0.4154	13.65	2.53	12.34	9.81	4.67	12.6	7.93
C-3	32.15	0.4365	12.99	1.68	11.83	10.15	3.26	13.91	10.65
C-4	32.15	0.4619	12.28	4.41	16.01	11.6	8.26	14.68	6.42
mean		0.4277	13.3	3.31	12.23	8.92	5.3	13.46	8.16
sd		0.028	0.86	1.43	2.98	3.28	2.11	1.01	1.78
Ne 1/30									
D-1	19.96	0.268	16.67	4.06	10.29	6.23	6.81	8.6	1.79
D-2	19.96	0.2848	15.69	6.62	11.93	5.31	7.63	9.12	1.49
D-3	19.96	0.2954	15.13	4.14	9.42	5.28	3.86	11.92	8.06
D-4	19.96	0.3069	14.56	4.87	10.69	5.82	8.87	12.45	3.58
mean		0.2888	15.51	4.92	10.58	5.66	6.79	10.52	3.73
sd		0.0165	0.9	1.19	1.04	0.45	2.13	1.94	3.03

TF = Tightness Factor (sq. root Tex/Stitch Length cm)
Spiral = Angle of Spirality in Degrees

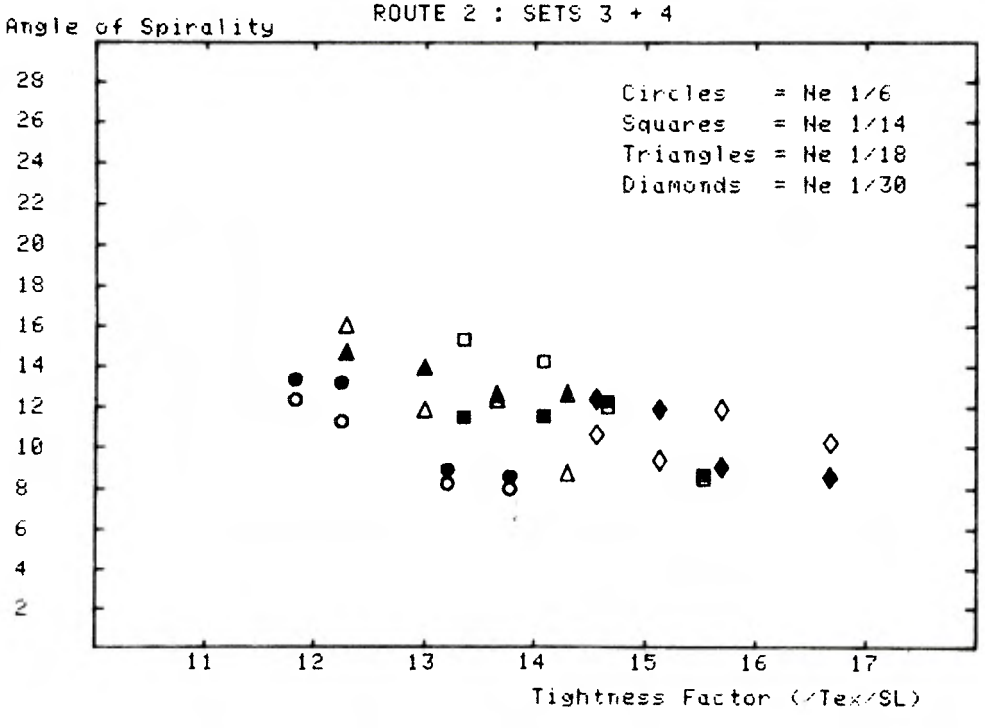
IIC/CI : SINGLE JERSEY : RING YARNS : FINISHED REFERENCE

ROUTE 2 : SETS 1 + 2



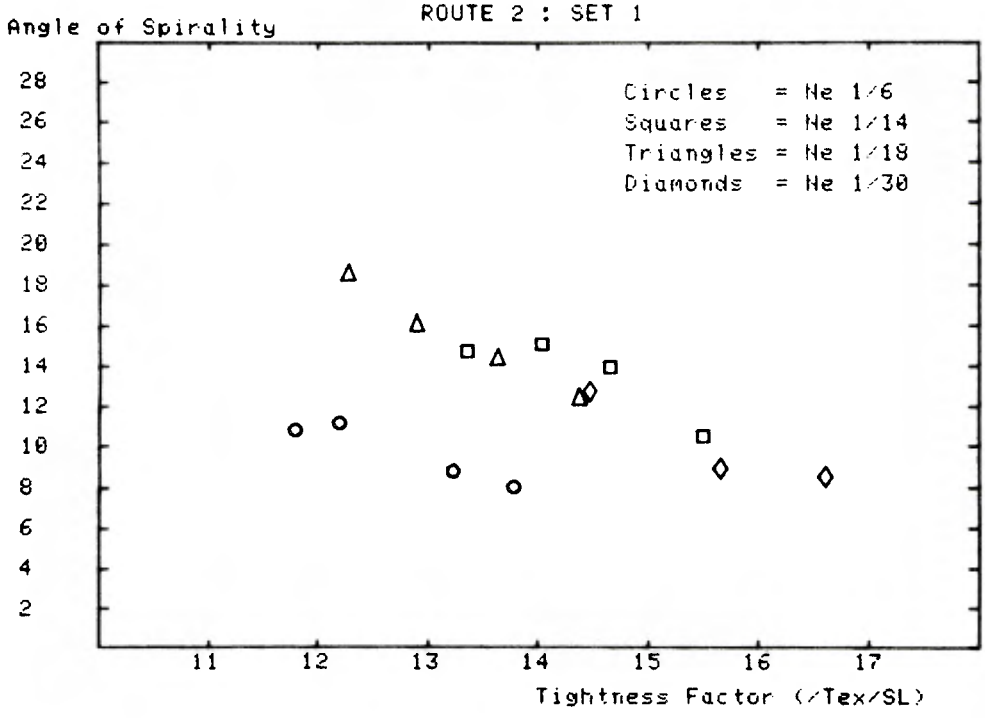
IIC/CI : SINGLE JERSEY : RING YARNS : FINISHED REFERENCE

ROUTE 2 : SETS 3 + 4



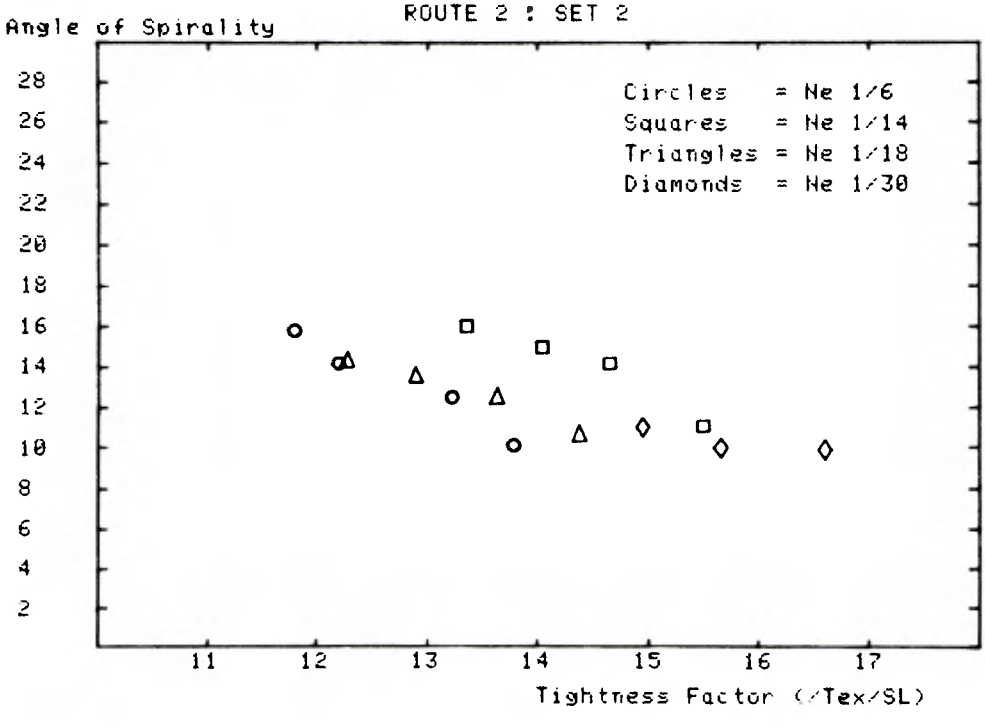
IIC/CI : SINGLE JERSEY : RING YARNS : FINISHED REFERENCE

ROUTE 2 : SET 1



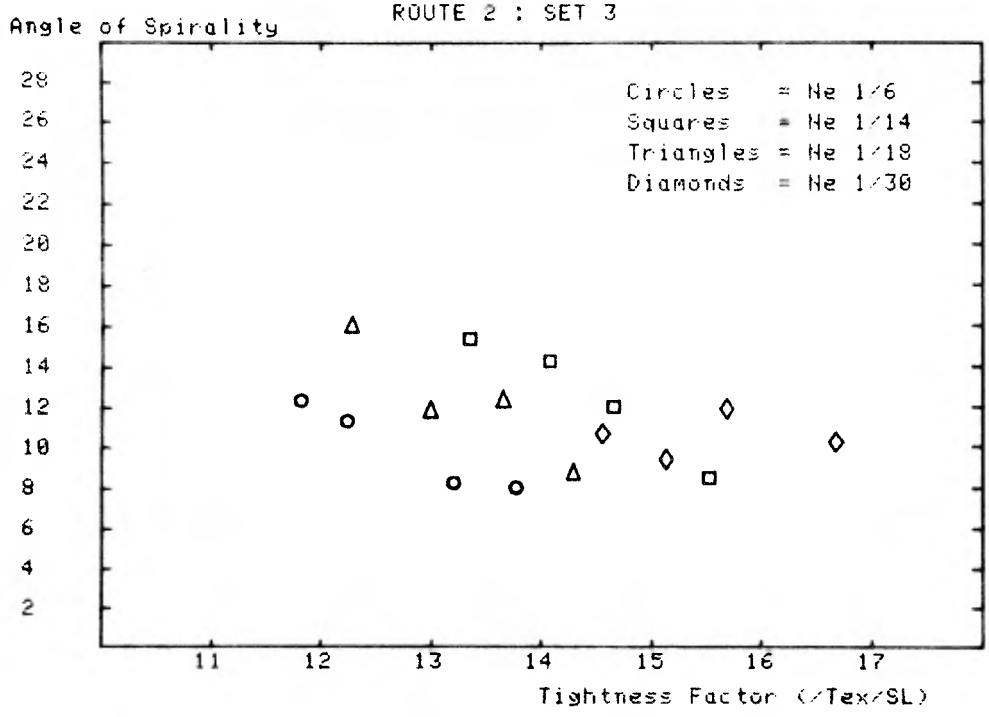
IIC/CI : SINGLE JERSEY : RING YARNS : FINISHED REFERENCE

ROUTE 2 : SET 2



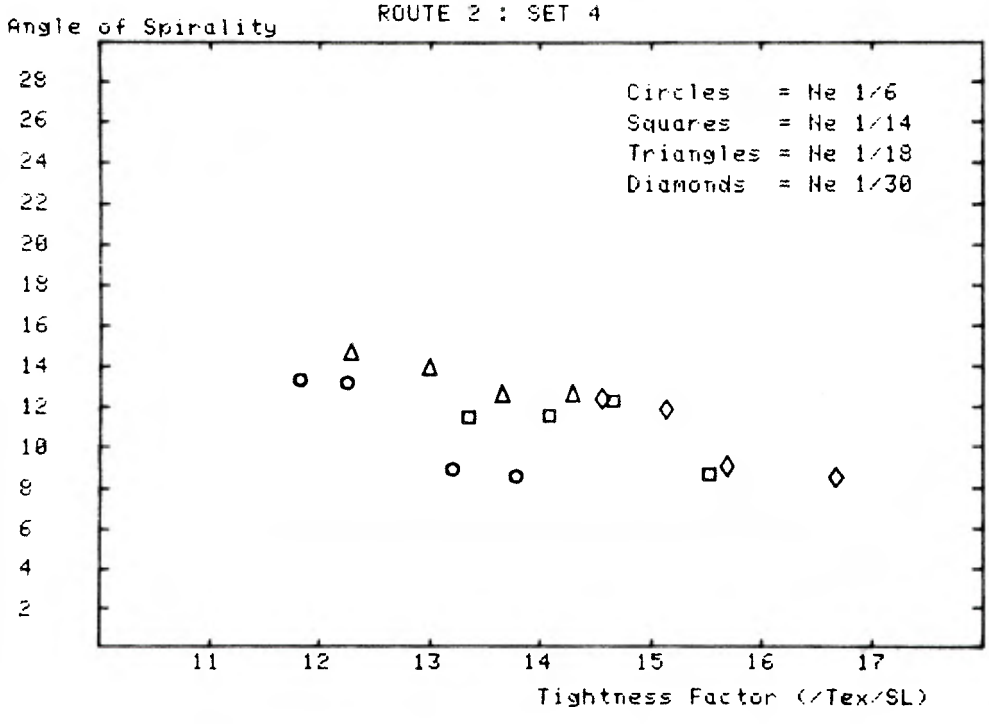
IIC/CI : SINGLE JERSEY : RING YARNS : FINISHED REFERENCE

ROUTE 2 : SET 3



IIC/CI : SINGLE JERSEY : RING YARNS : FINISHED REFERENCE

ROUTE 2 : SET 4



IIC/CI STARFISH DATABASE EXPANSION 1987

SINGLE JERSEY FABRIC : RING SPUN YARNS
SPIRALITY ANGLES

PROCESS : ROUTE 3 : Argathen prepare, Overflow Jet dye

Sample Ref No		Av 1+2 Tex AW	Av 1+2 AvSLcm	TF AW	Set 1 BW	Set 1 AW	Diff AW-BW	Set 2 BW	Set 2 AW	Diff AW-BW
Ne 1/6										
A-1		92.27	0.6953	13.81	5.53	10.56	5.03	5.99	10.77	4.78
A-2		92.27	0.7227	13.29	6.3	11.3	5	6.21	11.7	5.49
A-3		92.27	0.7832	12.26	6.34	13.99	7.65	6.77	13.92	7.15
A-4		92.27	0.8091	11.87	5.96	14.71	8.75	7.27	14.33	7.06
	mean		0.7526	12.81	6.03	12.64	6.61	6.56	12.68	6.12
	sd		0.0526	0.9	0.38	2.02	1.89	0.58	1.72	1.17
Ne 1/14										
B-1		40.99	0.4135	15.48	5.49	10.71	5.22	7.74	11.81	4.07
B-2		40.99	0.4345	14.74	6.78	12.61	5.83	5.32	13.07	7.75
B-3		40.99	0.4555	14.06	3.98	13.73	9.75	8.46	14.31	5.85
B-4		40.99	0.4787	13.37	8.65	15.65	7	7.2	16.8	9.6
	mean		0.4455	14.41	6.22	13.17	6.95	7.18	14	6.82
	sd		0.028	0.91	1.98	2.07	2.01	1.34	2.13	2.39
Ne 1/18										
C-1		31.86	0.3935	14.34	4.62	13.74	9.12	7.19	12.97	5.78
C-2		31.86	0.413	13.67	3.85	15.59	11.74	6.55	15.32	8.77
C-3		31.86	0.4367	12.92	3.86	17.52	13.66	5.83	16.19	10.36
C-4		31.86	0.4593	12.29	4.23	20.29	16.06	5.86	18.33	12.47
	mean		0.4256	13.31	4.14	16.78	12.64	6.36	15.7	9.34
	sd		0.0285	0.89	0.37	2.8	2.94	0.65	2.22	2.82
Ne 1/30										
D-1		19.83	0.2666	16.71	7.77	9.93	2.16	5.3	9.24	3.94
D-2		19.83	0.2846	15.65	5.51	11.75	6.24	6.72	10.45	3.73
D-3		19.83	0.2958	15.05	4.17	12.38	8.21	4.73	11.34	6.61
D-4		19.83	0.3062	14.54	5.81	13.34	7.53	8.49	13.36	4.87
	mean		0.2883	15.49	5.81	11.85	6.03	6.31	11.1	4.79
	sd		0.017	0.93	1.49	1.44	2.71	1.68	1.74	1.31

TF = Tightness Factor (sq. root Tex/Stitch Length cm)
Spiral = Angle of Spirality in Degrees

IIC/CI STARFISH DATABASE EXPANSION 1987

SINGLE JERSEY FABRIC : RING SPUN YARNS
SPIRALITY ANGLES

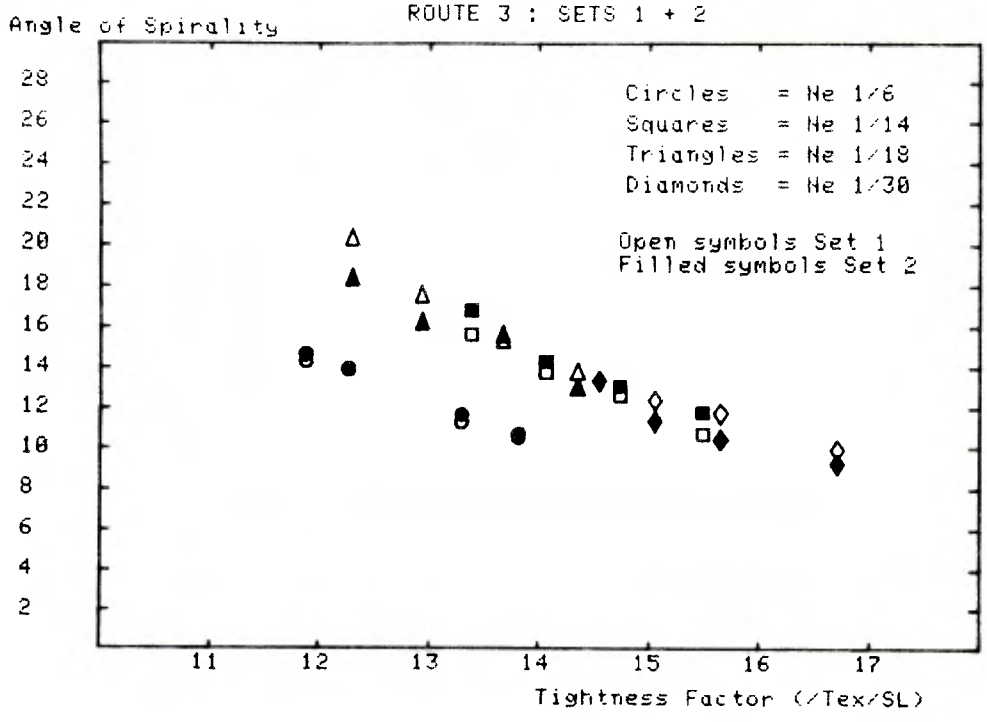
PROCESS : ROUTE 3 : Argathen prepare, Overflow Jet dye

Sample Ref No	Av 3+4 Tex AW	Av 3+4 AvSLcm	TF AW	Set 3 BW	Set 3 AW	Diff AW-BW	Set 4 BW	Set 4 AW	Diff AW-BW
Ne 1/6									
A-1	93.78	0.6947	13.94	5.42	9.42	4	7.22	8.62	1.4
A-2	93.78	0.7278	13.3	2.19	11.35	9.16	7.05	9.72	2.67
A-3	93.78	0.7865	12.31	5.9	13.4	7.5	2.27	11.07	8.8
A-4	93.78	0.812	11.93	3.85	14.5	10.65	4.93	12.4	7.47
mean		0.7553	12.87	4.34	12.17	7.83	5.37	10.45	5.08
sd		0.0536	0.92	1.68	2.25	2.86	2.31	1.64	3.6
Ne 1/14									
B-1	41.47	0.416	15.48	5.32	9.84	4.52	4.41	9.38	4.97
B-2	41.47	0.4373	14.73	6.15	12.52	6.37	5.59	10.88	5.29
B-3	41.47	0.4588	14.04	6.82	12.2	5.38	5.61	13.29	7.68
B-4	41.47	0.4787	13.45	4.89	13.01	8.12	6.6	15.22	8.62
mean		0.4477	14.42	5.79	11.89	6.1	5.55	12.19	6.64
sd		0.0271	0.88	0.86	1.41	1.55	0.9	2.58	1.79
Ne 1/18									
C-1	32.02	0.398	14.22	4.4	10.95	6.55	7.3	11.28	3.98
C-2	32.02	0.4167	13.58	3.66	13.15	9.49	6.85	13.15	6.3
C-3	32.02	0.4344	13.03	5.64	14.45	8.81	5.12	12.19	7.07
C-4	32.02	0.4634	12.21	6.02	17.05	9.03	6.12	13.27	7.15
mean		0.4281	13.26	5.43	13.9	8.47	6.35	12.47	6.13
sd		0.0278	0.85	1.91	2.55	1.31	0.95	0.93	1.48
Ne 1/30									
D-1	20.02	0.2681	16.69	3.92	7.63	3.71	5.23	6.88	1.65
D-2	20.02	0.2847	15.72	2.49	10.09	7.6	4.91	8.82	3.91
D-3	20.02	0.2945	15.19	4.1	10.47	6.37	4.39	9.99	5.6
D-4	20.02	0.3079	14.53	2.81	10.37	7.56	4.39	10.98	6.59
mean		0.2888	15.53	3.33	9.64	6.31	4.73	9.17	4.44
sd		0.0168	0.91	0.8	1.35	1.82	0.41	1.76	2.16

TF = lightness Factor (sq. root Tex/Stitch Length cm)
Spiral = Angle of Spirality in Degrees

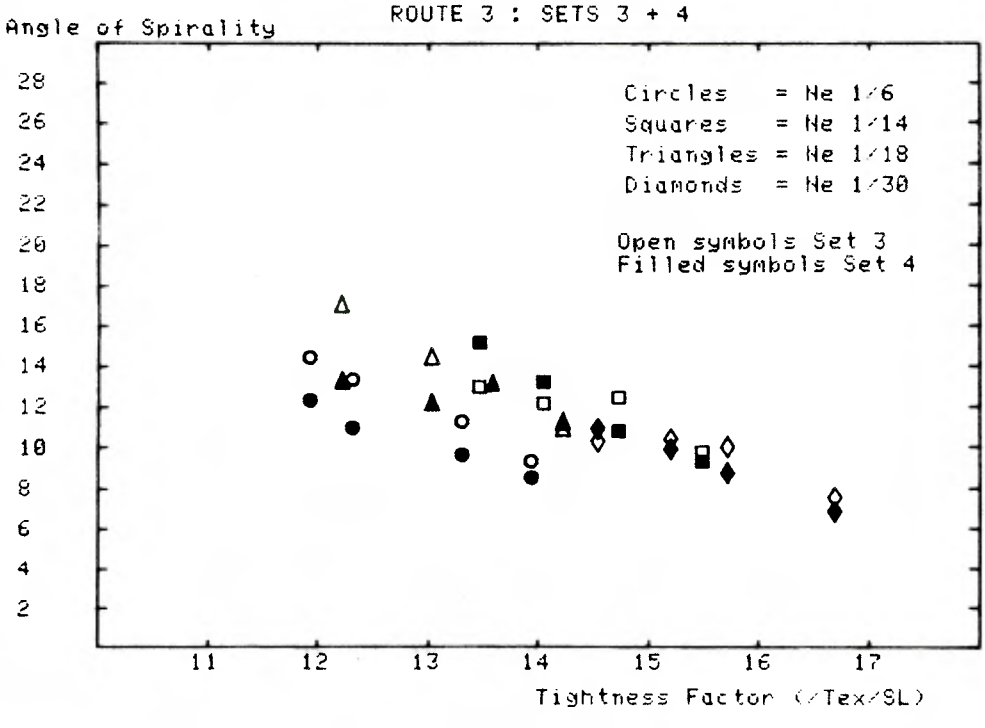
IIC/CI : SINGLE JERSEY : RING YARNS : FINISHED REFERENCE

ROUTE 3 : SETS 1 + 2



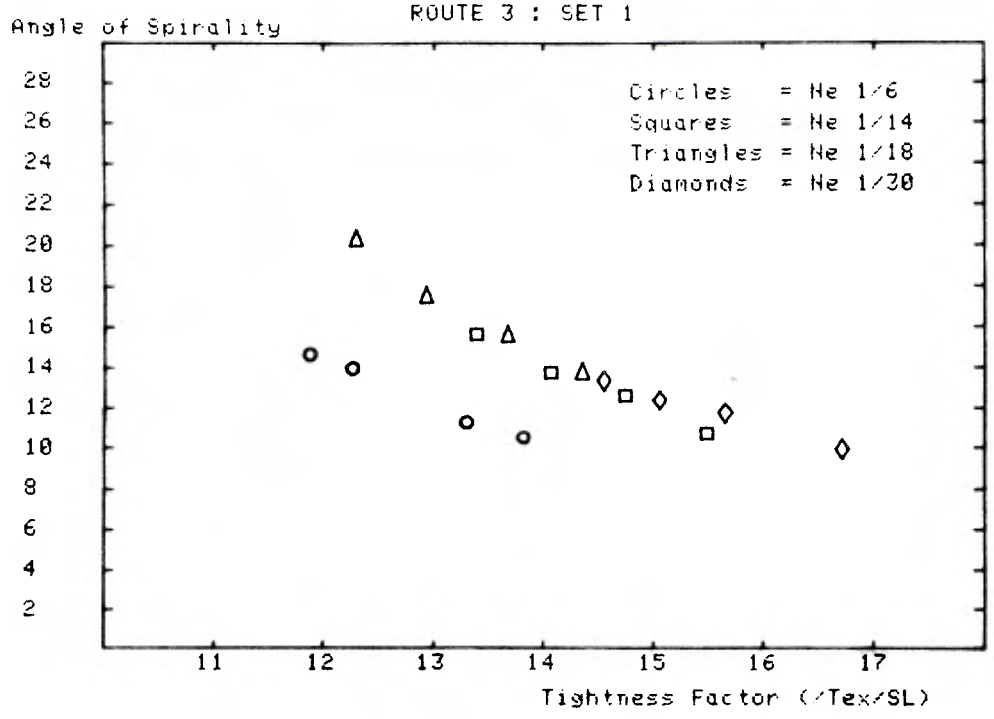
IIC/CI : SINGLE JERSEY : RING YARNS : FINISHED REFERENCE

ROUTE 3 : SETS 3 + 4



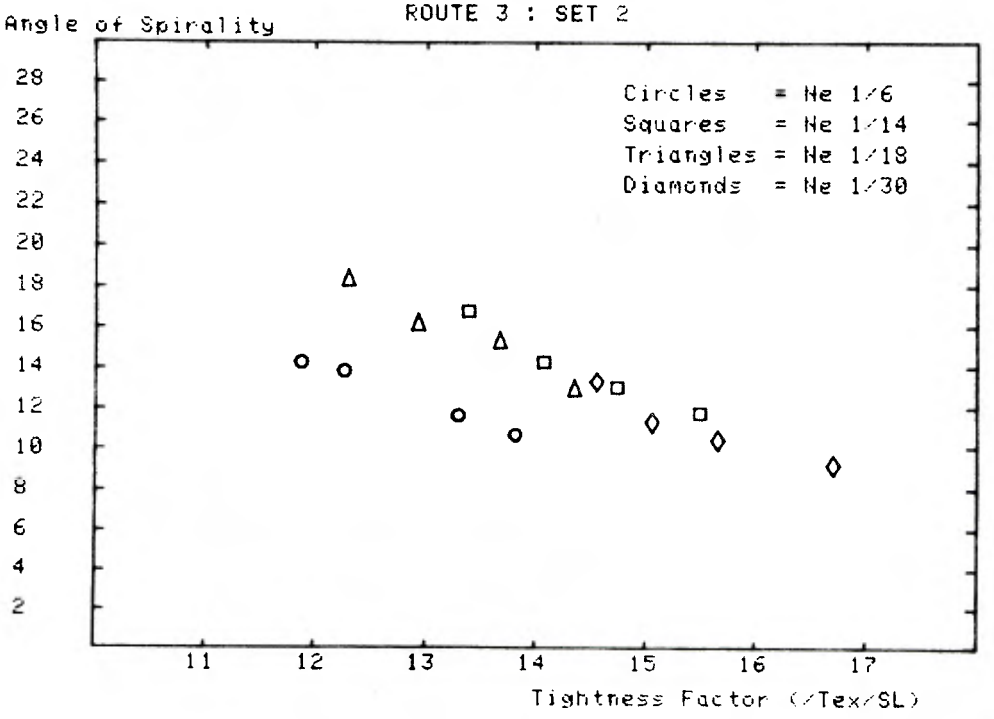
IIC/CI : SINGLE JERSEY : RING YARNS : FINISHED REFERENCE

ROUTE 3 : SET 1



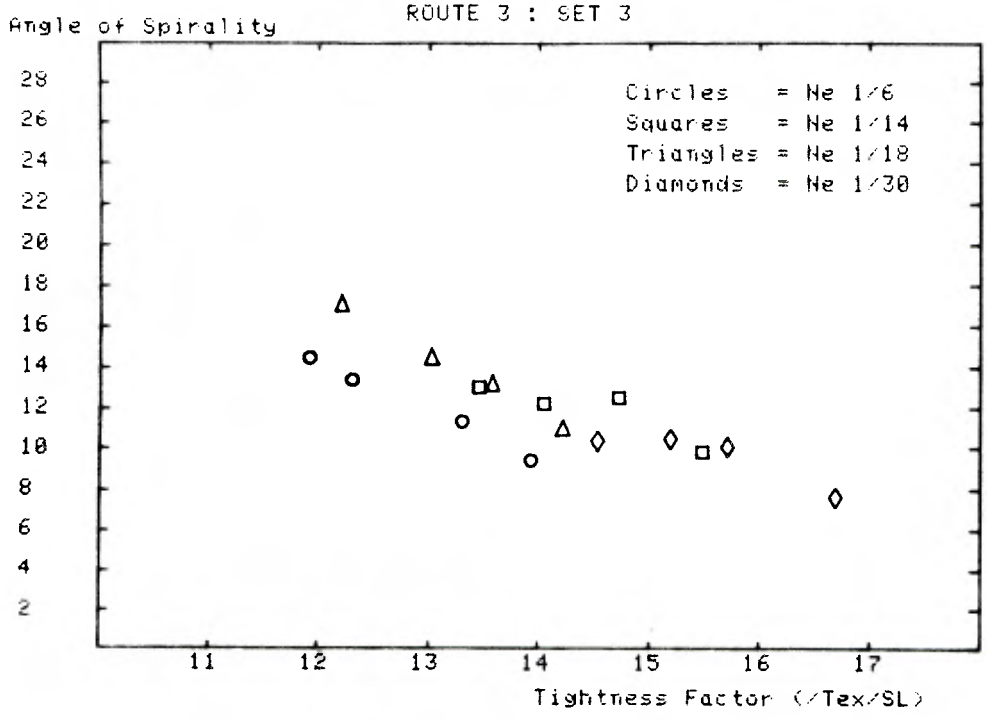
IIC/CI : SINGLE JERSEY : RING YARNS : FINISHED REFERENCE

ROUTE 3 : SET 2



IIC/CI : SINGLE JERSEY : RING YARNS : FINISHED REFERENCE

ROUTE 3 : SET 3



IIC/CI : SINGLE JERSEY : RING YARNS : FINISHED REFERENCE

ROUTE 3 : SET 4