

TECHNICAL SERVICE DEPARTMENT

402413103

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INDEX

<u>PAGE</u>	<u>TITLE</u>
1	Primary Processing of Tobacco
2- 6	Filter Tow and Filter Manufacture
7-13	Cigarette Making
14-17	Cigar Making
18-23	Packaging Materials

402413104

PRIMARY PROCESSING OF TOBACCO

Process Control Improvement (ECL, PB)

Routine testing of T & N deliveries of cigarettes showed significant between plant differences. A survey of the control and operating procedures in the different plants was set up to determine the reasons for these differences.

As a result of this study, a number of changes have been made. For example, cut tobacco driers and coolers were examined and adjusted on a temporary basis and a study initiated on process control parameters and equipment required to optimize and normalize cut tobacco filling value, waste and T/N delivery. A data base is currently being set up to obtain information on current filling values of lamina, CRS and WTS exit coolers in order to compare the effects of changes as work progresses.

Evaluation of the Dickenson CCM (PB)

Five Dickenson continuous conditioning machines were installed in two of our cigarette plants. Settings and procedures were recommended and we are currently evaluating the results of this change. Cigarettes manufactured from tobacco recipes packed in bales and processed on the Dickenson are being compared to cigarettes made from the same lots of tobaccos packed in hogsheads and processed on the CTCM.

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FILTER TOW AND FILTER MANUFACTURE

Project Title: Evaluation of the Lasermike (DE)

Objective : To develop a method of measuring the circumference of filter rods made with ultra porous plugwrap.

A "Lasermike" optical micrometer (model 1150-JM) was acquired, modified and evaluated as a means of overcoming the shortcomings of pneumatic systems for measuring filter rods made with porous plugwraps.

The lasermicrometer measures and displays on a digital read-out the difference between a scan transmitter and a scan receiver when an object is placed in between, e.g., rod diameter. The instrument takes 100 readings per second which can be averaged to 10 per second. Since filter rods are not perfectly round objects, a device was built in order to rotate the rod in the laser beam once every second.

The laser instrument produced the following rod circumference readings when compared to the Solex and the Filtrona Universal and Band gauges:

.../3

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Circumference (mm)

		<u>Lasermike</u>	<u>Solex</u>	<u>Filtrona Universal</u>	<u>Filtrona Band Gauge</u>
-Steel rod	:	24.85	24.85		
-Non-porous type 270-A P-W:	Ave. :	24.95	24.84		
	Range:	24.75-25.1	24.70-24.94		
	S.D. :	0.074	0.061		
-Wattens "100" P.W.	Ave. :	25.12	25.03		
	Range:	25.00-25.20	24.94-25.12		
	S.D. :	0.045	0.035		
-Wattens "200" P.W.	Ave. :	25.07	24.98		
	Range:	25.00-25.15	24.65-25.04		
	S.D. :	0.040	0.043		
-Ultra-porous type W-912 P-W	Ave. :	24.91		24.51	24.80
	Range:	24.77-25.09	-----	24.60-24.30	24.65-24.94
	S.D. :	0.069		0.053	0.060
-Ultra-porous type W-912 P-W	Ave. :	25.20	24.77		
	Range:	25.00-25.35	24.63-24.85	-----	-----
	S.D. :	0.090	0.058		

The Lasermike appears to read approximately 0.1 mm higher in circumference than the Solex on plugwraps with porosities up to 200 Coresta. On ultra-porous plugwraps (26,000 Coresta), approximately the same differential was found between the Lasermike and the Filtrona Band Gauge. ^{0th SIZE SAMPLE?}

We believe, in view of this, that the Lasermike is a useful laboratory instrument; but we did not recommend its use on the production floors. The Laser instrument was used to recommend a target to set other instruments when producing rods with ultra-porous plugwrap to obtain an acceptable circumference for cigarette assembly.

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Plasticizer Application Monitor (DE)

An Eastman plasticizer monitor was installed and evaluated (vs the wet/dry and GLC methods) on a KDF-2 rod maker for a trial period of a few months. This unit monitors the amount of plasticizer being applied -- the operator can see the application rate and make necessary adjustments without stoppages.

The monitor was found more accurate than the wet/dry method, helped reduce tow waste and, therefore, improved productivity.

Filtrona and Celanese Pressure Drop Apparatus (DE)

A metric conversion chart has been completed and values have been obtained for all our filter rod pressure drop specifications using the Filtrona air pressure drop apparatus (Mk IV/EPD and MkV/EEPD) and the Celanese digital vacuum gauge. We found pressure drop differences between the Filtrona and Celanese gauges when testing the same filter rods. This difference was discussed with Mr. A. Cronshaw who indicated, upon his return to Southampton, that our Filtrona reference standards are reading high. We will investigate.

High Yield Tow (DE)

Eastman approached us on a new tow development supposed to yield a 4 to 5% saving in weight. Our tests so far with Eastman HY

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two items have shown no significant improvement. The supplier is continuing investigative work in their laboratories.

Filter Making using "Porowrap" (DE)

see item a) on ventilated cigarette design - pages 7-9.

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CIGARETTE MAKING

Project Title: Ventilated cigarettes (DE)

Objectives : Relate to the introduction of a number of low yield brands.

A) Filter Making using "Porowrap":

Eastman A-258S hot melt, applied as viscous as possible to minimize absorption into the porowrap, is used to seal and also to anchor the P.W. to the tow but when filter pressure drop is extremely high, no anchoring is required.

Problems encountered in producing cigarettes on KDF-2 equipment and steps taken to overcome them follow:

- The nozzle of the H/M gun was modified and the speed of the pump increased to deliver two streams of H/M (lap and anchorage) arranged so they can be both chilled by the cooler bar. A number of tests had previously been carried out with PVA adhesive to anchor the tow; but they all failed because of the adhesive striking through and building on the garniture.

- Oilite bearings in the H/M pump were replaced with needle bearings which can be greased to prevent bearings seizing after two months of use.

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- An additional paper guide was installed to control the position of the P.W. more accurately.
- A vacuum system to remove fibers and dust on both sides of the porowrap was installed to prevent clogging of the gun and dirtying of the garniture.
- A groove was made on one side of the tonguepiece and another in the hold down bar of the automatic cut off device to prevent build up of H/M.
- With porowrap, the premelt section of the cooler bar is not turned on and the cooler bar is run at a lower temperature than with regular P.W.
- The circumference measuring head is offset (-0.3 mm) to counter the effect of the porous wrap on air gauges - see: "Evaluation of the Lasermike" - page 2.
- The manually activated clean up cycle for the circumference measuring head on the KDF-2 was made automatic with the installation of an adjustable timing device.

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- Finally, the fluted drum stops were filed and repositioned to prevent contact with H/M lines and, therefore, hot melt build up.

We currently experience about 10% less production and 7% more waste when running Schweitzer 260-R1 Porowrap. This should be reduced when the plants start using 260-M1 material.

B) Cigarette Assembly using Perforated Tipping:

Our Hauni Max 5 MR machines were also modified with a decurling bar and a vacuum brake to obtain better control over the spacing of the perforated tipping on the drum.

C) Measuring Ventilation:

The Instrument Section of the Research Department has developed an instrument with digital read out to measure directly the % ventilation in cigarettes. The apparatus employs a hot wire flow meter; a Celianese critical flow orifice and Filtrona labyrinth seals instead of balloons in a new design holder.

Testing rate : 6 to 7 cigarettes per minute.

Available range: 10 to 100% dilution.

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Studies on the Effects of Paper Conditioning to Reduce Paper Breakages (EWS)

We have studied seven grades of cigarette paper from three different suppliers under five R.H. conditions (from 35 to 75% RH at 72°F). At equilibrium, the moisture content in the paper, its tensile strength, percent elongation and in-plane tear resistance were tested.

Even though papers from different suppliers reacted differently, we found that with increasing moisture content the papers lose on tensile; but gain in stretch and tear resistance.

It appears that a minimum of 5.3% moisture content in the paper is desirable. Suppliers normally manufacture cigarette paper with 4.0 to 5.5% m.c. -- they will now see if they can control m.c. between 5.0 and 6.0% m.c. and we will try to improve the pre-conditioning of papers in our plants.

- N.B.: 1) We have now been studying the in-plane tear tester for some time. The sensitivity of this instrument is somewhat deceiving when papers are tested under a specific R.H.; but meaningful results are obtained when comparison is made after conditioning the papers to various relative humidities.
- 2) In another study, we found that the majority of paper breakages on our filter tube makers were due to a number of makers in poor running order and that only about 15% of the breakages reported could have been caused by paper with low moisture content.

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New Procedure for Cigarette Paper Sampling (EWS)

A new procedure was introduced which reduces ITL's workload and shipping costs and hastens the analysis and clearance of cigarette papers, perforated tippings and ultra porous plugwraps. This involves the forwarding of strips (stapled to cards with all pertinent information) by the supplier directly to our laboratory; instead of sending over 9,000 sample bobbins per year along with regular shipments to our plants, which then had to be forwarded to the laboratory and subsequently returned to our plants.

Specifications (EWS)

Tremendous effort was put in correlation work for paper characteristics in order to finalize specifications with our suppliers for all grades of papers, plugwraps and perforated tippings. This has now been achieved with Schweitzer and Ecusta.

Cigarette Printing Inks (DSMcL)

As a result of a customer complaint due to cigarettes smeared with a cigarette printing ink, a survey was initiated to insure that all inks used for this purpose meet government regulations for printed materials coming in contact with foods and possibly the German regulations for tobacco products. Fortunately, the ink in question met our Canadian FDD regulations.

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Alternate Sources of Supply for: (EWS)

1) Wattens-100

Samples from Schweitzer, Papeteries de Mauduit, Ecusta, Fletcher and Schoeler & Hoesch were received and analysed. All were turned down because of poor appearance, improper burn additives and/or smoking characteristics.

New samples submitted by Papeteries de Mauduit and Fletcher are currently being analysed.

2) 14 and 20 Coresta Non-Wetproof Grades (35 and 25 Greiner Sec.)

Samples from Miguel Y Costas, Schoeler & Hoesch and Fletcher were received.

Only the samples from Miguel Y Costas have been analysed. They were outside our specifications for air permeability and M.A.P. In addition, one of their two samples showed severe ash flaking.

3) Schweitzer 270-A Non-Porous Plugwrap

Ecusta's 29648 and Schweitzer's MR650-2 materials both passed our Phase-I tests and larger quantities of each are being tested in our plants.

4) Schweitzer 260-R1 Ultra-Porous Plugwrap

Samples from Ecusta and Wattens were not sufficiently porous. However, Dexter's X-4644 initial sample was close to target and new samples of this grade will be obtained to allow us to determine its air permeability range.

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5) Papeteries de Malaucène's Macro Perforated Tippings

The initial samples of laser perforated tippings submitted by Ecusta did not match the air permeability of any of the three types of tippings that we currently obtain from France.

6) Flax Fibers

Cigarette paper from Ecusta containing approximately 25% Kenaf fibers and 75% flax fibers (instead of 100% flax fibers) is presently being analysed.

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CIGAR MAKING

Project Title: Evaluation of KDS Cigar "bunch-making" Process (PB)

Objective : To identify variables and optimize the KDS cigar bunch-making process.

Variation in weight, pressure drop and firmness of KDS cigar bunches led to a study on the filling capacity of cigar fillers. We found that the optimum storage and running conditions for cigar fillers containing a high percentage of flue-cured tobaccos were 62 to 68% R.H. at 75°F -- which produced moisture contents of 13.2% to 13.9%.

Different curves of filling capacity and moisture content were obtained when sieved fractions were tested: each fraction being different from the blend composition due to segregation occurring during sieving of the blend. We also obtained large differences in sieve tests when samples were drawn before and after the garniture; but we found that degradation was reduced and had little effect on filling capacity when the filler was at optimum moisture content, e.g., the effect of too low or too high m.c. on filling capacity far outweighed the effect of particle size degradation due to the KDS cigar bunch-making process.

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The various tests conducted in the course of this study also showed that:

- filling capacity relates to particle size.
- there is an ideal particle size and moisture content for each blend to control weight and pressure drop.
- blend particle size affects final particle size and, therefore, firmness and weight.
- blend composition could be used to optimize particle size.
- smaller particle size could reduce degradation and improve uniformity of the product while not adversely affecting quality.
- at constant weight, the pressure drop increases if the fines content increases.
- at too high a moisture content, weight is less controllable.
- weight, pressure drop and firmness uniformity could be obtained at lower weight.

New test methods and procedures were devised to reduce process fluctuations and/or obtain more reliable information:

- samples must be representative of the total blend.
- there is an optimum moisture content for each blend of filler.
- the feeding rate of tobacco must be properly adjusted during shaker tests.

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-16-

- tests must be carried out before and after carding for m.c.
and particle size.

The above implications affect other areas and provide a start
for optimizing not only KDS; but all cigar processing.

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Automation and Material Costs Reduction (DWB)

Work is underway to streamline cigar, pocket pack and case sizes to automate cigar making and packing. Display containers for pocket packs have already been eliminated.

U.S. Made Cigar Binders (DSMcL)

Lap sealing difficulties were experienced on our KDS makers when using binders made by AM&F to manufacture cigars for the U.K. market. This forced us to reduce our running speed by half.

Tests, with various pastes and glues using the regular paste applicator or a Kaymich applicator in conjunction with a longer heater, are currently being conducted to improve the running speed.

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PACKAGING MATERIALS

Project Title: Evaluation of odor and taste transfer from cigarette package components. (DSMCL)

Objective : To determine what is causing the odor and if it is likely to affect the taste of cigarettes. This implies setting up inspection procedures and testing methods to reduce the possibility of tainted cigarettes reaching the market.

We have in the past experienced odor problems with packaging materials which sometimes have affected the taste of cigarettes to various degrees. On one occasion we have also found a material with a relatively low odor level which gave a very bad taste to our products.

These problems resulted from:

- residual polymer in the synthetic binder of a clay coating formula.
- a solvent "tri-decanol alcohol" used at too high a level as diluent or tack reducer in U.V. inks and varnishes.
- too high a level of an ink and varnish drier "cobalt naphthenate".
- differences between printing processes and sometimes between lots of inks and varnishes.
- overvarnishing to reduce bronze pick-up.
- contamination from wash-up solution between runs.
- incomplete curing or removal of solvents, etc. ...

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After a great deal of testing, we have established a one-day jar test which correlates fairly well with the smoking qualities of cigarettes after normal market duration of nine weeks in packages with good innerfoil. We have also established the importance of the innerfoil as an odor/taste barrier.

We have been able to produce a general rating for the various printing processes used to produce each of our current brand components. Varnishes were found to be the major source of taint transfer and, when judged necessary, alternate inks and varnishes were tested in order to reduce the level of taste transfer.

We will continue to work closely with the printers and ink suppliers to identify changes, suspect ingredients and/or minimum levels of usage. In the meantime, smoking tests are carried out for all new inks/varnishes/board/formulations/designs prior to qualifying their use in production.

Correlation of Jar Test with Packaged Stock:

We selected du Maurier Special Mild, a middle tar range cigarette, for test purposes as a good comparison between high and low delivery cigarettes. After numerous attempts, we found a fairly good correlation between a one-day jar test and packages kept at constant 72°F-60% RH for nine weeks.

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We remove the slip foil and re-close the packages the day before the test; which is also the day samples in jars are prepared for comparison the following day.

Seven or eight cigarettes are placed and held in direct contact between rectangular pieces of board (printed side out) cut out of the main panel of slides, shells (87 x 65 mm for K.S./75 x 64 mm for regular) and F/T blanks (87 x 55 mm). Three of these units are placed into a gasketed 16 oz jar and maintained at 72^oF for 24 hours.

These cigarettes are then smoked by our expert panel and compared to samples prepared with acceptable packaging material and sometimes to unpacked cigarettes as control the following day.

With this information, we can now evaluate suspect materials (with high level or foreign odor) within two working days after we receive them. (Sample preparation/aging in jars/subjective evaluation).

Innerfoil -- A Barrier to Taint Transfer:

All indications show that the innerfoil provides much protection against taste transfer. The plants were, therefore, provided with a standard showing what was considered to be an acceptable level of pinholing; but they still have problems keeping below this level; also, missing or crumpled slipfoil can occur which then eliminates this barrier property. A test was carried out using a heavier application of wax and heavier tissue backing; but no reduction in the number of pinholes was obtained.

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A recent investigation of the use of Champrene embossing units instead of Nylotron indicates that these may virtually eliminate pinholing. However, long term running properties have yet to be studied.

Printing Processes:

In general, we found rotogravure to give the least taste transfer and, while most brands printed by lithography using conventional oil-base inks and varnishes are better than U.V. inks and varnishes, some were found to be worse. Varnishes appear to be the major source of taste transfer.

We are fortunately changing rapidly over to rotogravure for a number of our large volume multi-colour brands to reduce printing costs, to improve quality and to generate capacity.

Recommendations and Suggestions for Further Study:

We are in the process of preparing recommendations regarding the detection of potential taint/odor problems and a systematic procedure of sampling and evaluating incoming shipments as well as suggestions for future work to get a better feel for the within run and run to run variation and to improve methods of differentiating between acceptable and unacceptable materials.

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Possible Substitute for Metallized Cellophane (DSMCL)

We are currently testing Olin's 103VF-58 foil reinforced cellophane as a possible replacement for TCF's Z-153 metallized cellophane for wrapping individual REAS cigars.

VF-58 is a laminate consisting of two micro-thin cellophane layers with a foil core. The material is coated on both sides with a heat sealable vinylidene chloride co-polymer and one side is treated for release.

The VF-58 laminate has a lower yield than metallized cellophane; but it is less expensive and as a result, in spite of the import duty, the two films are comparable pricewise. VF-58 provides a fresh-foil look and has superior gas and moisture barriers.

We obtained poor end tuck seals when running VF-58 with normal heater temperature settings and we will now have to modify our heaters to increase the sealing temperature to approximately 280°F.

Some of the VF-58 characteristics are:

yield - 10,300 in²/lb

thickness - 0.0016 in.

W.V.T.R. - under 0.1 g/100 in²/24 hrs.

"Aluglass" as Possible Substitute for Cigarette Innerfoil (DSMCL)

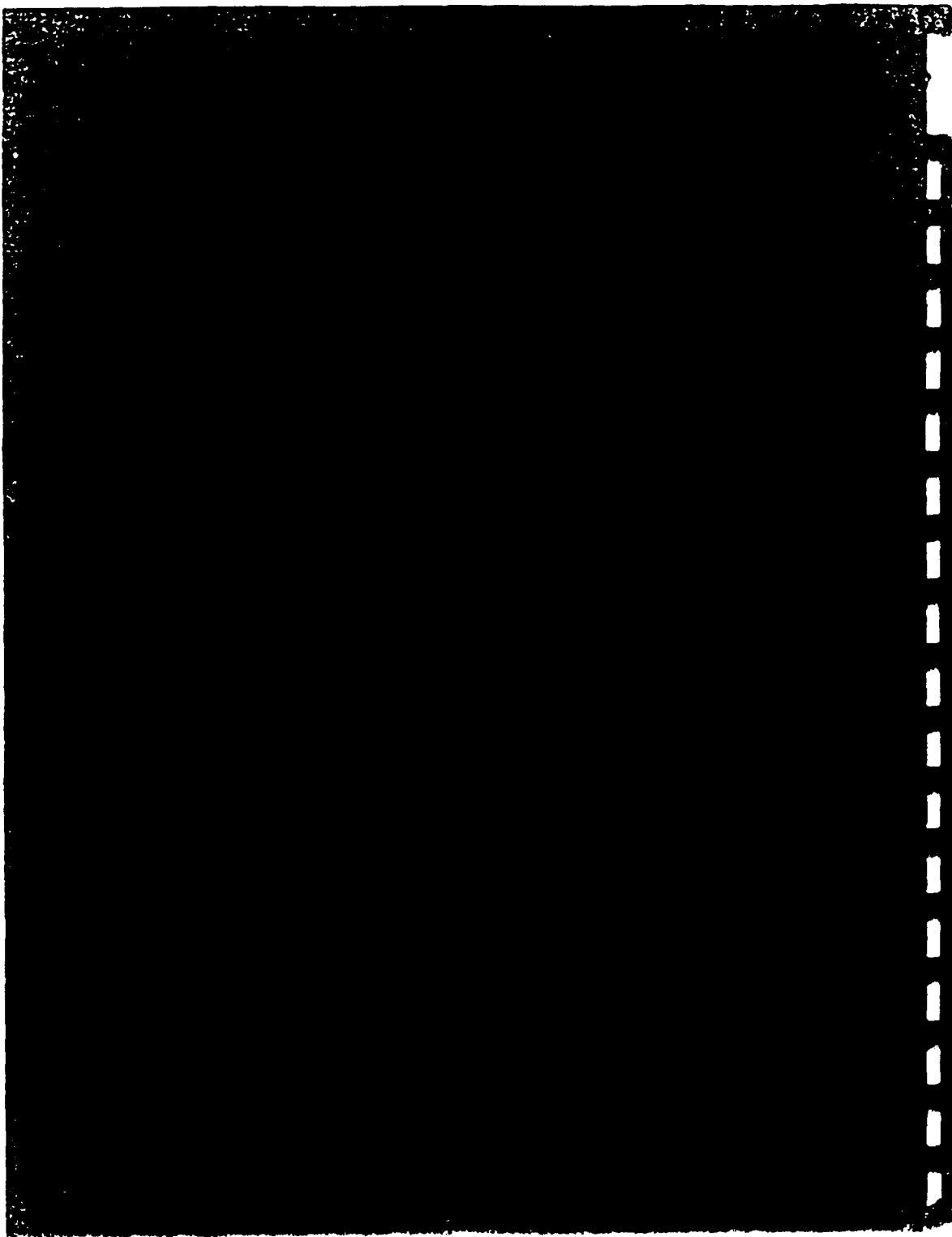
Aluglass RPP-55 produced by Complisa S.A. Barcelona (Spain) was tried on a slide & shell packer. We were able to improve the

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initial running properties of this material; but it became evident that we would not produce normal quality bundles without extensive adjustments or machine modifications. The material was finally turned down because it did not provide adequate protection against tainting from high odor lithographed packaging material.

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