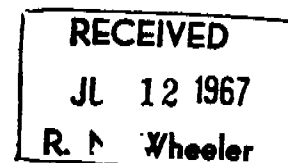


Young
12/10

To: Mr. C. R. Field
Union Carbide Corporation
New York 17, New York



MONTHLY TECHNICAL REPORT

Wire and Cable Materials

MAY 1967

F. A. DeMelio
UNION CARBIDE CORPORATION
Chemicals and Plastics Operations Division
Bound Brook, New Jersey

UCC
042383

HIGHLIGHTS

Vulcanizable Polyethylene Power Cable Compound The Gaylord unloading problem associated with HFDA-4208 pellets has been reduced considerably. A recent manufacturing trial, using the process improvements defined in laboratory work, resulted in a product which should prove satisfactory for Kaiser. Pellet size, soak temperature and Dicap purity in that order, are the most significant factors in the improvement.

Development & Manufacturing
Personnel

Fluid Bed Process Serious consideration is being given to using fluid bed instead of loop reactors for the 1969 expansion of the high density facility at Seadrift. To aid in the decision, three propylene copolymers of 0.2 melt index and .955 density have been prepared in the pilot plant fluid bed reactor using S-5-9, S-5-2 and S-2-2 catalysts. Evaluation of these samples for cable jacket is under way on a high priority basis. The primary aim is to see if we can exactly duplicate DGDJ-3466, but there is also considerable interest in determining the suitability of these products for other wire and cable uses such as telephone singles insulation.

Butene copolymers will be made as soon as the comonomer is available at the pilot plant.

R. D. Cleland, R. J. Turbett

Vinyl Granular Compound made by a Slurry Process We are evaluating a sample of vinyl compound in granular form (soap detergent type particle) which was made by incorporating all the additives and stabilizers in a water slurry process. This process, developed by Chemische Werke Mücken-OHO Barlbcher, an additive manufacturer from Germany, claims a product conversion cost of 0.1¢/lb. Royalties of 0.2¢/lb. are sought. Since this conversion cost is superior to both dry blending and hot processing conversion costs, we are pursuing this development further through A. Costantin and G. K. Graeber.

Extrusion tests showed excellent feed in the hopper and a good quality extruded insulation. Some porosity was evident. Tests on physical properties are not complete. The electricals of the insulated wire were excellent.

H. J. Pazinski

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Highlights - continued

DXH-28 Direct Injection of Antioxidant Evaluation of DXH-28 resins produced at Seadrift employing direct injection of antioxidant to the product receiver have been completed. Results indicate that higher outputs should be obtainable without sacrificing the quality level of our DFDC-0506 Blk. 9845 jacketing compound. A larger scale run has been recommended to determine the magnitude of the increase obtainable by the direct injection method.

J. F. Groel, Seadrift
Personnel

rmr
6/5/67

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Polyethylene for Power Cable

Bound Brook (F. A. DeMelio, A. A. D'Onofrio)

Natural Vulcanizables

1. HFDA-4208 Natural

As a result of a recent cooperative R & D/Production cascade experimental program, we have been able to identify and weigh those factors most pertinent to the Whitlock-ability of HFDA-4208 Natural packaged in Gaylord containers. Pellet size (surface to volume ratio), soak temperature and Dicap purity were found to be the most significant variables, with pellet size being the most important consideration.

While some of the experimentation involved in this run caused higher than normal fines levels, it was agreed that after re-screening certain of the blends made, we will have a product which should prove satisfactory for Kaiser. We intend to carefully follow the use of these blends at Bristol in order to determine our future course of action.

Development and 101 Manufacturing
Personnel

2. Natural Vulcanizable Copolymer

Phelps Dodge has completed the construction of a trial length of 15 KV URD cable insulated with HXFD-2604, our ethylene-vinyl acetate copolymer natural vulcanizable. An intensive test program is planned by Phelps.

Reynolds Metals (URD insulation) and Essex Wire (ignition wire insulation) will be sampled with small laboratory samples of HXFD-2604 this month.

A. A. D'Onofrio

Medium and Low Voltage Insulations

We have requested that Phelps Dodge prepare the constructions necessary for the submittal of HXFD-3227 (vulcanizable copolymer - 60 part equivalent) to Underwriters. Pending management approval by Phelps, this will complete our program for producing the samples of HXFD-3225 (Alcan), 3226 (Hatfield) and 3227 (Phelps) necessary for RHH, RHW and USE submittal.

In addition, the Underwriters' laboratory has agreed to waive their submittal requirement of a complex braided construction and will accept an alternate.

R. L. Brockett, A. A. D'Onofrio

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The intermediates for HXFD-3225, -3226 and -3227 have been prepared in the Bay 17 FCM at high production rates. The initial data indicate that -3225 may require slower rates or a masterbatch technique, while -3226 and -3227 can readily be made in one step at high rates.

D. H. Frodey, S. Eberhardt,
G. Bush

Hendrix Wire and Cable, N. H.

Hendrix requested our assistance in determining the composition of a line wire insulation which exhibited extreme cracking. The material in question was high density polyethylene having a melt index of .9 and a carbon black content of .5%. Evidently an error was made by the customer and a molding grade material was employed in the application.

J. F. Groel

Semi-Conductive Polyethylene

1. Thermoplastic

Oral presentations of the significant properties of the new thermoplastic semi-conductive, DXHD-3240 were made to Simplex, General Cable and Reynolds Metals. Production-trial quantities have been released to each of the above customers. Kaiser, Bristol will be given a similar presentation in late June.

R. L. Brockett

2. Vulcanizable

The peroxideless intermediate for HFDA-0580 Blk. 55 has been prepared successfully in the Bay 17 FCM at higher than expected rates. The tape testing and electrical test results were excellent.

D. H. Frodey, S. Eberhardt,
G. Bush

Automotive Insulations

At a recent meeting with Essex and Ford personnel, two alternative proposals, to circumvent the scrape abrasion test required in the Hypalon low tension wire specifications, were agreed upon. These were as follows:

1. UCC will develop test data showing the superiority of HFDA-4730 over vinyl and Hypalon in a scrape test of our own choosing.

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2. Failing the above, we will be allowed to submit testimony that Packard Electric (General Motors) is currently using HFDA-4730 in truck and auto primary body wire.

R. L. Brockett

Vulcanizable Copolymers (General)

Cure rate studies on samples of Dicum crosslinked ethylene/bicycloheptene copolymer (C₂/BCH) indicate that this copolymer is somewhat slower curing than DYNH. Cure speeds identical to DYNH systems can be achieved with slightly higher concentrations of peroxide.

We have requested that South Charleston prepare larger quantities of devolatilized C₂/BCH copolymer for our planned formulation and extrusion studies.

R. L. Brockett

We have been generally unsuccessful in developing a satisfactory automotive insulation which will not melt at high temperatures, but will not require steam curing. Although the EVA/Silica/PVC system was originally promising, at least one of the required properties is deficient with each formulation variation.

We are now broadening the scope of the program to include an evaluation of ionically crosslinked salts of Polymer H and Polymer K.

E. L. Schmidt

We visited P. S. Starcher, D. J. Trecker and H. O. Colomb of the South Charleston Technical Center to initiate a cooperative program to evaluate norbornene derivatives as cure accelerators for vulcanizable polyethylene. We will consider these derivatives as direct comonomers, as post-polymerization modifiers of ethylene-acrylic acid copolymers, and as direct additives to our current polymers.

E. J. Fisher, D. J. Trecker, H. O. Colomb

Peroxide Evaluation

Three peroxide samples were evaluated to see if they would fit into our current manufacturing procedures for crosslinked polyolefins which consists of soaking peroxide into preheated pellets. Lab experiments showed that all three peroxides melted below 60°C and could, therefore, be used in our present blending operation. Future experiments will be conducted to define optimum concentrations and cure rate versus temperature curves.

E. L. Schmidt

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Polyethylene for Power Cable

4.

Trips

5/4/67	Phelps Dodge	R. L. Brockett A. A. D'Onofrio	Underwriters submittal.
5/4/67	N. Y. Section IEEE	F. A. DeMelio R. L. Brockett A. A. D'Onofrio	Round table corona and tracking dis- cussion.
5/5/67	General Cable	A. A. D'Onofrio	Cooperative develop- ment review.
5/8/67	S. Charleston	E. J. Fisher	Initiate VPE bas resin program.
5/10/67	Hatfield W & C	A. A. D'Onofrio	HFDA -0580 technical service.
5/7/67 to 5/12/67	Wayne State U.	R. L. Brockett	Polymer conference.
5/16/67	Essex/Ford	R. L. Brockett A. A. D'Onofrio	Automotive insula- tions.
5/17/67	Simplex	R. L. Brockett A. A. D'Onofrio	Introduce DXHD - 3240.
5/23/67	Reynolds Metals	A. A. D'Onofrio	Technical service.
5/24/67	Public Service, N. J.	A. A. D'Onofrio	Spacer cable.

Visitors and Training

<u>Date</u>	<u>Visitor</u>	<u>Host(s)</u>	<u>Subject</u>
5/18/67	Siemens Electric	A. A. D'Onofrio	Power cable.

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5.

Polyethylene for Communications Cable
Bound Brook, (F. A. DeMelio, A. A. D'Onofrio)

Telephone Cable

DXH-28 Direct Injection of Antioxidant

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J. F. Groel, Seadrift Personnel

Fluid Bed Process

Serious consideration is being given to using fluid bed instead of loop reactors for the 1969 expansion of the high density facility at Seadrift. To aid in the decision, three propylene copolymers of 0.2 melt index and .955 density have been prepared in the pilot plant fluid bed reactor using S-5-9, S-5-2 and S-2-2 catalysts. Evaluation of these samples for cable jacket is under way on a high priority basis. The primary aim is to see if we can exactly duplicate DGDJ-3466, but there is also considerable interest in determining the suitability of these products for other wire and cable uses such as telephone singles insulation.

Butene copolymers will be made as soon as the comonomer is available at the pilot plant.

R. D. Cleland, R. J. Turbett

Phillips Processable PF Copolymers

Phillips has been working to commercialize processable copolymers made in the PF reactor. Eventually we can expect such products to be offered in competition with "S" copolymers. Two such copolymers have been tested for telephone singles insulation. One had been made without catalyst modification; the other, with triethylborane added to broaden MWD. Some properties are listed:

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	<u>PFE 7-17</u>	<u>PFE 7-45 (TEB Mod.)</u>	<u>DGDA-3363</u>
Melt Index	.28	.36	.25
Density	.954	.954	.950
Swell Ratio	1.75	1.63	1.5
IV	2.28	2.25	2.1
Stress Crack, Quench Cooled, 100% Igepal			
F ₀ , F ₅₀ , F ₁₀₀ (days)	2, 2, 2	2, 4, 5	F ₀ 7
Surface Smoothness,			
24 AWG, 2000 fpm	poor (melt fracture)	fair	good

Stress crack resistance, even in the TEB modified form was poor in comparison with our singles compound, and it does not seem likely that a superior cable jacket compound could come from this process.

We had once considered processable PF copolymers as a route to low swell ocean cable jacket resins, but the high swell ratio measured on these samples would seem to preclude this approach.

R. J. Turbett

Gloss in DGDJ-3466 Blk.

In anticipation of the eventual need to provide a moderately glossy, high density, black cable jacket compound to meet the competition of Ziegler-based compounds, we have been testing the effect of numerous additives in DGDJ-3466 Blk. Most of the additives had very little effect; however, 5% DEX-7455 was found to give gloss equivalent to that in Hercules HE071B. (DEX-7455 is a 0.5 melt index S-6-9 homopolymer processed in the NRM at Seadrift.) No change in physical properties is predicted at this level of modification.

We do not plan to change the formulation of J3466 Blk. at this time, but P. Lucchesi is following up this finding as a route to gloss improvement in pipe compounds based on "S" resin.

R. J. Turbett, H. M. Quackenbos

DFDC -0506 Blk. 9845 - Nippon Unicar

At the request of Nippon Unicar, samples of DFDC -0506 Blk. 9845 produced in Japan and the United States, and a sample of Alathon 1250 copolymer jacketing stock were subjected to the Western Electric Brabender degradation test. Results didn't confirm Nippon Unicar's findings that the Japanese product had a larger increase in melt index and flow index. The Alathon 1250 showed the greatest change. All materials still had an F₀ of 21 days when tested for environmental stress cracking in a 10% Igepal solution. We question whether Nippon Unicar has a problem.

J. F. Groel

Specifications - REA-PE-210

We replied in the negative to a supplier's proposal to REA that the brittle temperature of polypropylene copolymers be tested on a .020" thick injection molded specimen rather than the conventional .075" thickness. It was our feeling that the degree of reproducibility between different test locations would deteriorate severely by going to the thin specimens.

REA-PE-200 Appendix E

REA has issued an additional appendix to PE-200, Appendix E, which allows the use of a .5 melt index low density black jacketing compound. The only other difference between Appendix E and B is that the former has a more stringent stress crack requirement, 0 failures in 96 hours, versus 2 failures in 24 hours for Appendix B. The new appendix erroneously implies that Alathon 1250, a .4 melt index copolymer, is a superior product to DFDC - 0506 Blk. 9845 and competitive materials previously offered against Appendix B. To counteract this false implication we have recommended to the Sales Dept. that DFDC -0506 Blk. 9845 be certified to both Appendix B and E of PE-200.

J. F. Groel

Kaiser and Essex Wire and Cable Specifications

A total of six specifications for compounds used in the communications field were reviewed. Along with our recommended compounds to meet the requirements, where appropriate, minor changes in the specifications were proposed. It is becoming increasingly evident that in addition to certification, customers are requesting more and more actual test data on each shipment.

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Wire and Cable Products - Torrance

Torrance has gradually been able to increase the productivity of DXH-28 resin from 1300 to 1700 lbs. /hr. on their 1" tubular reactor. As expected, physical properties of the end product, DFDC-0506 Blk. 9845, are still acceptable.

J. F. Groel, Torrance

Cellular Polyethylene

Plans with production personnel were made regarding the forthcoming run of DFD-4960 in Bay 3 Building 101. It was decided that additional cooling facilities, and blending facilities will be needed during the run. It was also decided that provisions be made to heat the batches in the hopper of the Banbury to prevent the batch from becoming too cold. Cold batches will cause the sheet emerging from the extruder to tear. General operating conditions and procedures were also agreed upon for the run.

E. J. Fisher, H. J. Pazinski,
Production Personnel

Cellular - DFD-4960 Natural - Times Wire and Cable

Customer has evaluated two blends of DFD-4960 Natural containing 1% extra blowing agent and produced with optimum blending conditions. Customer thus far reports bag to bag and pallet to pallet variation very low with excellent blown densities.

J. F. Groel, Ottawa Manufacturing

Western Electric at Kearny, has evaluated DFDB-6660 for use in their Video Pair application. They found this material unsuitable for this application. Plate-out of material on the die and guider tip during extrusion was the main reason for the failure of this material. Plate-out causes grooving of the insulation and decreased extruder output.

A report was written which describes the development of DFDB-6660.

E. J. Fisher

A visit was made to Hatfield Wire and Cable Company to discuss equipment to be used in the manufacturing of cellular coaxial cables. Recommendations were made as to what type cooling facilities were needed and also the type of screw needed to do an adequate extrusion job. Interest in cellular coaxial cables is high at Hatfield as evidenced by the installation of capacitance and O.D. monitoring equipment on one of their lines.

E. J. Fisher

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9.

Polyethylene for Communications Cable

A visit was made to Alpha Wire Company to discuss the use of compounded cellular polyethylene. At the present time, Monsanto dry blend material is used. Alpha agreed to evaluate a 200 pound sample of DFD-4960. It was hinted that the reject rate using Monsanto material might be too high to suit the managerial people there.

E. J. Fisher

Adhesives

An attempt to produce a one-side coated copper tape for Western Electric in Baltimore was made. Good deposition of Polymer H was obtained. The run was not completely successful because of slight anodic oxidation caused the coating to be slightly green. This, it was felt, would not be acceptable for sampling to Western Electric. Future runs will be made in which the elimination of this oxidation will be hopefully accomplished.

E. J. Fisher

A 30 gallon Polymer H emulsion for electrocoating has been prepared in a 50 gallon resin still. The solids, pH, and viscosity are within specifications. This material has been successfully electrocoated onto aluminum and is suitable for sampling to the field.

W. L. Wheelwright

Evaluation of Electrical Properties
of I. C. I. 's Poly(4-Methylpentene-1)

Electrical measurements have been performed on specimens of "TPX" - Grade RT(I. C. I. 's poly(4-methylpentene-1)) obtained from Mr. D. Weston of BXL Plastics Group Ltd. during the writer's visit to Aycliffe on April 13, 1967. The excellent electrical properties reported were obtained only after prolonged heating of the material at 120°C prior to molding. The further report that the dissipation factors decrease with increasing frequency has been found to be erroneous. The very low value reported from Aycliffe from tests at 6 Mc resulted from failure to make the correction for the losses in the test cell leads that is necessary when tests are made above 1 Mc on materials which have dielectric constants substantially different from that of the standard 1.0 cs silicone fluid employed in the liquid-displacement method. While it is true that there is a decrease of dissipation factor between 100 Kc and 1 Mc, our measurements at 6 and 10 Mc show a reversal of this trend and a rather rapidly rising dissipation factor with increasing frequency above 1 Mc. The losses are also very adversely affected by short-time (24 hour) immersion in water at room temperature.

T. Hazen

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Rheology

A large number of low and high density polyethylenes are being examined with the Weissenberg Rheogoniometer. Among these are the low density wire and cable resins previously studied with the capillary rheometer and rotational viscometer. It was disappointing to find that recoverable shear strain differences found with the rotational viscometer did not appear in the "Rheo" data.

O. K. Spurr

Reports

"An Improved Telephone Cable Jacketing Compound", HF-129, by J. B. L. Hollingsworth.

"Dispersion of Dry Carbon Black in Telephone Cable Jacketing", HA-132, by J. B. L. Hollingsworth.

"A Test for the Effect of Strain on Stress Crack Resistance of Low Density Polyethylene", HF-130, by J. J. Pickering.

Trips

5/9/67	S. Charleston	R. J. Turbett	Set up fluid bed crash program.
5/11/67	Hatfield W&C	E. J. Fisher	Discuss cellular PE.
5/16/67	Western Electric, Baltimore	F. A. DeMelio	New applications.
5/24/67	Alpha W&C	E. J. Fisher	Discuss cellular PE.
5/25/67	Western Electric, N. Y.	J. F. Groel A. A. D'Onofrio F. A. DeMelio	Discuss quality, technical programs.

Visitors

5/1/67	W. Knight Torrance Plant	J. Luth J. F. Groel	Discussion quality control test procedures.
5/5/67	J. Levy (UCI)	J. F. Groel	Wire and cable in communications field.
5/17/67	Sowa Dainichi Hitachi (Cable Works)	J. F. Groel J. J. Helbling	Wire and cable in communications field.

MAY 1967

11.

Silicone Rubber for Wire and Cable
Tonawanda (D. B. Braun, P. K. Huester)

Underwriters Laboratory Wire Insulation

A compound suitable for this application can be prepared with triethylamine but it requires 30 minutes hot milling on production-scale equipment. A possible alternative solution, shorter hot mill and higher catalyst, has been shown to be untenable because of poor reproducibility. We are continuing investigations of the utility of other, lower boiling, tertiary amines. A review of the project is in progress and a decision on the desirability of introducing our current compound at Belden is expected shortly.

Rubber Aging at Subcritical Temperatures

Underwriters Laboratory Standards for 200°C Fixture and Appliance Wiring require air aging of the insulated wire for 60 days at 210°C. Although oxidation of silicone rubber is a minor factor at 210°C, there has been considerable difficulty in developing rubbers which retain adequate margins of elongation after such aging cycles. The development problem is complicated by a pricing situation which forces consideration only of compositions rather highly loaded with extending fillers; such rubbers have a low starting elongation and provide little margin for change. Part of the elongation loss on aging results from a polymer-filler interaction similar to crepe-hardening which continues to intensify slowly after vulcanization of the rubber. This interaction is at least partly reversible by mechanical working and can also be altered by chemical means. Compositions employing limited chemical inhibition are being readied for field trials and others employing more extensive effects are being considered.

In the course of our exploratory work, a second phenomenon affecting aging resistance was recently discovered: an extensive network of microscopic cracks in the surface of aged rubbers which develops as the rubber is stretched. The cracking phenomenon is associated with an increase in apparent rate of elongation loss which occurs rather suddenly after several weeks' exposure in the aging ovens. If this sudden increase in loss rate did not occur, very adequate aging performance could be developed. Surface cracking in silicone rubbers under these conditions is certainly new to us and we have been unable to find any reference to it in the external published literature. The initial observation of cracking was later realized to have been highly fortuitous, for subsequent attempts showed that the effect was noticeable to the naked eye only under special circumstances. Even under moderate optical magnifications, observation of cracking was an uncertain affair. With detection of cracking on such an ephemeral basis, it was not possible to find any rational causal relationships so that some of our earlier work where observations were negative must now be held suspect.

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MAY 1967

12.

Silicone Rubber for Wire and Cable

Recently, through the fine cooperation of the Physics Group at Tonawanda, considerable progress has been made with the development of an electron microscope technique for observing the surface of stretched rubbers. This development is rapidly providing new data which has considerably extended our understanding. There is now no doubt that a surface film, in some way different from the body of the rubber, is the initial site of cracking. The conditions required to initiate cracking and the appearance of the cracked film strongly suggest that the surface film is not hard and brittle but rather extensible and weak; but with appreciable elastic nature. Operations designed to remove the surface, such as mechanical abrasion or chemical etching, are effective and all tendency toward surface cracking can be eliminated. The surface film appears to develop gradually and to become thicker with increasing aging time. We are now looking for conditions which accelerate or retard the rate of film formation since they may throw some light on the composition and origin of the film. Success in elucidating the nature and source of the film should lead to means for its elimination and a substantial improvement in aging resistance.

Mil-C-3702 and Mil-W-8777B Wire Insulation

No reports have yet been received from Eltra Corporation on their testing of our Mil-C-3702 wire insulation, but these are expected shortly. In the meantime, some progress has been made in our quest for a suitable Mil-W-8777B compound. A modification of the Mil-C-3702 compound made by replacing some of the hydroxy end blocked silicone plasticizer with ethoxy end blocked silicone gave a good balance of handling properties and physical properties. This work is being pursued vigorously with hopes of initial scale-up in about a month.

Sistersville, W. Va. (O. K. Clark)

Base Compound for Eltra

Favorable response to Y-3755 base compound for Mil-C-3702 ignition wire insulation at Eltra prompted the preparation last month of two more batches. Evaluation this month shows them to have reproduced the previous material.

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MAY 1967

13.

Plasticizers and Dry Blend Resin for Wire and Cable
Tarrytown (W. H. Bauer)

Dry Blend Wire and Cable Resin

A plant run of QXAP-12 has been made by D. E. Richardson and resin properties determined. The median particle size is high, the resin being quite similar to Escambia 2225. Meanwhile, samples of competitive resins are being received from the field for purpose of comparison and definition of current use requirements. Six samples (five resins) are under test with additional materials promised.

A second run of QXAP-12 on wire will be made by H. J. Pazinski at Bound Brook. Operating problems made the first run subject to some question and results must be verified.

E. B. Harris

General Electric Company, Bridgeport, Connecticut

Infrared spectra and specific resistance data are being generated for Flexols DOP, 10-10, 10-10X, 13-13, 13-13X and EPO. This information is to be used for sales introduction in establishing confidence in the UCC line at GE and as a technical assistance to a potential customer.

E. B. Harris

UCC
042398

MAY 1967
PVC Compounds for Wire and Cable
Bound Brook (A. A. D'Onofrio)

14.

Extrusion of QFY-9644 Natural at Western Electric

We have regained our position as an approved supplier of this product at Western Electric, Buffalo, on the basis of a successful hopper car evaluation. The sample extruded with a smooth surface. Production will keep a close watch on recent hopper car production to prevent future unloading problems.

P. Hassialis, H. J. Pazinski

Evaluation of Electricals of Process 12 Resin

The recent run of QXAP-12 Blend 1 which was double washed at Texas City showed low electricals when tested on wire. Insulation resistance values were approximately 33% of the Escambia Control (187 versus 630 megohms / 1000 ft.). We feel that this resin is not competitive as a commercial dry blend resin for wire and cable products.

H. J. Pazinski

Vinyl Granular Compounds Made by a Slurry Process

We are evaluating a sample of vinyl compound in granular form (soap detergent type particle) which was made by incorporating all the additives and stabilizers in a water slurry process. This process, developed by Chemische Werke Mucken-OHO Barbocher, an additive manufacturer from Germany, claims a product conversion cost of 0.1¢/lb. Royalties of 0.2¢/lb. are sought. Since this conversion cost is superior to both dry blending and hot processing conversion costs, we are pursuing this development further through A. Costantin and G. K. Graeber.

Extrusion tests showed excellent feed in the hopper and a good quality extruded insulation. Some porosity was evident. Tests on physical properties are not complete. The electricals of the insulated wire were excellent.

H. J. Pazinski

Evaluation of Cereclor 42 Plasticizer Extender

QFD-9509 Natural made in production equipment with 10 and 20% Cereclor 42 plasticizer extender replacing Flexol 1010 was evaluated for volume resistivity and retention of physical properties after oven aging. The volume resistivity was excellent. The aging data show the sample with 20% extender to fail the retention of elongation requirements after 7 day aging tests. Additional testing on the compound containing 10% extender are continuing.

H. J. Pazinski

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042399

High Speed Extrusion of Thin Wall Semi-Rigid PVC

We evaluated 9 additives (including ABS, butyl rubber, EPR, caprolactone, Zutty modifier, etc.) to determine if we could improve the high speed extrudability of our semi-rigid compound, QFD-9282. None of the additives showed any improvement over the control at speeds up to 3000 ft. /min. A number of other approaches to the problem of high speed extrudability will be investigated.

H. J. Pazinski

Chemically Crosslinked PVC

I. T. T. Wire and Cable is promoting an irradiated PVC insulation for which they claim a 125°C operating temperature and will withstand the penetration of soldering iron at 660°F.

Cursory checks of our reactive resins, VYRE and VMCA, in combination with small amounts of epoxy plasticizers provided crosslinked compositions. We plant to follow up these results with a broader investigation of potential low cost routes to chemically crosslinked vinyl compounds for wire and cable use.

Similarly it has been found that an ethylene acrylic acid copolymer (DXM-234 - 5 melt index - 14% AA) can be readily crosslinked by small amounts of the cycloaliphatic diepoxide ERL-4221. This will be investigated further as a means of producing a peroxide-less vulcanizable product for wire and cable and other possible applications using our own economical crosslinking agent. The patentability of this finding is also being investigated.

H. J. Pazinski

Scale-up of QXAP-12 Resin for Wire and Cable Dry Blend

Approximately 100,000 pounds of QXAP-12 resin was made in Production for wire and cable dry blend evaluation. Ted Smith provided R & D technical support to monitor the 12 autoclave runs. The particle size of the resin was somewhat larger than desired, but particle size distribution was very narrow and other properties were excellent. The new plaque test indicated that electrical properties should be satisfactory, although not as good as double-washed QSAN-7. The QXAP-12 was double-washed and treated with Ionol (butylated hydroxy toluene) as a shortstop at the conclusion of each autoclave run. The resin was boxed as Blend 1 and shipped to Perth Amboy, and samples were forwarded to Hank Pazinski in Bound Brook and Bill Bauer in Tarrytown for evaluation.

Particle size control was considered satisfactory, and autoclave fouling was indicated to be slightly more than for QYSC-7 in that solvent-washing of the autoclaves after every third run was required, as compared to washing after every fourth run for QYSC-7. No further work is planned until evaluation of the resin is complete.

T. R. Smith,
Vinyl Operating Supervisors

Polysulfone - Future Programs

The most serious deficiency preventing substantial sales of wire and cable extrusion grade polysulfone (P-2300) has been identified as its susceptibility to crazing in contact with solvents commonly used in connection with the various potential applications. As a result we have reformulated our development program in order to concentrate our efforts on potential cures for the crazing problem.

J. J. Helbling

Polysulfone - Technical Service

A prototype cable manufactured for the U.S. Army Signal Corps exhibited extensive crazing of the polysulfone insulated singles. Since the singles did not fail until after the neoprene jacket had been applied and cured, it appeared that some component in the neoprene was responsible for the crazing. Although our initial tests showed that that particular neoprene formulation would cause crazing, it was later determined that the primary cause of failure was the nylon yarn that was used as a serving on each insulated pair.

Evidently, the nylon contained additives which have a deleterious effect on polysulfone. This type of problem could foreseeably occur in other applications, therefore, the fieldmen will be alerted of this danger. We have suggested that a second cable be made using an innocuous substitute for the nylon serving along with a lapped Mylar wrap to prevent any potential neoprene additive crazing.

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Bis-S Polyether

Some recent tests indicate that Bis S polyether is much more flame retardant than polysulfone. In a test which measures burning time after ignition with a lab burner, Bis S burned for only 1 second compared to 65 seconds for a similar polysulfone construction. Although the particular test is subject to high variability it nonetheless indicates that Bis S is substantially more flame retardant than polysulfone.

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Antimony Oxide Modified PSF

After short term aging it appears that polysulfone modified with antimony oxide for flame retardance (formulation prepared specifically for General Cable) loses its elongation faster than unmodified polysulfone. These aging studies, as well as electrical property studies are continuing.

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Polysulfone for Building Wire

We have terminated our project on the use of polysulfone insulation for building wire applications. Failures in the long term insulation resistance test in water at 75°C under a 600 volt a-c stress using the present PE-2300 Blend 32, prohibits its use for this application.

An interim report covering this work will be issued next month.

H. J. Pazinski

Trips

5/4/67	U. S. Army Signal Corps.	J. J. Helbling	PSF crazing in military control cable.
5/10/67	Monarch Wire and Cable	J. J. Helbling	Extrusion trial.
5/25/67	Tensolite Wire and Cable	J. J. Helbling	Extrusion trial.

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