Monsanto

ORGANIC CHEMICALS DIVISION

Monsanto Company
800 N. Lindbergh Boulevard
St. Louis, Missouri 63166
Phone: (314) 694-1000

February 18, 1971

Subject: Capacitor Aroclor 1242 vs. MCS 1016

On August 6, 1970 we sent to you the proposed specifications for MCS 1016 along with copy of our specifications for Aroclor 1242, so that the typical properties of these fluids could be compared conveniently. The two fluids appear very similar.

You will recall that the purpose of MCS 1016 is to provide essentially the same characteristics as Aroclor 1242, except that higher chlorinated biphenyls have been removed, to help alleviate the PCB pollution problem.

Our goal remains to be in large scale production of MCS 1016 by July 1, 1971. Pursuant to changing to MCS 1016, we sent a drum of it to you for examination and capacitor life testing. Additional sample amounts can be made available, if needed.

Our laboratory has completed a capacitor life test study of these fluids, extending over a period of 3,200 hours and including exposure to voltage levels and temperatures considerably in excess of the conditions prescribed in the commercial acceptance tests for the fluorescent lamp ballast type capacitors used in our study. These capacitors were 2.0 microfarad units of the type rated at 580 volts AC, and required to withstand 1.5x580 = 870 volts at 70°C for 750 hours.

The severity of our test conditions is defined in the attached data. The results are essentially the same for both of the fluids and reflect excellent stability and capacitor life. While the number of capacitors tested was small (six Aroclor 1242 and five MCS 1016), the work was done under very carefully

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controlled conditions in our Research Laboratory.

We have an extensive research program on materials for use in capacitor dielectric systems.

We would be most pleased to have you visit our laboratory to review not only MCS 1016 but also other work assigned to serve our mutual interests in capacitor dielectrics.

Our rather extensive new commercial facilities to produce MCS 1016 are being installed. As we are committed to the July 1, 1971 production date, please give us your findings and views from your testing work, at the earliest appropriate time.

Believing that you may like another copy of the specifications for MCS 1016 and Aroclor 1242, we are pleased to enclose them.

Best regards,

P. G. Benignus

P. G. Benignus
Market Manager
Dielectric Fluids

cs

Enclosures

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LIFE TEST DATA - PAPER CAPACITORS

Test Conditions, Tan δ, Capacitance, Failure Times

Started 9-16-70

Temp. °C		70°	70°	70°	70°	70°	70°	80°	90°	100°
Voltage		870	900	900	930	965	1000	1000	1000	1000
Time, hrs.	0	750	168	1274	336	168	168	168	168	168
	a	a	a	b	b	b	b	b	b	b
Aroclor 1242	.00338	.00344	.00348	.00360	.00303	.00304	.00301	.00309	.00341	.00472
	1.979						112 hr.			12.75 hr
	ufd									79.5
										136.0
										2 OK
MCS 1016	.00348	.00342	.00345	.00358	.00318	.00320	.00306	*.00316	.00350	.00434
	1.996									8.5 hr.
	ufd									15.0
										126.16
										2 OK

a) Measured at 600V, room temp.
b) Measured at test voltage and temp.
* line fuse blew, measured time was 148 hrs.

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CAPACITOR DIELECTRIC MCS 1016

(Similar to Aroclor 1242, except that some of the more highly chlorinated biphenyls have been removed.)

PROPERTY	TYPICAL
Appearance	Clear, colorless liquid
Color, APHA	10
Acidity (ASTM D974, D664)	0.001 mg KOH/g
Water (ASTM D1533-60)	40 ppm
Inorganic Chlorides (ASTM D1821)	0.02 ppm
Specific Gravity 25/15.5°C (ASTM D1810)	1.364
Viscosity 37.8°C (ASTM D88-56)	73.8 SUS
Refractive Index 26°C (ASTM D1807)	1.6219
Dielectric Strength (ASTM D877)	44KV
Pour Point, °C (ASTM D97-57)	-20°C
Hydrolyzable Chlorine Compounds, (ASTM D1820-65)	0.07 ppm
Hydrolyzable Chlorine Compounds, by Refluxing (ASTM D2441-65T)	0.17 ppm
Thermal Stability (ASTM D1936-64)	0.09 ppm
Distillation Range (ASTM D20-56)	10% - 327°C 90% - 342°C
Resistivity, 100°C 500 volts DC at 0.05 inch gap (ASTM D1169)	400,000 X 10^9 ohm-cm. min.
Dielectric Constant (ASTM D924-49) 100 C; 60 Hz	4.88
Power Factor (ASTM D924-49) 100 C; 60 Hz	0.1%
Flash Point, Clev. open cup (ASTM D92-57)	350 to 365°F
Fire Point	None to Boiling

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AROCLOR 1242 (Trichlorobiphenyl)
Specification Properties - September 27, 1962

PROPERTY	TYPICAL
Visc. at 37.8°C. (ASTM D88-56)	82 - 92 seconds Saybolt Universal
Specific Gravity at 25/15.5°C. (ASTM D1810)	1.381 - 1.392
Color, APHA	50 max.
Condition	Clear
Acidity, mg. KOH/g. (ASTM D974, D664)	0.01 max.
Pour Point, °C. (ASTM D97-57)	-14 or lower
Inorganic Chlorides (ASTM D1821)	0.05 ppm. max.
Refractive Index at 25°C. (ASTM D1807)	1.6240 - 1.6260
Distillation Range (ASTM D20-56) °C. corrected for stem and barometric pressure	10% 325 min. 90% 360 max.
Water content (ASTM D1533-60)	35 ppm. max
Resistivity, 100°C. 500 volts DC at 0.1 inch gap. (ASTM D1169)	500 X 10^9 ohm-cm. min.
Dielectric constant, 100°C. at 1,000 cycles (ASTM D924-49)	4.7 to 4.9
Flash Point, Cleve. open cup (ASTM D92-57)*	170° to 200°C.
Fire Point*	None to boiling point
Sulfates (ASTM D117-31)*	None
Fixed Chlorine Content (Carius)*	43 ± 0.5%
Specific Heat at 25°C.*	0.29
Evaporation at 100°C. for 6 hrs.*	0.4% max.
Dielectric strength (ASTM D877-49) at 25°C. KV min.*	35
Hydrolyzable Chlorine Compounds, (ASTM D1820-61) ppm. chlorides, max.	0.5
Thermal Stability (ASTM D1936) ppm. chlorides, max.	0.4
Coefficient of Thermal Expansion* (ASTM D1903)	0.00068 cc./cc./°C.

*Not determined unless by special request.

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Recipients of P. G. Benignus letter dated August 6, 1970 are as follows:

Mr. Abe Kalstein
AEROVOX CORPORATION
740 Belleville Avenue
New Bedford, Massachusetts

Mr. Kurt Lopes
CORNELL-DUBILIER
1605 Rodney French Boulevard
New Bedford, Massachusetts

Mr. Ray Clark
ELECTRONIC COMPONENTS, INC.
902 Crescent Avenue
Bridgeport 8, Connecticut

Mr. Robert E. Abbe
GENERAL ELECTRIC COMPANY
Capacitor Department
John Street
Hudson Falls, New York

Mr. Howard Brown
HERCULES, INC.
P. O. Box 5038
Terre Haute, Indiana

Mr. Ralph Meyers
MC GRAW EDISON IND.
Line Materials Company
South Milwaukee, Wisconsin

Mr. H. B. Vaught
P. R. MALLORY
Waynesboro, Tennessee

Mr. T. Katazama
MITSUBISHI MONSANTO CHEMICAL COMPANY
C. P. O. Box 879
Tokyo, JAPAN

Mr. C. R. Coleman
MONSANTO CHEMICALS, LTD.
Ruabon
Denbighshire
North Wales, UNITED KINGDOM

Mr. Boyce Whitman
SANGAMO ELECTRIC COMPANY
Pickens, South Carolina

Mr. Howard Davis
SPRAGUE ELECTRIC COMPANY
North Adams, Massachusetts

Mr. Donald L. McClain
WESTINGHOUSE ELECTRIC CORPORATION
P. O. Box 341
Bloomington, Indiana

Dr. L. Mandelcorn
WESTINGHOUSE RESEARCH
Beulah Road
Churchill Borough
Pittsburgh, Pennsylvania

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P. G. Benignus - St. Louis

February 22, 1971

MCS 1016

Please circulate to: T. L. Gossage - TGOSS
W. R. Richard - WRICH
R. H. Munch - Queeny
J. R. Fallon - JFALL
J. G. Bryant - JBRYA

H. S. BERGEN - HBERG

Pursuant to our production of MCS 1016 we felt it desirable to send the attached letter dated February 18, 1971 as a reminder and follow-up of our previous communication of August 6, 1970 to all our U.S.A. domestic and Canadian capacitor Aroclor customers.

We are also sending a copy to Peter Marsh in Brussels.

P. G. Benignus

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Monsanto

FROM (NAME & LOCATION) P. W. Gann - B2SF

DATE May 9, 1973 CC:

SUBJECT PCB Warning Letters, Dielectric

REFERENCE

TO : Memo to File

On May 8, 1973, I reviewed the dielectric warning letters and the corresponding address list with Paul Benignus. The purpose was to verify the address list for these letters.

Tab No. 2, Feb. 18, 1970, Olson letter:

This letter went to all of our transformer Askarel customers. Apparently the letter went to both transformer and capacitor customers. The list included in the file appears complete, per Paul Benignus.

Tab No. 7, May 11, 1970, Olson Letter:

Benignus agrees with the list for this letter.

Tab No. 8, May 12, 1970, Olson Letter:

Benignus agrees with this list for this letter.

Tab 19, Sept. 28 - Oct. 12, 1970, Graham Letter:

Benignus believes Randy's list looks fairly complete for Randy's area of responsibility. Benignus however, does not know if other salesmen sent out similiar letters. Benignus suggests I check this question with Don Olson.

Tab No. 22, Dec. 15, 1970, Graham Letter:

Benignus believes that this letter was the result of Don Pogue's attempt to gain information on estimated amount of Askarel for incineration. Benignus suggests I check with Pogue on that possible mailing list.

Tab 34, Dec. 20, 1971, Bergen #1 Letter:

This letter was sent to the transformer and capacitor customers. A letter was written to companies were we had a personal name to contact.

Tab No. 35, Dec. 20, 1971, Bergen #2 Letter:

This letter was sent to transformer and capacitor customers were we did not have a name to write to. Many of these letters went to the Office of the President. The combined list of 34 and 35 appears to be complete for these customers according to Benignus

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Tab No. 24, Feb. 18, 1971, Benignus Letter:

This went to all capacitor people only. Benignus is confident that this letter went to the people on his "1970 list of customers" which list he pulled out of his file cabinet on May 8, 1973. This list should be the same list as used for letter Tab No. 14, dated Aug. 6, 1970.

Tab No. 39, Feb. 4, 1972, Bergen Letter:

Benignus agrees the mailing list is correct.

Tab No. 40, Feb. 7, 1972, Gossage Letter:

Benignus agrees with the mailing list.

Tab No. 41, Feb. 28, 1972, Gossage Letter:

Benignus agrees with this list. These are people who bought transformer fluid of any quantity over a period of the few years preceeding 1972.

Note: Benignus commented that many of these letters were months in their making. He stated that it seemed to take forever to get a letter written and approved for mailing since each letter and each word was reviewed very carefully.

R. W. Gann

/mc

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