

CHEMICALS



INDUSTRIES

*-E-
VDC - Product
Specifications (new file)*

INTEROFFICE / LAKE CHARLES

TO John Dockum
FROM J. M. Anderson
DATE March 28, 1969
SUBJECT VDC Specifications
LC-648

Lake Charles personnel have reviewed the vinylidene chloride specifications of Tennessee Eastman and B. F. Goodrich included in your marketing report PMS-2091. We are confident that our purified material will conform to the purity levels required.

To be exact, we will meet Tennessee Eastman specification number 1160-1 dated March 1963, with a 50 ppm maximum water limit as noted. We will meet B. F. Goodrich's specifications M-2 and M-32 dated June 24, 1968.

Dr. Kon Bartlett reports that the odor and polymerization tests run at Barberton are favorable. Morpholine in the few ppm range is not detectable, and does not affect polymerization nor impart odor to the polymer.

Joe

JMA:edh

cc: I. C. Klimas
W. B. Graybill ✓
P. R. Arnold
J. E. Wyche

SL 044622

Note to file

Telephone conversation

with Ron Bartlett

Subject VDC specifications

A 10 ppm peroxide spec. is no problem. Over a 9 month period our average peroxide content was $\frac{(4)}{3}$ ppm with a range of 1 to 8 pp.

On acetylene we have to be more ~~careful~~, cautious. At Corpus the lab. removed all of the monochloroacetylene when they azeotropically dried VDC; however the level of MCA was 50 ppm in the feed. Lake Charles has 800 ppm in the crude. Assuming 1 ppm final content in lab. material, the final content of L.C. material might be 16 ppm.

The content of dichloroacetylene must be less than 30 ppm to pass the color specification.

$$16 \times \frac{26}{70} \frac{\text{mol wt acetylene}}{\text{mol wt MCA}} = 6 \text{ ppm}$$

$$30 \times \frac{26}{95} \frac{\text{mol wt acetylene}}{\text{mol wt DCA}} = 8.2 \text{ ppm}$$

SL 044623

14 ppm

24
2

25
35
70

24
71
95

Tennessee Eastman's specification is 25 ppm of ~~acetylene~~ acetylenic compounds determined by copper precipitation and reported as acetylene. We can meet this specification.

The Goodrich specification is 10 ppm acetylene by a chromatographic method. We have ~~now~~ less than 1 ppm acetylene in our product. The dichloroacetylene will come out as a separate peak on the chromatogram and this quantity is not mentioned. The monochloroacetylene also is resolved separately, and this is not asked for either. On this basis we can meet the Goodrich specification. We currently take the same position on vinyl chloride specifications.

P.P.G.

Typ. Spec

			Dow	T-E	Good. M-2	Good M-32
.	Acetylene ppm max		25	25	10	10
	Appearance		Free + Clear	water white clear	Free clear	Free + clear
20	Color	APHA max	30	20	25	25
	1,1 Dichloroethane % max		.25	.25		
.01	Trichloroethylene		.25	.25		
	Trichloroethane		.25			
.10	Trans dichlor		.25	.3		
.03	Cis dichlor		.25	.25		
.01	VDC EDC		.25	.25		
	VDC by diff min.		99.5	99.5	99.5	99.
meet spec.	HQMME ppm		180-220	150-250		180-2
	Peroxide ppm max		25	25	10	10
	RI @ 25 °C			1.4220 - 1.4260	1.4220 - 1.4240	92%
	SpGr 25/25		1.2022 1.2122	1.2022 - 1.2122	20/20 1.210 - 1.220	92%
200	Water Carl Fischer ppm max		50	50	50	50
	Acidity as HCl ppm max		15		10	10
	Phenol %				0.4 - 1.0	
300 - 600	Toluene carrier ppm					

%
100 100 ppm
25 18 "
0 1 "

Dow 18 ppm

L.C 1.3 ppm

no data. odor

good polymerizer

10	A	26
	DCA	95
	MCA	70

SL 044625

FILE -
MC
VDC QUALITY
SPECS

[Handwritten signature]

Study of Composition of Vinylidene Chloride from
Lake Charles. II

September 26, 1968

by F. M. Cummings

Status Report FMC/46

I. INTRODUCTION

Vinylidene chloride (VDC) produced at Lake Charles does not, at present, meet customer specifications for polymer grade material. While efforts continue toward producing an acceptable material the study of the composition of VDC samples from Lake Charles has also continued, as described in Status Report FMC/42.

This report summarizes the results of analysis of VDC samples produced at Lake Charles from May 1 to September 1, 1968.

II. EXPERIMENTAL (NBp J-4902,04,09,20; J-6201,08,17,18,20,21,23,25,26,27,28;
J-4607,08)

Eighteen 5-gallon samples of VDC were taken from Lake Charles storage tank at periodic intervals between May 1 and September 1, 1968 and shipped to the Corpus Christi Laboratories in mild steel drums. The contents of each drum were analyzed upon receipt and again following flash distillation, under nitrogen, through a 24-inch Vigreux column into a receiver containing p-methoxyphenol.

None of these samples met all of the industrially accepted specifications either before or after flash distillation.

Emission spectrographic analyses were not done on these samples since previous work (FMC/42) had shown no significant metallic impurities in VDC from Lake Charles.

The results of analyses are summarized in Table I while Table II lists VDC specifications from two prospective customers and one competitor.

III. DISCUSSION

A. p-Methoxyphenol Concentration - The level of stabilizer in these VDC samples does not represent that of the Lake Charles' storage tanks since additional amounts were added to the drums before shipment at our request.

FMC/46 - 1

SL 044626

TABLE I

VDC from Lake Charles' Storage Tank—May to September 1968

	As Received		After Distillation		Dow VDC (LS 20580)	
	Ave.	Range	Ave.	Range	As Received	After Distillation
p-Methoxyphenol, ppm	890	17-4300	335	200-500	-	409
Peroxide, ppm	3	1-8	2	< 1-3	< 1	< 1
Water, ppm	70	20-187	67	51-82	22	20
Acetylene, ppm ¹	286	170-525	314	181-450	-	-
Ionic Chloride, ppm	12	1-17	17	1-22	2	< 1
Color, APHA units	55	20-175	10	(None)	75	10
Vinylidene Chloride, Wt %	99.5	99.4-99.6	99.7	99.7-99.8	99.9	99.9
1,2-Dichloroethylene, Wt %	0.41	0.26-0.51	0.25	0.08-0.33	0.1	0.01
"Lights", Wt % ²	0.05	0.03-0.08	0.06	0.04-0.10	Traces (< 0.01)	Traces (< 0.01)
"Heavies", Wt % ³	0.05	<0.01-0.09	Traces (< 0.01)	-	0.02	< 0.01
Monochloroacetylene, ppm	630	300-900	690	400-1000	Trace (< 5)	Trace (< 5)
Dichloroacetylene, ppm	402	200-650	485	250-700	4	8

1. Total acetylenic compounds as determined by R&D Method No. 319

2. Vinyl chloride, methyl chloride

3. Trichloroethylene, 1,1,2-trichloroethylene, toluene

SL 044627

PMC/46 - 2

3/31/69
NOTES BY WBG

TABLE II

Vinylidene Chloride Specifications

1160-1 1963

Dewey & Almy

Tennessee Eastman Co.

Dow Chemicals Co.¹

Vinylidene Chloride, Wt %	99.6 min.	99.5 min.	99.6 min.
Trichloroethane, Wt %	0.25 max.	-	-
Dichloroethylene, Wt %	0.30 max.	0.55 max. { t. 0.30 e. 0.25	< 0.1
1,1,-Dichloroethane, Wt %	0.006 max.	0.25 max.	0.2
Ethylene Dichloride, Wt %	0.015 max.	0.25 max.	-
Trichlorethylene, Wt %	-	0.25 max.	-
Acetylene, ppm ²	25	25	10
Acid (as HCl), ppm	15	-	-
Water, ppm	50	25 50	-
Peroxide (as H ₂ O ₂), ppm	25	25	-
Color, APHA	30	20	15

Proposed
Same as
Tennessee
Eastman

* BFGoodrich
Spec by G.C.
10
SL-044628

* Ours analyzes
zero by G.C. for
H₂

1. Typical analysis, as listed in A Special Report, Vinylidene Chloride Monomer, Dow Chemical Company

2. As determined by R&D Method No. 319

Lake Charles Normal -

16 ppm MCA x 1/3 = 5
35 ppm OCA x 1/4 = 9

L.C. expected 14 ppm C₂H₂

B. Peroxide and Water Concentration - The peroxide level found in typical product from Lake Charles is well within customer specifications of 25 ppm.

The average water concentration is higher than specification (25-50 ppm) but this is not considered to be a serious problem since drying procedures are readily available.

C. Acetylene - VDC produced at Lake Charles contains about twenty times the specified maximum amount of acetylenic material for polymer grade VDC. While acetylene (C_2H_2) itself has not been detected in these samples, both monochloroacetylene and dichloroacetylene are present in substantial quantities as detected by gas chromatography. Firm quantitative values have not been determined but appear to be within the 500-800 ppm range for each chloroacetylene.

These materials are believed to arise from dehydrochlorination of vinylidene chloride leading to monochloroacetylene and of trichloroethylene or tetrachloroethane which gives dichloroacetylene.

D. Ionic Chloride - Water extracts of VDC from Lake Charles show comparatively high levels of ionic chloride (Table I). Whether this chloride is from free HCl, phosgene, or hydrolysis of some impurity, isn't apparent at present.

The level is much higher than that found in samples during the first quarter of 1968.

E. Color - Freshly distilled VDC is colorless and clear. However, VDC from Lake Charles rapidly develops a color past the maximum of the APHA scale (> 500 APHA) while the Dow product remains almost colorless (10-15 APHA) under the same conditions.

The color of the Dow VDC listed in Table I is atypical. Distillation of this material produced a color-stable VDC which remained color stable after 300 hours at $50^\circ C$.

F. Assay by Gas Chromatography - VDC from both Lake Charles and Dow meet the specifications for chlorinated hydrocarbons listed in Table II. However, the Dow material contains less dichloroethylenes, probably due to a difference in production methods.

IV. CONCLUSIONS

1. Lake Charles VDC contains 500-800 ppm of both monochloro- and dichloroacetylene.

2. Vinylidene chloride from the Lake Charles installation consistently fails industry specifications for polymer grade material due to its poor color stability and high acetylene content.

3. The level of ionic chloride has increased from an average of 4 to 17 ppm since the first of 1968. The reason for this increase is unknown.

V. RECOMMENDATIONS

It is recommended that:

1. The exhaustive study of Lake Charles VDC product be discontinued for the present.
2. Effective procedures be found for removing chlorinated acetylenes from VDC.
3. Production processes be altered to prevent formation of chlorinated acetylenes.

jc

Signed Frances M. Cummings Date 9/30/68

Approved R. S. Bartlett Date 10/1/68

TABLE XXIII

Vinylidene Chloride Specifications

PPG
Proposed

Specification	Dow	DuPont	Dewey & Almy (W. R. Grace)	National Starch (Purchase from Dow)
VDC Monomer, (Phenol-free basis)	99.6%	-	-	99.6%
Trans-1,2-Dichloroethylene	(0.3%	0.3%	(10 ppm 0.10	0.1%
Cis-1,2-Dichloroethylene	0.25%	0.25%	0 ppm 0.03	-
1,1-Dichloroethane	0.25%	-	-	0.2%
1,2-Dichloroethane	0.25%	0.25%	(44 ppm 0.01	-
Chloroform	(0.1%	-	-	0.1%
Acetylene	(25 ppm	-	-	-
Chloroacetylene	10 ppm	-	-	10 ppm as C ₂ H ₂
Dichloroacetylene	-	25 ppm	-	-
Trichloroethylene	0.25%	0.25%	0 ppm 0.01	-
Methyl ether of hydroquinone	-	-	-	100-200 ppm 0.02%
Phenol	0.4-1.0%	0.4-1.0%	0.4-1.0%	0.5-0.8%
Water	500-1000 ppm	-	(185 ppm 200 ppm	-
Vinyl chloride	-	-	(113 ppm	-
Methyl chloride	-	-	-	-
Toluene (for PMP carrier)	-	-	-	300-600 ppm
Polymerization Rate:				
Minimum	-	77%	-	-
Polym. Viscosity, min.	-	1.01	-	-
Boiling Range (Cottrell):				
B. P. @ 50%	-	31.8-32.2°C	-	-
Boiling Range @ 80%	-	0.5°C	-	-
Density, 25°C/25°C	1.2022-1.2122	1.2022-1.2122	1.2022-1.2122	-
Ref. Index, 20°C	-	-	1.427	-
Odor	-	-	"Sweet"	-
Appearance	-	-	"Clear"	clear & colorless
Color (ADAA)	-	-	-	20

TABLE XXIII (continued...)

VINYLDENE CHLORIDE SPECIFICATIONS

Specification	Tennessee Eastman	Olin Mathieson
VDC Monomer (Stabilizer Free basis)	99.5% minimum	--
Trans-1,2	0.30% maximum	--
Cis-1,2	0.25% maximum	--
1,1-DCE	--	--
1,2-DCE	--	--
Chloroform	--	--
Acetylene	25 ppm maximum	--
Chloroacetylene	--	--
Dichloroacetylene	--	25 ppm max.
TCE	0.25% maximum	--
PMP	150-250 ppm	--
Phenol	--	0-4-1.0%
Water	25 ppm maximum	--
VC	--	--
MC	--	--
Polymerization Rate:		
Minimum	--	77%
Polymerization Viscosity (min.)	--	1.01 min.
Boiling Range (Cottrell)		
B. P. @ 50%	--	--
Boiling Range @ 80%	--	0.5°C
Density 25/25	1.2022-1.2122	1.2022-1.21
Ref. Index 20°C	1.4220-1.4260	--
Odor	--	--
Appearance	Water white and clear from suspended material	--
Color (APHA)	20 max.	--

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5/10/67
transmitted letter

EXHIBIT "A"

VINYLDENE CHLORIDE SPECIFICATIONS

Specific Gravity at 25° C/25° C	1.2022 - 1.2122
Cottrell Boiling Range	
A. Boiling Point, 50% - °C	31.7 - 32.2
B. Boiling Range, Mid 80% - °C	0.5 Max.
Phenol, Percent by Weight	0.4 - 1.0
Chloroacetylene	
Calculated at C ₂ H ₂ , PPM	25 Max.
Polymerization Rate, Percent Conversion	80 Min.
Trichlorethylene, Percent	0.25 Max.
Trans-Dichloroethylene, Percent	0.30 Max.
Cis-Dichloroethylene, Percent	0.25 Max.
Ethylene Dichloride, Percent	0.25 Max.
Vinyl Chloride, Percent	0.25 Max.
Water, PPM	200 Max.
Any other properties	

SL 044633

ADDENDUM TO REPORT
EXAMINATION OF POLYMER GRADE VINYLIDENE CHLORIDE
FROM THE DOW CHEMICAL COMPANY AND THE ETHYL CORPORATION
LD-452A

Colors of the vinylidene chloride samples from the Dow Chemical Company and the Ethyl Corporation were run. Samples of PPG material from the VDC storage tank on February 21, 22, 23, 24, 25, 1963, were also run. The results are listed below:

<u>PPG</u>	<u>Dow</u>	<u>Ethyl</u>
(5	20	70
(5		
(5		
(5		
(5		

Irons were then run on the various samples.

<u>Material</u>	<u>ppm, FeCl₃</u>
PPG	0.10
Dow	0.36
Ethyl	1.33

The material from Ethyl was then filtered through activated carbon whereby the color was reduced from greater than 70 to a 20. A chromatogram of the filtered material was then run to see if any of the components had been removed in the process.

The Ethyl Corporation

<u>Component</u>	<u>Weight %</u>
Methyl Chloride	Trace
Ethyl Chloride	0.01
Vinylidene Chloride	99.46
Trans-1,2-Dichloroethylene	0.02
Unsym-Tetrachloroethane	Trace
Phenol	0.51

Author: R. Kenneth Lee 3-6-63
R. Kenneth Lee Date

Approved: C. A. Burns 3-7-63
C. A. Burns Date

RKL:rj

SL 044634

The Dow Chemical Company

<u>Component</u>	<u>Weight %</u>	
Methyl Chloride	0.03	0.02
Ethyl Chloride	0.01	0.01
Vinylidene Chloride	99.37	99.36
Trans-1,2-Dichloroethylene	0.02	0.02
Trichloroethylene	0.01	Trace
1,1,2-Trichloroethane	Trace	0.01
Unsym-Tetrachloroethane	Trace	0.01
Sym-Tetrachloroethane	Trace	0.03
Phenol	0.56	0.54

Ethyl Corporation

<u>Component</u>	<u>Weight %</u>	
Methyl Chloride	Trace	Trace
Ethyl Chloride	0.01	0.01
Vinylidene Chloride	99.38	99.44
Trans-1,2-Dichloroethylene	0.06	0.03
Trichloroethylene		Trace
Unsym-Tetrachloroethane	0.01	
Sym-Tetrachloroethane	0.01	Trace
Phenol	0.53	0.52

Typical PPG Material

<u>Component</u>	<u>Weight %*</u>
Methyl Chloride	0.04
Vinyl Chloride	0.04
Vinylidene Chloride	99.27
Trans-1,2-Dichloroethylene	0.26
Cis-1,2-Dichloroethylene	0.25
Trichloroethylene	0.03
Phenol	0.10

* These figures are averages for November and December, 1962, and January, 1963.

SL 044635

PURCHASE SPECIFICATION

VINYLDENE CHLORIDE

SPECIFICATION NO.	
1100-1	
PAGES	EFFECTIVE DATE
7	March, 1960
SUPPLEMENT ISSUE	DATED

A. GENERAL

A-1. This specification covers a grade of vinylidene chloride that shall meet all the requirements listed below according to the methods of testing described on the following pages and, in addition, must be suitable to Tennessee Eastman Company for actual use in its processes.

B. PROPERTIES

- | | |
|--|---|
| B-1. <u>Acetylene</u> | 25 ppm maximum |
| B-2. <u>Appearance</u> | Water white and clear from suspended matter |
| B-3. <u>Color, APHA</u> | 20 maximum |
| B-4. <u>Infrared Analysis</u> | |
| 3.1 1,1, Dichloroethane | 0.25% maximum |
| 3.2 Trichloroethylene | 0.25% maximum |
| 3.3 Trans Dichloroethylene | 0.3% maximum |
| 3.4 Cis Dichloroethylene | 0.25% maximum |
| 3.5 Ethylene Dichloride | 0.25% maximum |
| 3.6 Vinylidene Chloride | |
| (Obtained by subtracting the sum of 3.1 through 3.5) | 99.5% minimum |
| B-5. <u>Inhibitor</u> | 150 - 250 ppm hydroquinone monomethyl ether |
| B-6. <u>Peroxide (as H₂O₂)</u> | 25 ppm maximum |
| B-7. <u>Refractive Index at 25° C.</u> | 1.4220 - 1.4260 |
| B-8. <u>Specific Gravity at 25°/25° C.</u> | 1.2022 - 1.2122 |
| B-9. <u>Water</u> | 25 ppm maximum |

TABLE XXIII

Vinylidene Chloride Specifications

Specification	Dow	DuPont	Dewey & Almy (W. R. Grace)	National Starch (Purchase from Do
VDC Monomer, (Phenol-free basis)	99.6%	-	-	99.6%
Trans-1,2-Dichloroethylene	(0.3%	0.3%	(10 ppm	0.1%
Cis-1,2-Dichloroethylene	0.25%	0.25%	0 ppm	-
1,1-Dichloroethane	0.25%	-	-	0.2%
1,2-Dichloroethane	0.25%	0.25%	(44 ppm	-
Chloroform	(0.1%	-	-	0.1%
Acetylene	(25 ppm	-	-	-
Chloroacetylene	10 ppm	-	-	10 ppm as C ₂ H ₂
Dichloroacetylene	-	25 ppm	-	-
Trichloroethylene	0.25%	0.25%	0 ppm	-
Methyl ether of hydroquinone	-	-	-	0.02%
Phenol	0.4-1.0%	0.4-1.0%	0.4-1.0%	0.5-0.8%
Water	500-1000 ppm	-	(185 ppm	-
Vinyl chloride	-	-	(113 ppm	-
Methyl chloride	-	-	-	-
Polymerization Rate:				
Minimum	-	77%	-	-
Polym. Viscosity, min.	-	1.01	-	-
Boiling Range (Cottrell):				
B. P. @ 50%	-	31.8-32.2°C	-	-
Boiling Range @ 80%	-	0.5°C	-	-
Density, 25°C/25°C	1.2022-1.2122	1.2022-1.2122	1.2022-1.2122	-
Ref. Index, 20°C	-	-	1.427	-
Odor	-	-	"Sweet"	-
Appearance	-	-	"Clear"	-
Color (ADAA)	-	-	-	-

TABLE XXIII (continued...)

VINYLDENE CHLORIDE SPECIFICATIONS

Specification	Tennessee Eastman	Olin Mathieson
VDC Monomer (Stabilizer Free basis)	99.5% minimum	--
Trans-1,2	0.30% maximum	--
Cis-1,2	0.25% maximum	--
1,1-DCE	--	--
1,2-DCE	--	--
Chloroform	--	--
Acetylene	25 ppm maximum	--
Chloroacetylene	--	--
Dichloroacetylene	--	25 ppm max.
TCE	0.25% maximum	--
FMP	150-250 ppm	--
Phenol	--	0-4-1.0%
Water	25 ppm maximum	--
VC	--	--
MC	--	--
Polymerization Rate:		
Minimum	--	77%
Polymerization Viscosity (min.)	--	1.01 min.
Boiling Range (Cottrell)		
B. P. @ 50%	--	--
Boiling Range @ 80%	--	0.5°C
Density 25/25	1.2022-1.2122	1.2022-1.21
Ref. Index 20°C	1.4220-1.4260	--
Odor	--	--
Appearance	Water white and clear from suspended material	
Color (APHA)	20 max.	--

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5/10/67
transmittal letter

EXHIBIT "A"

VINYLDENE CHLORIDE SPECIFICATIONS

Specific Gravity at 25° C/25° C	1.2022 - 1.2122
Cottrell Boiling Range	
A. Boiling Point, 50% - °C	31.7 - 32.2
B. Boiling Range, Mid 80% - °C	0.5 Max.
Phenol, Percent by Weight	0.4 - 1.0
Chloroacetylene	
Calculated at C_2H_2 , PPM	25 Max.
Polymerization Rate, Percent Conversion	80 Min.
Trichlorethylene, Percent	0.25 Max.
Trans-Dichloroethylene, Percent	0.30 Max.
Cis-Dichloroethylene, Percent	0.25 Max.
Ethylene Dichloride, Percent	0.25 Max.
Vinyl Chloride, Percent	0.25 Max.
Water, PPM	200 Max.
Any other properties	

RECEIVED 3, 1963

ADDENDUM TO REPORT
EVALUATION OF POLYMER GRADE VINYLIDENE CHLORIDE
FROM THE DOW CHEMICAL COMPANY AND THE ETHYL CORPORATION
LD-452A

Colors of the vinylidene chloride samples from the Dow Chemical Company and the Ethyl Corporation were run. Samples of PPG material from the VDC storage tank on February 21, 22, 23, 24, 25, 1963, were also run. The results are listed below:

<u>PPG</u>	<u>Dow</u>	<u>Ethyl</u>
(5	20	)70
(5		
(5		
(5		
(5		

Irons were then run on the various samples.

<u>Material</u>	<u>ppm, FeCl₃</u>
PPG	0.10
Dow	0.36
Ethyl	1.33

The material from Ethyl was then filtered through activated carbon whereby the color was reduced from greater than 70 to a 20. A chromatogram of the filtered material was then run to see if any of the components had been removed in the process.

The Ethyl Corporation

<u>Component</u>	<u>Weight %</u>
Methyl Chloride	Trace
Ethyl Chloride	0.01
Vinylidene Chloride	99.46
Trans-1,2-Dichloroethylene	0.02
Unsym-Tetrachloroethane	Trace
Phenol	0.51

Author: R. Kenneth Lee 3-6-63
R. Kenneth Lee Date

Approved: C. A. Burns 3-7-63
C. A. Burns Date

RKL:rj

SL 044640

The Dow Chemical Company

<u>Component</u>	<u>Weight %</u>	
Methyl Chloride	0.03	0.02
Ethyl Chloride	0.01	0.01
Vinylidene Chloride	99.37	99.36
Trans-1,2-Dichloroethylene	0.02	0.02
Trichloroethylene	0.01	Trace
1,1,2-Trichloroethane	Trace	0.01
Unsym-Tetrachloroethane	Trace	0.01
Sym-Tetrachloroethane	Trace	0.03
Phenol	0.56	0.54

Ethyl Corporation

<u>Component</u>	<u>Weight %</u>	
Methyl Chloride	Trace	Trac
Ethyl Chloride	0.01	0.01
Vinylidene Chloride	99.38	99.44
Trans-1,2-Dichloroethylene	0.06	0.03
Trichloroethylene		Trace
Unsym-Tetrachloroethane	0.01	
Sym-Tetrachloroethane	0.01	Trace
Phenol	0.53	0.52

Typical PPG Material

<u>Component</u>	<u>Weight %*</u>
Methyl Chloride	0.04
Vinyl Chloride	0.04
Vinylidene Chloride	99.27
Trans-1,2-Dichloroethylene	0.26
Cis-1,2-Dichloroethylene	0.25
Trichloroethylene	0.03
Phenol	0.10

* These figures are averages for November and December, 1962, and January, 1963.

SL 044641

PURCHASE SPECIFICATION

VINYLDENE CHLORIDE

SPECIFICATION NO.	
1180-1	
PAGES	EFFECTIVE DATE
7	March, 1963
SUPERCEDES ISSUE	DATED

A. GENERAL

A-1. This specification covers a grade of vinylidene chloride that shall meet all the requirements listed below according to the methods of testing described on the following pages and, in addition, must be suitable to Tennessee Eastman Company for actual use in its processes.

B. PROPERTIES

B-1. <u>Acetylene</u>	25 ppm maximum
B-2. <u>Appearance</u>	Water white and clear from suspended matter
B-3. <u>Color, APHA</u>	20 maximum
B-4. <u>Infrared Analysis</u>	
3.1 1,1, Dichloroethane	0.25% maximum
3.2 Trichloroethylene	0.25% maximum
3.3 Trans Dichloroethylene	0.3% maximum
3.4 Cis Dichloroethylene	0.25% maximum
3.5 Ethylene Dichloride	0.25% maximum
3.6 Vinylidene Chloride (Obtained by subtracting the sum of 3.1 through 3.5)	99.5% minimum
B-5. <u>Inhibitor</u>	150 - 250 ppm hydroquinone monomethyl ether
B-6. <u>Peroxide (as H₂O₂)</u>	25 ppm maximum
B-7. <u>Refractive Index at 25° C.</u>	1.4220 - 1.4260
B-8. <u>Specific Gravity at 25°/25° C.</u>	1.2022 - 1.2122
B-9. <u>Water</u>	25 ppm maximum

FILE-ME-

VDC Product
Quality - Spec

Teletype to John Dockman R. H. H. H.

Messrs Anderson, Brund, Graybill, Lynch Gouts and
Johnson recommended the following Production Specifications
and Typical Analysis for V.D.C.

		Production Specifications	Typical analysis
Trans - Dichloroethylene	wt. %	0.10	0.05
Cis - Dichloroethylene	"	0.03	0.02
1,2 Dichloroethane	"	0.01	less than 0.0
Trichloroethylene	"	0.01	less than 0.0
Inhibitor pmp (Paramethoxy phenol)	ppm	100-200	150
Toluene (carrier for pmp)	"	300-600	400
Appearance		clear - colorless	
Water	"	200	100
Color (APHA)		20	10

Robert J. Johnson