STANDARDIZED APPENDIX PAGES

COMPONENT - PLASTICS (QMFZ2, QMFZ3, QMFZ8, QMFZ9)
COMPONENT – PLASTICS, PROPRIETARY (QMTR2, QMTR8)

STANDARDIZED APPENDIX PAGES

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COMPONENT – PLASTICS (QMFZ2, QMFZ3, QMFZ8, QMFZ9)
COMPONENT – PLASTICS, PROPRIETARY (QMTR2, QMTR8)

APPENDIX A - FIELD ENGINEER'S RESPONSIBILITIES AND INSTRUCTIONS FOR EXAMINATION OF THE PRODUCT

GENERAL

The Field Engineer's general responsibilities, as part of the Follow-Up Services Procedure, are as noted in the published document titled, "UL Mark Surveillance Requirements", and is available through UL's secure customer portal MyHome@UL.com and/or through UL's internet site www.UL.com. Manufacturers that do not have Internet access may obtain the current version of these requirements from their local UL Customer Service Representative or UL Field Engineer.

Factory visits are conducted each year until the required number of materials are sent by the manufacturer to UL for testing.

The Field Engineer must assure that the manufacturer has a clear understanding of sample submittal requirements.

The Field Engineer and the manufacturer shall review the eTag Sample Dashboard and Special Appendix B, Table B, Index to Testing. The review of these tools is to assist the manufacturer in determining selections of the correct samples in accordance with program requirements for testing at UL.

The Field Engineer and the manufacturer shall review production records, production schedules, and inventory records to determine what materials have been produced since the last visit, what production lots are available for sampling, and if there are plans to produce any lots in the future.

Recognized Components:
Samples of current production and/or stock are examined to verify that the Recognized company's identification and/or Tradename as described in the Procedure, factory identification code if the material is produced at more than one location and UL Recognized Plastics Grade Designation, as shown in UL's Certification database, are legibly marked on the smallest unit of packaging.

The Recognized component Mark  is optional for this category. The application of all markings, which designate a material as a UL Recognized Component, are to be applied ONLY at the manufacturing site covered within this FUS Procedure

Unlisted Components:
Samples of current production and/or stock are examined to verify that the company's identification and/or Tradename and the material designation as described in the Procedure and the factory identification code, if the material is produced at more than one location, are legibly marked on the smallest unit of packaging. The required markings as noted in the Procedure are to be applied only at the authorized manufacturing site covered within this FUS Procedure.

COMPONENT - PLASTICS (QMFZ2, QMFZ3, QMFZ8, QMFZ9)
COMPONENT – PLASTICS, PROPRIETARY (QMTR2, QMTR8)

The UL Field Engineer will work with the manufacturer to achieve the following:

1. The required number of Grades in each Group are submitted to UL for sample testing.
2. The manufacturer maintains production records of UL Grades and understand what Grades have been produced and are planned to be produced.
3. Grade Designations and/or the UL Mark are shown appropriately as required by the Procedure.
4. Nonconforming Sample Test Results (NC's) are resolved.
5. Replacement and Special Samples are discussed and a submittal plan is agreed to.
6. Processes are in place to hold shipment for materials that are not in compliance with requirements.
7. Review previous sample selections and assure samples selected at previous visits have been received at UL for test within 30 days.
8. Review Root Cause and countermeasures established for issues or problems with previous samples are effective – such as samples not received within 30 days, incorrect samples were sent (thickness, color, form etc).
9. The manufacturing site representative has access to the reminder / Non-conformance resolution emails from UL.

PROCEDURE IN THE EVENT OF NONCONFORMANCE

When a product does not comply with the Follow-Up Service Procedure it is required that the manufacturer implement appropriate action as outlined in the "UL Variation Notice and Corrective Action Requirements" document.

In situations where manufacturer and applicant have not provided the required assistance in accomplishing each of the above noted responsibilities, a Variation Notice is written to document the nonconformance.

Instruct the manufacturer and applicant to implement appropriate corrective actions and that the affected Grades will be withdrawn from ULiQ for Plastics unless actions are performed by the required dates.

COMPONENT – PLASTICS (QMFZ2, QMFZ3, QMFZ8, QMFZ9)
COMPONENT – PLASTICS, PROPRIETARY (QMTR2, QMTR8)

APENDIX B – INSTRUCTIONS FOR FIELD ENGINEER'S SAMPLE SELECTION

Samples are to be prepared by normal production means. The Samples may be selected from current production, production lots in inventory, or retained samples with traceability to production lots.

SAMPLES FOR THE TESTING OFFICE

The Field Engineer shall use the eTag Sample Dashboard, Special Appendix B - Table B, and the manufacturer's records to review the sample selection history and availability for selection with the client.

Figure 1 – Example, Special Appendix B, Table B, Index to Testing

Sample Group	#/Group /Year	Generic Class	Material Designation	Report Date	Thk, mm	Color	Flame	MCC Ref	IR Ref	TGA Ref	DSC Ref	Additional Info	Test Program Code
1	8	Polycarbonate (PC)											
			BBB	YYYY-MM-DD	0.75	WT	V-0	-	X11-22-33	X11-23-33	X11-24-33	-	B
			BBB	YYYY-MM-DD	0.8	BK, GN	5VA	-	X11-22-33	X11-23-33	X11-24-33	-	Q
			CCC, DDD	YYYY-MM-DD	0.75	NC	V-1	X22-32-44	X22-33-44	X22-34-44	X22-35-44	Natural color for this grade appears black	V

Figure 2 – Example, eTag Sample Dashboard, Group Level

		Sample Selection Summary			
Group Number	Number of Samples per Year	2019	2018	2017	2016
1	3	0	0	0	2
2	1	0	1	1	1
3	4	0	2	2	4
4	8	4	8	10	8
Totals	16	4	11	13	15

Groups indicated as red

Group indicated as yellow

1. Review the status at the Group level – check the number of Grades per year required for each Group Number versus the number submitted for the current and past 3 years. Prioritize selection of Grades from "Red" Groups first, "Yellow" second, and "Green" no further selection needed.

    a. Red = Grade not selected this year or previous 3 years. This is the highest priority for sample selection
    b. Yellow = Grade was selected and tested in previous 3 years but not the current year
    c. Green = Grade was selected and tested in current year

2. Review production records to select UL Recognized/Unlisted Component Plastics grades currently in production or in inventory. Review what UL Recognized/Unlisted Component materials have been produced since the last visit. Determine the grades available for immediate selection.

3. Review inventory records and select UL Recognized/Unlisted Component materials available for immediate sampling.

4. Review inventory to see if samples are available for ID testing of HB rated materials. Molded samples or pellets (which can be easily molded into small plaques) in production/ storage for HB rated materials could be easily sampled. (materials with "ANY" Dimension and Thickness in the Sample Selection Guide, Table A).

5. Review Client's production forecasting records and arrange to select UL Recognized/Unlisted Component materials that will be produced in the future. Arrange to retain sufficient quantities of future production for collection at the next visit or arrange to email them an eTag for shipment upon production.

6. Review the SAMPLE SELECTION GUIDE section, below, for specific instructions on sample preparation.

7. Review any additional sample requests (Special, Hold Lot, and Replacement), select the samples if possible, and if not make arrangements to retain samples for selection, or alert responsible staff to take appropriate actions to withdraw the grades from the UL Certification.

8. Review grade designations that were selected in the previous visit but have not yet been received at the UL Testing Office. Determine the current status of the sample, if UL can be of any assistance, and if a replacement sample is required. A replacement sample is required when the original sample has not been received within 30 days or the original sample was submitted in the wrong color, form, or thickness. The Field Engineer is encouraged contact local FUS Admin or other office staff for assistance as needed with these discussions.

9. The Field Engineer will complete the eTag for the samples selected for testing, and the manufacturer will make the arrangements to ship the materials to the UL Testing Office indicated in the eTag.

COMPONENT - PLASTICS (QMFZ2, QMFZ3, QMFZ8, QMFZ9)
COMPONENT – PLASTICS, PROPRIETARY (QMTR2, QMTR8)

SAMPLE SELECTION GUIDE

For each grade designation selected:

1. The FUS Test Program and sample requirements are indicated in the Test Program Code column in Sp. App. B, Table B.
2. Specific details regarding the Test Program Codes are contained in Table A, including quantity of samples, size, thickness, mass, special notes, and the required test program.

The Field Engineer shall emphasize to the manufacturer that the acceptable thickness tolerances for test specimen are indicated in Table A-1 under the Special Notes Section referenced in the Table. For example, if a material has a V-0 rating in the 3.0 mm thickness, then test specimen shall be molded in a thickness between 2.75 mm and 3.25 mm.

Samples of each material grade having multiple flame ratings at multiple thicknesses selected for all flame ratings in the color available and shall be identified and tagged using a single eTag. Each sample eTag is to be marked with all required fields. If it is necessary to utilize more than one eTag per individual submitted material, a note in the comment field is required to identify all eTag numbers utilized. The comments field should also be populated to include required additional information pertaining to the selected material.

If the client cannot produce materials in the thickness required they need to contact with an off-site molder or UL to produce the materials; please see the “OFF-SITE” molding section, below. If it is impossible to produce materials in the required thickness then select a thicker thickness or even a sample for ID testing only and make a note on the eTag and the service profile for reference at subsequent visits.

Molding at UL is available at http://iq.ul.com/plastics/Img/TTC Molding Request Form.pdf

COMPONENT – PLASTICS (QMFZ2, QMFZ3, QMFZ8, QMFZ9)
COMPONENT – PLASTICS, PROPRIETARY (QMTR2, QMTR8)

TABLE A - SAMPLE SELECTION GUIDE

Test Program Code	Quantity of molded / formed samples	Dimensions, mm (L x W)	Thickness, mm	Min. Mass, g	Max. Mass, g	Special Notes (See Below)	Required Test Program
A	3	Any	Any	2	10		IR, TGA, DSC
B	30	125 +/- 5 x 13.0 +/- 0.5	At Recognized thickness			(1)	IR, TGA, DSC, V-Flame
C	35	150 +/- 5 x 50 +/- 1	At Recognized thickness			(2, 4)	IR, TGA, DSC, HBF/HF-Flame, Density
D	30	200 +/- 5 x 50 +/- 1	At Recognized thickness			(3)	IR, TGA, DSC, VTM-Flame
E	3	Any	Any	2	10		IR, TGA
F	30	125 +/- 5 x 13.0 +/- 0.5	At Recognized thickness			(1)	IR, TGA, V-Flame
G	35	150 +/- 5 x 50 +/- 1	At Recognized thickness			(2, 4)	IR, TGA, HBF/HF-Flame, Density
H	30	200 +/- 5 x 50 +/- 1	At Recognized thickness			(3)	IR, TGA, VTM-Flame
I	3	Any	Any	2	10		GC, TGA, DSC
J	30	125 +/- 5 x 13.0 +/- 0.5	At Recognized thickness			(1)	GC, TGA, DSC, V-Flame
K	35	150 +/- 5 x 50 +/- 1	At Recognized thickness			(2, 4)	GC, TGA, DSC, HBF/HF-Flame, Density
L	30	200 +/- 5 x 50 +/- 1	At Recognized thickness			(3)	GC, TGA, DSC, VTM-Flame
M	3	Any	Any	2	10		GC, TGA
N	30	125 +/- 5 x 13.0 +/- 0.5	At Recognized thickness			(1)	GC, TGA, V-Flame
O	35	150 +/- 5 x 50 +/- 1	At Recognized thickness			(2, 4)	GC, TGA, HBF/HF-Flame, Density
P	30	200 +/- 5 x 50 +/- 1	At Recognized thickness			(3)	GC, TGA, VTM-Flame
Q	20	125 +/- 5 x 13.0 +/- 0.5	At Recognized thickness			(1)	5V-Flame
R	—	-	-	-	-	(6)	Variant test program
S	20	125 +/- 5 x 13.0 +/- 0.5	At Recognized thickness			(1)	V-Flame
T	20	200 +/- 5 x 50 +/- 1	At Recognized thickness			(3)	VTM-Flame
U	20	150 +/- 5 x 50 +/- 1	At Recognized thickness			(2)	HBF/HF-Flame
V	-	-	-	-	-	(5)	IR, TGA, DSC, MCC
W	-	-	-	-	-	(5)	IR, TGA, MCC
X	-	-	-	-	-	(5)	MCC
Y	3	Any	Any	2	10	(5)	Halogen Content Determination
Z	3	Any	Any	2	10	(5)	Restricted Use Substance Testing(XRF, Py/TD GC-MS)
AA	3	Any	Any	2	10		MCC
AB	1	Any	Any	2	10		IR
AC	1	Any	Any	2	10		TGA
AD	1	Any	Any	2	10		DSC
AE	1	Any	Any	2	10		GC

COMPONENT – PLASTICS (QMFZ2, QMFZ3, QMFZ8, QMFZ9)
COMPONENT – PLASTICS, PROPRIETARY (QMTR2, QMTR8)

Test Program Code	Quantity of molded / formed samples	Dimensions, mm (L x W)	Thickness, mm	Min. Mass, g	Max. Mass, g	Special Notes (See Below)	Required Test Program
AF	10	125 +/- 5 x 13.0 +/- 0.5	At Recognized thickness	-	-	(7)	HB-Flame
AG	5	150 +/- 5 x 50 +/- 1	At Recognized thickness	-	-	(4)	Density
AH	5	125 +/- 5 x 13.0 +/- 0.5	At Recognized thickness	1	5	-	Specific Gravity
AI	5	Discs or Plaques min. 12.7 mm diameter	Min. 3.0 mm	-	-	-	Vicat Softening Test

SPECIAL NOTES TO TABLE A (Sample Selection Guide)

(1) The material(s) in this group have a V-0, V-1, V-2, 5VA or 5VB rating. These specimens are to be provided in the thickness specified in Sp. App. B, Table B, with an acceptable thickness tolerance as specified in Table A-1. The edges of the test specimen shall be smooth, and the radius on the corners shall not exceed 1.3 mm.

Exception: If the material is extruded in the form of a sheet or film, then the specimens are to be provided in the thinnest thickness available at the time of the inspection. For example, if grade D has been assigned a V-0 rating in the 0.75, 2.0 and 4.0 mm thickness and at the time of the inspection, sheets are extruded in the 4.0 mm thickness, then specimen shall be provided in the production 4.0 mm thickness.

Note: If a material has been assigned a dual flammability rating in the same minimum thickness, then add those samples required per the individual test program code. For example, if grade B has been assigned both a V-0 and a 5VA rating in the 2.5 mm minimum thickness, select sample quantity for both test codes).

Note: If a material has been assigned multiple flammability rating at different minimum thicknesses, select sample quantity for all tests codes at assigned minimum thickness.

(2) The material(s) in this group have a HBF, HF-1 or HF-2 rating. These specimens are to be provided at the thickness specified in Sp. App. B, Table B, with an acceptable thickness tolerance as specified in Table A-1. . The edges of the test specimen shall be smooth, and the radius on the corners shall not exceed 2 mm.

Exception: Specimens in the 12.7 mm minimum thickness may be provided within the range of 12.2-13.2 mm.

COMPONENT – PLASTICS (QMFZ2, QMFZ3, QMFZ8, QMFZ9)
COMPONENT – PLASTICS, PROPRIETARY (QMTR2, QMTR8)

Note: If a material has been assigned multiple flammability rating at different minimum thicknesses, select samples for all tests codes at the assigned minimum thickness.

(3) The material(s) in this group have a VTM-0, VTM-1, or VTM-2 rating. These specimens are to be provided at the thickness specified in Sp. App. B, Table B, with an acceptable thickness tolerance as specified in Table A-1.

Exception: If the material is extruded in the form of a sheet or film, then the specimen are to be provided in the thinnest thickness available at the time of the inspection. For example, if grade D has been assigned a VTM-0 rating in the 0.05, 0.14 and 0.17 mm thickness and at the time of the inspection, film is extruded in the 0.14 mm thickness, select sample quantity for all test codes at assigned thickness.

(4) When applicable, specimens must be provided in the density range shown in Sp. App. B, Table B, under "Additional Info" column".

(5) For MCC, Identification tests, Halogen Content Determination and/or Restricted Use Substance Testing, the material shall be submitted as documented below depending on their processing method and the form in which they are furnished.

Furnished as (Processing method)	Submit as	Dimension or Mass
Pellets (Injection Molding)	Pellets or molded part	2 to 10 grams
Sheets / Film	Sheets / Films	Any
Multi-component liquids	Cured sample	Any

(6) Variant Test Program – See Table B of Sp. App. B and Sec. Gen. for the test program and sample requirements of additional variant tests required

(7) The material(s) in this group have an HB rating and are to be evaluated by the UL 94 Flame Tests The edges of the test specimen shall be smooth, and the radius on the corners shall not exceed 1.3 mm.

Exception: If the material is extruded in the form of a sheet or film, then the specimens are to be provided in the thinnest thickness available at the time of the inspection.

COMPONENT – PLASTICS (QMFZ2, QMFZ3, QMFZ8, QMFZ9)
COMPONENT – PLASTICS, PROPRIETARY (QMTR2, QMTR8)

TABLE A-1: SPECIMEN TOLERANCE GUIDE

Thickness tolerances (mm):	
≤ 0.02	±10%
0.02 ≤ t < 0.05	±0.005
0.05 ≤ t < 0.1	±0.010
0.1 ≤ t < 0.2	±0.020
0.2 ≤ t < 0.3	±0.030
0.3 ≤ t < 0.5	±0.04
0.5 ≤ t < 0.6	±0.05
0.6 ≤ t < 3.0	±0.15
3.0 ≤ t < 6.0	±0.25
6.0 ≤ t < 13.0	±0.4

Example: If grade C is Recognized in a minimum thickness of 0.75 mm, then each individual specimen provided should be between 0.60 mm and 0.90 mm (0.75 ± 0.15 mm) thick.

LIQUID SAMPLES

Liquids samples shall be provided in containers that are new, never before used, clean and contain a locking top to prevent leakage in shipment. Plastic bottles with narrow throats may be used for liquid samples that remain in the liquid state at ambient temperatures. Metal containers with wide throats should be used for liquids that cure to a solid state at ambient temperatures. The wider throat is necessary to remove the sample in its solid form. The metal container permits the heating of the sample to a liquid state.

The manufacturer shall provide Safety Data Sheet(s) (SDS) prepared in accordance with the United States Occupational Safety and Health Administration (OSHA) Guidelines and assure that it is packaged with the sample. Whenever possible, attach the SDS to the sample container with tape or rubber bands.

If a SDS is not required, the manufacturer must provide supporting documents showing that the liquid in question is exempt from SDS requirements. Refer to https://www.osha.gov/Publications/OSHA3514.html for additional information on SDS requirements.

The eTag sets the default SDS status to “No”, please change the field to “Yes” when an SDS is included with the sample shipment.

COMPONENT - PLASTICS (QMFZ2, QMFZ3, QMFZ8, QMFZ9)
COMPONENT – PLASTICS, PROPRIETARY (QMTR2, QMTR8)

OFF-SITE MOLDERS

The Field Engineer will complete the eTag for the samples, and the manufacturer will make the arrangements to send the raw material to the molder. The molded samples may then be sent to UL either directly from the molder or from the manufacturer without additional involvement of the Field Engineer. The molding, packaging and shipment of samples are the responsibility of the manufacturer until the samples have been received at the UL testing office.

The eTag must accompany the molded samples to the UL Testing office.

COMPONENT - PLASTICS (QMFZ2, QMFZ3, QMFZ8, QMFZ9)
COMPONENT – PLASTICS, PROPRIETARY (QMTR2, QMTR8)

APPENDIX C – SPECIAL INSTRUCTIONS FOR FOLLOW-UP TESTS AT UL

GENERAL

The samples selected per Appendix B shall be subjected to the tests indicated in Sp. App. B, Table B for the specific product. Tests are to be conducted in accordance with the current Standard for Polymeric Materials - Short Term Property Evaluations (UL 746A), the Standard for Tests for Flammability of Plastic Materials (UL 94), the Standard Test Method for determining Flammability Characteristics of Plastics and Other Solid Materials Using Micro-scale Combustion Calorimetry (ASTM D 7309), the Standard for Non-Halogenated Materials (UL 746H) and the Standard for Restricted Use Substances In Polymeric Materials (UL 746R).

FLAMMABILITY TESTS:

Method

The specimens must be verified for color, density and thickness, as indicated in Sp. App. B, Table B. The specimens are then to be subjected to the appropriate burning tests in accordance with the methods described in Standard UL 94. When applicable refer to Sp. App. B for additional information.

Basis for Acceptability

The classifications results are to be the same as those indicated in Sp. App. B, Table B.

QUALITATIVE INFRARED ANALYSIS (IR):

Method

An infrared spectrum of the material is to be obtained by means of an infrared spectrophotometer. Sample preparation and instrument settings used in obtaining the spectrum are to be identical to those used in obtaining the original spectrum of the material referenced in this Procedure.

Basis For Acceptability

The IR spectrum obtained from the current sample shall not indicate any significant differences in comparison to the reference spectrum obtained under the original investigation, in accordance with Appendix A of UL 746A. The sample shall be considered non-conforming if it's IR spectrum:

COMPONENT – PLASTICS (QMFZ2, QMFZ3, QMFZ8, QMFZ9)
COMPONENT – PLASTICS, PROPRIETARY (QMTR2, QMTR8)

QUALITATIVE INFRARED ANALYSIS (IR): (CONT'D)

Basis For Acceptability (Cont'd)

(a) exhibits one or more transmittance bands which are not evident in the reference spectrum.

(b) does not exhibit one or more transmittance bands which are evident in the reference spectrum.

(c) exhibits one or more transmittance bands having shape or transmittance (%T) differences which indicate a qualitative variation in comparison to the corresponding transmittance band(s) in the reference spectrum.

Spectral differences associated with sample concentration, i.e. the transmittance level of the prepared sample, or other effects unrelated to pertinent sample composition shall not be considered as a conformance criterion.

THERMOGRAVIMETRY (TGA):

Method

A thermogram of the material is to be obtained by means of a thermal analyzer with a thermogravimetric module. Instrument settings used in obtaining the thermogram are to be identical to those used in obtaining the original thermogram of the material referenced in this Procedure.

Basis For Acceptability

a) The thermogram obtained from the current sample shall indicate all of the following in accordance with Appendix B of UL 746A: The current sample shall exhibit the same number of degradations (distinct areas of weight loss) as the reference sample.
b) The weight loss percent of each degradation of the current sample shall correspond to that of the related degradation of the reference sample to within ± 8%.
c) The extrapolated onset and offset temperatures and the inflection temperature of each degradation exhibited by the current sample shall correspond to a degradation on the reference sample TGA to within ± 25° centigrade. The degradation of the current sample shall simultaneously conform to the second criterion as well.
d) The residual weight of the current sample shall correspond to that of the reference sample TGA to within ± 8%.
e) Overall curve shape of the current sample TGA shall conform to that of the reference sample TGA.

COMPONENT – PLASTICS (QMFZ2, QMFZ3, QMFZ8, QMFZ9)
COMPONENT – PLASTICS, PROPRIETARY (QMTR2, QMTR8)

DIFFERENTIAL SCANNING CALORIMETRY (DSC):

Method

A thermogram of the material is to be obtained by means of a thermal analyzer with a DSC (Differential Scanning Calorimeter) module. Instrument settings used in obtaining the thermogram are to be identical to those used in the original thermogram of the material referenced in this Procedure.

Basis For Acceptability

a) The thermogram obtained from the current sample shall exhibit the same number and type of significant thermal events as observed in the cited reference thermal curve, in accordance with Appendix C of UL 746A.

b) Shifts in corresponding endothermic melt events and glass transition temperatures between the current Thermal Curve and the corresponding reference Thermal Curve shall fall within the range of ±5°C.

c) The qualitative presence or absence of crystallizations and or cures observed on the current Thermal Curve must be consistent with those observed on the reference Thermal Curve.

DENSITY:

Method

The apparent overall density of the material is to be obtained by the weight and volume method indicated in ASTM D1622 and referenced in UL 746A by means of an analytical balance or scale and a micrometer dial gage, caliper, or steel rule, suitable for the purpose.

Basis For Acceptability

The average density obtained from the current sample shall be within ±20% of the Recognized density value indicated in Sp. App. B, Table B, under the “Additional Info” column.

PYROLYTIC GAS CHROMATOGRAPHY (GC):

Method

A pyrogram of the material is to be obtained by the test method referenced in UL 746A.

Basis For Acceptability

The resulting pyrogram obtained from the current sample shall not indicate any significant differences in comparison to the reference pyrogram obtained under the original investigation of the material.

COMPONENT – PLASTICS (QMFZ2, QMFZ3, QMFZ8, QMFZ9)
COMPONENT – PLASTICS, PROPRIETARY (QMTR2, QMTR8)

SPECIFIC GRAVITY

Method

The specific gravity of the material is to be obtained by the ASTM D792 test method referenced in UL 746A.

Basis For Acceptability

The average specific gravity obtained from the current sample shall be within 6 10% of the Recognized specific gravity value indicated in Sp. App. B, Table B, under the "Additional Info" column.

MICROSCALE COMBUSTION CALORIMETRY (MCC):

Method

The temperature at 25 W/g heat release rate, the peak heat release rate, the temperature at peak heat release rate, the total heat released, and the percent char residue shall be measured in accordance with ASTM D7309, Method B or Method A. An average of temperature at 25 W/g heat release rate(considered to be the onset of combustion), peak heat release rate, temperature at peak heat release rate, total heat released (heat of combustion) and percent char residue shall be determined from three separate determinations on each sample.

Basis For Acceptability

The average values of the temperature at 25 W/g heat release rate, peak heat release rate, temperature at peak heat release rate, total heat released, and percent char residue of the current sample shall be within the acceptable tolerances indicated in the below table relative to the reference investigation.

	Property	Tolerance
1	Heat of Combustion (HOC)	±8% of Reference Average Value
2	Temperature at 25 W/g HRR	±13% of Reference Average Value
3	Peak HRR	±15% of Reference Average Value
4	Temperature at Peak HRR	±2.5% of Reference Average Value of lowest temperature Peak
		±7.5% of Reference Average Value of Peaks after the lowest temperature Peaks
5	Char Residue	±5% of Reference Average Value

COMPONENT – PLASTICS (QMFZ2, QMFZ3, QMFZ8, QMFZ9)
COMPONENT – PLASTICS, PROPRIETARY (QMTR2, QMTR8)

Description for similar curve shape and occurrences of peaks / events:

The current sample and reference sample MCC curves shall be defined as the curves generated by plotting the average Heat Release Rate (W/g) vs Temperature (°C) where the average Heat Release Rate is calculated from the three separate determinations on each sample.

The overall shape of the current sample MCC curve shall conform to that of the reference sample MCC curve. This is a judgmental criteria based on experience. It is difficult to define in specific terms due to the numerous ways it can be manifested. It relates to definite, reproducible changes in the current sample MCC curve that are apparent to the reviewer and will be described in plain language as clearly as possible.

The current sample MCC curve shall exhibit the same number and type of significant thermal events as observed in the cited reference MCC curve when using the same test method (e.g. Method B or A).

Thermal events include distinct peaks, and "shoulders" that do not return to a level baseline (slope = 0) due to obscuration by larger intensity or closely occurring peaks.

HALOGEN CONTENT DETERMINATION:

Method

The halogen (F, Cl & Br) content shall be determined by means of an X-ray fluorescence (XRF) spectrometer or Combustion-Ion Chromatography (C-IC). The C-IC method shall be considered the referee method in the event of dispute.

Basis For Acceptability

The maximum allowable concentration in the sample is 900 mg/kg (0.09% by mass) of elemental bromine, 900 mg/kg (0.09% by mass) of elemental chlorine, 900 mg/kg (0.09% by mass) of elemental fluorine and a maximum total halogen content of 1500 mg/kg (0.15% by mass).

COMPONENT – PLASTICS (QMFZ2, QMFZ3, QMFZ8, QMFZ9)
COMPONENT – PLASTICS, PROPRIETARY (QMTR2, QMTR8)

RESTRICTED USE SUBSTANCE TESTING:

Method

The general testing approach and test methods shall consist of the screening and verification methods depicted in the Flow chart of the test methods in IEC 62321-1, Determination of certain substances in electrotechnical products - Introduction and overview and the test methods in the IEC 62321 (Determination of certain substances in electrotechnical products) family of standards. The referee method to be used in the event of dispute shall be the verification methods in the IEC 62321 family of standards.

Screening for lead, mercury, cadmium, total chromium and total bromine using test apparatus and procedures for each substance shall be as described in IEC 62321-3-1, Determination of certain substances in electrotechnical products Part 3-1: Screening - Lead, mercury, cadmium, total chromium and total bromine by X-ray fluorescence spectrometry.

Screening for bis(2-ethylhexyl) phthalate (DEHP), butyl benzyl phthalate (BBP), dibutyl phthalate (DBP) and diisobutyl phthalate (DIBP) shall be as described in IEC 62321-8, Determination of certain substances in electrotechnical products - Part 8: Phthalates in polymers by gas chromatography-mass spectrometry (GC-MS), gas chromatography-mass spectrometry using a pyrolyzer/thermal desorption accessory (Py/TD-GC-MS).

Verification testing shall be conducted using the apparatus and procedures described below.

COMPONENT – PLASTICS (QMFZ2, QMFZ3, QMFZ8, QMFZ9)
COMPONENT – PLASTICS, PROPRIETARY (QMTR2, QMTR8)

Substance	Apparatus and Procedure
lead (Pb)	IEC 62321-5, Determination of certain substances in electrotechnical products - Part 5: Cadmium, lead and chromium in polymers and electronics and cadmium and lead in metals by AAS, AFS, ICP-OES and ICP-MS
cadmium (Cd)	
chromium (Cr)	
mercury (Hg)	IEC 62321-4, Determination of certain substances in electrotechnical products - Part 4: Mercury in polymers, metals and electronics by CV-AAS, CV-AFS, ICP-OES and ICP-MS
hexavalent chromium (Cr(VI))	IEC 62321-7-2, Determination of certain substances in electrotechnical products - Part 7-2: Hexavalent chromium - Determination of hexavalent chromium (Cr(VI)) in polymers and electronics by the colorimetric method
polybrominated biphenyls (PBBs)	IEC 62321-6, Determination of certain substances in electrotechnical products - Part 6: Polybrominated biphenyls and polybrominated diphenyl ethers in polymers by gas chromatography - mass spectrometry (GC-MS)
polybrominated diphenyl ethers (PBDEs)	
bis(2-ethylhexyl) phthalate (DEHP)	IEC 62321-8, Determination of certain substances in electrotechnical products - Part 8: Phthalates in polymers by gas chromatography-mass spectrometry (GC-MS), gas chromatography-mass spectrometry using a pyrolyzer/thermal desorption accessory (Py/TD-GC-MS)
butyl benzyl phthalate (BBP)	
dibutyl phthalate (DBP)	
diisobutyl phthalate (DIBP)	

COMPONENT – PLASTICS (QMFZ2, QMFZ3, QMFZ8, QMFZ9)
COMPONENT – PLASTICS, PROPRIETARY (QMTR2, QMTR8)

RESTRICTED USE SUBSTANCE TESTING: (CONT'D)

Basis For Acceptability

Screening:

Result	Individual limits for lead and mercury (mg/kg)	Action
"Below Limit" (BL)	≤ 700-3σ	Acceptable, No Further Testing Required
"Inconclusive" (IN)	> 700-3σ and < 1300 - 3σ	Proceed to Verification Testing
"Over Limit" (OL)	≥ <1300+3σ	Not Acceptable, No Further Testing Required

Result	Individual limits for cadmium (mg/kg)	Action
"Below Limit" (BL)	≤ 70-3σ	Acceptable, No Further Testing Required
"Inconclusive" (IN)	> 70-3σ and < 130 - 3σ	Proceed to Verification Testing
"Over Limit" (OL)	≥ <130+3σ	Not Acceptable, No Further Testing Required

Result	Individual limits for total chromium and total bromine (mg/kg)	Action
"Below Limit" (BL)	≤ 700-3σ	Acceptable, No Further Testing Required
"Inconclusive" (IN)	> 700-3σ	Proceed to Verification Testing

Result	Individual limits for DEHP, BBP, DBP and DIBP (mg/kg)	Action
"Below Limit" (BL)	≤ 500	Acceptable, No Further Testing Required
"Inconclusive" (IN)	> 500 and < 1,500	Proceed to Verification Testing
"Over Limit" (OL)	≥ 1,500	Not Acceptable, No Further Testing Required

COMPONENT – PLASTICS (QMFZ2, QMFZ3, QMFZ8, QMFZ9)
COMPONENT – PLASTICS, PROPRIETARY (QMTR2, QMTR8)

Verification Testing:

Substance	Acceptable Results	Unacceptable Results
lead (Pb) mercury (Hg) hexavalent chromium (Cr(VI)) Total polybrominated biphenyls (PBBs) Total polybrominated diphenyl ethers (PBDEs)	≤ 0.1% by mass	> 0.1% by mass
cadmium (Cd)	≤ 0.01% by mass	> 0.01% by mass
Bis(2-ethylhexyl) phthalate (DEHP) Butyl benzyl phthalate (BBP) Dibutyl phthalate (DBP) Diisobutyl phthalate (DIBP)	≤ 0.1% by mass	> 0.1% by mass

In the event that hexavalent chromium test results are found not applicable to the sample analyzed (i.e. matrix spike recovery is < 10 % or > 125 %), the results shall be reported as inconclusive and further analysis is needed.

COMPONENT - PLASTICS (QMFZ2, QMFZ3, QMFZ8, QMFZ9)
COMPONENT – PLASTICS, PROPRIETARY (QMTR2, QMTR8)

APPENDIX D - MANUFACTURER' S RESPONSIBILITIES, CONSTRUCTION CONSIDERATIONS, AND REQUIREMENTS FOR SAMPLE TEST PROCESS

The Follow-Up Service Procedure covering the product is loaned to the manufacturer and constitutes the basis on which the product is judged for compliance with the applicable requirements.

MANUFACTURER' S RESPONSIBILITIES

GENERAL

The Manufacturer’s general responsibilities, as part of the Follow-Up Services Procedure, are as noted in the published document titled, “UL Mark Surveillance Requirements”, and is available through UL’s secure customer portal MyHome@UL.com and/or through UL’s internet site www.UL.com. Manufacturers that do not have Internet access may obtain the current version of these requirements from their local UL Customer Service Representative or UL Field Engineer.

When your material meets UL’s requirements, it becomes a UL Recognized Component and is published in UL’s online Certification Directory, ULiQ for Plastics unless proprietary or an Unlisted Component which are not published. The material, now covered under UL’s Follow-Up Services Program, is required to be tested at UL at least once every 4 years.

Samples must be submitted to UL for testing to keep the certification active and published on ULiQ for Plastics. Samples not submitted and tested as required should not be marked as UL Recognized/Unlisted Component and subsequently may be removed from ULiQ for Plastics.

The manufacturer is responsible for preparing and shipping the samples to UL. An overview of the sample test process is shown in Figure 1, below. The Field Engineer can help explain the process, the testing required and the number and dimensions of samples needed.

The manufacturer shall prepare the samples in accordance with the specifications in Appendix B, Table A for the indicated Test Program Code for each selected material. The samples are to be packaged to assure no damage will occur during shipping and that the associated eTag is securely attached.

The manufacturer shall review the sample selection records with the Field Engineer and shall provide production records and forecasts for UL Recognized or Unlisted Component materials. Samples may be selected from current production, production lots in inventory, or retained samples with traceability to production lots.

COMPONENT - PLASTICS (QMFZ2, QMFZ3, QMFZ8, QMFZ9)
COMPONENT – PLASTICS, PROPRIETARY (QMTR2, QMTR8)

Visits may be scheduled in advance or unannounced for this category. During the first visit of the year it is recommended to review the past year samples, samples status, and results, and to make sample selection plans for the current year.

UL has designed Table B in Special Appendix B and the eTag Sample Dashboard that can be reviewed through the Field Engineer to assist in the process of selecting samples.

- UL organizes Grades into Sample Groups. Each Group contains all grade designations in one generic type (for example, PVC is a generic type)
- The eTag Dashboard and Table B show the required number of Grades for each Group that need to be sampled each year (25% of the total number of grade designations in the Sample Group - this number is rounded up to the next highest number).

The UL Field Engineer will visit the manufacturing location until the required samples are selected and submitted. The Field Engineer can help explain the testing required and the number and dimensions of samples needed. The Field Engineer must be given free and immediate access to all production and storage areas of the facility.

Packaging and shipment of the samples are the responsibility of the manufacturer.

- Samples molded at the manufacturing facility are expected to be forwarded to UL within 5 working days of the UL visit.
- Samples molded at an off-site molder are expected to be received within 30 days of the UL visit.

APPLICANT’S RESPONSIBILITIES

The applicant and manufacturer are jointly responsible to comply with UL’s requirements and submitting the proper number and type of FUS samples.

The applicant is primarily responsible to work with UL and the manufacturer to resolve any FUS test failures and non-conformances an is responsible to assure all selected samples are received at the UL test location.

COMPONENT - PLASTICS (QMFZ2, QMFZ3, QMFZ8, QMFZ9)
COMPONENT – PLASTICS, PROPRIETARY (QMTR2, QMTR8)

PROCEDURE IN CASE OF NONCONFORMING RESULTS

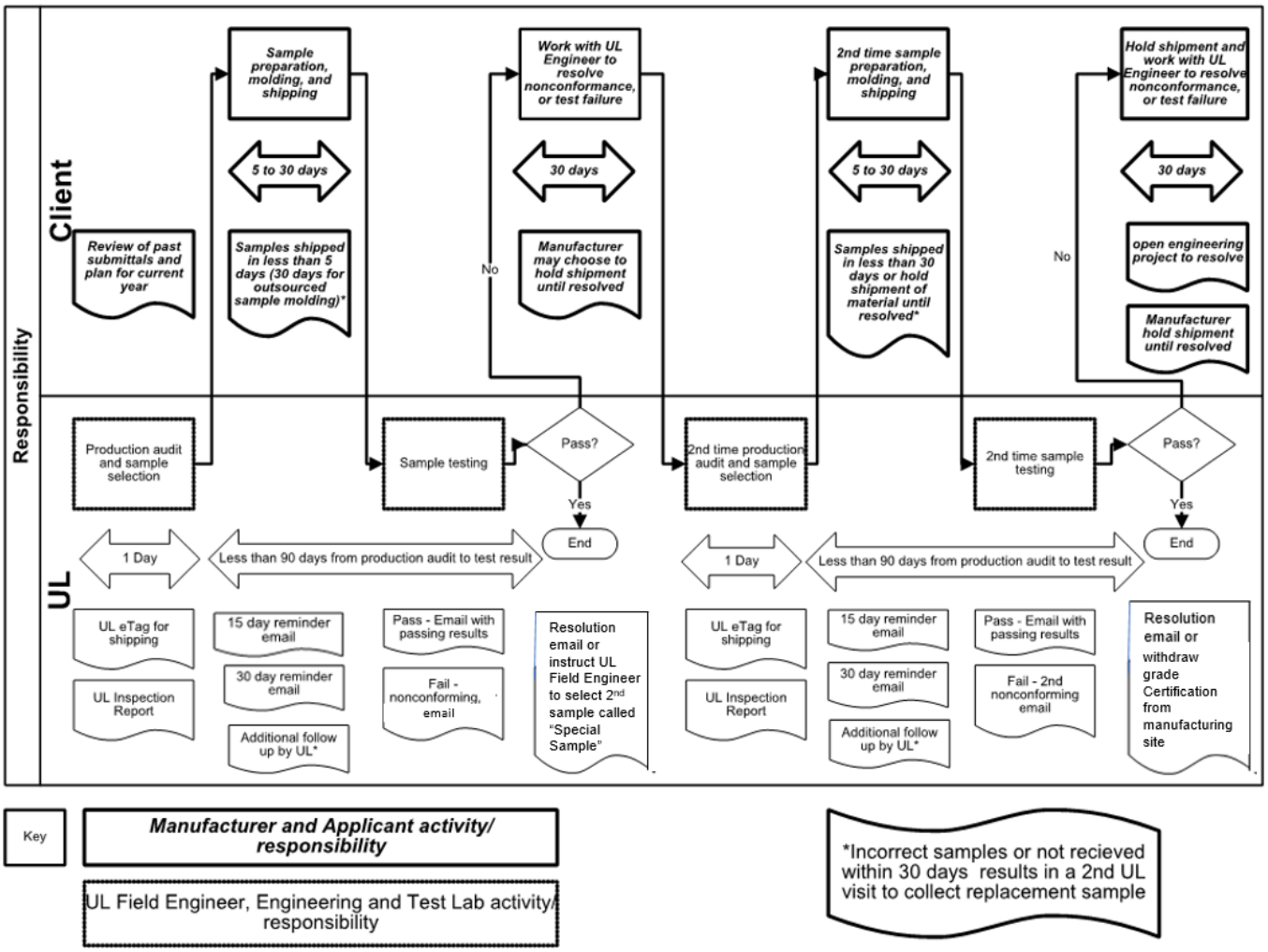
If you receive a letter indicating your material did not conform with FUS testing requirements, please contact the reviewer of the letter or email to resolve the issue. Please see below for additional timeline requirements.

After a second-time nonconformance is issued, UL must receive a response within 30 days from the date of the letter or the grade designation will be withdrawn from the Certification product directory (UL iQ for Plastics).

Event	**Requirement**	**Timeline**
Receipt of first-time nonconformance letter	Contact reviewer with root cause analysis of issue OR	5 days from date of letter
	Submit new FUS samples	30 days from Field Engineer's visit
Receipt of second time nonconformance letter	Stop shipment of material AND	Immediately
	Contact reviewer with root cause and open a project to resolve the nonconformance or withdraw the grade	30 days from date of letter

COMPONENT - PLASTICS (QMFZ2, QMFZ3, QMFZ8, QMFZ9)
COMPONENT – PLASTICS, PROPRIETARY (QMTR2, QMTR8)

Figure 1 – Overview of Follow-Up Services Sample Test Process



COMPONENT - PLASTICS (QMFZ2, QMFZ3, QMFZ8, QMFZ9)

TABLE B - INDEX TO TESTING

Sample Group	#/Group /Year	Generic Class	Material Designation	Report Date	Thk, mm	Color	Flame	MCC Ref	IR Ref	TGA Ref	DSC Ref	Additional Info	Test Program Code
1	**1**	**Acrylonitrile Butadiene Styrene (ABS)**											
			AF353(*)	**2010-08-04**	**0.8**	**ANY**	**HB**	**-**	**T07-08-10**	**T02-20-10**	**T07-22-10**	**-**	**AF**

COMPONENT - PLASTICS (QMFZ2, QMFZ3, QMFZ8, QMFZ9)

INDEX TO FOOTNOTES:

- May be followed by the suffix with letter A or N or number 0 (zero).
(*) - Replace by one digital 1-9, unconcerned with formula or constituent changed.
(+) - Replace by one digital 0-9 or one alphabet A-Z, unconcerned with formula or constituent changed
(H) - Replace by one digital 0-9 or one alphabet H, unconcerned with formula or constituent changed
(a) - The Grade GP5350 was placed on-hold from July 03, 2008
(b) - May be replaced by one digit alphanumeric to indicate color.
(f1) - Suitable for outdoor use with respect to exposure to Ultraviolet Light, Water Exposure and Immersion in accordance with UL 746C.
(f2) - Subjected to one or more of the following tests: Ultraviolet Light, Water Exposure or Immersion in accordance with UL 746C, where the acceptability for outdoor use is to be determined by UL.
(x) - Replace by one digital 0-9, unconcerned with formula or constituent changed

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Revised: 2018-12-06

FOLLOW-UP SERVICE PROCEDURE
(TYPE R)

COMPONENT - PLASTICS
(QMFZ2,QMFZ8)

Manufacturer: SEE ADDENDUM FOR MANUFACTURER LOCATIONS

590791 (Party Site)
Applicant: FORMOSA CHEMICALS & FIBRE CORP PLASTICS DIV
(202142-001) 201 TUNG HWA N RD
TAIPEI
105 TAIWAN

590791 (Party Site)
Recognized Co.: SAME AS APPLICANT
(202142-001)

This Follow-Up Service Procedure authorizes the above Manufacturer(s) to use the marking specified by UL LLC, or any authorized licensee of UL LLC, including the UL Contracting Party, only on products when constructed, tested and found to be in compliance with the requirements of this Follow-Up Service Procedure and in accordance with the terms of the applicable service agreement with UL Contracting Party. The UL Contracting Party for Follow-Up Services is listed on addendum to this Follow-Up Service Procedure ("UL Contracting Party"). UL Contracting Party and UL LLC are referred to jointly herein as "UL."

UL further defines responsibilities, duties and requirements for both Manufacturers and UL representatives in the document titled, "UL Mark Surveillance Requirements" that can be located at the following web-site: http://www.ul.com/fus. Manufacturers without Internet access may obtain the current version of this document from their local UL customer service representative or UL field representative. For assistance, or to obtain a paper copy of this document or the Follow-Up Service Terms referenced below, please contact UL's Customer Service at http://www.ul.com/aboutul/locations/, select a location and enter your request, or call the number listed for that location.

The Applicant, the specified Manufacturer(s) and any Recognized Company in this Follow-Up Service Procedure must agree to receive Follow-Up Services from UL Contracting Party. If your applicable service agreement is a Global Services Agreement ("GSA"), the Applicant, the specified Manufacturer(s) and any Recognized Company will be bound to a Service Agreement for Follow-Up Services upon the earliest by any Subscriber of use of the prescribed UL Mark, acceptance of the factory inspection, or payment of the Follow-Up Service fees which will incorporate such GSA, this Follow-Up Service Procedure and the Follow-Up Service Terms which can be accessed by clicking here: http://services.ul.com/fus-service-terms. In all other events, Follow-Up Services will be governed by and incorporate the terms of your applicable service agreement and this Follow-Up Service Procedure.

It is the responsibility of the Recognized Company to make sure that only the products meeting the aforementioned requirements bear the authorized Marks of UL LLC, or any authorized licensee of UL LLC.

This Follow-Up Service Procedure contains information for the use of the above Manufacturer(s) and representatives of UL and is not to be used for any other purpose. It is provided to the Manufacturer with the understanding that it will be returned upon request and is not to be copied in whole or in part.

This Follow-Up Service Procedure, and any subsequent revisions, is the property of UL and is not transferable. This Follow-Up Service Procedure contains confidential information for use only by the above named Manufacturer(s) and representatives of UL and is not to be used for any other purpose. It is provided to the Subscribers with the understanding that it is not to be copied, either wholly or in part unless specifically allowed, and that it will be returned to UL, upon request.

Capitalized terms used but not defined herein have the meanings set forth in the GSA and the applicable Service Terms or any other applicable UL service agreement.

UL shall not incur any obligation or liability for any loss, expense or damages, including incidental, consequential or punitive damages arising out of or in connection with the use or reliance upon this Follow-Up Service Procedure to anyone other than the above Manufacturer(s) as provided in the agreement between UL LLC or an authorized licensee of UL LLC, including UL Contracting Party, and the Manufacturer(s).

UL LLC has signed below solely in its capacity as the accredited entity to indicate that this Follow-Up Service Procedure is in compliance with the accreditation requirements.

Bruce A. Mahrenholz
Director
Conformity Assessment Programs (CPO)
UL LLC

LOCATION

1440718 (Party Site)
Polymerit Asia
858 Moo 2
Soi 1C/1 Bangpu Industrial Estate
Muang Samutprakarn Samputprakarn
Bangpumai 10280 THAILAND
Factory ID: SaleeColour PLC
UL Contracting Party for above site is: UL GmbH

INDEX

Grade Designation		Pro. Sec. Or Report Date		USR		CNR
AF353(*)		2015-08-27		X		X

USR - Indicates investigations to United States Standard UL 94 and UL 746A.
CNR - Indicates investigations to Canadian Standard CSA C22.2 No. 0.17-00.

Recognized Component Marking Data Page (RCMDP)

(FILE IMMEDIATELY AFTER AUTHORIZATION PAGE)

RECOGNIZED COMPONENT MARKING

Products Recognized under UL's Component Recognition Service are identified by marking elements consisting of:

1. The Recognized Company's identification specified in this document.

2. A catalog, model or other applicable product designation specified in the descriptive sections of this document.

3. The UL Recognized Component Mark shown below is optional unless required elsewhere in the Procedure.

Only those components, which actually bear the Marking, should be considered as being covered under the Recognition Program. The UL Listing or Classification Mark is not authorized for use on or in connection with Recognized Components.

Recognized Component Mark

Minimum size of the Recognized Component Mark is not specified as long as it is legible. Minimum height of the registered symbol ® shall be 3/64 inch but may be omitted if it is out of proportion to the Recognized Component Mark or not legible to the naked eye.

The manufacturer may reproduce the Mark electronically. Any decision regarding the acceptability of the manufacturer's Mark reproduction will be made at the Reviewing Office.

Recognized Component Marking Data Page (RCMDP)

(FILE IMMEDIATELY AFTER AUTHORIZATION PAGE)

RECOGNIZED COMPONENT MARKING

Products Recognized under UL's Component Recognition Service are identified by marking elements consisting of:

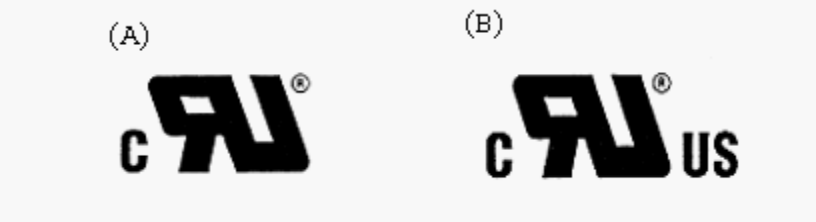
1. The Recognized Company's identification specified in this document.

2. A catalog, model or other applicable product designation specified in the descriptive sections of this document.

3. The UL Recognized Component Mark shown below is optional unless required elsewhere in the Procedure:
   (A) Recognized only to Canadian safety requirements, or;
   (B) Recognized to both U.S. and Canadian safety requirements.

Only those components, which actually bear the Marking, should be considered as being covered under the Recognition Program. The UL Listing or Classification Mark is not authorized for use on or in connection with Recognized Components.

Recognized Component Mark



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The manufacturer may reproduce the Mark electronically. Any decision regarding the acceptability of the manufacturer's Mark reproduction will be made at the Reviewing Office.

GENERAL

PRODUCT COVERED:

Component - Plastics.

COLORING FACTORIES:

These factories add colorants to Recognized natural grades, as-received from FORMOSA CHEMICALS & FIBRE CORP PLASTICS DIV. The operations are conducted in accordance with the manufacturer's instructions. The material may be either returned to the factory or shipped directly to the user. If shipped to the user, factory identification shown below shall be added to the Recognized Marking.

MARKING:

Recognized company's name or trade name, as shown below, and the material designation on the smallest unit container, plus factory identification where applicable.

U.S. AND CANADIAN

Where models meet U.S. and Canadian requirements as indicated either in the individual descriptive sections or the Appendix B of this Procedure, the smallest unit container shall be provided with the required Markings as specified above. In addition, the following Canadian Recognized Component Marking shall appear on the smallest unit container; generic polymer identification, color number where appropriate, and batch or lot number or date of manufacture on container, wrapper or molded on finished part.

TRADEMARK DESIGNATION:

The following trademark or trade name, if any, may be used in lieu of the company name to identify Recognized materials covered by this Procedure.

TAIRILAC

or