



SPEEDING UP UL COMPLIANCE FOR E&E PRODUCTS

**WITH UL 94 RECOGNIZED
COLOR CONCENTRATES**

INTRODUCTION

TODAY'S PRESENTER FROM AVIENT

BENOIT FLAMMANG

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Benoit Flammang has over 30 years experience in the plastics industry in sales & marketing, business development, research and product development, key account support, customer technical service, and manufacturing. He holds a master's degree in chemistry, later complemented by a post-graduate degree in business management. He previously worked for Shell Chemicals, RKW group, and Clariant's Masterbatch division, which was acquired by PolyOne in 2020 to form Avient.

As senior marketing leader for E&E applications, Benoit is responsible for strategic growth with a particular focus on developing innovative and sustainable polymer solutions in collaboration with suppliers, customers, and the whole supply chain.



AGENDA

- About Avient™
- UL flammability standards and testing – definition of terms
- UL 94 recognized concentrates – how do they work?
- Finding Avient UL 94 color concentrates in Product iQ – demonstration
- OnColor™ UL 94 Colorants – key takeaways
- Increasing the sustainability of E&E products – products and services



ABOUT AVIENT™

AVIENT

ABOUT US



9,300
employees
worldwide



35,000+
solutions



\$3.14 billion
in 2023 sales



\$19+ million
donated
since 2007



100+
facilities in
35 countries

SOLUTIONS AND SERVICES

KEY INDUSTRIES



Building &
Construction

Consumer
Discretionary

Consumer
Staples

Energy

Healthcare

Industrial

Packaging

Telecommunications

Transportation

ALIGNED WITH GLOBAL TRENDS



HEALTHCARE



SUSTAINABILITY



URBANIZATION



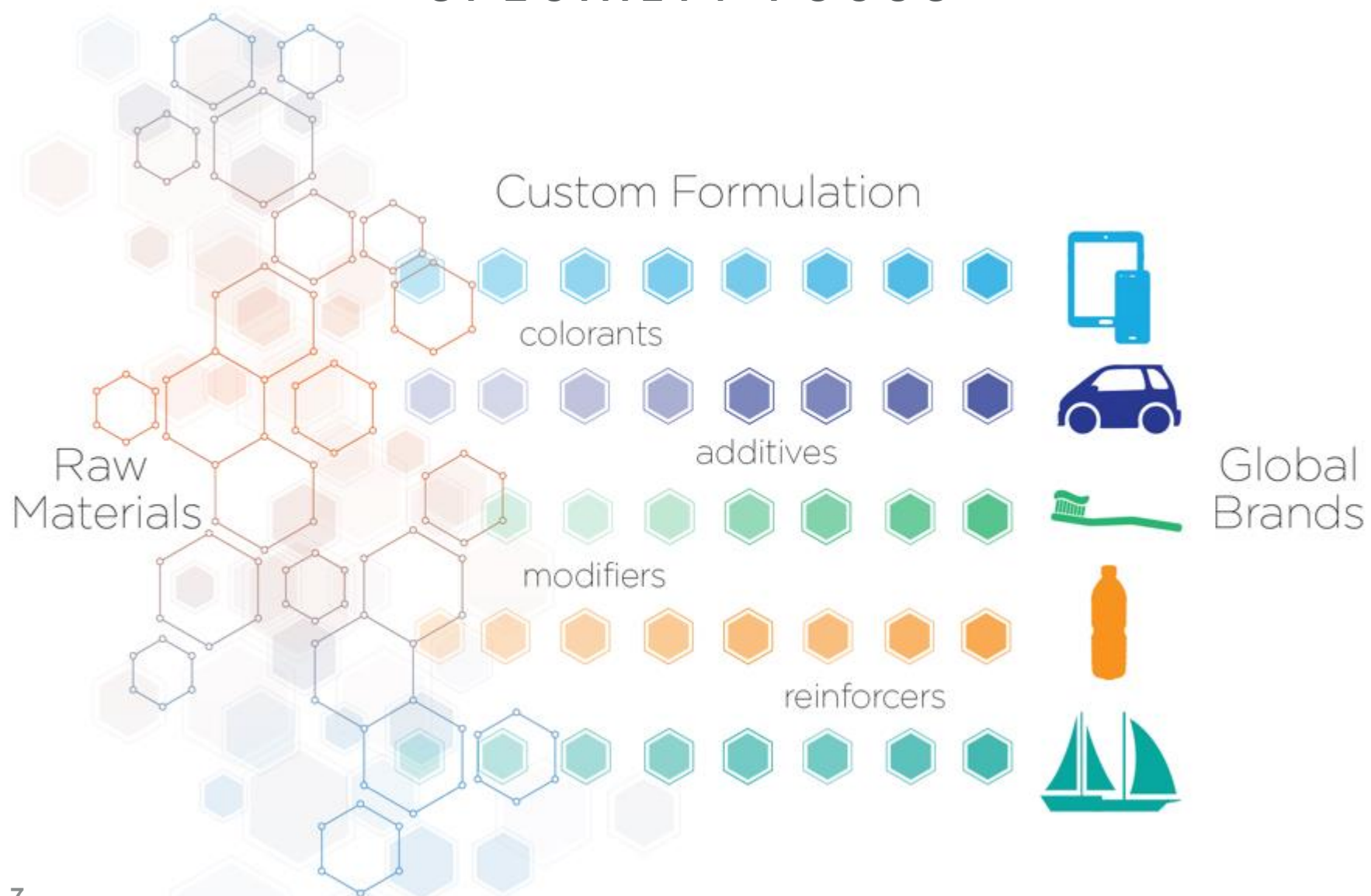
DEMOGRAPHIC



BUYER POWER

SOLUTIONS AND SERVICES

SPECIALTY FOCUS





UL FLAMMABILITY STANDARDS AND TESTING

DEFINITION OF TERMS

UL CERTIFICATION FOR E&E PRODUCTS

IN A NUTSHELL

- Underwriter Laboratories (UL) is a safety organization that sets industry-wide standards for new products. They continually check these products to ensure they're up to their standards
- UL ensures the **traceability** and **safety** of thermoplastic materials in technical environments along the plastics value chain
- UL certifies products with the aim of making the world a safer place for both workers and consumers ensuring peace of mind along the value chain
- UL doesn't test every product themselves. UL authorizes manufacturers to test their products using the UL stamp. UL follows up on a regular basis to make sure that the manufacturers are testing their products and following proper guidelines

DEFINITION OF TERMS

UL MARKS FOR E&E PRODUCTS

RECOGNIZED

The UL RECOGNIZED mark is used only for **components** and **unfinished products** (including polymeric materials) which go into the manufacturing of fabricated parts.



LISTED

The UL LISTED mark contains only **fabricated parts** which are tested according to safety standards. For polymeric materials, the standards are categorized under UL 746.



DEFINITION OF TERMS

STANDARDS, PRODUCT FILES AND DATA SHEETS



STANDARDS



UL 746: Polymeric Materials

- A** Short-Term Property Evaluations
- B** Long-Term Property Evaluations
- C** Use in Electrical Equipment Evaluations
- D** Fabricated Parts



PRODUCT FILES

QMFZ2: Plastics – Components

- For compounds and other finished resin mixtures
- Used by resin/compound producers



DATA SHEETS



UL 94: Tests for Flammability of Plastic Materials for Parts in Devices and Appliances

- HB** Horizontal burning test
- V-0, -1, -2 / 5VA, 5VB** Vertical burning test

QMQS2: Color Concentrates

- For color and additive concentrates in combination with compounds and other finished resin mixtures (QMFZ2)
- Used by masterbatch (concentrate) producers

There is no Yellow Card™ certification for concentrates, but the information is provided in Avient's Technical Data Sheets (TDS) and online in Avient's UL file.

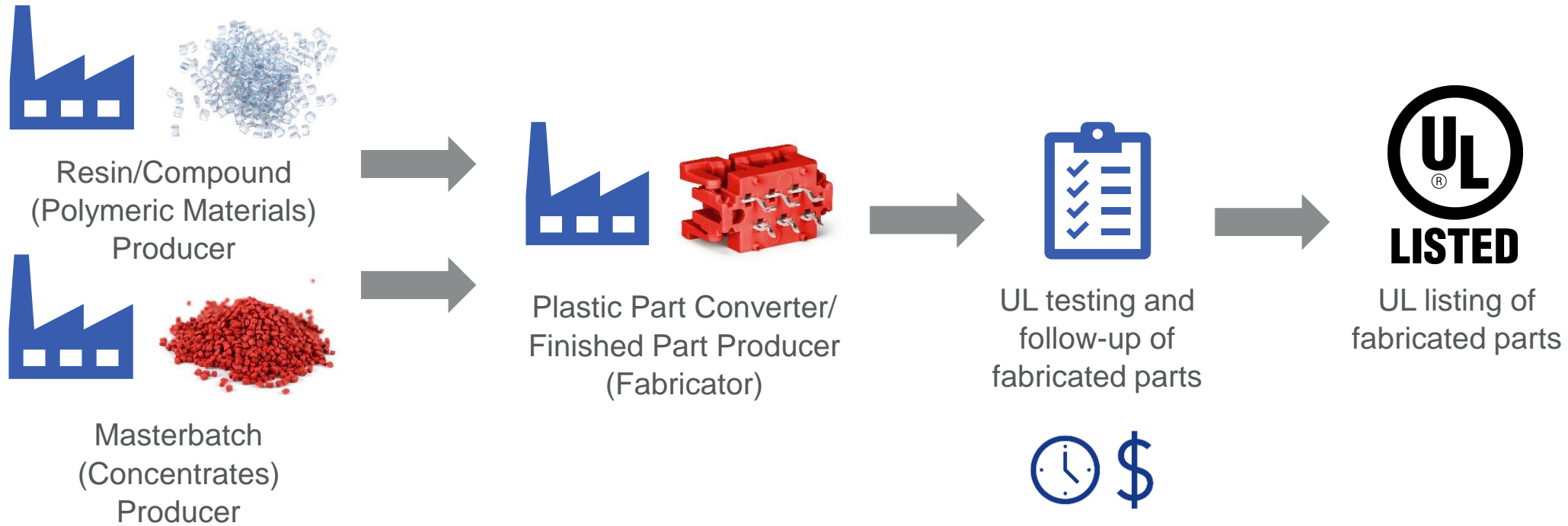


UL 94 RECOGNIZED CONCENTRATES

HOW DO THEY WORK?

RESIN COLORATION

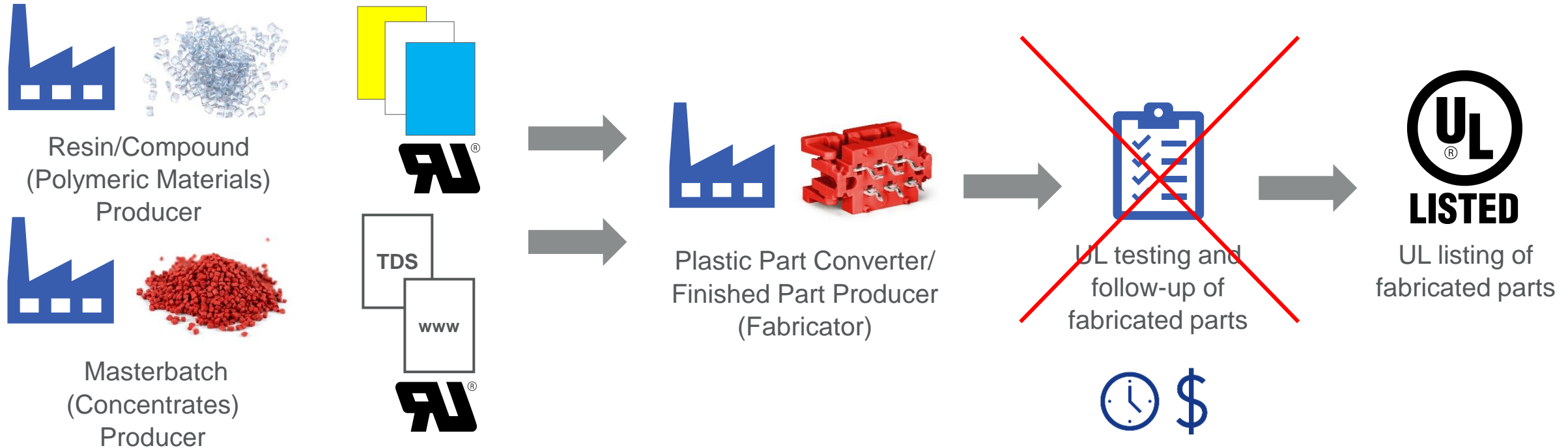
WITHOUT RECOGNIZED MATERIALS



The production of fabricated parts **WITHOUT UL recognized materials** leads to additional **expensive testing** and follow-up services for each finished part.

RESIN COLORATION

WITH RECOGNIZED CONCENTRATES



The production of finished parts **WITH UL recognized materials** eliminates the need for UL testing of the finished part saving time and costs.

The concept requires a specific polymer recognition in the Avient QMQS2.E73454 file.

UL 94 RECOGNIZED CONCENTRATES

ALL-COLOR RECOGNITION WITH AVIENT



- We perform the necessary UL 94 testing in one of Avient's UL-approved laboratories
- We need to know the exact polymeric material name to check the polymer Yellow Card and the minimum thickness of the fabricated parts
- All concentrates follow the rules of UL 746 A – polymer variations
 - The following is tested:
 - Heaviest inorganic pigment typically TiO_2 (5% weight)
 - Heaviest carbon black (2.5% weight)
 - Heaviest organic pigment (0.5% weight)
- In the UL acceptance program framework, it is considered that the concentrate does not compromise the other short-term and long-term properties of the resin nor the final properties -> no other testing is needed
- Follow-up services are organized by UL on recognized components to ensure that all steps above are valid and regularly tested



FINDING UL 94 COLOR CONCENTRATES IN PRODUCT IQ

DEMONSTRATION

NEW PART DESIGN

FINDING UL 94 COMPLIANT COLOR CONCENTRATES



YELLOW CARD RESIN

Check if your resin grade has a Yellow Card and if it fulfills all the requirements of your fabricated part



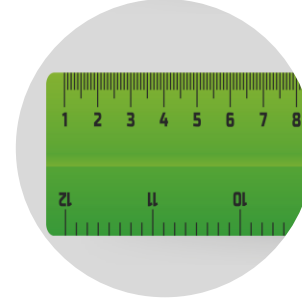
COLOR RECOGNITION

Ensure the polymer has recognition for all colors in the Yellow Card



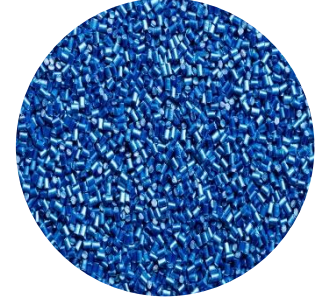
FLAMMABILITY RATING

Determine if the fabricated part needs to fulfill generic (HB-Type) or specific (V-Type) flammability ratings



PART THICKNESS

Check the minimum thickness of the fabricated part so it complies with the Yellow Card of the polymer/compound



COLOR CONCENTRATE

Search Avient's concentrate file QMQS2.E73454 to find out if there is an existing color solution

DEMONSTRATION

The demonstration on how to find UL 94 Colorants in UL's Product iQ platform is included in the UL Prospector Knowledge Center and webinar recording.

NEW PART DESIGN



I FOUND MY RESIN GRADE IN AVIENT'S FILE



The color matching process for the development of a custom color concentrate can start right away with Avient.

Please contact your Avient representative and specify the UL 94 concentrate requirements with reference to the polymer Yellow Card you will be using.

NEW PART DESIGN



I DIDN'T FIND MY RESIN GRADE IN AVIENT'S FILE



OPTION 1:

Find an alternative resin which is included in Avient's list.

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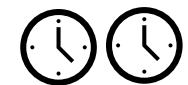
OPTION 2:

Avient starts an all-color recognition for the customer's resin. This includes molding of test specimens, flame testing, and administrative work internally and with UL.



OPTION 3:

Customer may decide to go for final part listing and manage all UL work on their own.



WHERE CAN I FIND INFORMATION?

USEFUL LINKS



Avient information hub

[WEBINAR SLIDES AND
RECORDING](#)



UL Product iQ

[UL PRODUCT IQ
\(ULPROSPECTOR.COM\)](#)



QMFZ2 file

[PRODUCT IQ | SEARCH QMFZ2](#)



QMQS2.E73454

[PRODUCT IQ | SEARCH
\(ULPROSPECTOR.COM\)](#)



UL 94 CLIENT TEST DATA PROGRAM

UL 94 CLIENT TEST DATA PROGRAM

Avient successfully certified by UL under its UL Client Test Data Program. We can utilize our testing facilities after being qualified for the program. The test data will be accepted by UL as having been tested by themselves.

AVIENT SOLUTIONS

UL 94 Client Test Data Program

WHY AVIENT

- An independent test house for UL 94 flammability of plastic materials
- Lower cost and increased speed of adding new listings to both QMQS2 (masterbatches) and QMZF2 (pre-colors) listings



KEY ADVANTAGES

- Global competence center in Avon Lake (US) and Singapore for UL 94 data acceptance program
- Customers can benefit from reduced testing costs and time to market



ONCOLOR™ UL 94 COLORANTS

KEY TAKEAWAYS



UL 94 COMPLIANT COLORANTS

POSSIBILITIES

Electrical and electronic applications requiring UL 94 compliance, such as:

- Connectors
- Plugs and sockets
- Appliances
- Consumer Electronics
- Terminal blocks
- Circuit breakers

IMPACT

Supports fast and cost-efficient project management with large choice of colors in different polymers

Reduces risk by fulfilling UL 94 standards

Avoids extra UL listing approval steps for finished products

ONCOLOR™ UL 94 COLORANTS

Tailor-made concentrates for applications that require UL 94 compliance

WHAT IT DOES

Simplifies customers' UL approval steps thanks to UL 94 recognition

Offers a wide choice of recognized concentrates in all colors

HB rating for PP, PS, ABS, PC/ABS, PBT, PA, PA-GF, TPU generic resins

V-0, V-1, V-2 and 5VA/5VB ratings for more than 200 specific engineering resins

Customizable for specific resins and application needs

PROCESSES

Injection molding

WHERE CAN I FIND INFORMATION?

OUR UL 94 BROCHURE PROVIDES ALL INFORMATION IN ONE DOCUMENT



UL HB

GENERIC RESIN TYPE	FLAME RATING	MINIMUM THICKNESS (MM)	MAXIMUM LET-BURN RATIO
Acetal Copolymer (POM)	HB	1.50	1.20
Acrylonitrile Butadiene Styrene (ABS)	HB	1.50	1.10
Ethylene Propylene Thermoplastic Rubber (EPTR)	HB	1.50	1.20
High Impact Polystyrene (HIPS)	HB	1.50	1.10
Liquid Crystal Polymer (LCP)	HB	0.83	1.10
Polyamide (PA)	HB	3.20	1.15
Polyamide (PA66 and PA 4/6)	HB	0.81	1.20
Polyamide 6 (PA6)	HB	0.75	1.25
Polyamide 66 (PA66)	HB	0.40	1.40
Polybutylene Terephthalate (PBT)	HB	0.81	1.20
Polybutylene Terephthalate/Polycarbonate (PBT/PC)	HB	1.50	1.10
Polycarbonate (PC)	HB	1.50	1.15
Polycarbonate/Acrylonitrile Butadiene Styrene (PC/ABS)	HB	1.50	1.20
Polycarbonate/Polyethylene Terephthalate (PC/PET)	HB	1.50	1.20
Polyethylene (PE)	HB	1.50	1.50
Polyethylene Terephthalate (PET)	HB	0.80	1.18
Polyketone	HB	1.50	1.20
Polymethyl Methacrylate (PMMA)	HB	3.00	1.25
Polypropylene (PP)	HB	1.50	1.15
Polystyrene (PS)	HB	0.83	1.15
Polyurethane (PUR)	HB	1.50	1.25
Polyvinylchloride (PVC)	HB	1.50	1.20
Styrene Acrylonitrile (SAN)	HB	1.50	1.20
Thermoplastic Elastomer (TPE)	HB	0.75	1.25

UL 94 V-0, V-1, V-2

ASCEND

GENERIC RESIN TYPE	SPECIFIC BASE RESIN	MINIMUM THICKNESS (MM)	FLAME RATING	MAXIMUM LET-BURN RATIO
Polyamide 66 (PA66)	21X1(a)(f2), 21SPC1(a)(f2), 21SPF1(a)(f2), 21SPG1(a)(f2), 21SPM1(a)(f2), 20NSP1(a)(f2)	0.75	V-2	1.20
	22HS1(e)	0.75	V-2	1.20
	64C R	3.0	V-2	1.20
	ECO366(e)	0.4	V-0	1.25
	ECO366H(e)	0.2	V-0	1.25
	FR350J	0.4	V-0	1.25
Polyamide 66/6 (PA66/6)	20NSP1(a)(f2), 21SPF1(a)(f2), 21SPM1(a)(f2), 21SPC1(a)(f2)	0.4	V-2	1.20
	20NSP1(a)(h)(f2), 21SPF1(a)(h)(f2), 21SPM1(a)(h)(f2), 21SPC1(a)(h)(f2)	1.5	V-2	1.20
	ECO315(e), ECO315J(e)	0.4	V-0	1.25
	M344	3.0	V-0	1.25
Polyamide 66/6 (PA66/6)	909	0.75	V-0	1.25

UL 94 V-0, V-1, V-2

CELANESE

GENERIC RESIN TYPE	SPECIFIC BASE RESIN	MINIMUM THICKNESS (MM)	FLAME RATING	MAXIMUM LET-BURN RATIO
Liquid Crystal Polymer (LCP)	A130(+), MT1310	1.50	V-0	1.40
Polyamide (PA)	112P(+)(f1), 113P(+)(f1)	0.75	V-2	1.20
	HTNFR52G30NH	0.40	V-0	1.25
Polyamide 6/12 (PA6/12)	151, 151L	1.50	V-2	1.25
Polyamide 66 (PA66)	A3 GF 25 V0H	0.40	V-0	1.25
	101 (9/1)(f1), 101F (9/1)(f1), 101L (9/1)(f1)	0.75	V-2	1.20
	103PH5(+), 103H5L(+)	0.75	V-2	1.20
	FR50(+)(f2)	0.35	V-0	1.20
	FR7025V0F(+)	0.50	V-0	1.33
	FR72G25V0	0.80	V-0	1.25
Polyamide 66/6 (PA66/6)	FR55G25V0NH	0.40	V-0	1.25
	HTNFR52G30BLV(3)	0.75	V-0	1.33
	HTNFR52G30L(+), HTNFR52G30L(+)	0.75	V-0	1.33
	HTNFR52G30NHV(5)	0.40	V-0	1.25
	HTNFR52G30BL	0.75	V-0	1.25
	HTNFR52G35(+), HTNFR52G35	0.75	V-0	1.33
Polyamide 6T/MPMDT	HTNFR51G35L(+)	0.81	V-0	1.33
Polybutylene Terephthalate (PBT)	2016(h)	1.50	V-0	1.20
	3116(h)	1.50	V-0	1.20
	3216(h)	1.50	V-0	1.20
	3316(h)	1.50	V-0	1.20
	3316HF	1.50	V-0	1.20
	LW9030FR	1.50	V-0	1.25
Polyethylene Terephthalate (PET)	T841FR (H)	1.50	V-0	1.25
Polyethylene Terephthalate (PET)	FR5301(+)(f1), FR530L(+)(f1)	0.75	V-0	1.25
Thermoplastic Elastomer (TPE)	HTR8068	1.60	V-0	1.25

WHERE CAN I FIND INFORMATION?

OUR TECHNICAL DATA SHEETS PROVIDE MORE DETAILED INFORMATION ON THE UL RECOGNIZED MASTERBATCHES

Masterbatches Technical Product Information



Product ONCOLOR®-ORANGE AB23025742-ZN
(AB23025742)

Description	Colour concentrate for the colouration of below stated polymer. The concentrate contains organic and/or inorganic colourants.	
Dosage	4,00 %	
Form of delivery	CYLINDRIC GRANULATE	
Application	INJECTION MOULDING	
Application polymer	PAB6/8T TECHNYL J 60X1 V30	
Carrier Type	POLYAMIDE 6	
UL-94 Code	V-0 (0,4MM/4,0%)	
Light Fastness (Blue scale)	6	(EN ISO 105-B02:2014)
Heat Stability	320 °C	(EN 12877:1999)

The moisture content of the concentrate should not exceed 0,1 %.

UL-94 Code

V-0 (0,4MM/4,0%)

The information in this publication corresponds to the present state of our knowledge and is intended to describe our products and their possible applications. It is not intended to guarantee the suitability of particular product characteristic for a specific use. Any existing industrial rights are to be taken into consideration. Quality is guaranteed in accordance with our general conditions of sale.

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INCREASING THE SUSTAINABILITY OF E&E PRODUCTS

PRODUCTS AND SERVICES

PRODUCTS

8 WAYS TO SUSTAINABILITY



REDUCE

 Lightweighting

 Reduced Energy Use

 VOC Reduction



RENEW

 Recycle Solutions

 Bio-polymers



PRESERVE

 Eco-conscious

 Sustainable Infrastructure

 Human Health & Safety

SUSTAINABLE POLYMER SOLUTIONS

FOR E&E PRODUCTS



NON-HALOGEN FLAME RETARDANT SOLUTIONS

- Cesa™ Flame Retardant Additives & Smartbatch™ for PP
- Cesa™ Flame Retardant Additives & Smartbatch™ for PC



NON-PTFE FLAME RETARDANT SOLUTIONS

- Cesa™ Flame Retardant Additives & Smartbatch™ PTFE-free non-halogen for PC



POLYMER SOLUTIONS FOR RECYCLED RESINS

- Cesa™ Flame Retardant Additives & Smartbatch™ for recycled PS
- Maxxam™ REC compounds (recycled PP) with Smartbatch™ for different glow wire levels
- Cesa™ impact modifier for recycled PS



SERVICES FOR RECYCLE SOLUTIONS

- CycleWorks™ Innovation Center for Plastic Recycling
- PCR Color Prediction Service
 - Product Carbon Footprint Calculator

**THANK YOU FOR
YOU ATTENTION
QUESTIONS?**