SIMPLIFY ROHS COMPLIANCE WITH UL'S "YELLOW CARD"!

RoHS Compliant Certification for Plastics (QMFZ2)

July 21, 2015

Presenters

Noé P. Navarro

Global Business Manager

Distinguished Member of Technical Staff

Scott MacLeod

Principal Chemist

Distinguished Member of Technical Staff

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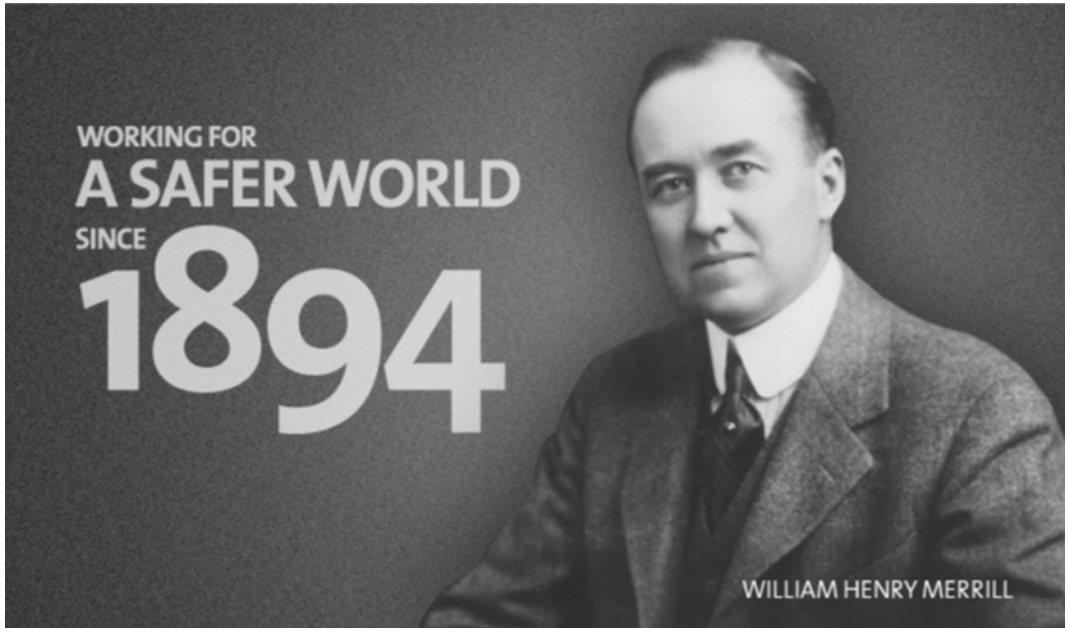
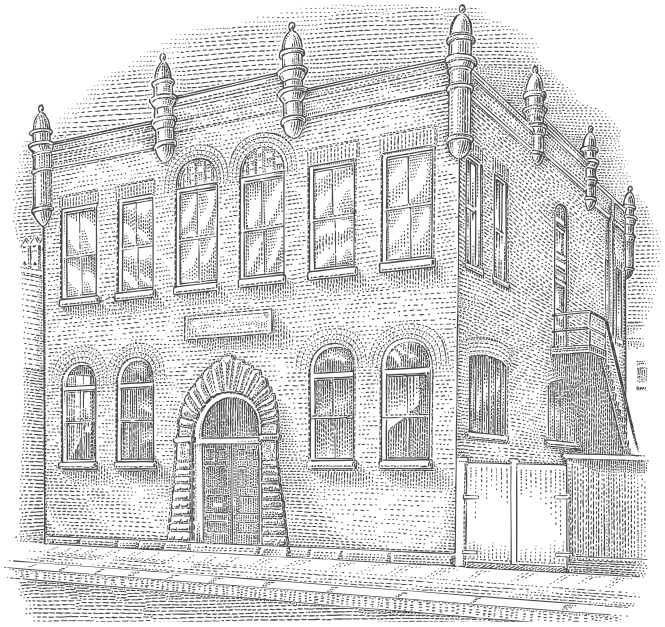
Since the Chicago World's Fair we have been on the leading edge of safety science

Our mission drives everything we do…





UL, 1894

AND HELP YOU NAVIGATE

GLOBAL TRADE

UL helps you navigate:

- Complex country compliance issues
- Regulatory and trade challenges
- Marketplace demands
- Supply chain management

Global Footprint

567,423
FOLLOW-UP
SERVICES
INSPECTION VISITS
WERE CONDUCTED
BY UL

IN THE COUNTRIES IN
WHICH WE OPERATE,
THERE ARE
131 UL
LABORATORY
TESTING AND
CERTIFICATION
FACILITIES

9,476
PRODUCTS
CERTIFIED FOR
ENERGY STAR

NEARLY
1 BILLION
CONSUMERS
WERE REACHED
WITH SAFETY
MESSAGES IN ASIA,
EUROPE AND
NORTH AMERICA

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UL's Safety Standards Overview and Plastics Program

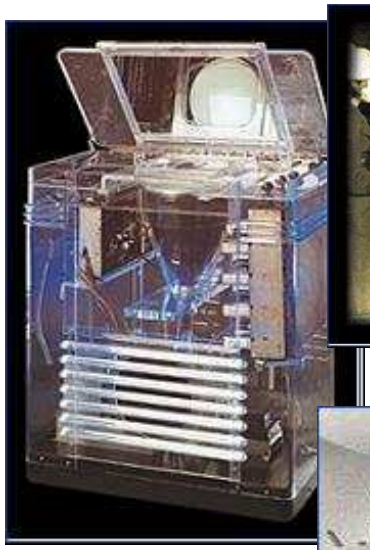
- UL has published more than 1400 Safety Standards
- Key objective is to mitigate the risks of fire, electric shock, personal injury
- Plastic materials are relied upon for critical applications - electrical insulation and enclosures (fire and mechanical)
- Plastics Recognition Program established more than 40 years ago to characterize material performance properties
- UL Polymeric Material Standards are referenced in a wide variety of UL Standards and Outlines:

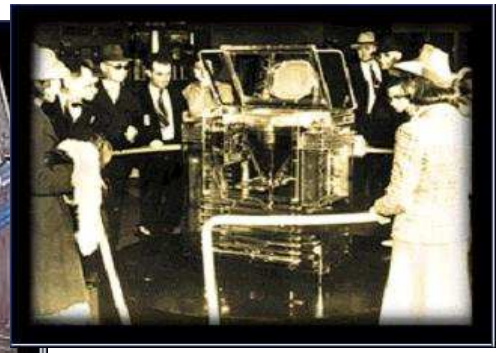
Plastics Standard	References in UL Standards or Outlines
UL 746A	>250
UL 746B	>250
UL 746C	>400
UL 94	>400

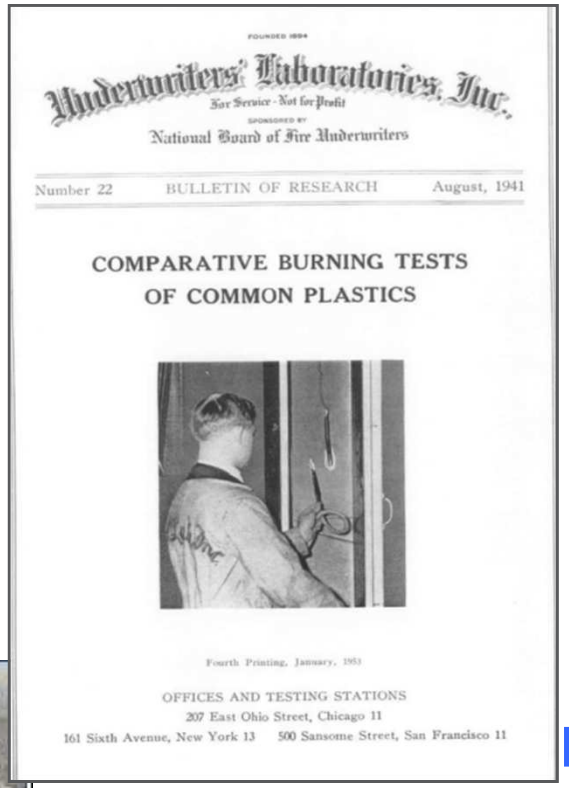
UL's "Path to Plastics"

1938 World's Fair –

- a TV is exhibited for the public with plastics as the major insulating material.







Underwriters' Laboratories, Inc.
For Service - Not for Profit
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National Board of Fire Underwriters

Number 22 BULLETIN OF RESEARCH August, 1941

COMPARATIVE BURNING TESTS OF COMMON PLASTICS

Fourth Printing, January, 1951

OFFICES AND TESTING STATIONS
207 East Ohio Street, Chicago 11
161 Sixth Avenue, New York 13 500 Sansome Street, San Francisco 11

1941: "Comparative burning tests of common plastics"

- UL Research Bulletin #22, A. J. Perkins (1941)

Yellow Card Example

Flammability	Value	Test Method
Flame Rating		UL 94
1.20 mm, ALL	V-0	IEC 60695-11-10, -20
3.00 mm, ALL	V-0, 5VA	
Electrical	**Value**	**Test Method**
Hot-wire Ignition (HWI)		UL 746
1.20 mm	PLC 3	
3.00 mm	PLC 2	
High Amp Arc Ignition (HAI)		UL 746
1.20 mm	PLC 0	
3.00 mm	PLC 0	
Thermal	**Value**	**Test Method**
RTI Elec		UL 746
1.20 mm	80.0 °C	
3.00 mm	80.0 °C	
RTI Imp		UL 746
1.20 mm	80.0 °C	
3.00 mm	80.0 °C	
RTI Str		UL 746
1.20 mm	80.0 °C	
3.00 mm	80.0 °C	
Physical	**Value**	**Test Method**
Outdoor Suitability	f2	UL 746C

Why Certification?

Organizations that have achieved certification communicate to the market that they have successfully undergone a comprehensive, rigorous assessment and their products and processes meet defined standards of quality or performance.

Certification demonstrates to customers, competitors, suppliers, staff and investors that you use industry standards and practices and that you are committed to producing high quality products.

Individuals validate their mastery of skills, knowledge and abilities through certification and meet ongoing learning and practice requirements through recertification.

Gives you an advantage over the competition.

Why Certification?

Organizations that have achie[illegible] communicate [illegible]ket that they [illegible]ssfully undergone a [illegible], rigorou[illegible]ent and their [illegible]d processes meet defined st[illegible]ds of qua[illegible]rmance.

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Individuals validate t[illegible] m[illegible]ery of skills, knowledge and abilities through certi[illegible] m[illegible]goi[illegible]learning and practice requirements through rece[illegible]

Give[illegible] vantage over the competition.

TRUST

America Counts on CPAs®

Why UL Certification?

Independent Testing – UL provides confirmation that manufactured products continue to meet certification requirements as third party certifier. It provides market integrity.

Safety – UL's mission is safety and UL has many initiatives and programs (Safety Smart, UL Research, The Product Mindset, etc.) that increase safety awareness with consumers and others.

Standards/New Products – UL helps customers grow by creating standards and code acceptance for new products/technologies.

Code Authorities/Acceptance – UL has a dedicated staff with AHJ's (Authorities Having Jurisdiction) to address questions and assist with product acceptance.

Market Surveillance – The integrity of UL certifications is enhanced by investigating Product Incident Reports and by proactive Market Surveillance investigations on field-obtained product samples.

Anti-counterfeiting – UL has dedicated staff that works with Customs and others in verifying product authenticity through labels and other data.

Advertisement – Certified companies can use UL's name and references in advertisements. With UL's brand recognition this is a significant benefit.

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UL Performance Materials – Global Locations

Engineering & Lab

- Taipei City, Taiwan
- Suzhou, China
- Hong Kong, China
- Krefeld, Germany
- Northbrook, IL, USA
- Enfield, CT, USA
- San Jose, CA, USA
- Melville, NY, USA

Project Engineering Teams

- Seoul, S Korea
- Guangzhou, China
- Bangalore, India
- Japan – Tokyo & Ise
- Guilford, UK
- Arnhem, Netherlands
- Milan, Italy
- ASEAN - Singapore & Thailand

Suzhou, China

Taipei city

Krefeld, Germany

Northbrook, IL (Headquarters)

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Demand Drivers

RoHs Directives 2002/95/EC & 2011/65/EU

The primary purpose of the "RoHS" directives is "..is to approximate the laws of the Member States on restrictions of the use of hazardous substances in electrical and electronic equipment, and to contribute to the protection of human health and the environmentally sound recovery and disposal of waste electrical and electronic equipment."

http://ec.europa.eu/environment/waste/pdf/faq_weee.pdf

In The Beginning

"Free for All" When RoHS Was Initially Passed Into Law / Implemented (2002 / 2006)

- Legal Requirements Predated Appropriate Analytical Testing Methodology ("Law Before Order!)
- Scope & Requirements Confusing
- Homogeneous Material Concept Confusing
- House, US EPA Solid Waste Methods and a List of Assorted Other Out-Of-Scope Techniques Used
- Standardization Development Organizations Established Technical Committees (TC's) to Write Appropriate Test Methods
- "Screening" Concept Was Born
- IEC 62321-2008 Published

Further On Down The Road

RoHS “Recast” Published (2011)

- CE Mark Inclusion
- Industry And Enforcement Authorities Have Better Understanding
- Phasing In More Product Categories
- New Substances Targeted

- Cr+6 In Plastics A Testing Challenge
- New Test Methods Under Development
- 62321 Grows Into Family Of Standards

How to show compliance?

EN-50581"..assessment of electrical and electronic products with respect to the restriction of hazardous substances"

- Supplier Declarations / Contractual Agreements
- Material Declarations
- Analytical Test Results
- Supplier & Material Confidence Assessments

- Periodic Review

How to Simplify Compliance?

- Make it easy for specifiers and other purchasers to find plastics utilizing search databases they use today - Prospector and iQ
  - Prospector for Plastics has over 250,000 registered users and processes over 16,000 Yellow Card data sheet views a month.
  - iQ for Plastics has over 50,000 registered users and processes over 100,000 Yellow Card listing views a month.
- Reduce repetitive lot testing and on-going compliance maintenance
- Ensure appropriate test methods are used
- Utilize third party to determine compliance is met
- Reduce costs and time to market

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EU's Restriction of Hazardous Substances (RoHS)

EU's Restriction of Hazardous Substances (RoHS) directive law (2002/95/EC and 2011/65/EU).

Intended to reduce the large amounts of e-waste entering landfills and ease recovery efforts:

1. Lead (Pb)
2. Mercury (Hg)
3. Cadmium (Cd)
4. Hexavalent chromium (Cr6+)
5. Polybrominated biphenyls (PBB)
6. Polybrominated diphenyl ether (PBDE)

This EU directive is applicable to

- Large household appliances
- Small household appliances
- IT & Telecommunications equipment
- Consumer equipment
- Lighting equipment
- Electronic and electrical tools
- Toys, leisure, and sports equipment
- Medical devices
- Monitoring and control instruments
- Automatic dispensers
- Semiconductor devices
- Other electronics not covered by the above categories

(Red items are new categories for 2011/65/EU)

The Requirements

DIRECTIVE 2011/65/EU OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 8 June 2011 on the restriction of the use of certain hazardous substances in electrical and electronic equipment (recast)

"..maximum concentration values tolerated by weight in homogeneous materials"

Lead (0,1 %)

Mercury (0,1 %)

Cadmium (0,01 %)

Hexavalent chromium (0,1 %)

Polybrominated biphenyls (PBB) (0,1 %)

Polybrominated diphenyl ethers (PBDE) (0,1 %)

0.1% = 1000 ppm (mg/kg), 0.01% = 100 ppm (mg/kg)

Homogeneous Material

- “..cannot be mechanically disjointed into different materials.”
- “..of uniform composition throughout.”
- “..can be, in principle, separated by mechanical actions such as unscrewing, cutting, crushing, grinding and abrasive processes.”
- Mechanical Disjointing Definition Excludes Chemical Separation
- Dilution is Not the Solution!

Homogeneous Material

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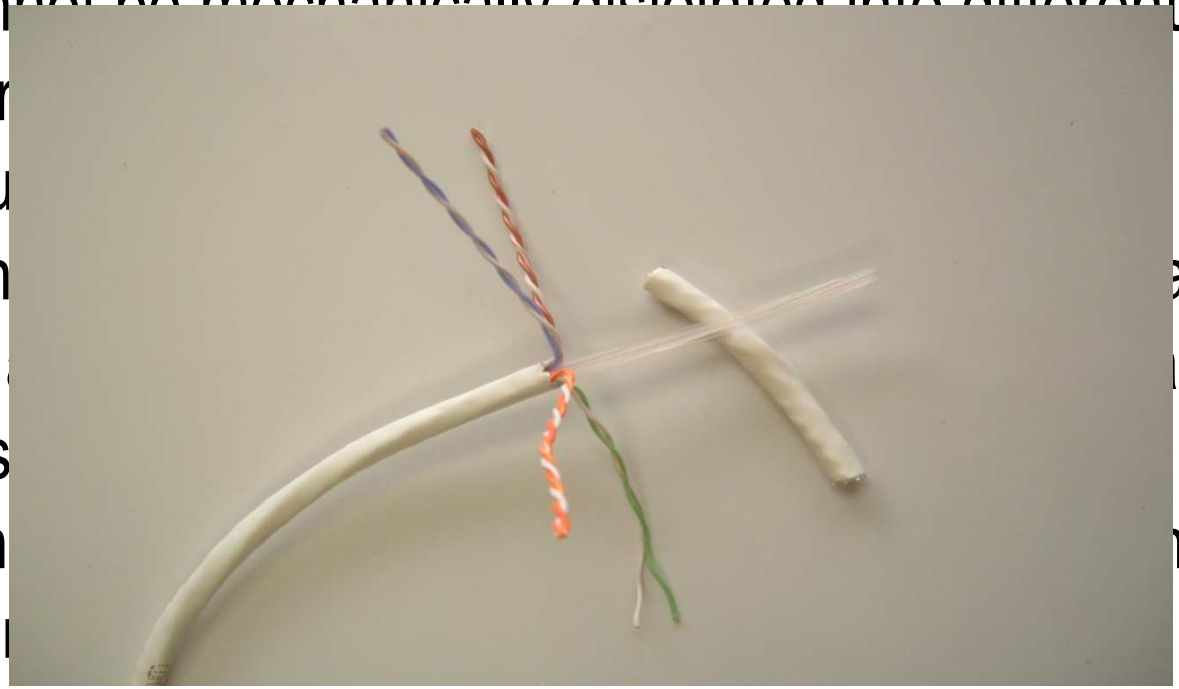
  mater
- "..of u
- "..can actions
  such and
  abras
- Mech nical
  Sepa
- Dilution is Not the Solution!



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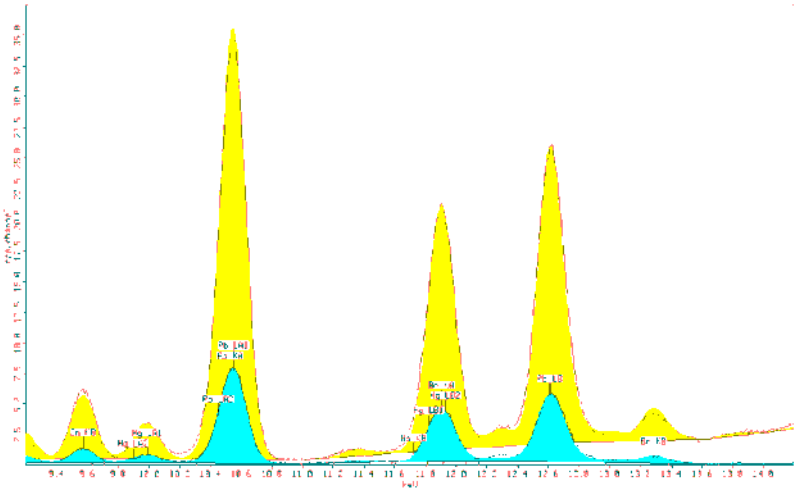
Optional RoHS Compliant “Yellow Card” Rating Certification Requirements

Based On

- EU’s Restriction of Hazardous Substances Directive 2002/95/EC, and 2011/65/EU, often referred to as RoHS & RoHS Recast
- UL Outline of Investigation UL746R, “Restricted Use Substances In Polymeric Materials”



Testing

•XRF Screening & Destructive Verification Testing per IEC 62321

(UL’s Scott MacLeod is the Co-Convenor of the IEC TC111 WG3 responsible for the 62321 test method standard.)

Deliverable and Continuing Certification

Deliverables

Certification with searchable iQ and IDES Prospector Yellow Cards.

UL LLC
333 Pfingsten Rd, Northbrook, IL, USA

Grade: 101
Acrylonitrile butadiene styrene (ABS), pellets

Flammability	Value	Test Method
Flame Rating		
1.50 mm, ALL	HB	UL 94
Electrical	**Value**	**Test Method**
Hot-wire Ignition (HWI)		UL746
1.50 mm	PLC 3	
Comparative Tracking Index (CTI)	PLC 0	UL 746
RoHS Compliance	**Value**	**Test Method**
RoHS 2011/65/EU Material (color: XX)	Compliant	UL 746R/IEC 62321

Continuing Certification

Clients will be required to show on-going compliance to these requirements during follow-up surveillance and follow-up testing.

Primary Benefits

- An easy means for specifiers and other purchasers to find plastics that meet RoHS compliance requirements
- Elimination of repetitive lot testing
- Evaluation to globally recognized standards & test methods
- Creates a level playing field for the industry by allowing companies to compete fairly against the same standard
- Ability to communicate compliance clearly and credibly from a trusted provider on leading industry databases (iQ and Prospector)
- Reduce time to market by streamlining safety evaluation with RoHS evaluation

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RoHS Compliance	**Value**	**Test Method**
RoHS 2011/65/EU Material (color: XX)	Compliant	UL 746R / IEC 62321

'The number of RoHS compliance requests have steadily increased the last several years and the increase in media savvy customers makes this option a "no brainer". Having UL act as the "independent lab" to test and add RoHS information to our yellow cards will significantly improve our customers access to this information. Many of our customers are online looking thru yellow cards and having the information right there saves them an extra step.'

Ralph Guyer
Technical Service
Ascend Performance Materials

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Conclusion

By choosing manufacturers with the Yellow Card RoHS Compliance rating, you can

- Simplify Selection of RoHS Compliant Plastics
- Heighten Confidence and Trust Through Certification
- Eliminate Costly Repetitive Testing / Declaration
- Ensure Use of Globally Recognized Standards & Test Methods
- Ensure Ongoing Compliance Through Continuing Certification

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THANK YOU

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Look for a Non-Halogenated Webinar in the coming months!