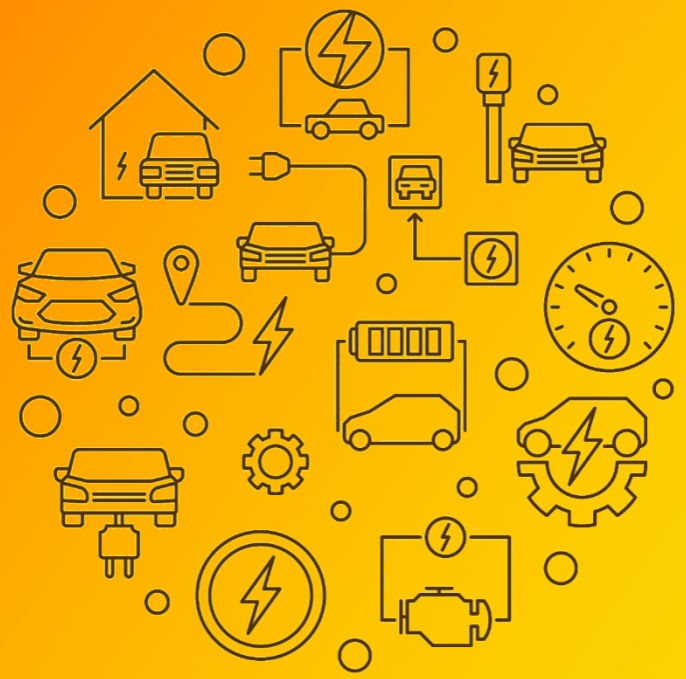
Clariant Exolit® Flame Retardants help ensure Fire Safety in E-Mobility



CLARIANT

Dr. Christian Schmidt
Global Segment Manager Thermosets
BU Additives, BL Flame Retardants
01.07.2019

what is precious to you?

CLARIANT

Addressing global megatrends E-Mobility

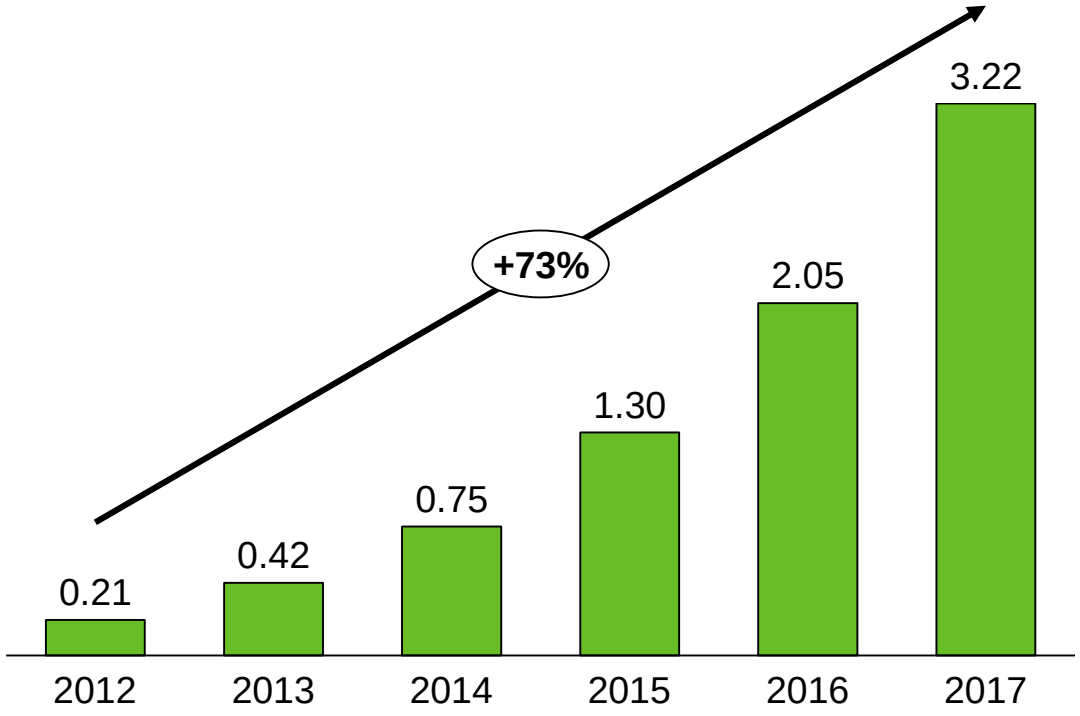
- In 2040, more than two billion automobiles will be on the roads
- New energy cars will be part of the global transport growth
- The transition towards safer, emission-free mobility can only take place with improved material properties
- Clariant has a broad portfolio of additive solutions that help to make plastics safer, look better, last longer and be more sustainable

Source: Business Insider (2016)

CLARIANT

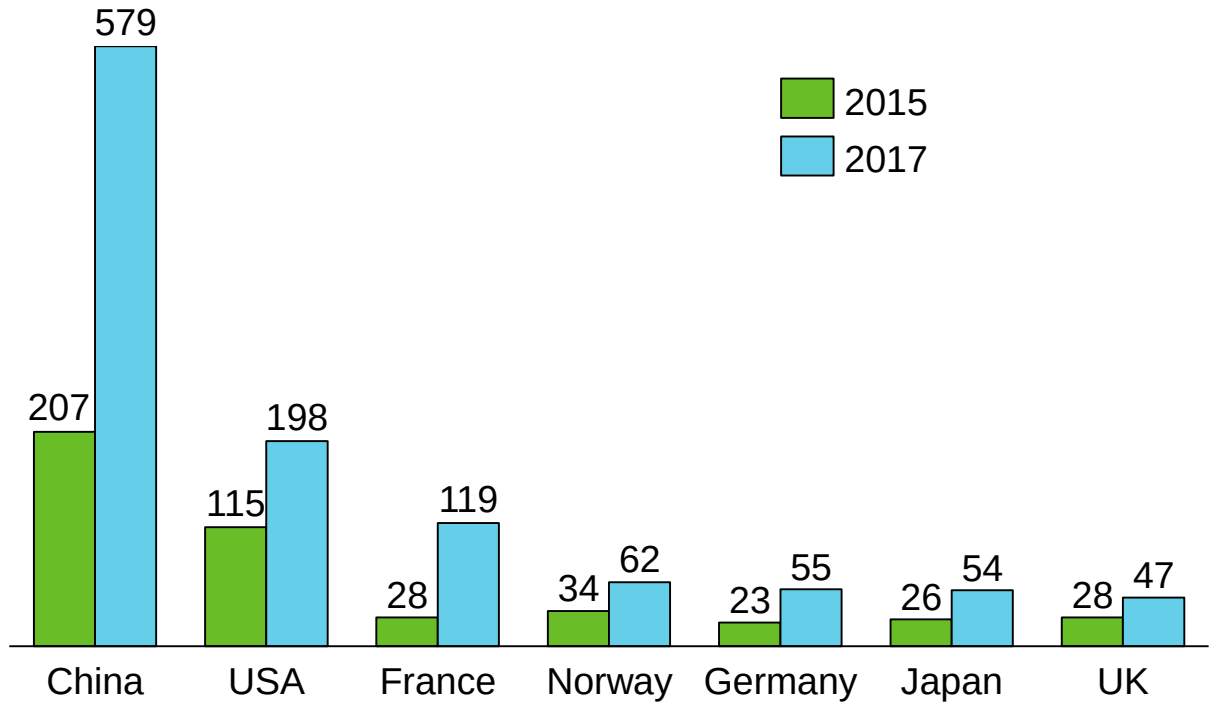
The total number of E-Vehicles has reached 3.2 mio units in 2017, forecasted at sales of 40 mio units by 2030 ~ 40% market share?

Number of electric cars (BEV + PHEV)
[million units]



BEV = battery electric vehicle,
PHEV = plug in hybrid electric vehicle

Sales of electric cars 2015 vs. 2017
[thousand units]



PLUS 7/2018, Page 1144
Source: International Energy Agency 6/18


CLARIANT
Additives solutions
FOR E-MOBILITY

CLARIANT

Exolit® OP flame retardants are recognised for their safe and sustainable chemistry

These phosphinate based flame retardants have achieved the highest sustainability standard within Clariant, the EcoTain® label:

ECOTAIN®

EXOLIT® OP 1230

EXOLIT® OP 1240

EXOLIT® OP 1400

EXOLIT® OP 930

EXOLIT® OP 935

Third party assessments have confirmed as well Exolit® OP's outstanding environmental profile

Umwelt Bundesamt

German Environment Protection Agency (UBA)

US Environment Protection Agency Design for Environment projects

ENFIRO research project funded by the European Commission

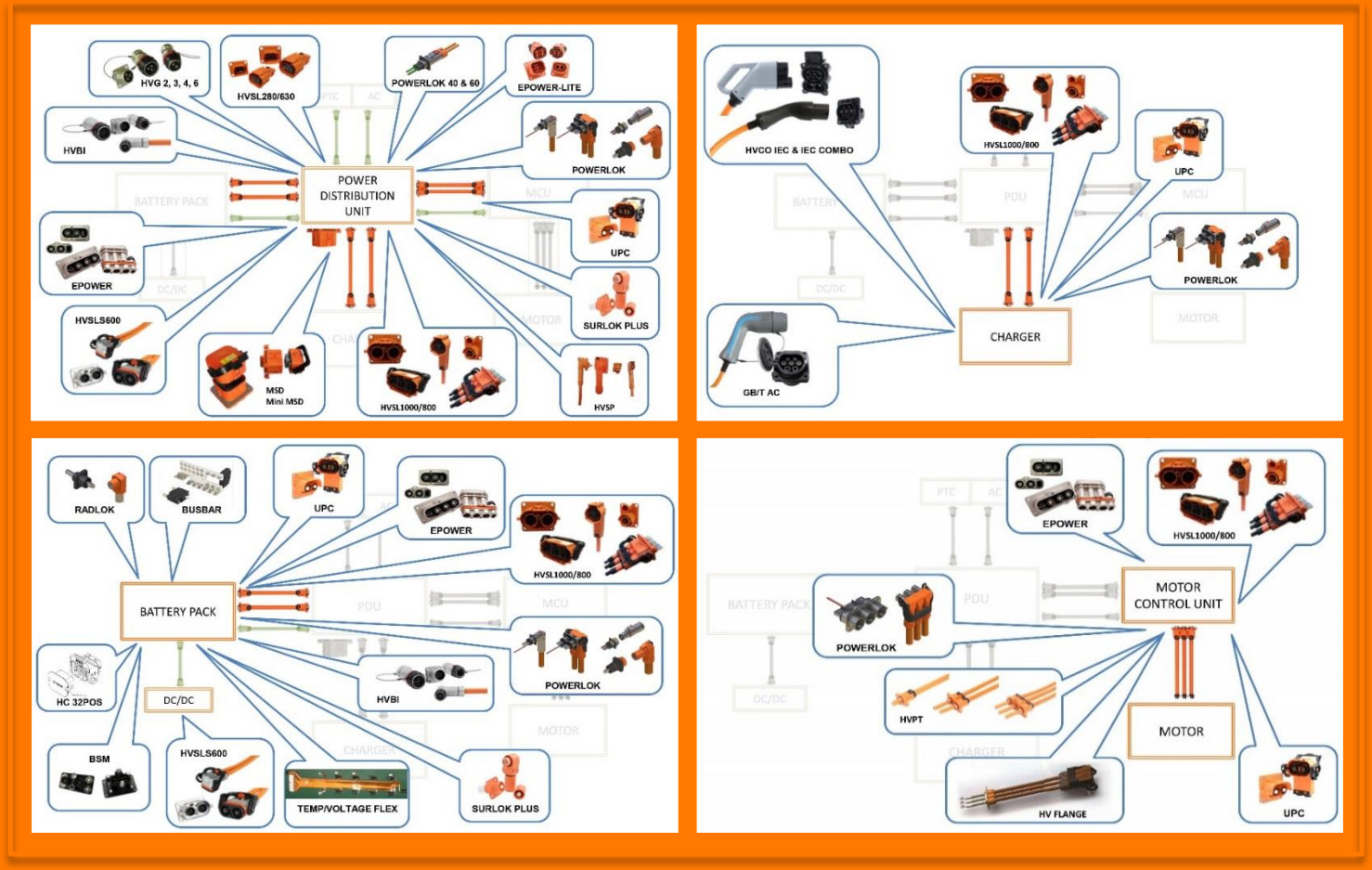
GreenScreen® Practitioner Program

GreenScreen Assessment (benchmark 3, revision 2016-10. DEPAL)

Fraunhofer UMSICHT

Marzi T., Beard A. (2006): The ecological footprint of flame retardants: A case study. Specialty Chemicals Magazine, pp. 28–30

Exolit OP Value Proposition for Engineering Thermoplastics



what is precious to you?

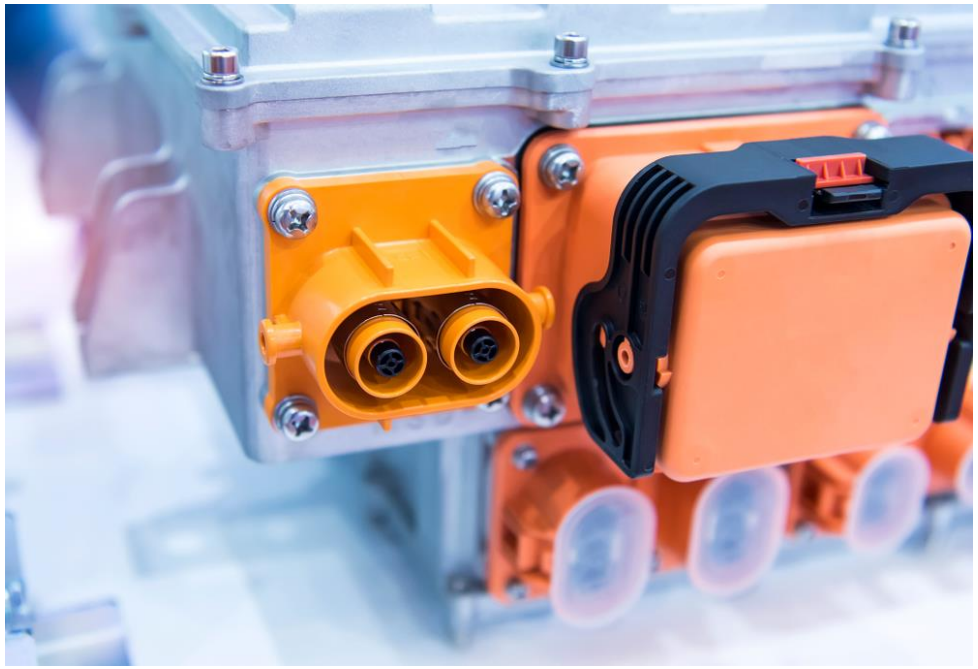
CLARIANT

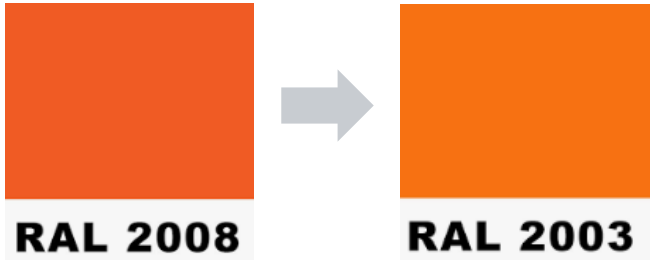
Demanding requirements for High voltage connectors

– Resins for electric connectors require:
  - Impact strength and creep resistance
  - Reliability at temperature cycles of -40°C to 150°C
  - UL 94 V0 classification
  - High Comparative Tracking Index of 600V
  - No metal contact corrosion under hot and humid condition
  - Medium weather-fastness
  - Orange color stability at elevated temperature
  - RoHS / WEEE
  - Halogen free not regulated, but strongly preferred due to excellent performance

– Materials
  - PBT, PA, PPA, PPS – FR grades

– Coloration
  - Trend to RAL 2003





CLARIANT

Value Proposition for Engineering Thermoplastics

To Compounders for high voltage connectors applications

Who want

- consistent and high quality FRs
- to use an environmental friendly chemistry that meets sustainability criteria.
- the option for recyclable compounds to follow ecological and economic megatrend
- To work with a solution that meets the demanding technical requirements of the industry

EXOLIT OP FRs are the products that…

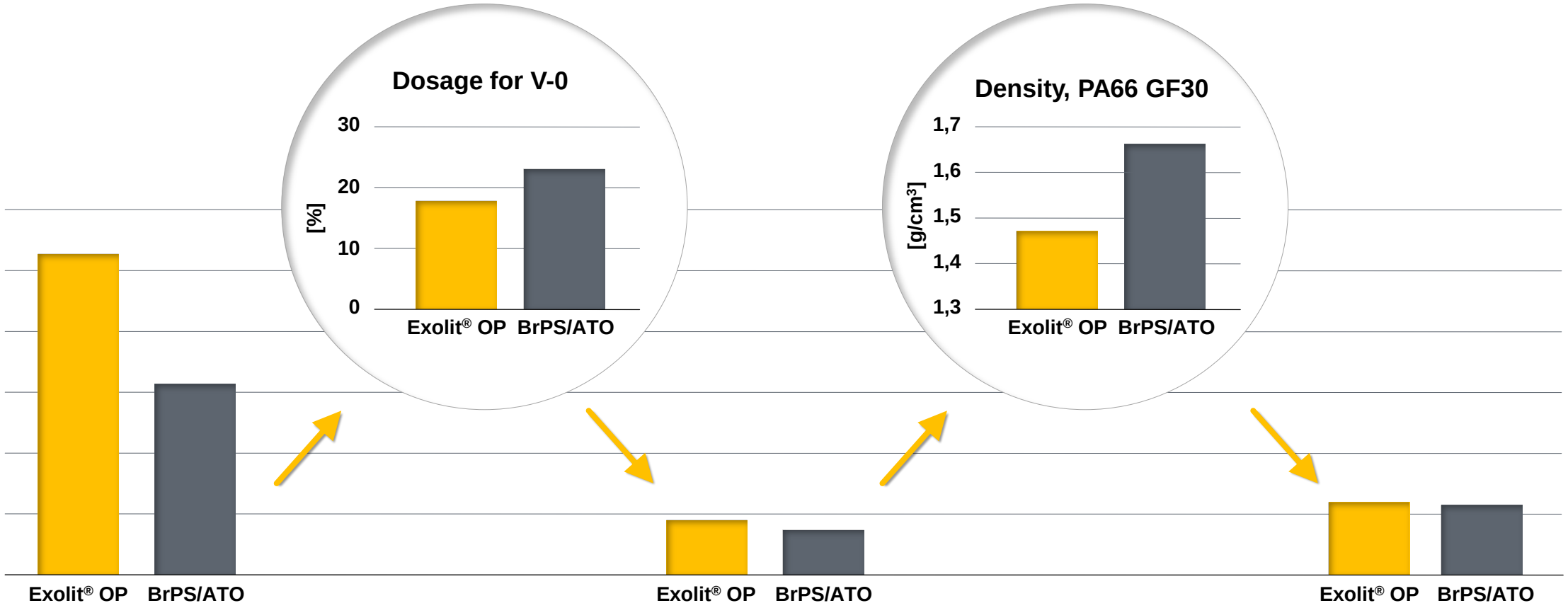
- are supplied by Clariant, a leading HFFR supplier for Engineering Thermoplastics
- use green and sustainable, halogen free chemistry with high thermal stability up to 350 °C, suitable for application even in HPPAs, fulfilling RoHS, WEEE regulations
- can be used as well in recycled post-industrial materials
- are already today widely used for high voltage connectors, offering high CTI to meet high voltage resistance and demanding electrical performance requirements from OEMs
- are state of the art solution (Exolit® OP 1400) to resolve blooming and mold deposit issue.
- compatible with various anti-oxidants to achieve good long-term thermal stabilized materials

Reasons To Believe

- V0 rating at all thicknesses
- High CTI value data (600 V CTI)
- No blooming and mold deposit solution
- Mechanical performance data
- Recipe cost comparison
- Density data
- Pinfa recycling data
- Heat aging data with Exolit OP
- CLN EcoTain label and GreenScreen benchmark 3

CLARIANT

Exolit® OP based compounds are cost-competitive to BrPS based formulations, especially in Polyamides



The price of FR pro part for brominated or Exolit® based UL94 V0 PA GF compound is similar

CLARIANT

Exolit® OP can be used for all colors compounds

PV FAST BLUE BG

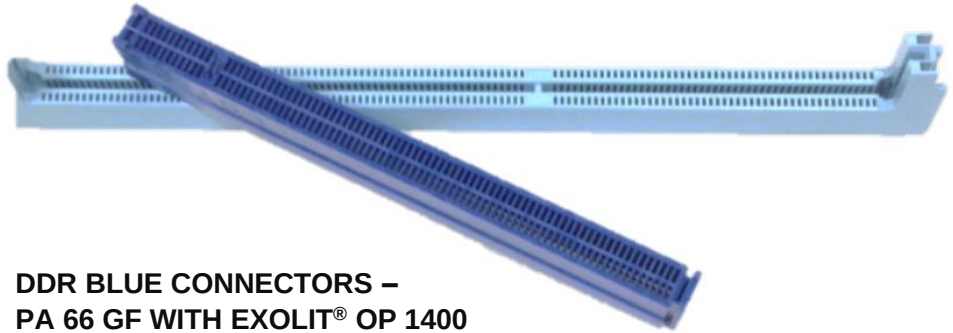
PV FAST RED B

PV FAST VIOLET RL

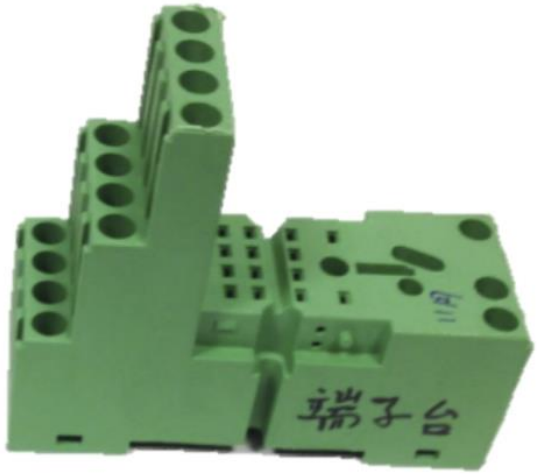
YELLOW NR

PV FAST PINK E

VIRGIN



**DDR BLUE CONNECTORS –
PA 66 GF WITH EXOLIT® OP 1400**



**CONNECTOR STATION –
PA 66 GF WITH EXOLIT® OP 1314**

AddWorks Value Proposition for polyolefin based materials

CLARIANT

Sustainable fire protection for polyolefin based materials AddWorks® LXR 920

There is a move from PVC towards TPO skin for leather/synthetic leather finish in car interiors. Unlike PVC, PP can propagate fire. PP is lighter than PVC, fulfilling lightweight requirements for e-mobility. E-car batteries will intensify flame retardancy requirements.

CUSTOMER NEEDS

- PP performing at least as good as PVC, including good protection against possible fire caused by batteries overheating
- Sustainable environment in car interiors
- Aesthetics

ADDWORKS LXR 920

- Halogen-free flame retardant for polyolefin based materials
- Efficient flame retardancy at low concentration
- Maintains mechanical and optical properties of final articles
- High compatibility, low migration in polyolefin films
- Fulfils stringent fire safety standards

Exolit Value Proposition for Thermosets and Polyurethanes

CLARIANT

A preferable flame retardant for flexible polyurethane foams Exolit® OP 560

Non-halogenated Exolit® OP 560 is an excellent choice for upholstering anything from car seats to padded doors, headliners and panels. It has been confirmed as a preferable flame retardant for polyurethane foams by the US Environmental Protection Agency (EPA).

Benefits

- Lower fogging and VOC values
- Meeting stringent emission standards in the automotive industry
- High efficiency
- High polymer compatibility
- Reduced risk to health and environment

CLARIANT

Ideal solution for advanced epoxy based composites for transportation Exolit® EP 360 & Exolit® EP 390

Exolit® EP 360 & Exolit ® EP 390 are liquid non-halogenated flame retardants based on phosphorus. They can be used for advanced composite application for transportation addressing lightweight requirements for e-mobility.

Benefits

- Broad epoxy resin compatibility
- Lower viscosity compared to alternative solutions
- Non halogenated flame retardant with epoxy functionality (Exolit EP 360)
- Enabling to fulfil the required flame retardant performance at a low dosage

CLARIANT

The values that guide us to success

WE DISCOVER – driven by a deep curiosity for innovative solutions.

WE MAKE IT HAPPEN – delivering excellent quality in time.

WE PLAY TO WIN – in the markets we are active in.

WE COLLABORATE – knowing the value of real team play and partnership.

what is precious to you?

CLARIANT

Dr. Christian Schmidt
Global Segment Manager Thermosets
BU Additives, BL Flame Retardants
01.07.2019

what is precious to you?