

CHEMISTRY THAT MATTERS™



BLUEHRO™ SOLUTIONS FOR EV BATTERY RELEVANTS, EVSE WITH THERMOPLASTICS

BLUEHERO™ 电动汽车电池相关与新能源充电装备材料解决方案

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A NEW SABIC INITIATIVE



SABIC AT A GLANCE

SABIC 简介



1976

Company
established
公司成立



31,000

Employees
around the world
全球员工



50

Countries
of operations
运营国家



10,090

Global patents and
pending applications
全球应用应用专利



4.67

US\$ bn

Estimated
Brand Value*
品牌价值

84.9

US\$ bn

Total
Assets
资产总值

6.15

US\$ bn

Net
Income
净收入

46.6

US\$ bn

Annual
Revenue
财政收入



≈ 150

New products
each year
约150新产品



66

World-class
plants worldwide
全球公司排名

MEGATREND 市场趋势

- World striving for a clean air economy in response to climate change goals

以应对气候变化全球全力实现清洁空气的经济为目标

Electricity increasingly vital part of energy mix for our planet's future

为了我们所住星球的未来，电气化在未来的能源结构中越来越重要

- Seeing seismic shift in automotive to Evs

汽车向电动汽车转化发生了翻天覆地的变化

- **Benefits (优势)** : Significant GHG reduction, energy savings for consumers and reduced manufacturing complexity for OEMs

显著减少温室气体，为消费者节约能源，并降低设备制造商的制造复杂性

Industry challenges: Reducing lead time and cost, improving performance and safety, overcoming industry legacy of ICE vs EV technology & manufacturing

工业挑战：相比较传统内燃机汽车，缩短开发周期，降低成本，提升安全性能以应对电动汽车技术和制造。



A NEW STRATEGIC INITIATIVE- BLUEHERO™ 新的战略举措- BLUEHERO™

- Embodies our commitment to **enable electrification** and achieve a lower carbon future, starting with automotive

体现我们实现电气化和实现低碳的承诺

Translates our commitment into action through an expanding **ecosystem of materials, solutions, and expertise**

通过不断扩大的材料、解决方案和专业知识的生态系统平台，将我们的承诺转化为行动



<https://www.sabic.com/en/bluehero>

SABIC APPROACH SABIC方案 - SERIVE MODULE 服务模式

INDUSTRY NEEDS

工业需求

- 1 **Fire safety – prevent thermal runaway**
火烧安全- 阻止热失控
- 2 **Reduce complexity – reduce weight and cost**
降低复杂性-减重，降本
- 3 **Reduce environmental impact**
减少对环境的影响

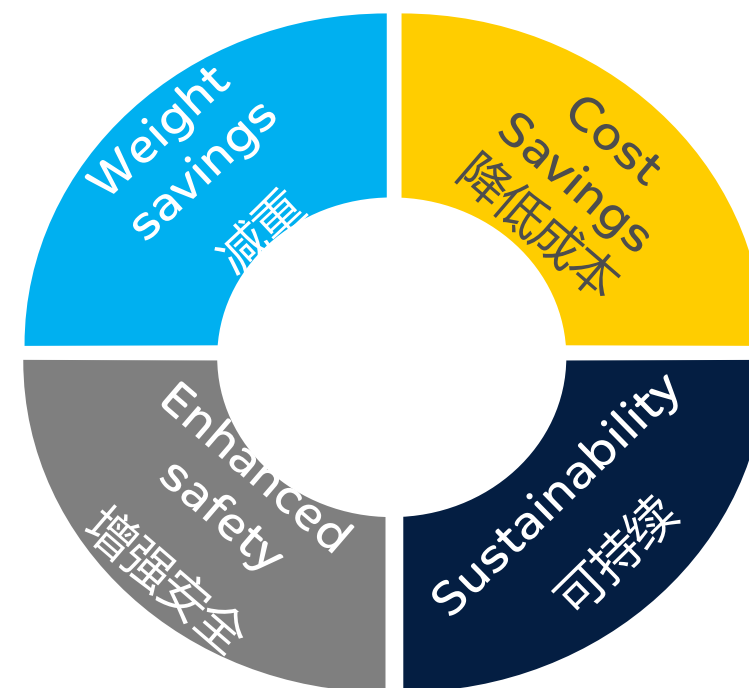
BLUEHERO ECOSYSTEM

BLUEHERO™ 生态系统



VALUE TO CUSTOMERS

客户价值体现



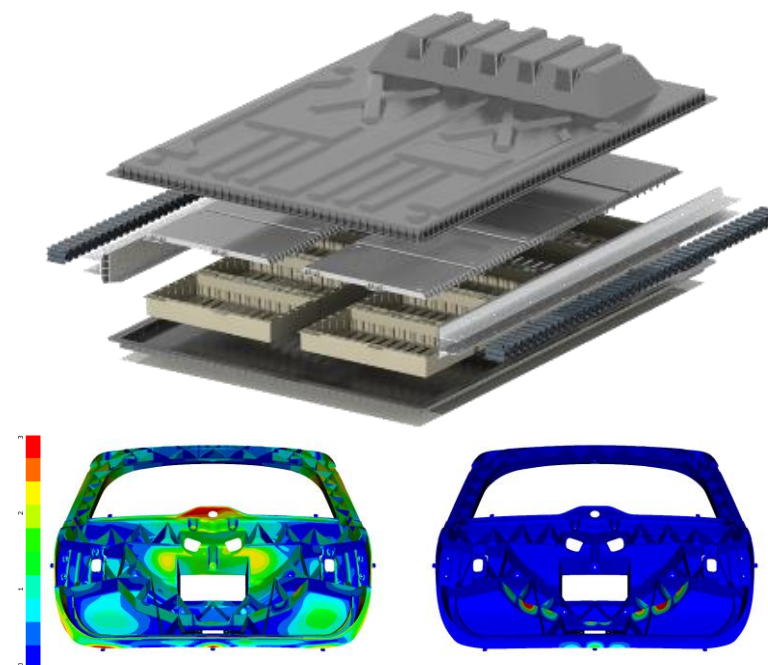
Work with customer to understand their current architecture and challenges
同客户一起了解现有结构和面临的挑战

Novel materials, ready to apply solutions and engage experts for bold new solutions
新型材料，可应用的解决方案，专家一起提供的新解决方案

Enable our customer to optimize their battery pack and create value
赋能于我们的客户以优化电池包，创造价值

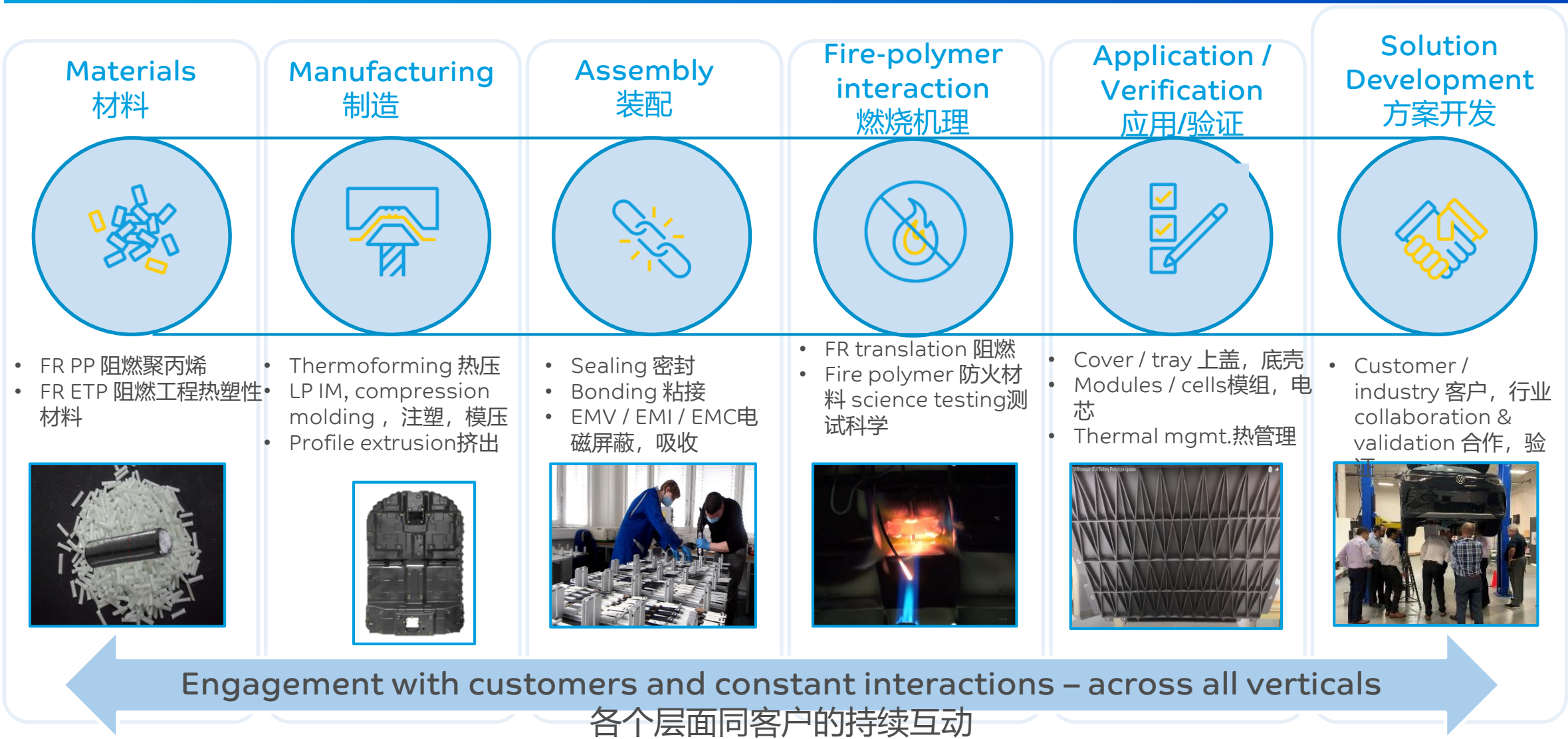
SABIC ONE-STOP TECHNOLOGY SOLUTION

SABIC 一站式技术解决方案



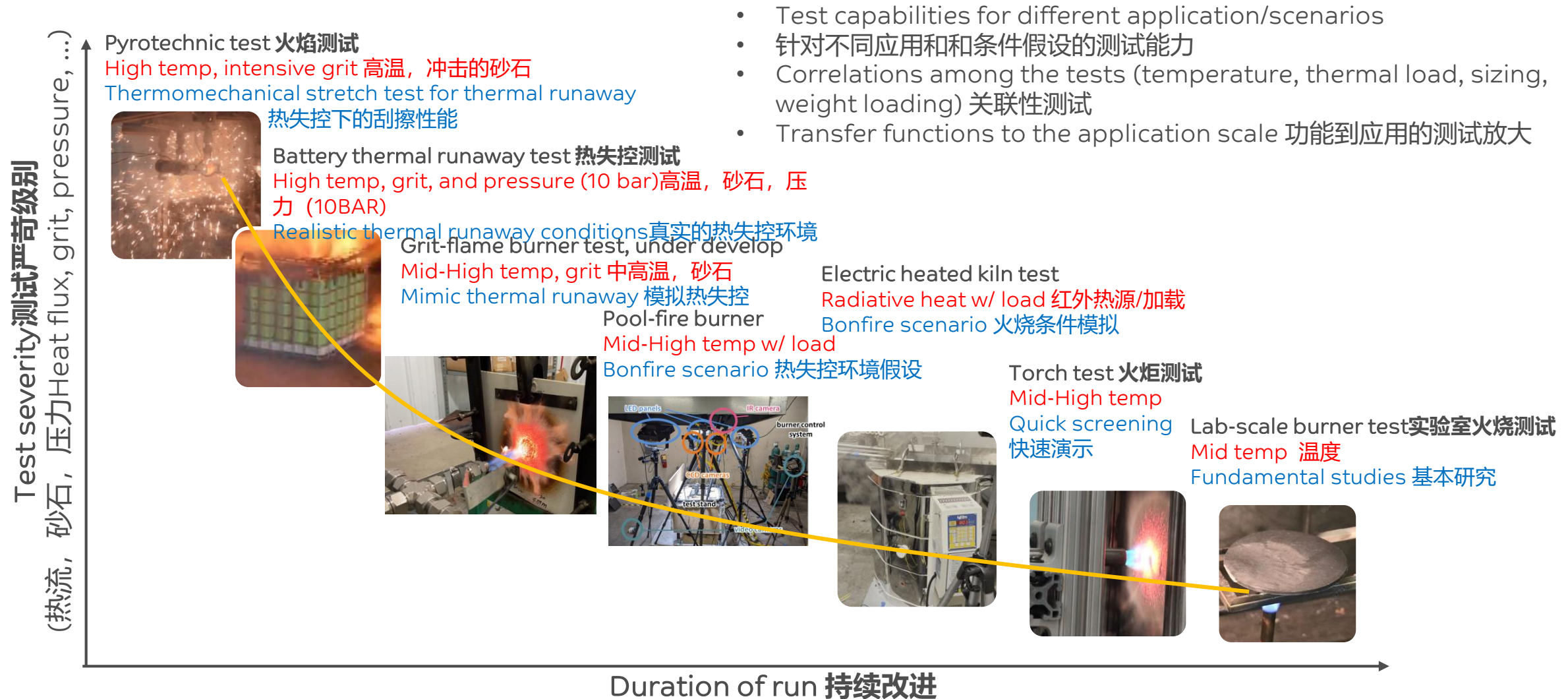
➤ Professional design and CAE capabilities to provide customers with technical feasibility solutions
专业的设计和分析能力为客户提供解决方案的技术可行性分析

BEYOND PARTS 远超产品- A HOLISTIC SYSTEMS ENGINEERING APPROACH 整体系统工程方案

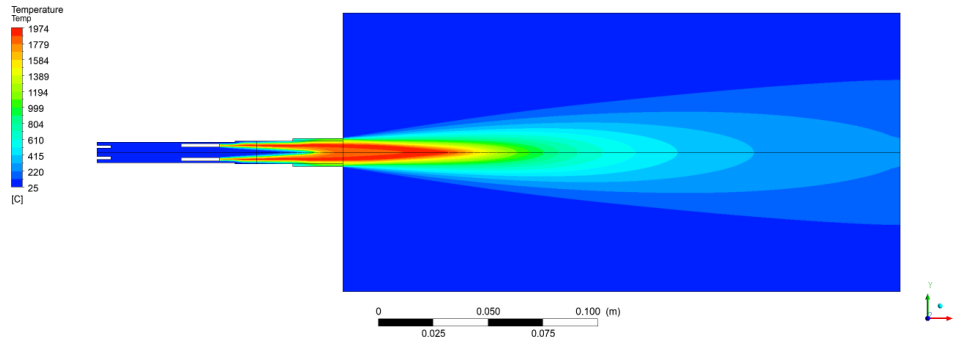


FIRE TEST FACILITIES, PURPOSES, AND CORRELATIONS

火烧测试设备，目标，关联性

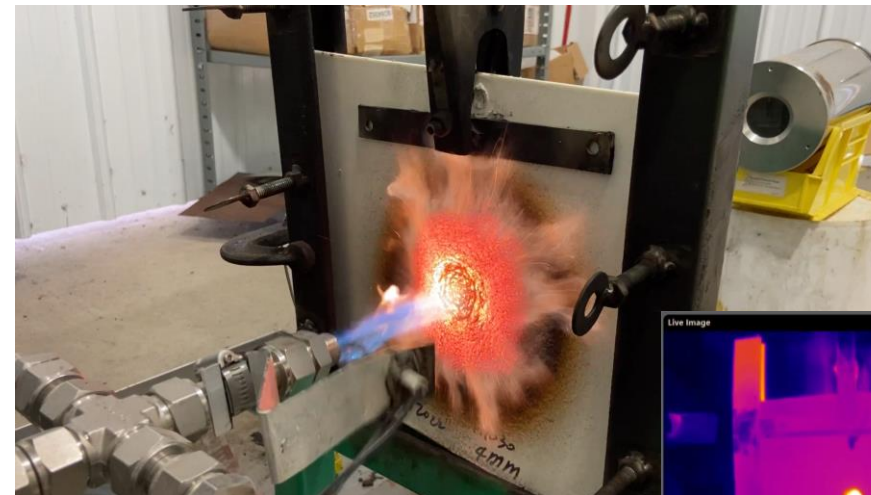
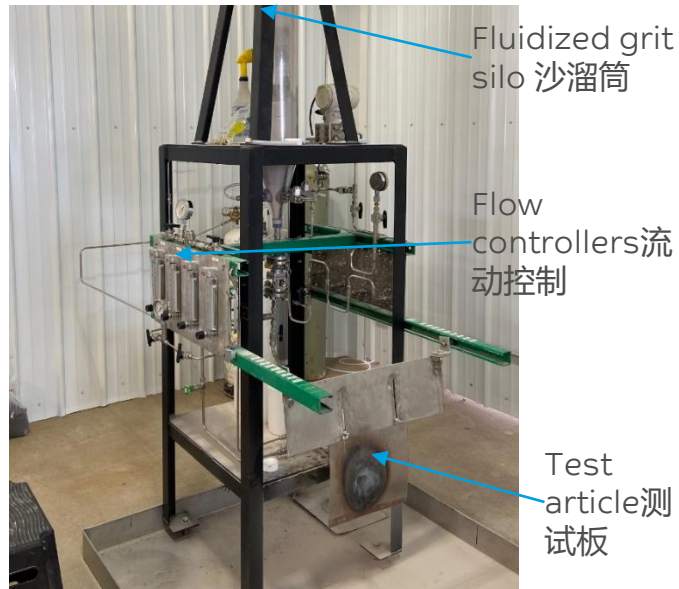


GRIT-FLAME BURNER FOR TRA CONDITION TEST AT SABIC 砂石的火烧测试



- Grit media: Al_2O_3 particles 砂石: Al_2O_3
- Particle size: 100-400 micron 尺寸: 100-400 微米
- Grit flow rate: 1-5 g/s 流速: 1-5 g/s
- Burner type: air/propane flame 火烧类型: 空气/丙烷
- Heat duty: 5000-12000 W 能量: 5000-12000 瓦

Grit-flame testing facility 砂石火烧测试设备

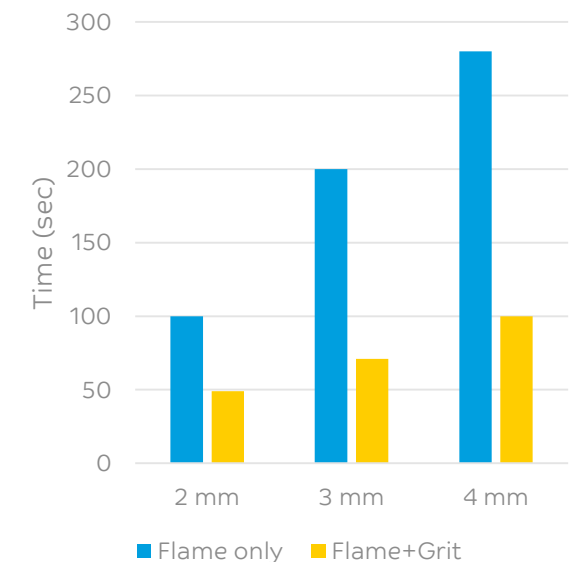


Grit-flame test on 4mm H1030
[砂石火烧测试@4.0mm H1030](#)



烧穿时间

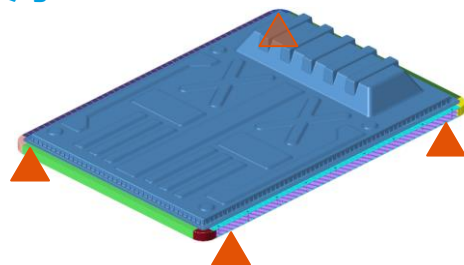
Burn-through time



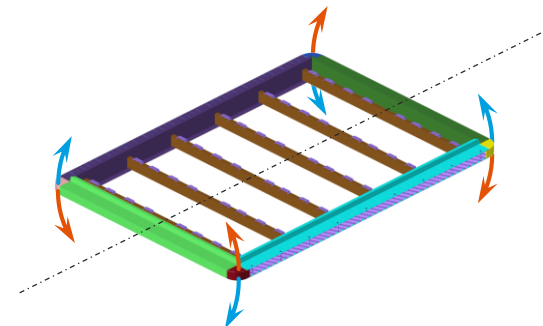
VALIDATION OF STRUCTURAL PERFORMANCE

Static Requirement 静态要求

Bending / Gravity stiffness
弯曲, 垂直刚性

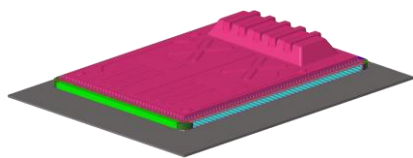


Torsional stiffness
扭转测试



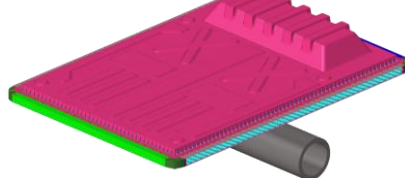
Impact Requirement 冲击要求

Drop test
跌落测试



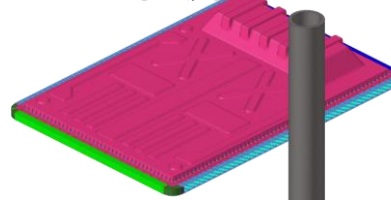
- Drop height 1m
- No failure in the module

Underbody impact
底部撞击



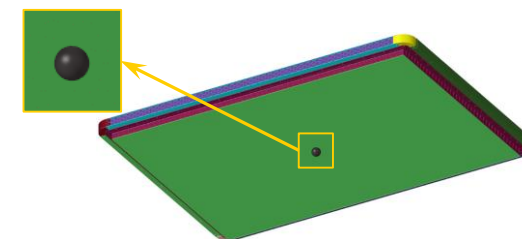
- Impact velocity 2.2m/s
- No failure in the module

Side pole impact
碰撞测试



- Impact velocity 32km/hr
- No intrusion in the battery module

Puncture resistance
穿刺测试



- 1 kg sphere at 6m/s
- No failure in the floor pan

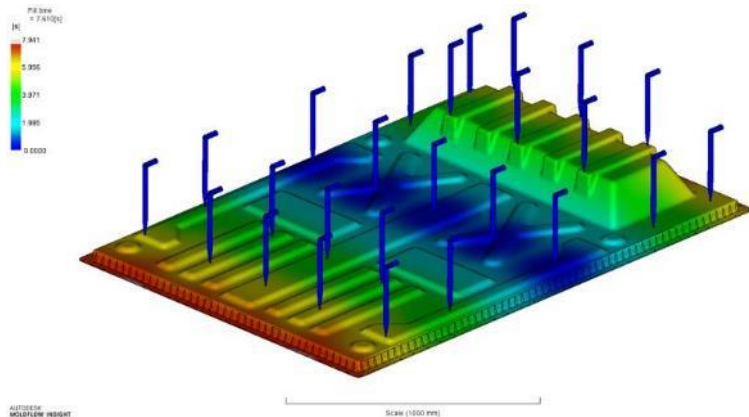
➤ Plastic-intensive battery pack with thermoplastics meets requirements for severe impact
热塑性电池包需要满足严格的冲击要求

ECONOMICALLY-DRIVEN MANUFACTURING TECHNOLOGIES 经济考量-生产技术

Low Pressure Injection Molding

低压注塑

2500 to 3500 T machines 注塑机



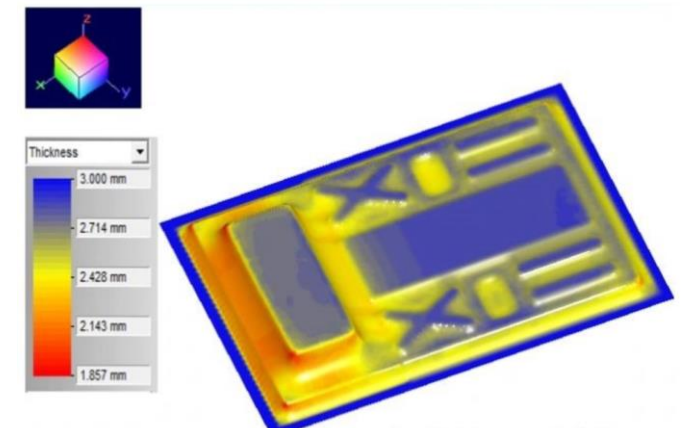
- Complex ribbed parts 复杂的结构产品
- Warpage correction capability 变形改善
- Structural foam capability 结构件发泡

Compression Molding 模压成型



- Long glass fiber reinforcement
- 长玻纤增强
- Deep drawn parts 深的拉伸
- Low warpage 低的变形量

Thermoforming 热压成型



- Simple geometries 简单结构
- Low volume series 小批量
- Low cost prototyping 模具成本低

ON THE ROAD: PHEV BATTERY COVER – HONDA 本田电池上盖

Global industry-first use of a **thermoplastic solution** to meet **stringent fire safety requirements** (GB 18384-2020)

全球第一个量产的热塑性 电池包上盖方案，满足严苛的火烧安全要求 (GB18384-2020)



Part size产品尺寸: 1600 mm x 1000 mm x 200 mm



- **40% lighter** vs. metal solution 相比较金属减重40%
- **Large 1.6 m** injection molded part 1.6米长，注塑部件
- **Non-halogenated flame retardant** PP 无卤阻燃
- **Elimination of thermal blankets** 移除了隔热毯
- In-built **electrical insulation** 电气绝缘
- **Sustainable** lower CO₂, extended range 低的CO₂ 排放
- **Cost savings** by avoiding sec. treatments 避免二次加工，成本降低

EV BATTERY PACK MODULE END CAP: JLR 捷豹路虎电池模组端盖

Global industry first use of plastic solution for structural module component in EV battery pack replacing a die-cast aluminum part offering

全球第一个塑料替代铸铝合金的模组结构件

- Superior fire performance Vs .Aluminum& other FR plastics
- 优良的防火性能Vs 铝合金和其他阻燃材料
- Up to 10% cost saving Vs die-casting aluminum
- 相比较铸铝10%以上的降本
- Up to 10% weight reduction Vs. die-cast aluminum
- 相比较铸铝10%以上的减重
- Enhanced structural , thermal and electrical insulation
- 增强结构， 热性能和电器绝缘
- Elimination of serval secondary operations 减少二次加工
- Signification sustainability benefits 显著的可持续应用的优势
- Sets important precedent for use of thermoplastics in stringent battery applications 针对热塑性材料方案提前介入电池应用方案



RECENT SUCCESSES : NEWER ELECTRICAL APPLICATIONS 成功案例，新的电气类应用

Busbar of High Voltage batteries 汇流排



Representative* picture

- SABIC FR PPc resin SABIC 阻燃PP
- Flame retardancy 阻燃
- Orange color 橙色

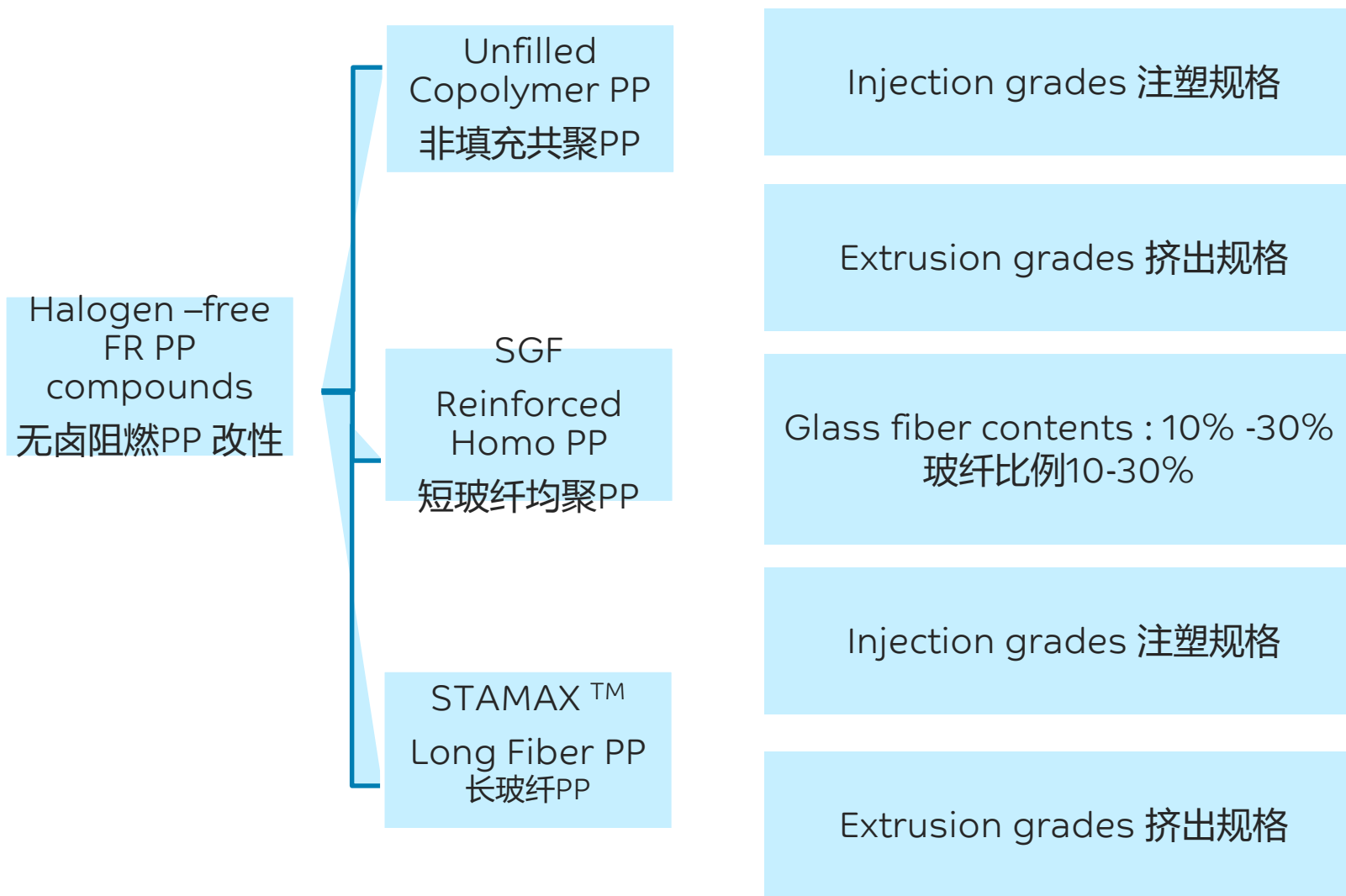
High Voltage connectors 高压连接器



Representative* picture

- SABIC VALOX™ PBT resins SABIC PBT
- > 600 V CTI , good HDT 高的热变形温度, CTI600
- Orange color 橙色
- Flame retardancy 阻燃

SABIC FR PP COMPOUNDS OFFERING SABIC 阻燃聚丙烯



SABIC FR ETP OFFERING

CYCOLOY™	LEXAN™	VALOX™
FR PC/ABS	FR PC	FR PBT (PBT/PC, PBT/PET)
Grades for enclosures: 壳体规格 - Enclosures 壳体 - Modules 模组	Glass fiber-un/filled grades for: 玻纤, 非增强 - Enclosures 壳体 - Cylindrical cells 圆柱电芯	Glass fiber-un/filled grades for: 玻纤, 非增强 - Connectors 连接器 - Enclosures 壳体 - Battery tray 电池底壳
Typical Features¹ and Benefits: 主要特性, 优势 • Aesthetics 外观 • Dimensional stability 尺寸稳定 • Thin wall FR capability • Balanced impact and flow 薄壁 • Low halogenated portfolio incl. Blue Angel & TCO99 低卤 • Molded in color 配色	Typical Features¹ and Benefits: 主要特性, 优势 • High Impact & Ductility 高冲击性 • Transparency 透明 • Higher thermal stability than 耐热 CYCOLOY™ • Dimensional stability 尺寸稳定 • Non-Brominated & Non-Chlorinated Flame Retardant 无卤阻燃 • Molded in color, Visual FX capability 配色 • Broad color capability 颜色丰富	Typical Features¹ and Benefits: 主要特性, 优势 • Electrical Properties 电性能 • Improved Chemical resistance vs amorphous resins 抗化学 • Lower water absorption compared to PA 低吸水 • RTI 130°C RTI130C • High CTI performance 高CTI

EVSE MATERIAL SOLUTIONS

新能源充电设备材料选择

You wish material to meet:
你希望材料满足:



MAIN TECHNICAL REQUIREMENTS OF EVSE

新能源充电设备的主要技术要求

1 Mechanical properties 机械性能

Charging Gun 充电枪

- Repeat plugging and unplugging 重复插拔
- Drop test (-30 °C storage>16h), 8 times without damage. Vehicle crushing and impact testing 摔枪测试 (-30 °C 存放>16h), 8 次无损坏。车辆碾压及冲击测试

Charging pile 充电桩

- Drop Ball Impact Test (Non-Breaking) 落球冲击测试 (无破坏)
- IK test IK 测试

2 Flame retardant 阻燃性能

Charging Gun 充电枪

- GWIT 带电部件灼热丝: 850±10°C
- other part 其余部件: 650±10°C

Charging pile 充电桩

- UL94 V0

3 Weathering 耐候性能

Charging gun&pile 充电枪&桩

- UL746C F1 (NA 北美)

Charging pile 充电桩

- High and low temperature cycle test 高低温循环测试 (-30 to 50°C, 3h, 2 cycles)
- Low temp testing 低温测试 (-30°C / 16h)
- Humidity test 湿热测试 (40 °C, 93%RH / 9h)

4 Electrical insulation 电绝缘

Charging gun 充电枪

- Prevent electrical short circuit in case of external contaminants 有外部污染物情况下防止电短路
- resistance to the loop voltage and avoids internal short circuits 对回路电压具备足够的抵抗穿击能力，避免内短路

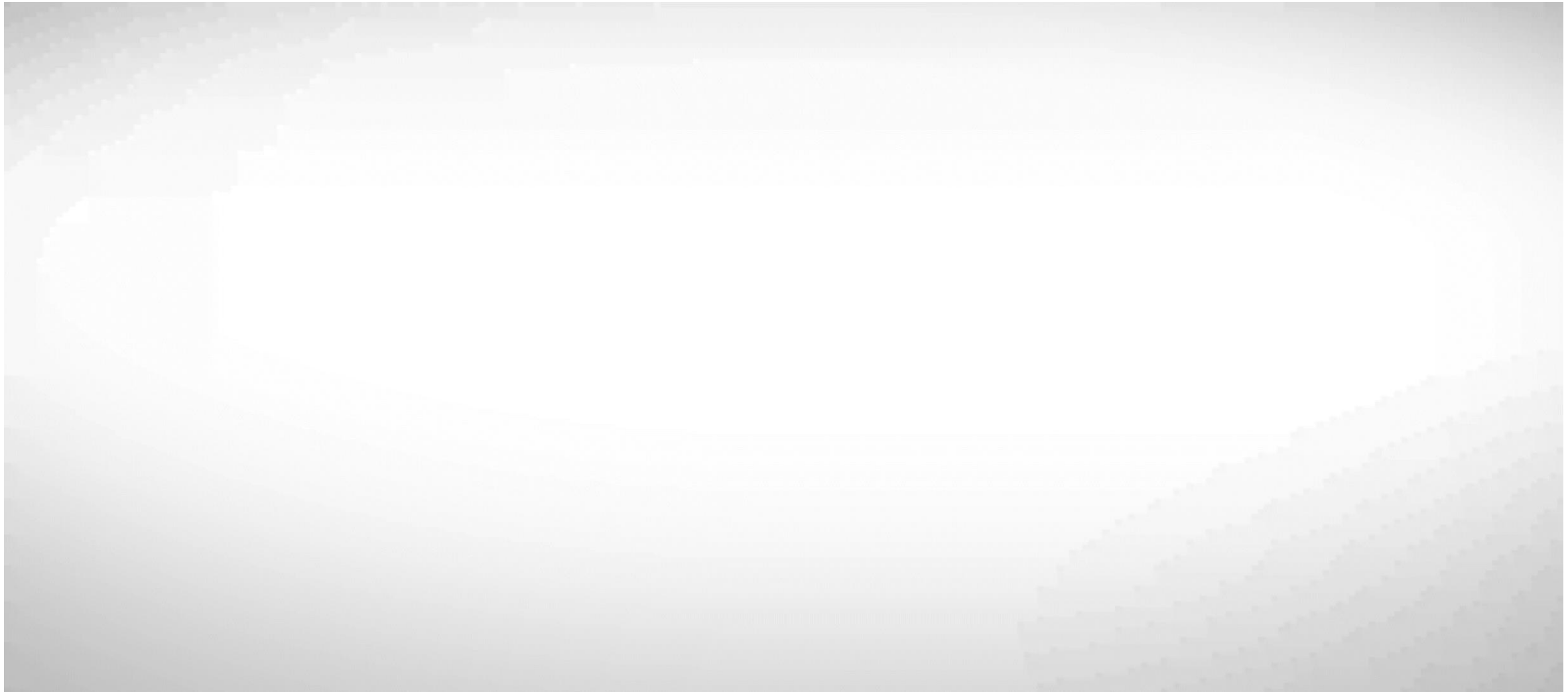
5 Heat resistant 耐高温

Charging gun 充电枪

- Structure part thermal resistance after heat aging 支撑带电部件: 125°C
- Other parts 其余部件: 80°C
- Ball pressure test 球压测试
- Drop test under high and low temp 高低温跌落测试

➤ SABIC is committed to supplying materials that meet the different technical requirements of EVSE
SABIC 致力于提供满足新能源充电设备不同技术要求的材料

SABIC 直流充电桩设计方案



SABIC EVSE MATERIAL SOLUTION

SABIC 充电设备材料解决方案

Charging coupler 连接器和充电枪:



Connector 充电枪

- VALOX™ 357X
- VALOX™ V3900WX
- LEXAN™ 945DU

Charging pile 充电桩:

Display 显示面板

- LEXAN™ LUX

Connector & Socket 连接器和插座

- VALOX™ 357U

Frame 框架

- LEXAN™ 505RU

Fascia 盖板

- VALOX™ 357U
- VALOX™ V3900WX
- LEXAN™ BY2710X
- LEXAN™ 945DU

Bumper 缓冲软触

- XENOY™ CL100

Console 支架

- LEXAN™ 945U
- CYCOLOY™ CY6310

SABIC MATERIALS MEET GLOBAL INDUSTRY STANDARDS FOR EVSE

SABIC 材料符合电动车充电装置的行业标准

SABIC material solutions suitable for global charging device industry standards:
适用于不同国家充电装置行业标准的SABIC 材料解决方案:

China 中国

Charging pile 充电桩:

GB/T 18487

Electric vehicle conduction
charging system

电动车辆传导充电系统

NB/T 33008

Electric vehicle charging
equipment inspection test
specifications

电动汽车充电设备检验试验规范

Charging Gun 充电枪:

GB/T 20234

电动汽车传导充电用连接装置

Connection device for conductive
charging of electric vehicles

US 美国

Charging pile 充电桩:

UL 2594

Electric Vehicle Supply
Equipment 电动汽车供电设备

UL 2202

Electric Vehicle (EV) Charging
System Equipment 电动汽车充
电设备

Charging Gun 充电枪:

UL 2251

电动汽车插头、插座和耦合器

Plugs, Receptacles, and

Couplers for Electric Vehicles

EU 欧洲

Charging pile 充电桩:

IEC 61851

Electric vehicle conductive
charging system 电动汽车传导
充电系统

Charging Gun 充电枪:

IEC 62196

Plugs, socket-outlets, vehicle
couplers and vehicle inlets -
Conductive charging of
electric vehicles 插头、插座、
车辆耦合器和车辆入口 - 电动汽
车的导电充电

JAPAN 日本

Charging pile 充电桩:

IEC 61851

Electric vehicle conductive
charging system
电动汽车传导充电系统

SUSTAINABLE MATERIAL SOLUTIONS
FOR EVSE

SABIC 充电设备可持续材料解决方案

SABIC 的可持续材料-开创多个行业先例

OUR JOURNEY SO FAR... MANY FIRSTS

PROVEN SOLUTIONS

经验证的解决方案

**MASS
BALANCE**
chain of
custody
聚合物的质量
平衡监管体系



2014

2014



**D4R WITH
TF-BOPE**
克服传统PE薄膜局限性的
单一材料解决方案



2019



2019

**CERTIFIED
RENEWABLE
POLYCARBONATE**
经认证的来自第二代可再
生原料聚碳酸酯



2019

2019



**CLOSED
LOOP**
与Tesco战略合作
作闭环回收项目



2020

2021



**PCR
COMPOUNDS**
高达70%物理回收的
聚合物产品



2021

2021



**CIRCULAR
PRODUCTS**
based on
**OCEAN
PLASTIC**
基于海洋塑料的
循环产品



2021

**CERTIFIED
RENEWABLE
PE & PP**
来自第二代生物基
原料认证可再生 PE
&PP

**CERTIFIED
CIRCULAR
PE & PP**
经过认证的
PE&PP 回收材料

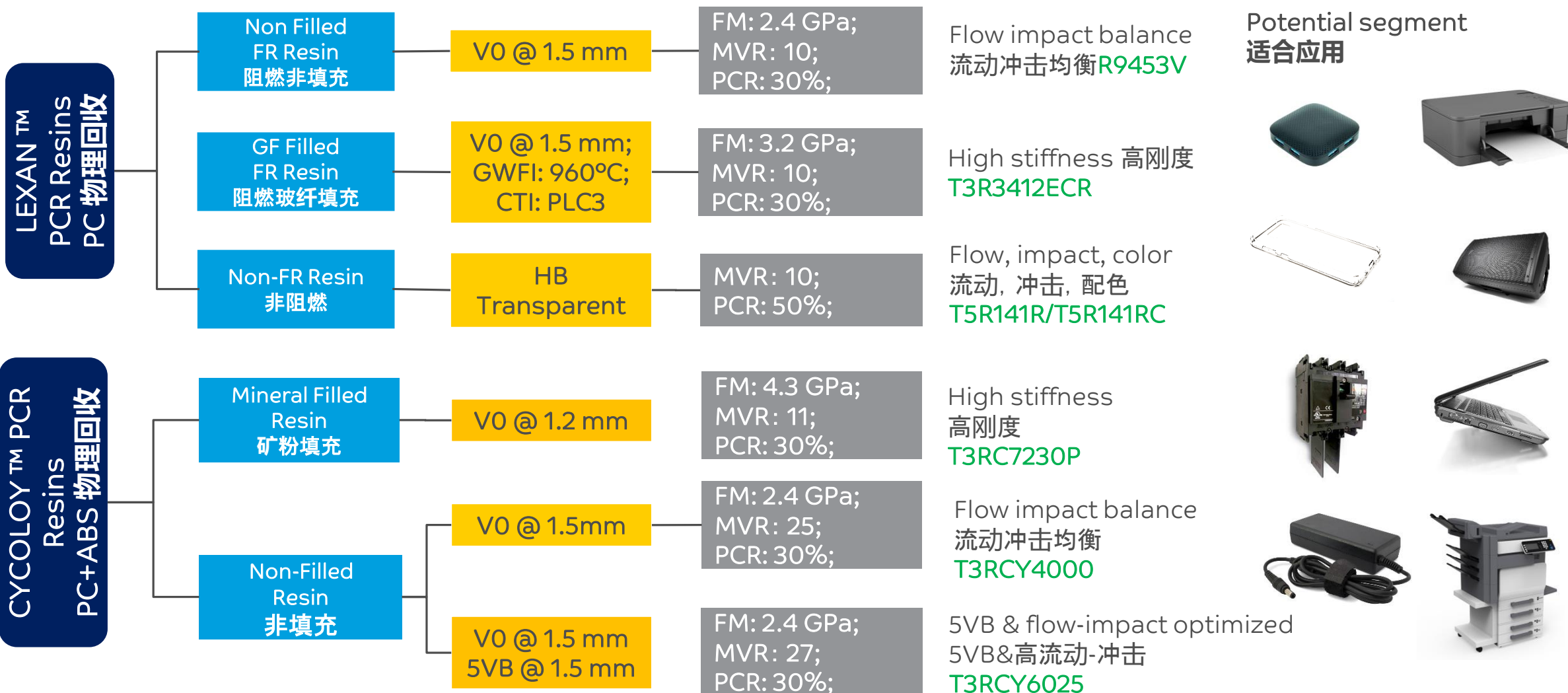
**CERTIFIED
RENEWABLE
CHEMICALS**
经认证的可再生化
学回收价值链

**CIRCULAR
PRODUCTS**
based on
**OCEAN BOUND
PLASTIC**
基于海洋环保塑料的循
环产品

**CERTIFIED
RENEWABLE
PRODUCTS**
经认证的二代基
于使用过的食用油
可再生产品

ETP 物理回收产品线

ETP PCR PORTFOLIO – LEXAN™ & CYCOLOY™ RESIN



SABIC 热塑性材料ISCC认证

SABIC ETP ISCC+ CERTIFICATE

ISCC PLUS Certificate

Certificate Number: ISCC-PLUS-Cert- DE129-35310534

TÜV NORD CERT GmbH
Am TÜV 1,
45307 Essen, Germany

certifies that

SABIC Innovative Plastics (China) Co., Ltd.

**No.1, Plastic Road, Western Industrial District, Nansha ETDZ
511458 Guangzhou, Guangdong Province
China**

complies with the requirements of the certification system

**ISCC PLUS
(International Sustainability and Carbon Certification)**

This certificate is valid from 07.01.2022 to 06.01.2023

The site of the system user is certified as:

Compounding Plant
Trader

The scope of the certificate includes the following chain of custody options:
(not applicable for paper traders)

Mass balance

Essen, 07.01.2022

Place and date of issue



Stamp, Signature of issuing party

The issuing Certification Body is responsible for the accuracy of this document.
Version / Date: 1 (no adjustments) / 07.01.2022

Annex to the certificate:

Sustainable materials handled by the certified site

(This annex is only applicable for material handled under the scopes: farm/plantation, point of origin, central office, (farm/plantation or point of origin) first gathering point, processing unit (any type) but not for material that is only traded and/or stored)

This annex is only valid in connection with the certificate:

ISCC-PLUS-Cert- DE129-35310534 issued on 07.01.2022

Input material	Output material	Add-ons (voluntary) ¹⁾	ISCC waste process applied ²⁾	SAI/ FSA ³⁾	FEFAC ⁴⁾
Circular PC grades (mixed plastic waste)	Circular PC blends (mixed plastic waste)	None	Yes	N/A	N/A
Bio-circular PC grades	Bio-circular PC blends	None	Yes	N/A	N/A

¹⁾ ISCC PLUS add-ons (voluntary application, see www.iscc-system.org for further information):

- 202-03: SAI Gold
- 205-01: GHG emission requirements
- 205-02: Consumables
- 205-03: Non GMO for food and feed
- 205-04: Non GMO for technical markets

²⁾ Yes: The raw material meets the ISCC definition of waste or residue, i.e. it was not intentionally produced and not intentionally modified, or contaminated, or discarded, to meet the definition of waste or residue

No: The raw material complies with the ISCC Principles 1 – 6 for the cultivation of sustainable biomass

³⁾ Farm Sustainability Assessment (FSA) was developed by the Sustainable Agriculture Initiative (SAI)

SAI Silver Compliance: ISCC Compliant material can be claimed as "Equivalent to FSA 2.1 Silver"

SAI Gold Compliance: ISCC Compliant material incl. add-on SAI Gold can be claimed as "Equivalent to FSA 2.1 Gold"

⁴⁾ FEFAC: European Feed Manufacturers' Federation. ISCC compliant materials can be claimed as "in line with FEFAC soy sourcing guidelines 2015"

The issuing Certification Body is responsible for the accuracy of this document.
Version / Date: 1 (no adjustments) / 07.01.2022



THANK YOU

