Amphenol APG

Automotive Products Group

Company Profile

Since 1996
S & K Electronics



APG Automotive Product Group

Amphenol Tuchel Electronics

- **Amphenol-Tuchel Electronics**
  - Interconnect components safety restraint systems
  - High-Power-Connectors
  - EV/HEV Full interconect system supplier
  - Customer specific solutions

»Konfektion E«

- **Konfektion E**
  - Harness solutions for Automotive with special requirements and performance
  - Customer special solutions

FILEC

- **Filec**
  - Harness solutions for Automotive
  - Customer special solutions

Cemm thomé
AMPHENOL APG

- **Cemm Thomé**
  - Interconnect systems for vehicle lighting
  - LED Exterior and Interior lighting

Since 1996
S&K Electronics



APG Automotive Product Group

Amphenol Tuchel Electronics

»KonfektionF«

FILEC

Cemm thome

AMPHENOL APG


Heilbronn / Germany


Ostrov / Czech R.


Nogales / Mexico


Pune / India



Canton / USA


Changzhou /China


El Fahs / Tunisia


Martklustenau/Germany


Ostrov / Czech R.


Staré Sedlisté / Czech R.


Presov / Slovakia


Airvault / France


El Fahs / Tunisia


Chanzhou /China



Monterrey / Mexico


Presov / Slovakia


Shouzuh /China

Since 1996
S & K Electronics



CEMM SIP

Key customers: Vehicle Manufacturers



Key customers: Tier 1 System suppliers



Product Overview



Since 1996
S & K Electronics



Automotive

Cable Assemblies and Overmouldings for

- **Power Train**
- **Passenger Comfort**
- **Passenger Safety**





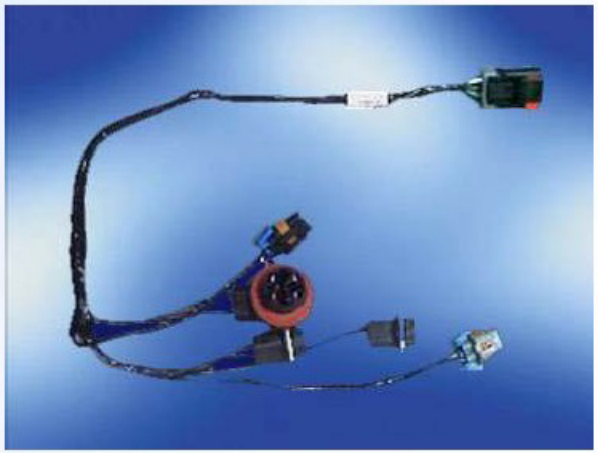




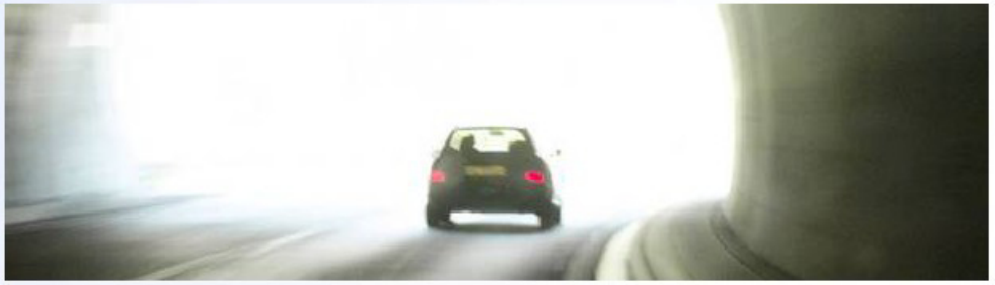
Automotive

Cable Assemblies and Overmouldings for

- Power Train
- Passenger Comfort
- Passenger Safety







Automotive

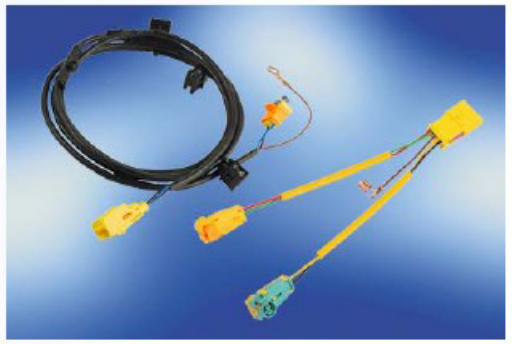
Connectors and Cable Assemblies for

- **Saftey Restraint Systems Connectors and Cable Assemblies**





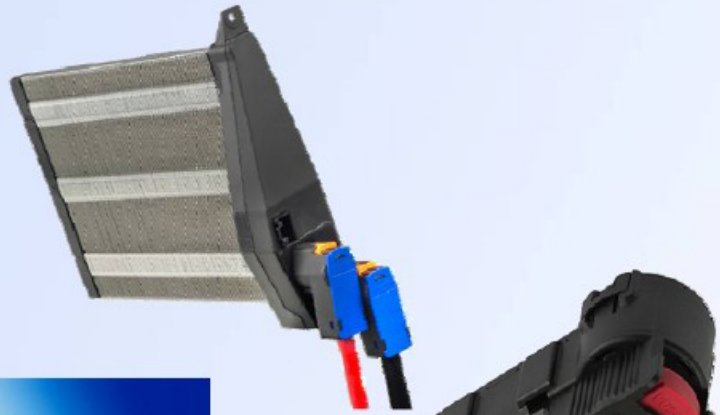




Automotive

RADSOK® High Current Connectors for the Automotive Industry











	field of application / current	mating force	reference applications	current designs
RADSOK® 3,6 mm system 	ampacity 125A @ 23°C 88A @ 85°C 60A @ 120°C category temp. 150°C surface gal Ag	9N ±5N	- MIDIFUSE -Battery management	180°holder as well as 90° crimp holder for cables up to 16mm²
RADSOK® 6,0 mm system 	ampacity 160A @ 23°C 110A @ 85°C 75A @ 120°C category temp. 150°C surface gal Ag	21N ±10N	- Busbar - Power - management - Power module - PTC / heater - Fuse boxes - Charging cables	90° crimp holer for 10mm2 - 25mm2 cables
RADSOK® 8,0 mm system 	ampacity 260A @ 23°C 180A @ 85°C 125A @ 120°C category temp. 150°C surface gal Ag	30N ±12N	- Power managment - Powermodul - Battery cables - Changing Cables	90° Crimpholder for 35mm2 - 50mm2 cables

High power Automotive applications

- Current distribution system
- Battery management systems
- Fuse boxes
- Battery charging systems
- PTC Heating systems
- Air conditioning systems
- Electrical power steering
- X by wire
- Starter Generator
- Storage element



Solutions for Hybrid Powernet









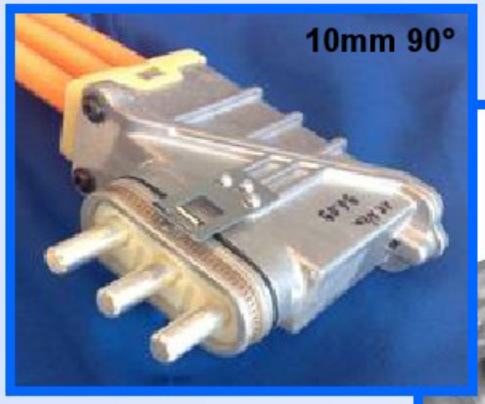


Modular Interface Solutions

- **Example: High Voltage Distribution Unit (HVDU) by using Amphenol HVC 3,6mm and HVC 8mm**



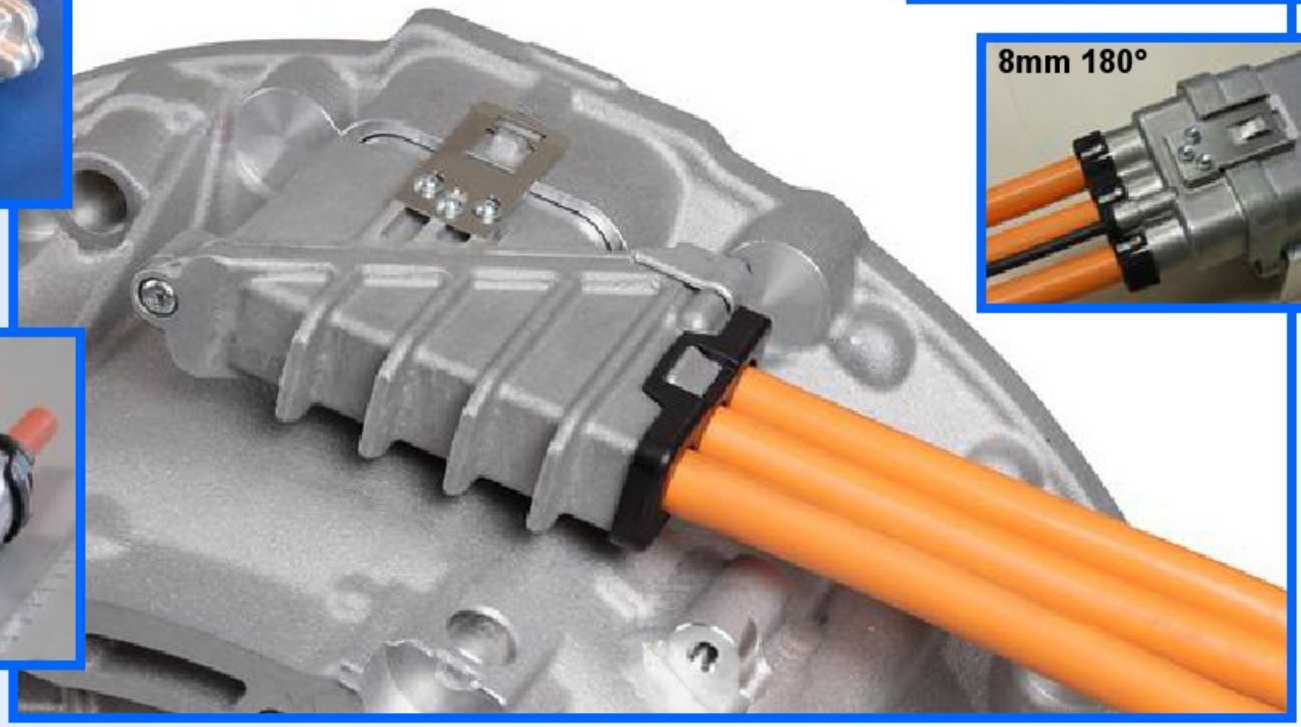
Transmission Connector Solutions











Since 1996
S & K Electronics



Hybrid Interconnection Systems

- **Manual Service Disconnect with / without Fuse**







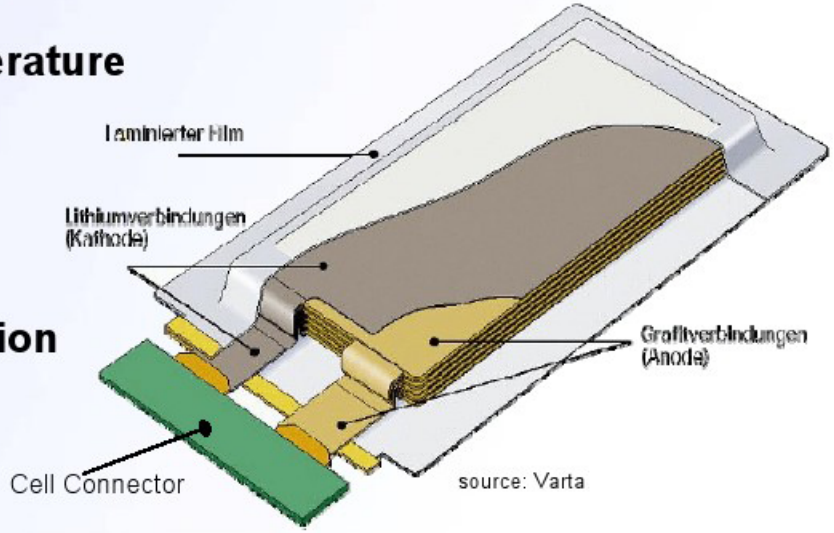


Cell Connectors

- **Mix of Materials**
  - Nickel plated steel (-)
  - Aluminium (+)
- **High conductivity**
  - High conductivity of base materials
  - ultra low resistance welding technology
- **Sensitive mating**
  - no torque, low forces & limited temperature
- **Tolerance handling**
  - alignment during assembly process
- **Flexibility**
  - compensation of temperature elongation
- **Integrated Cell Balancing access**



source: A123, li-Tec, SB-LiMotive



source: Varta

Cell Connectors

- **Task: Provide suitable cell connector parts with mixed materials (e.g. copper & aluminium)**



- **Technologies**
  - **Ultrasonic Welding**
    - Implementation of new welding process in Heilbronn (ultrasonic welding of aluminium & copper alloys)
    - 790 connections per battery pack
  - **Press-fit Technology (Cold welding)**

- **Task: Integrate cell monitoring**
  - **Integrated cell monitoring in welding process**
  - **Add signal layer PCB as mechanical and electrical component => integrated concept**

ECTA – Connection System









ECTA Series

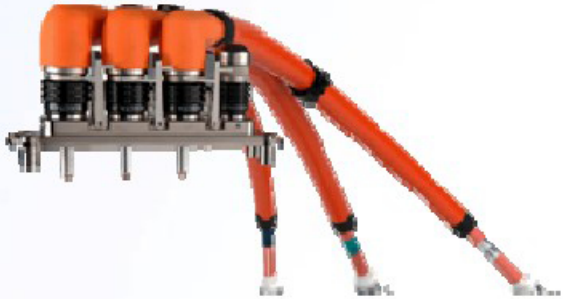
- Sealed
- Shielded
- IP class: IP6k9K











ECTA – Connection System

Serial applications



Porsche Cayenne Hybrid



VW Touareg Hybrid



Daimler S400 Hybrid

- Flange plate 3+1 for Power ECU Bosch
- Power connector 301
- Pilot connector 107



Porsche Panamera Hybrid

Amphenol EV APG Charge Plug Family

SAE J1772™ (also IEC 62196-2-1)
1. Charge Plug — Single Phase 16 or 30/32A
   up to 70A possible
2. Receptacle / Vehicle inlet

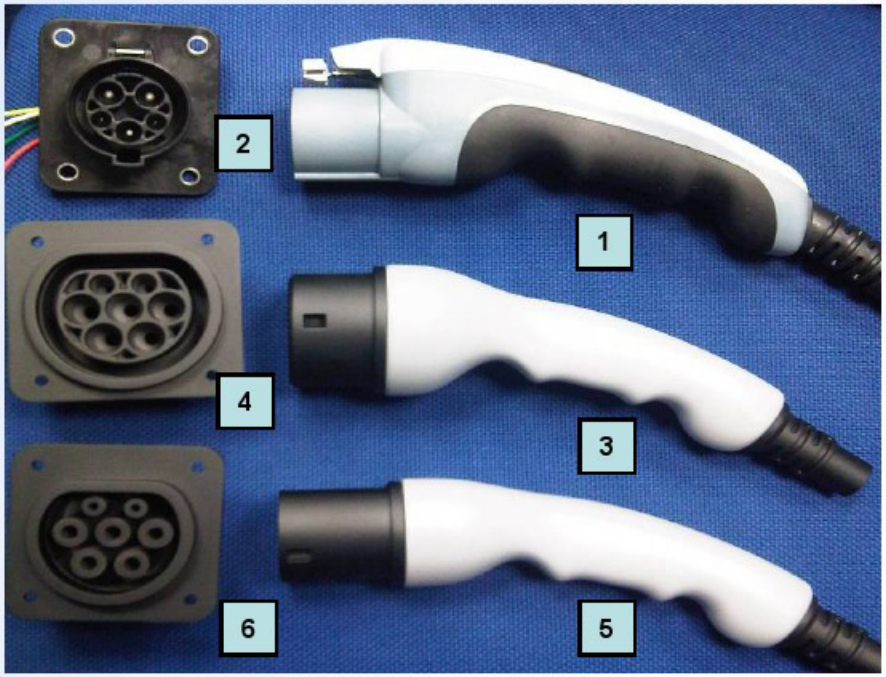
IEC 62196-2-2
3 Phase up to 63A

3. Vehicle Connector
4. Vehicle Inlet
5. Infrastructure plug
6. Infrastructure receptacle

GB standard – China
AC charging 1 (3) -phase up to 63A

7. Inlet / receptacle (female contacts)
8. Plug / Connector (Pin contacts)

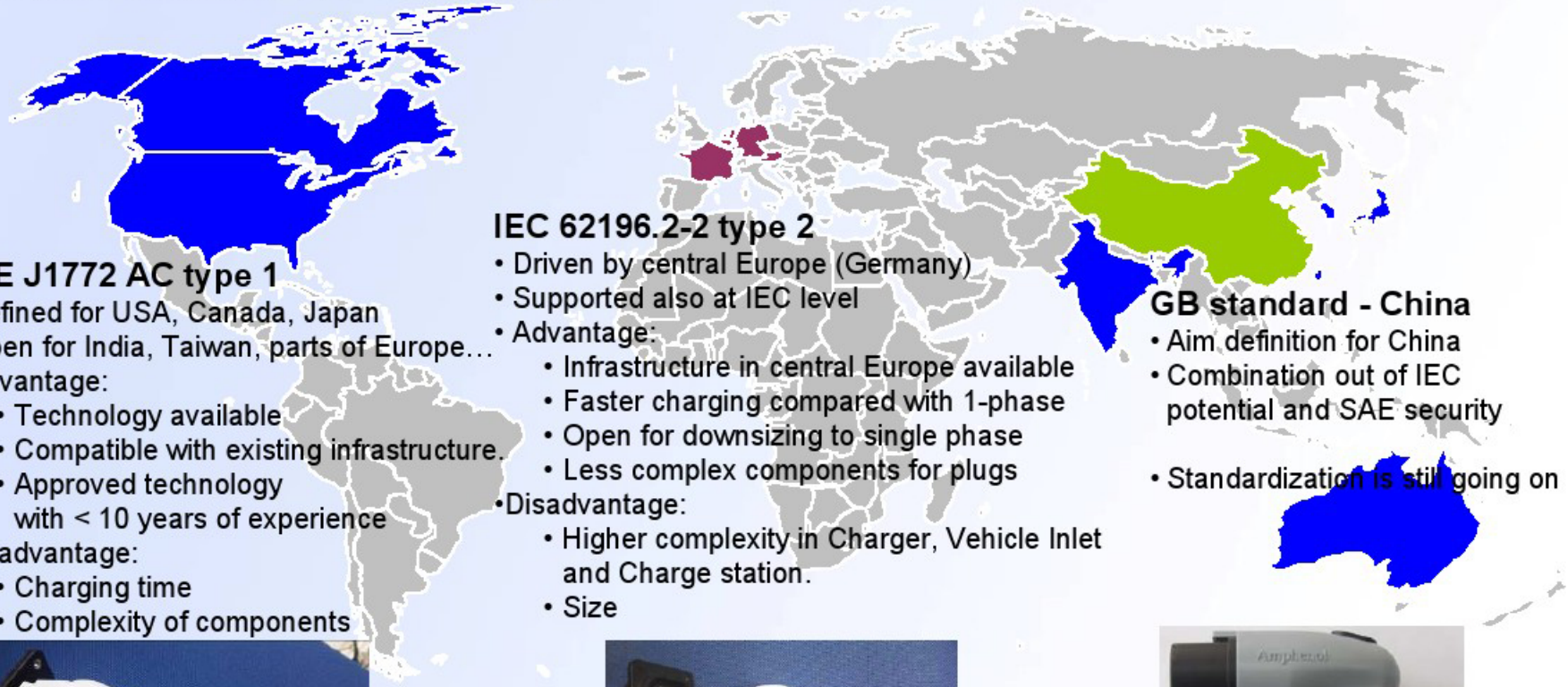
+ several design options for DC fast charge and variants of the APG EV plugs and inlets.





EV Plug In Market Overview

Market Situation AC chargeing:



SAE J1772 AC type 1
- Defined for USA, Canada, Japan
- Open for India, Taiwan, parts of Europe…
- Advantage:
  - Technology available
  - Compatible with existing infrastructure.
  - Approved technology with < 10 years of experience
- Disadvantage:
  - Charging time
  - Complexity of components



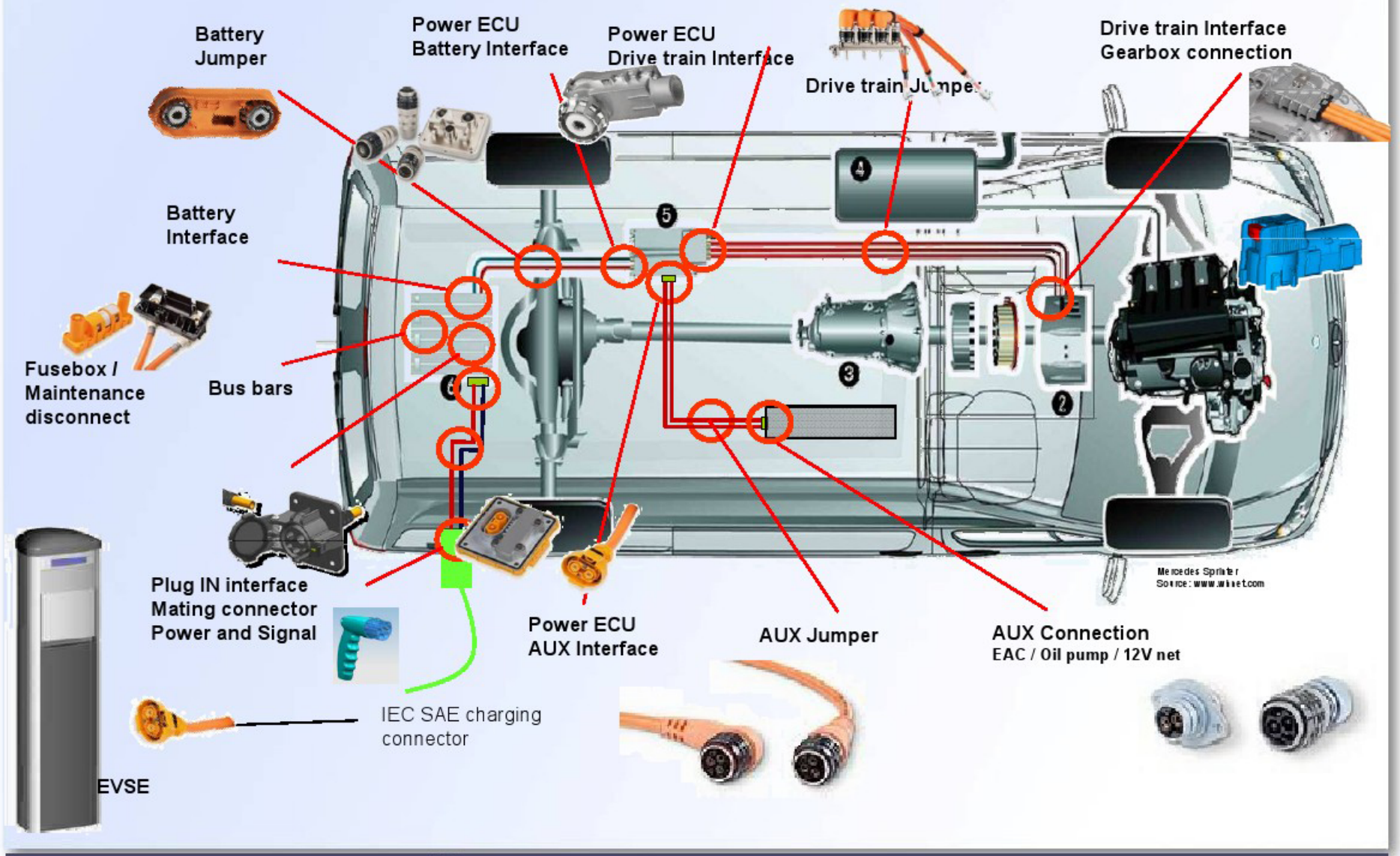
IEC 62196.2-2 type 2
- Driven by central Europe (Germany)
- Supported also at IEC level
- Advantage:
  - Infrastructure in central Europe available
  - Faster charging compared with 1-phase
  - Open for downsizing to single phase
  - Less complex components for plugs
- Disadvantage:
  - Higher complexity in Charger, Vehicle Inlet and Charge station.
  - Size



GB standard - China
- Aim definition for China
- Combination out of IEC potential and SAE security
- Standardization is still going on



Amphenol EV and Hybrid Vehicle Components



Harness Applications

Diagnostic



Harness Reparing Kits

After market Spare parts

Sun visors and roof

Rear window defrosting

Power train

Exterior mirrors

Airbags

Lighting and Signal Systems (Front and Rear)

Free hand door Handle

Switch for seat belt detection

Steering wheel control

Injection, speed and position transducers

Electric power steering

Switch for key detection

Standard Process Technologies

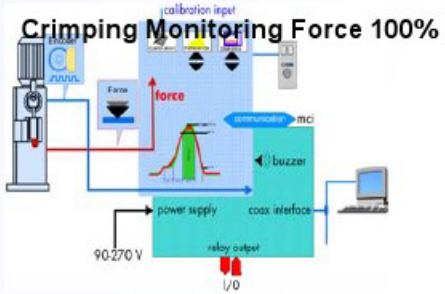
Worldwide Components Sourcing →

Wire Preparation
- Cutting
- Stripping
- Crimping (CQM)
- Tinning
- Seal Assembing
- Twisting

→ **Harness Assembling**
- Housings Assembling
- Active Matrix Control
- Taping
- Sheath Schrinking
- Gluing
- Welding (U.S, TIN, ELECTRICAL)
- Injection (PA66, PVC, TPE, ...)
- Hot Melt (Low Pressure)
- Bi Comp, Injection

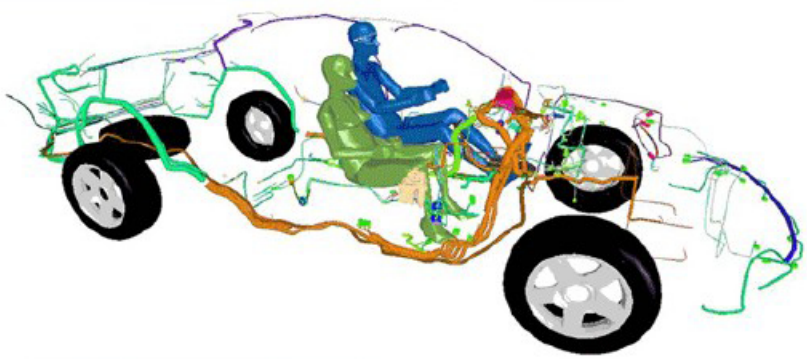
→ **Electrical Test**
- Continuity
- Connection Order
- Composents Presence
- Housings Locking
- Color Detection
- Contacts Retention
- Marking (WWY, Label, data Matrix)

→ **Final Inspection, Packaging** → **Worldwide Shipping**



FILEC provides the following services:

- Rapid prototyping
- Co-design platform activities, 2D-3D models
- Measurements in laboratory,
- Validation plan
- Tooling and equipment, in house
- Safe Launch Concept



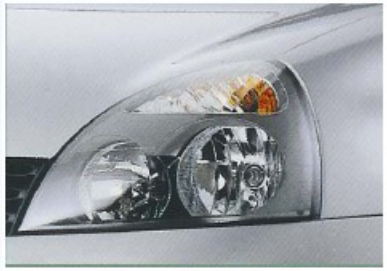
Cemm thome
AMPHENOL Group

AUTOMOTIVE LIGHTING



EXTERIOR LIGHTING





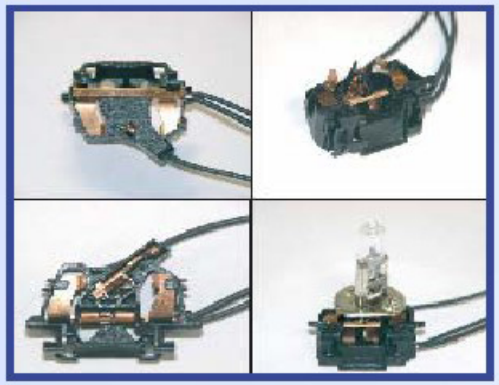
INTERIOR LIGHTING



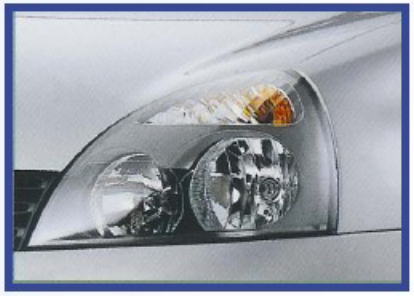
Exterior Lighting Products

Cemm thome
AMPHENOL Group

- **Bulbsockets, Connectors and Electrical Harnesses for Head Lamp**







- **Bulbsockets and Electrical Harnesses for Rear Lamp**



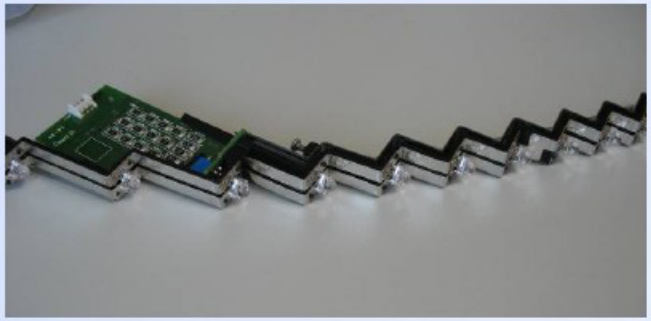


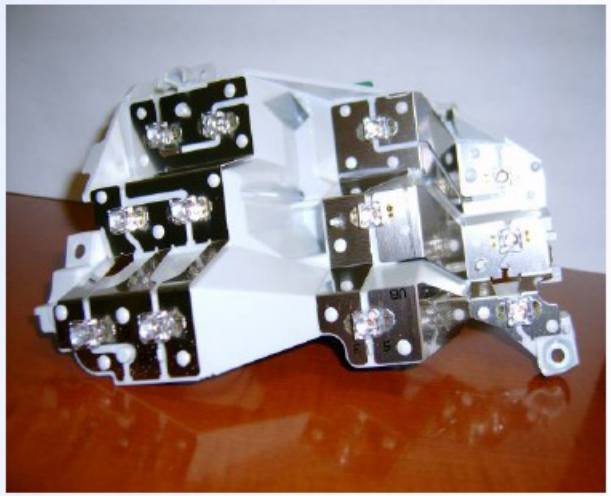


Exterior Lighting Products

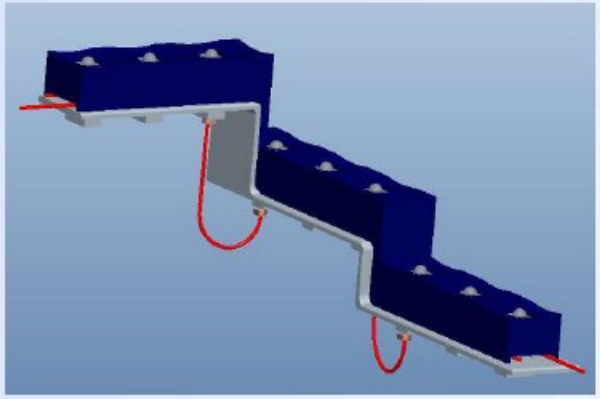
Cemm thome
AMPHENOL Group

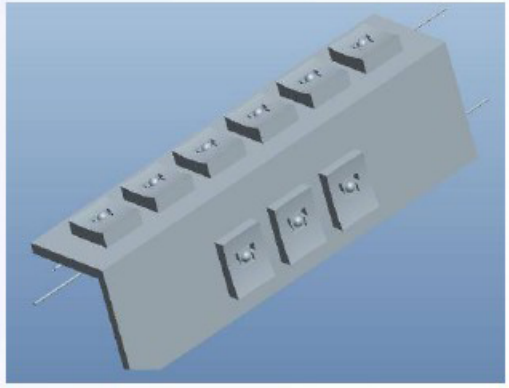
- **LED Modules**





- **FREE LED Modules**

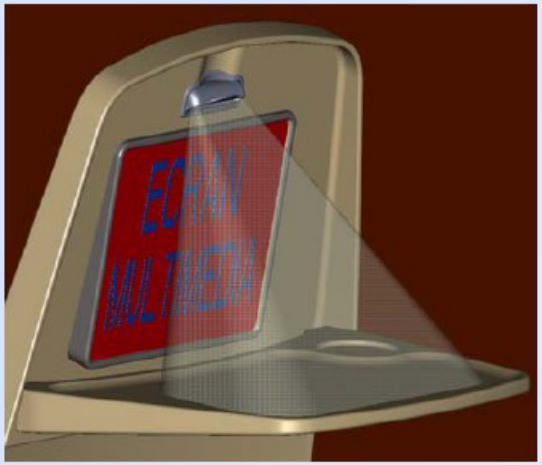




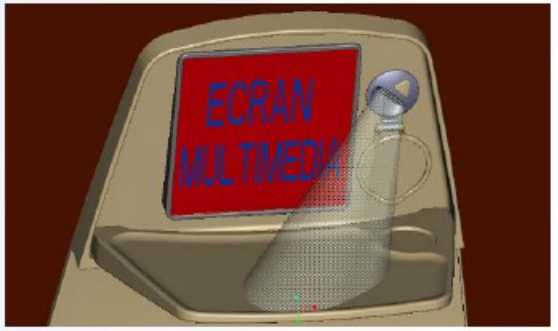
Interior Lighting Products

Cemm thome
AMPHENOL Group

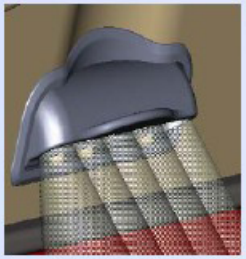
Reading Light





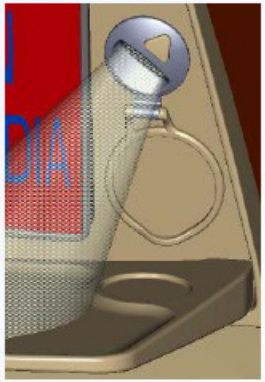










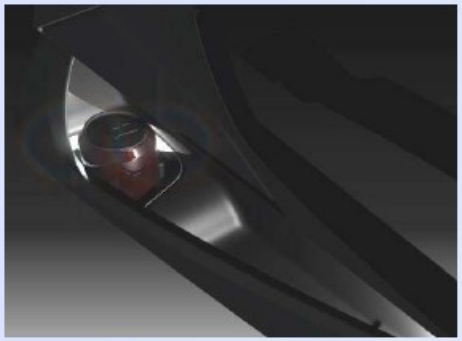


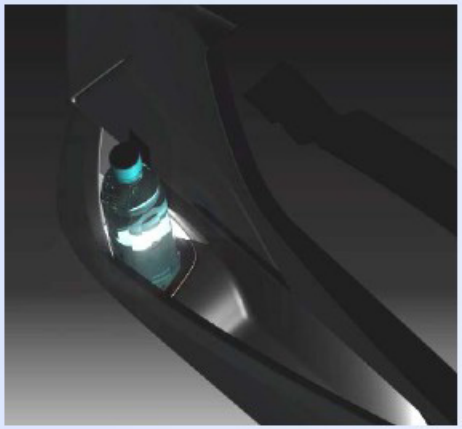


Interior Lighting Products

Cemm thome
AMPHENOL Group

Door Panel Map Pocket Lighting





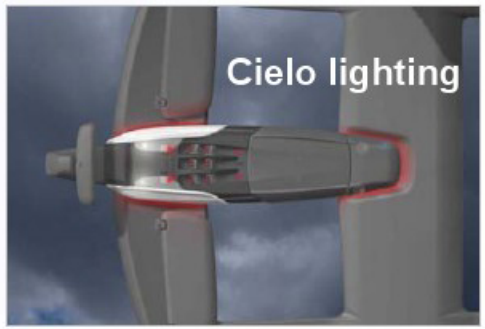
Mood Lighting of Command of Internal Opening





Dashboard Mood Lighting





>>Konfektion *E*<< **competences (technical)**

»Konfektion *E*«

- **connector and harness Know how**
- **technology of all core processes in house**
  - stamping
  - crimping
  - welding (ultrasonic, resistance, laser)
  - injection moulding (standard 2k)
  - overmoulding (wire, insert, reel to reel)



- **semiautomatic and fully automatic harnessing (0,14mm² to 50mm²)**
- **fully automatic double sided housing assembly, blockloading**
- **customer specific solutions, „nothing“ is impossible**
  (strong development and Lab capacities)
- **experience on applications with high technical demands**
  - high temperatures, tight systems in difficult environment (e.g. gear box oils)
  - HV applications
  - shielded applications

>>Konfektion *E*<< **automotive applications**

display & assistance systems

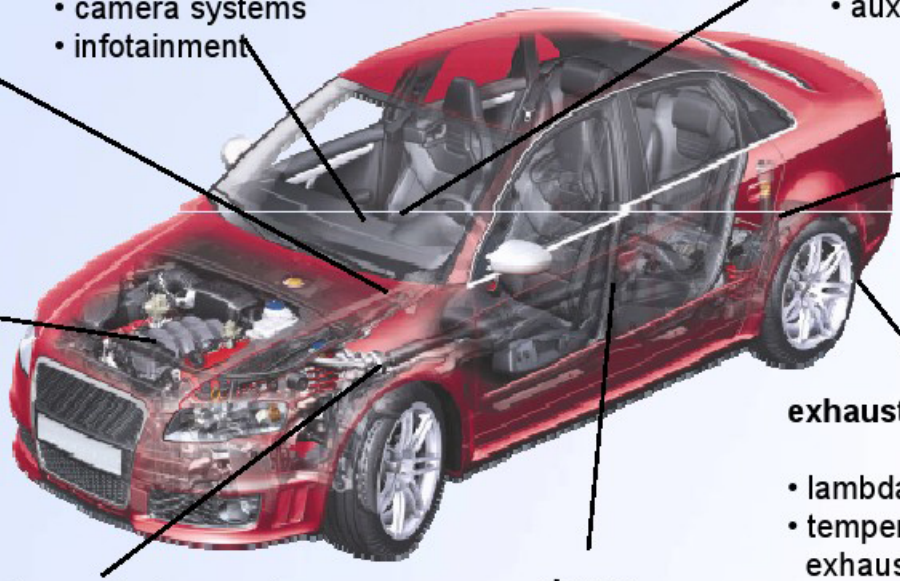
- interior mirror
- park distance control systems
- camera systems
- infotainment

steering

- electronic steering

climate and heating

- air condition systems
- auxiliary heating systems



chassis

- shock absorber adjustment
- rear axle steering

motor & aggregates

- engine cooling
- fuel handling devices
- windscreen washer system
- heating elements for engine cooling systems
- HVAC
- hybrid applications

exhaust systems

- lambda - sensors
- temperature sensors for exhaust systems
- nitrogen oxide-emission sensors (NOx)
- selective catalytic reduction (SCR) / AdBlue

power train & transmission systems

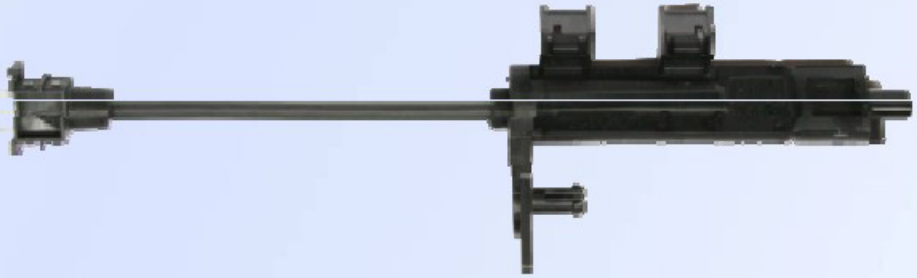
- DCT dual clutch transmission
- internal gearbox harnessing
- speed sensors
- temperature sensors

doors

- power window motors
- central locking systems

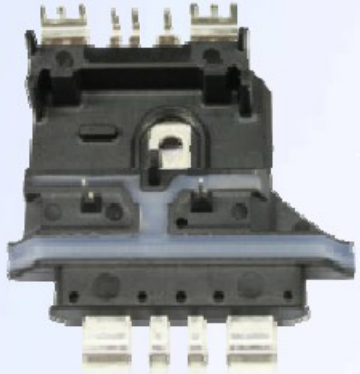
>>Konfektion *E*<< **product examples**

»Konfektion *E*«













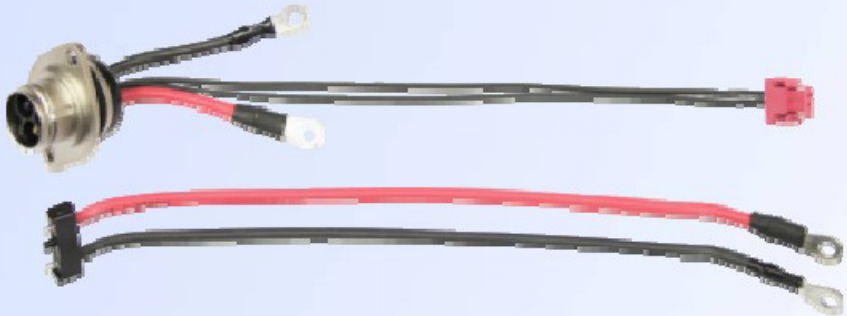
>>Konfektion *E*<< **product examples**

»Konfektion *E*«













>>Konfektion *E*<< **product examples**

»Konfektion *E*«









Amphenol APG

Automotive Products Group

Thank You!

Since 1996
S & K Electronics

