Product recommendations for light rail applications
PMA conduits, braids, fittings and accessories for light rail vehicle applications

Improved performance and safety for the rail industry with PMA cable protection solutions from ABB.

Conduits

On the carriage roof, couplings and intercar jumper connections
- **XPCS:** PA12/PA6 - Heavy-duty, multilayer conduit for dynamic and static applications: Good compression and impact strengths even at low temperatures and dry conditions
  - Good flexibility and fatigue/reversed bending
  - Excellent ageing characteristics
  - Excellent weathering and UV resistance
  - Black outer layer, green inner layer
  - Wear indicator

Under carriages and on bogies
- **XVCSF** multilayer conduit with blue inner layer is suitable for use in static external rail applications:
  - Outer layer: specially formulated polyamide 6
  - Inner layer: specially modified polyamide 6
  - Excellent resistance to UV rays and weathering
  - Good flexibility
  - High compression and impact strengths at low temperature and low humidity
  - Self-extinguishing
  - Free from halogens and cadmium
  - Temperature range -50°C ... +105°C continuous, +160°C short-term specifications

Inside carriages and in the passenger zone
- **PLR:** PA6 - Medium-duty conduit for static and “light” dynamic applications:
  - Good pressure resistance and mechanical properties
  - Very good fire safety characteristic
- **VAML:** PA6 - Medium-duty conduit preferably for static applications:
  - Complies with highest internal fire safety regulations regarding smoke and toxicity

Possible alternatives:
Depending on project and application area further PMA products may be suitable for traction applications (XSOL, PIS, VAM, VOH).

Braids

Cable bundling and abrasion protection
- **F.66 / C.66 / L.66:** PA6.6 Braids - Braids for bundling and protection of electrical wires
- **F.PX / L.PX:** Polyester - Braids for bundling and protection of electrical wires
- **G.PX:** Polyester - Open, self rewinding construction for fast installation
- **B.PX:** Polyester - High expansion ratio for wide application range
Fittings

Outdoor applications
- **PMAFIX VNV (straight)** with metric or PG thread:
- **PMAFIX VAV (45°)** with metric or PG thread:
- **PMAFIX VBV (90°)** with metric or PG thread:
  IP68GT one piece connectors with metal thread for standard connections in outdoor applications (to cases, plates, grommets etc.) with increased ingress protection requirements, e.g. for air conditioning systems, bogies, couplings, brake systems
- **PMAFIX VNZ metric or PG thread**: IP68 GT one piece connectors with strain relief and metal thread for dynamically loaded connections or increased ingress protection requirements between dry and wet areas, e.g. for air conditioning systems, bogies, couplings, waggon transitions
- **PMAFIX VIR/VIZR with metric or PG female thread**: IP68 GT one piece connectors with metal female thread, e.g. for round pin plug connections or transitions to steel tubes

Indoor applications
- **PMAFIX IP66 connectors** with polyamide thread, metric or PG, e.g. for passenger zone, driver's cab and general indoor application areas
- **PMAFIX IP68 GT one piece connectors** with polyamide or metal thread, metric or PG for increased ingress protection requirements, e.g. for passenger zone, driver's cab

Accessories
- **MAVI with metric thread / MAVIK with metric thread**: IP68 special / positioning elbow adapters made from nickel-plated aluminium for optimal wiring especially for dynamically loaded connections, e.g. for air conditioning systems, bogies, couplings
- **WPS IP69 water impact protection for IP68 connectors**: with NW 10 to 48 additional protection against high pressure water jets at the conduit/fitting connection, e.g. for air conditioning systems, bogies, couplings, waggon transitions
- **SWA swivel adapters** can be used to conduits from being exposed to torsion forces in dynamic applications

Fire Safety Certificates are available for the PMA conduits and fittings listed in this document according to various global standards. EN 45545-2, NFPA 130, UL 94, NF F 16 101/102, DIN5510, BS 6853 etc. All materials are self-extinguishing, free from halogens and cadmium. PMA RoHS, REACH and Conflict minerals confirmation documents can be supplied on request.

Users of PMA products should make their own evaluation to determine the suitability of each product for the specific application.

Please contact the local PMA specialist or PMA AG, CH-8610 Uster for further application engineering support. Use of grey products for the passenger zone may help to differentiate from products for outdoor applications where black is recommended. For technical details and specifications please see our technical data sheets on [www.pma.ch](http://www.pma.ch)

If PMA products are used in conjunction with non PMA products, all product liability claims will be rejected. Please contact the local PMA specialist or PMA AG, CH-8610 Uster pma-conduitsystems@ch.abb.com for further application engineering support.