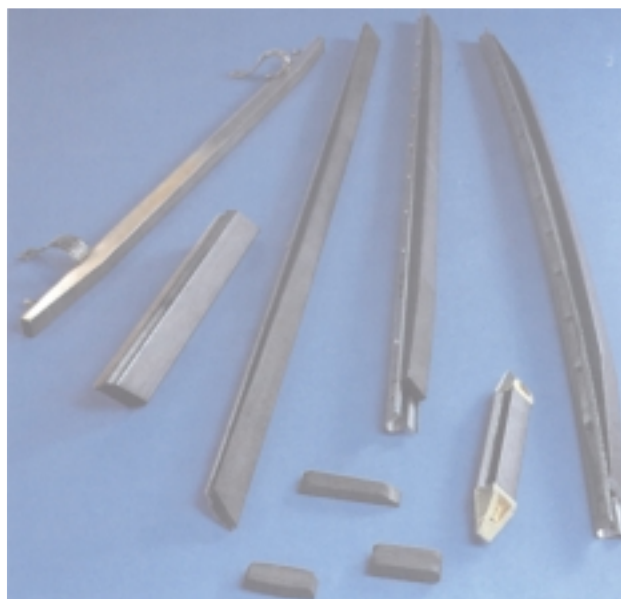




# CARBON SLIDING CONTACTS for main line, suburban and urban transit systems



As a pantograph strip, a collecting shoe or an insert, **carbon materials** are always an economic and high performance answer to your problem of current collection...



## ADVANTAGES of carbon-base materials in current collection

- **Self-lubrication**

Greasing cut down or eliminated and maintenance costs reduced.

- **Friction behaviour**

Contact lines are polished by a patina, which greatly reduces the wear of the conductor and protects the rubbing faces against oxidation.

- **Very low sparking**

Reduced arcing, no burn or spark damage on conductors, no beading. Reduced R.F. interference.

- **Resistance**

To high temperatures, thermal shocks and chemical attack.

## ASSETS of CARBONE LORRAINE Group

CARBONE LORRAINE, a world leader in carbon and graphite products, offers you more than 100 years of experience, and a worldwide organization.

A very close cooperation and tight technical ties with current collection systems manufacturers and users gives us a lead over the competition.

We propose 2 types of grades:

Black **amorphous carbon grades** which will solve all classical current collection problems, and **metal impregnated grades** which will be used for heavy duty applications.

All these grades are extruded and kilned at high temperature, that gives them very good mechanical characteristics.

Our new and advanced testing facilities, and the expertise of our research teams, allow us to conduct ambitious development programs.

## Average characteristics of the main grades of materials

Grade	AR 129	P 5696	P 6252
Density (g/cm <sup>3</sup> )	1.7	2.3	2.15
Résistivity (μΩ.cm)	3,300	700	1,000
Bending strength (MPa)	40	85	60
Shore hardness	85	90	85
Metal content (%)	0	20	25

## PANTOGRAPH CONTACT STRIPS

Grade		AR 129	AR 129 copper sheath	P 5696
Voltage	750-3,000 V	●●	●●	●●●
	15-25 kV	●●●	●	●●●
Current/ unit length	< 50 A/cm	●●●	●●	●●●
	50-150 A/cm	■	●●	●●●
Impact strength		●	●●●	●●●
Resistance to humidity		●●	●	●●
Surface finish & conductor wear		●●	●	●●

●●● Excellent ●● Very good ● Good ■ To be avoided

Our strips can be delivered as follows:

- plain, or with a copper coating on the bottom (dovetail),
- mounted on a sheath (copper or steel),
- mounted in a high copper sheath ("Kaspérowski"),
- fixed on a self supporting sheath. In that case, the stiffness of the pantograph head is given by the strip itself.

The strips can be manufactured straight or with a radius (R mini = 6 m).

To ensure mechanical strength, and to allow an efficient current flow, we recommend that the strip be brazed in its sheath.

To your wish, our strips can be equipped with a patented **failure and crack detection system**.

The performances of the carbon strips, in addition to the recommendations opposite, are affected by:

- the line condition (protrusions, geometry, surface...),
- untested accessories (insulators, suspensions, ...),
- use of pantographs with metal strips on the same line.

## THIRD RAIL COLLECTING SHOES

Grade		AR 129	P 6252
Voltage	600-900 V	●●	●●●
Current/ unit length	< 25 A/cm	●●	●●●
	25-100 A/cm	●	●●●
Impact strength		●	●●●
Resistance to humidity		●●	●●
Surface finish & conductor wear		●●	●●

●●● Excellent ●● Very good ● Good ■ To be avoided

The high mechanical and electrical characteristics of our **impregnated grade P 6252** allow mounting without any protection or end fitting. Also, in many cases, it is possible to avoid machining of bevels at the ends of the shoe.

For shoes made of **plain carbon materials**, it is better to mount with bronze end-fittings, which will protect the carbon by absorbing impacts and carry part of the current.

A special attention is given to the soldering of the carbon into its sheath, and guarantees a perfect electrical and mechanical link.

In each case, the actual wear of the shoe will depend on material and condition of the third rail (steel, stainless-steel, ...) and the use, at the same time, of cast-iron or steel shoes which will damage the patina and rail.

## TROLLEY BUS INSERTS

Grade		AR 129	P 6252
Voltage	600-750 V	●●	●●●
Current/ unit length	< 15 A/cm	●●●	●●●
	15-40 A/cm	■	●●●
Impact strength		●	●●
Resistance to humidity		●	●●
Surface finish & conductor wear		●●●	●●

●●● Excellent ●● Very good ● Good ■ To be avoided

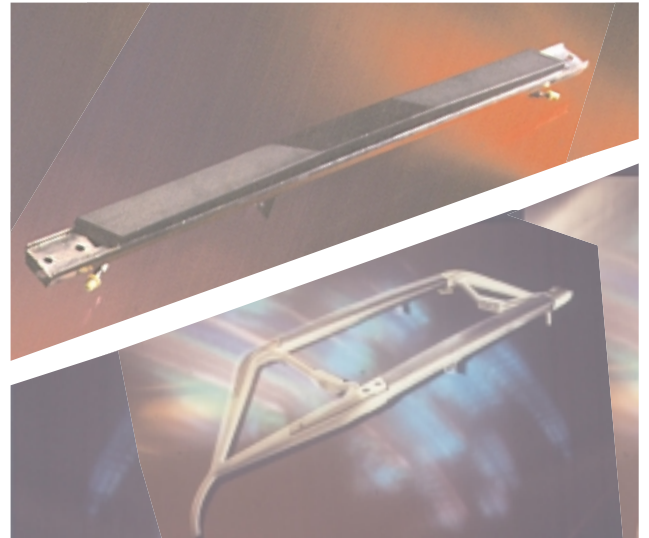
The models differ, depending on the design of the current collection pole head.

These parts are machined from rectangular profiles, which are extruded. The actual lifetime of the inserts is directly linked to local atmospheric and operating conditions:

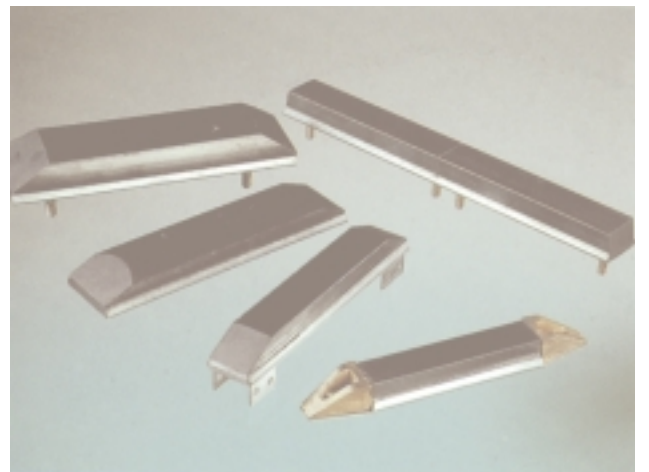
- condition of the electrical lines,
- frequency of crossings, switchings, starts.  
Speed, collection system and line design,
- rain, ice, ...

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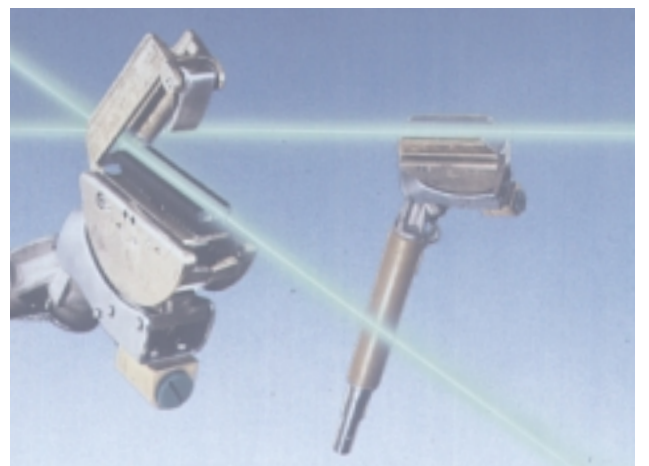
## CONTACT STRIPS



## COLLECTING SHOES



## INSERTS



## A few references:

As original grade on **FAIVELEY** collectors and pantographs.

**SNCF** (French National Railways), on high speed trains (TGV) and on the suburban network. **RATP** on Paris RER.

**France** local networks, new tramways.

**Italy, Switzerland, Mexico, Belgium**, on both local and national networks.

**North Africa** and **Middle East**, on national networks and several local networks.



## A few references:

As original grade on **FERRAZ** current collection systems.

In **Europe**, in Barcelona, on Frankfurt M-Bahn and on French metros (VAL and others).

In **Canada, Mexico** and **Asia**, (namely **Taiwan**).



## A few references:

As original grade on **DELACHAUX** collection systems.

Main local trolley networks in **Europe** (Switzerland, France, Portugal, ...) and a few **American** networks (Mexico).



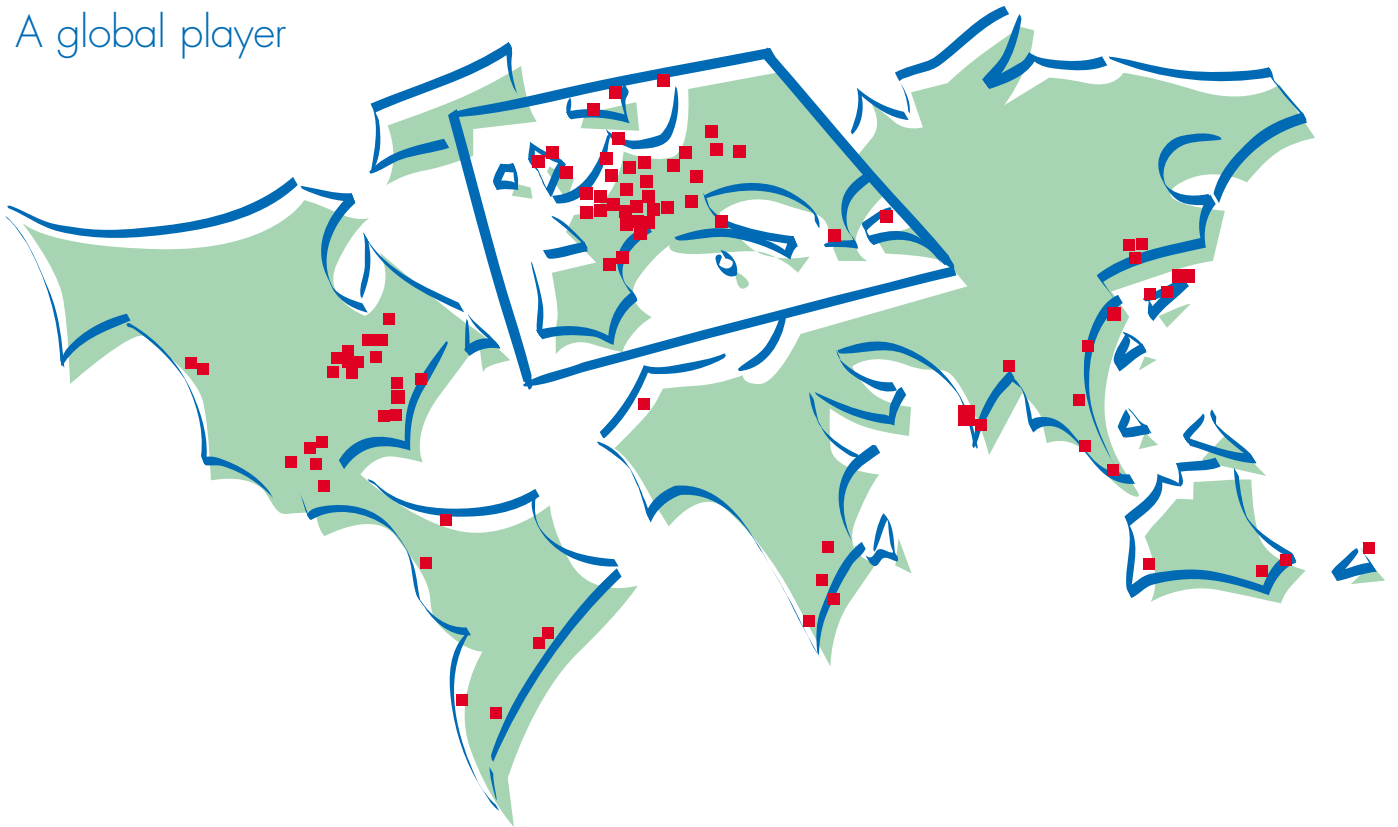
## A WORLD LEADER in the field of brushes for electric motors

Since its foundation in 1892, CARBONE LORRAINE has built up an international reputation by creating subsidiaries on all continents.

Today with industrial and commercial plants scattered in more than 30 countries, agencies and representatives

in more than 70 countries and 250 commercial contacts throughout the world, CARBONE LORRAINE offers its customers everywhere reliable high technology products and the service of its experienced technicians.

## A global player



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