

Electrical power resistors

---

# Energy

**Energy**  
under control



# To master the dis

## Traction

power and softness to save the heavy braking



Grenoble's tramway (picture by Alstom).

For Electrical locomotives, the braking is achieved by both mechanical brakes (drums & disks) and electrical brakes, which are most of the time rheostatic with high-performance resistors.

Gridex resistors equip the French ultra-high speed train TGV which must use a powerful braking system, and many other types of trains which have various braking cycles.



Braking and Shunting - Atlantic TGV (picture by Alstom).

## Energy transmission and distribution

protection and harmonics filtering.



Harmonic filter resistor  
Manitoba (Canada)

Most power distribution networks have earthed neutrals designed to support important currents whenever a default happens. In order to avoid the damages and disturbances such defaults can provoke, a resistor is fitted between the neutral and the earth to limit this current and to give electrical protection devices enough time to react.



Neutral earthing resistor (Indonesia), 24 KV - 1150 A - 10 sec.

In addition, interconnection stations between direct-current transmission networks, rolling mills and, generally speaking, all complex thyristor-based electronic systems cause disturbances in power transmission networks by generating harmonics. Those harmonic disturbances can be suppressed with filters using medium or high voltage resistors.

## Motor control

reliability and strength for starting and braking

Resistors have a strategic place in the control of Power Electric Motors. Their advantage is to limit the starting current of all kinds of applications, but they also smooth the mechanical shocks and in some heavy duty application, they can provide a start where other types of starting devices could not make it possible.

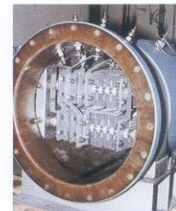
Simplicity, reliability, and strength, such are the advantages of metallic and liquid rheostats frequently used with electronic systems.



Motor control for travelling crane  
(Fos-sur-Mer).



Electrolytic starter VECTROSTAR R  
for slip ring motor



Shunting and starting  
water-cooled resistor for submarine

# tribution

## Load Banks

### Safety for test and regulation

In the load banks for generating sets, the resistors are used when the generator is running at low power to prevent the diesel engines from gumming up.

The use of industrial resistors as load banks is also a standard practice to maintain batteries in electrical laboratories and industrial testing facilities.



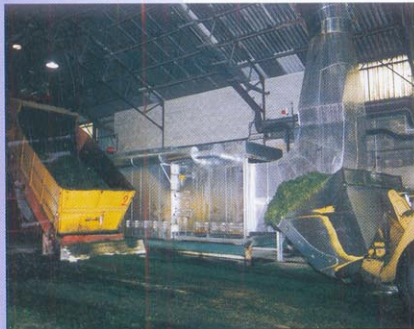
Load bank 25 MW - 5 containers of 5 MW each. (Dutch Railways)

## Industrial Heating

### Flexibility and cleanliness

The use of expanded metal resistors with low thermal inertia allows to heat a gas used for dehydration of pharmaceutical or chemical products with a great precision and without polluting.

For this reason new industries go for electric resistor heaters.



Lucerne dehydration in agribusiness. 16 MW power. 65 tons/h flow of 700°C air steam mix.

## Research and development

A background dedicated to innovation.



An integrated designing team composed of graduate engineers knows the industrial context in which the resistors will be installed. Our engineers handle full projects, from the design to the commissioning.

### With our applied research laboratory

We are able to perform thermal and mechanical tests as well as to get electric and dielectric measurements up to 150 kV.

All our resistors are final-checked on a test bank.

In order to be aware of the latest technologies, Metal Déployé S.A. keeps close relationships with research institutes and independent laboratories.



Repartition data acquisition of the air speed at the end of a forced ventilated resistor.

Awarded ISO 9001, by the AFAQ (French Institute for Quality), our resistors are controlled from the design to the commissioning with our quality procedure system.

Due to this innovative policy, our existing products are always improved and we are able to develop new fields of applications.



Lightning impulse on a filter resistor. HVDC Continuous current link between Denmark and Germany





