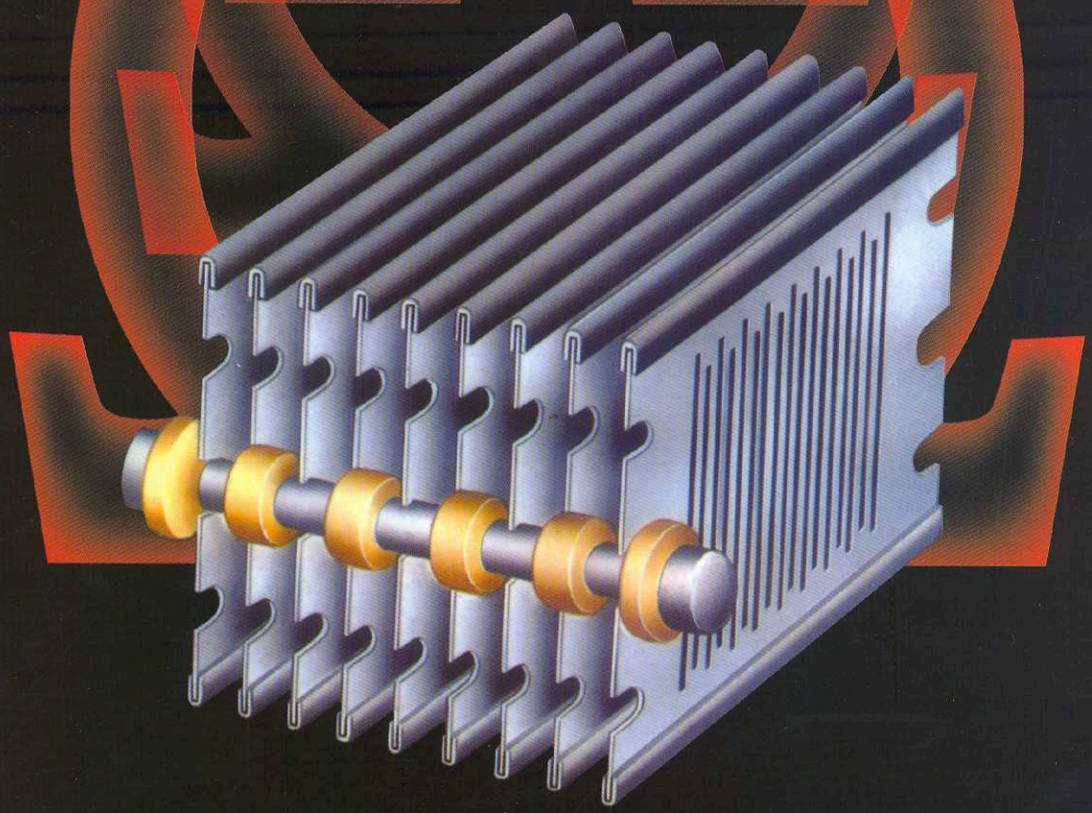
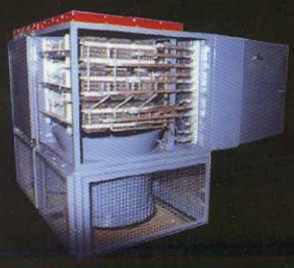
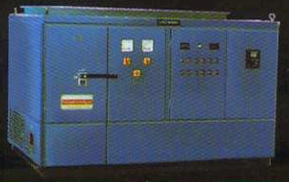
NATIONAL SWITCHGEARS

POWER RESISTORS







GENERAL

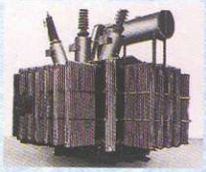
National Switchgears offer four types of resistors for various industrial applications and they are classified as wire wound, coil wound, punched stainless steel and cast iron. The power resistors are used for limiting inrush current in a slip ring or sq. cage induction motor or dropping the voltage to a required level in an electric circuit or loading device to dissipate I^2R loss. Though many electronic controls exist for speed control of DC/AC sq. cage motors, reliable electrical resistors are still widely used for speed control of motors. These resistors are particularly suitable for heavy industrial duty and conditions of severe vibration and shock. Individual resistance elements may be formed for currents from 12A to 520A, and resistor units of this type are assembled for currents up to a range of 4000A and above. The high thermal capacity and excellent ventilation enable the ratings to be considerably increased where the loading is intermittent and of short duration. Installation may be indoor or outdoor as specified. The resistor units require no maintenance. If they are used in dusty atmosphere, they must be periodically cleaned with dry air. The Resistance Unit may consist of several tiers or banks and they are stacked one above the other.

DESIGN FEATURES

- Degrees of protection as per IEC 60529, up to IP 33.
- Rigid sheet steel construction to withstand vibration as per IEC 60322.
- Robust design and elegant appearance.
- Ambient temperature range - 25 to 55°C.
- Maximum temperature rise up to 375°C for continuous duty resistors.
- ±10% of the rated value.
- The active element : Stainless Steel / Cast Iron / Chromium- Aluminium Alloy / Cupro Nickel depending on specific requirement or request.
- Suitable for Tropical condition.
- Enclosure : Hot dip galvanized(for outdoor)/sheet Steel coated with Anti corrosive heat resistant paints.

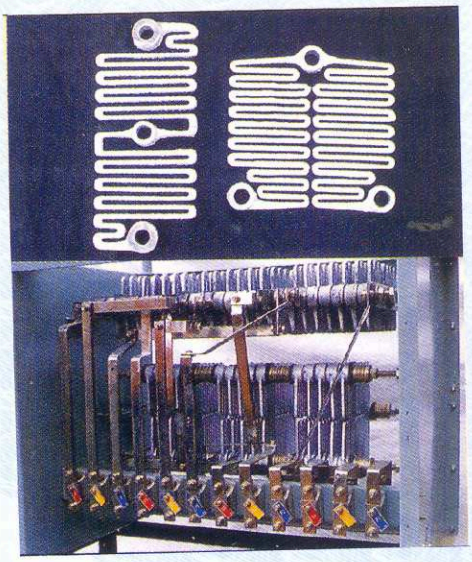
APPLICATIONS

- Starting and controlling of Speed of AC (Slip Ring) or DC Motors in winches, Colliery Haulage, Rolling Mill, Steel Mill.
- Controlling the speed of AC Slip ring motors in E.O.T.Cranes for all motions like Travel, Hoistng & Lowering,Luffing, Slewing, Grabbing etc.
- Rheostatic starters for Slip ring Motors.
- Stator Series Resistor for Squirrel Cage Motors.
- Field Discharge Dynamic Braking Resistors.
- Limit the surges in Highly Inductive Circuits.
- Earthing Resistance to limit fault current.
- Loading Resistors.
- Traction duty resistors.
- Load Banks for Generator testing.
- Thyristor protection.
- Fault current limiters.
- Harmonic filtering.
- Impedance matching for RF signals.

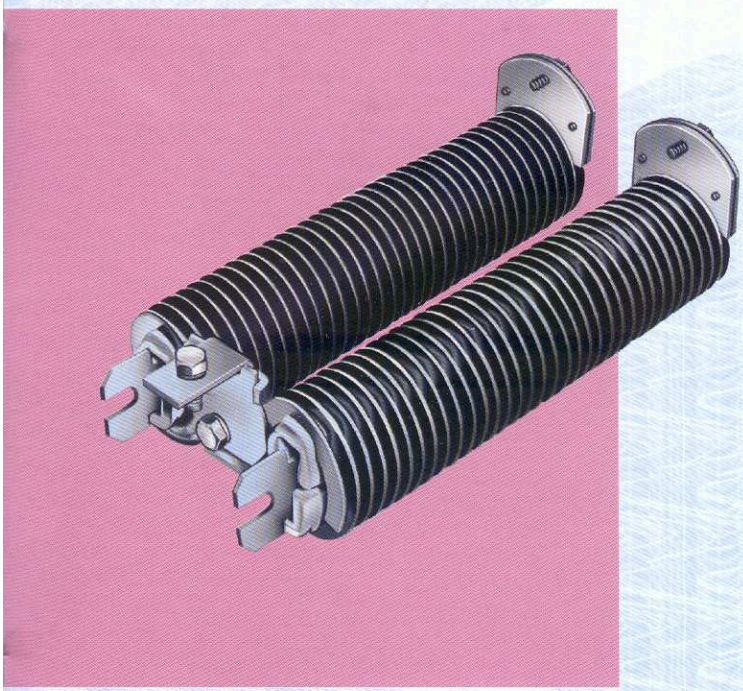




Standards Followed : BS587/IEC 60077/IEC60322/ IEEE 32/IPSS/VDE/IS/NEMA specifications.
Cooling : Forced / Natural / Oil / Specially designed cooling fans for continuously rated load banks.
Primary/Secontory Insulation: Exclusively designed ceramic insulators for various applications.
Non Inductive/Non Magnetic Construction.
High Power continuously rated resistors up to 12 MW.
Specially designed resistors for 400 Hz supply voltage as in Aircrafts/Submaines.
Draw-out arrangement for easy removal of the Resistance Boxes.
High voltage resistors up to 66KV. Special construction to withstand higher BIL.

CAST IRON RESISTORS



Cast iron resistors are cheap and strong, and, contrary to what might be expected, they are not easily damaged by corrosion.
For heavy duty service Cast Iron Grid resistor units are usually employed, except that where severe vibration is a factor.
In view of high thermal time constant the resistors are highly suitable for short time ratings.
The grids are mounted on Mica Insulated Steel Tie rods. Mica Washers are inserted between the grids for insulation.
The grids are made in many sizes and forms.
Cast Grids are employed in applications like Neutral Grounding Resistors, Cranes, Dynamic Breaking etc.

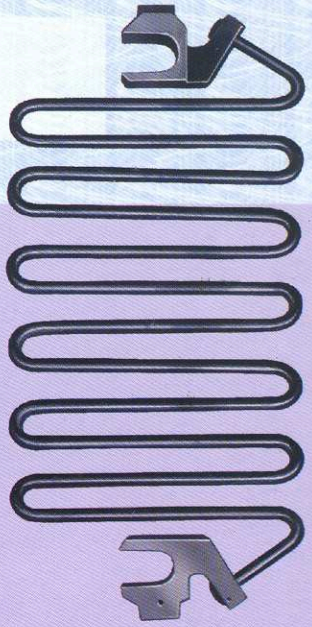


COIL RESISTORS

This well tried design of grid resistance consists of a helix of edge wound resistance strip mounted on porcelain insulators; which in turn are located on a steel support. The maximum surface area of the resistance material is exposed to the cooling air to give the maximum dissipation of heat and thus the highest possible rating. The ribbon element may be made of stainless steel, Nichrome or Ferrous based alloys.
Suitable for Heavy Industrial applications.
For use under conditions of vibrations.
Robust construction.
Operating temp. upto 600° C.

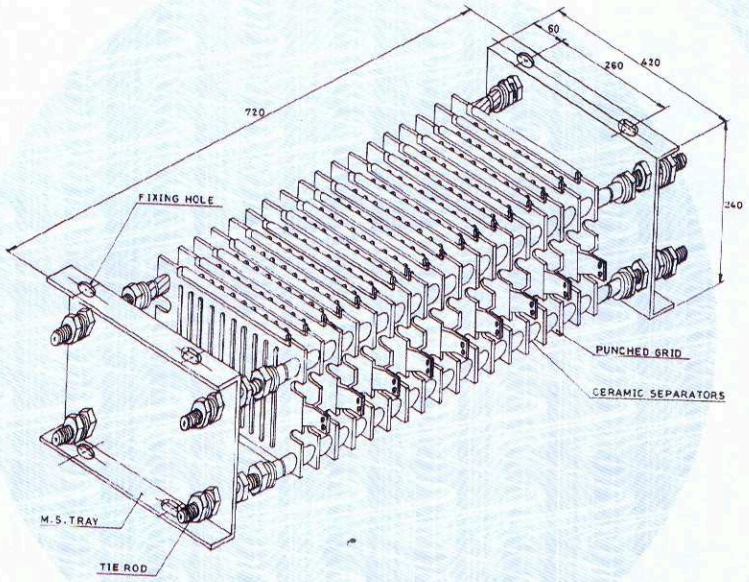
WIRE WOUND RESISTORS

Element in the form of Wave profile supported on mica insulated steel rods.
Elements are non-magnetic, rustless, unbreakable.
Mica Washers separate the grids which are then framed into rigid assembly.
The elements may be Copper Nickel, Nickel Chromium, Aluminium Chromium, Stainless Steel, Ferro based alloys. The box weighs less than Cast Grids for comparable electrical rating and the size of the box can be squeezed where space is at premium.

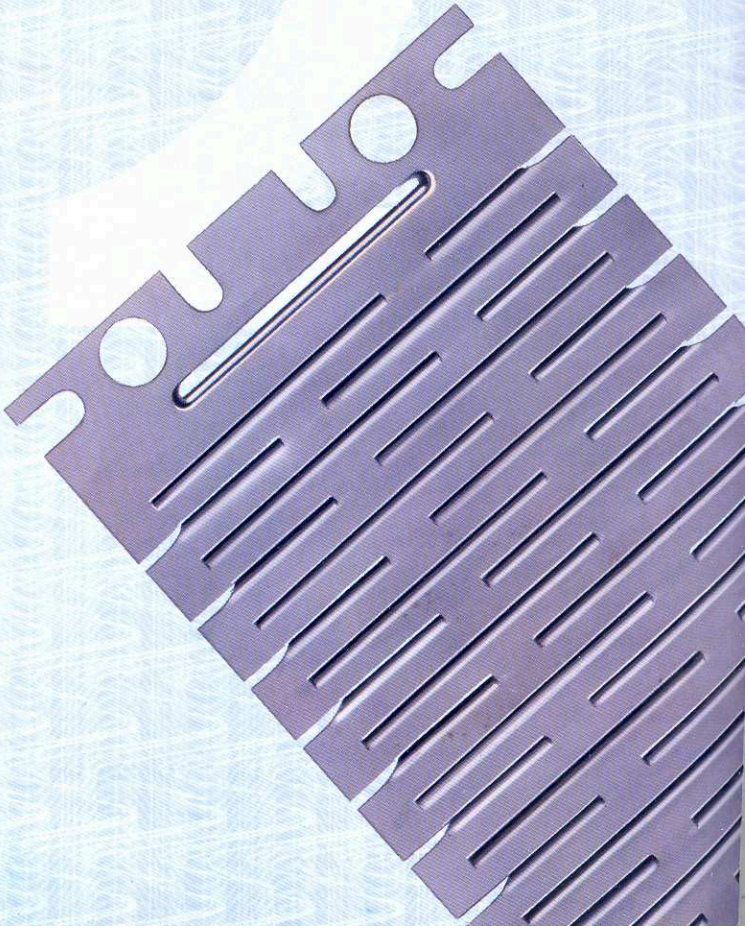


PUNCHED PLATE RESISTORS

Resistors are punched out of Stainless Steel/Cupro Nickel/Nickel Chromium
Rustless & Unbreakable.
Suitable for places of High Vibration.
Grids separated by Ceramic Rings.
Large Surface Area exposed to Cooling Air to give Maximum dissipation of heat.
Individual grids are self joining or connected by TIG Welding.
Rigid design & Elegent appearance.
Non Inductive design / suitable for high frequency applications.
Withstands Electrodynamic Forces admirably well.
Wide range of plate thickness and multiple forming render flexibility in choice of grids and consequent compact design.
Individual standard range is shown below:
Note : Punched Grid Resistors for low current rating upto 12A (continuous) and higher current rating Upto 520 A are made for special applications like Force cooled Resistors and Neutral Grounding Resistors.



Standard version Type	Rated Resistance +10%	Current Rating 120S duty cycle and duty factor of				
		100% A	60% A	40% A	25% A	15% A
PG 10	0.010	260	310	360	435	550
PG 15	0.015	210	250	295	350	450
PG 22	0.022	175	210	243	295	370
PG 32	0.032	145	170	202	244	306
PG 46	0.046	122	145	168	205	256
PG 68	0.068	100	120	140	168	210
PG 100	0.100	82	97	114	138	173
PG 150	0.150	67	79	93	112	142
PG 220	0.220	55	65	77	92	117
PG 320	0.320	46	54	64	77	97
PG 460	0.460	88	45	53	64	81
PG 680	0.680	32	38	44	54	66
PG 1000	1.000	26	31	36	44	55
PG 1500	1.500	21	25	30	35	45



LOAD BANKS

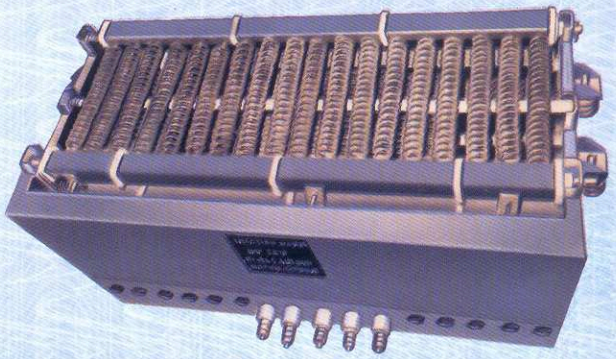
Natural air cooled and force cooled Resistive Load Banks can be manufactured from 1KW to 12Mega Watt. Incremental resistance steps with individual contactor control can be provided to give any desired load by using PLC. The elements are formed with metal having negligible temperature coefficient. Special elements are used for load banks operating at 400Hz like in aircrafts. Portable and trailer mounted load banks are also manufactured according to customers requirement. The application of resistors can be extended to battery discharging, testing of UPS, Dummy Loads and Generator Testing. All our continuous duty resistors are tested at CPRI, BANGLORE

CRANE RESISTORS

Resistors mounted on the cranes are subjected to considerable vibration and shock. Our resistors with unique constructions features will withstand easily such onerous applications. They are stacked using ceramic separators using tie rods. The stacks or banks are mounted one above the other. Three phases and single phase executions are available. Depending on the motion crane like Slewing/ Luffing/ CT/ LT/ Hoist etc. The step values of the resistor are designed to suit the duty cycle of the crane. Resistors conforming to Inter Plant Steel Standards (I P S S) are manufactured to various steel plant applications. Resistance Boxes are manufactured to suit different speed / torque requirements as in case of Mine Haulers, Drum Controlled Hoist and Winches. Dynamic braking Resistors and Resistors for DC drives are made to meet specific requirement of customer.

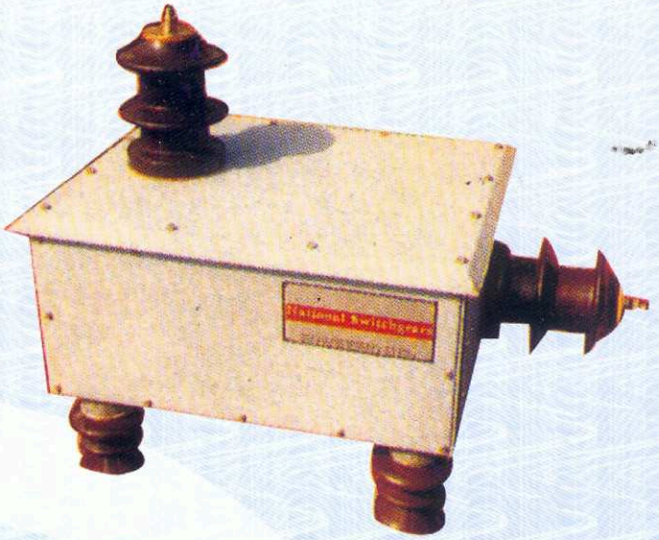
TRACTION RESISTORS

Custom designed resistors are manufactured to meet IEC 60322 and IEC 60077 specifications. Starting, Dynamic Braking Field diverter and snubber resistors are formed out of Nichrome / Chromium and Aluminium Alloys and the element are jointed by TIG Welding to withstand severe shock and vibration. Light weight is ensured by using aluminium frame and specially designed ceramic supports give rigid construction of the frame. Units can be natural convection cooled or fan cooled. Apart from resistive elements all other parts are designed with Stainless Steel and aluminium alloy construction for longer life.



HARMONIC FILTER RESISTORS

The introduction of thyristor conversions/inversions in the power system for High Voltage Direct current transmission, giant D.C. Mill drives and induction furnaces in Steel Mills has created harmonics in the power circuit and made the supply impure and unstable. The harmonics generated by these systems must be reduced by electric filter circuits using properly turned RLC networks. Our resistors may be used in a variety of Filtering applications like Static Var Compensation & Harmonic Filtering networks where a power resistor with low inductance is required. These resistors can be manufactured to suit indoor or outdoor applications. Hot dip galvanized or Stainless Steel enclosures may also be offered. Standard insulation level will conform to IEC 60071-1 publications.



NEUTRAL GROUNDING RESISTOR

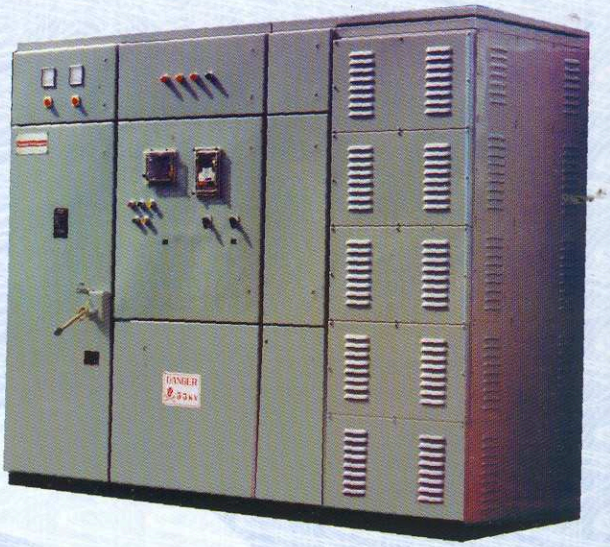
We manufacture complete range of Neutral Earthing Equipment Equipments like Neutral Grounding Resistor (NGR) and Isolators (upto 66kv and 4000A). NGRs are used in AC Distribution Networks to restrict Earth Fault Current to a predetermined level. Resistance Grounding to Transformer or Generator Neutral Star Point is the most effective and preferred method.
Both Cast Iron Grids and rustless Punched Stainless Steel Types are manufactured conforming to IEEE-32and IEC specifications. Our short time rated resistors have been tested successfully by deploying Infrared Techniques at KEMA, Holland with the help of HEAT & FLOW DEPT OF PHILIPS, HOLLAND.

Technical Features:

Rating : 10 sec/30sec/continuous
Unique Supporting Arrangement
Finish :Hot Dip Galvanized enclosure/powder or epoxy painting
Primary & Secondary Insulation :Porcelain
Enclosure : IP 21/23/33 suitable for outdoor applications
Range : Upto 66KV & 4000A
Compact and Robust Design
Totally Dry type
Max. allowed temperature rise upto 760°C. Temperature rise can be restricted to any level as per Customer`s request.

STARTING RESISTORS

One of the important applications of our Resistor is for starting slipring Motors. Our Resistors are being used to start Motors upto a system Voltage of 11KV and Horse Power upto 4000 HP. Both Air Cooled and Oil Cooled versions can be supplied. The Resistors can be designed to suit frequent inching, braking and Speed control applications. Resistors are designed and Tailor made for various application as in Cement Mills, Rubber Mills and Paper Industries, etc. Smooth acceleration and unique integrated assembly of Resistor and Panel is the characteristic of our starters. Speed Control of large size motors using Binary controls and PLC is adopted for Cement Mills and it is normally called GRR.



SPECIFY WHILE ORDERING

(I) Current (Rotor Current)

(ii) Operating Voltage

(iii) Ambient Temp. & Temp. Rise

(iv) Degree of protection for the enclosure

(v) No. of Tappings (or) Speed Torque characteristic of Motor

(vi) Service: Indoor / Outdoor

(Vii) Dimensional Restriction, if any.

(Viii) Application

OUR OTHER RANGE OF PRODUCTS

1. H.T.Switches
2. H.T.Panels

CREDENTIALS

BSI REGISTERED
UKAS QUALITY MANAGEMENT
003
ANSI · RAB QMS ACCREDITED

Certificate No.FM 82690
ISO 9001-2000

NATIONAL SWITCHGEARS

33, Sidco Industrial Estate, Ambattur, Chennai - 600 098. INDIA
Phone : 26252262, 26357368, Fax : 91-44-24991078,26255046
E-mail: nsgsamy@satyam.net.in Website: www.nsgindia.com