



# NATIONAL RESISTORS



## AN ISO 9001- 2008 CO

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**REF : NR 502**

**Sub: Introductory letter for Power Resistors i.e.**

1. **Neutral Grounding Resistors up to 66 Kv,**
2. **Starting Resistors,**
3. **Associated LT / HT Panels with Isolators /CT / PT / LA / SC etc.**

Dear Sir,

We take this opportunity to introduce ourselves as a manufacturer of various types of Electrical Resistors.

We manufacture following types of resistors: -

- 1) **Neutral Grounding Resistors up to 66 KV for Generators /Transformers**
- 2) **Loading Resistors for Generators/Transformers/Ups etc.**
- 3) **Load bank for testing of Generators/Transformers/Ups etc.**
- 4) **Starting / Speed control Resistors for Crane Motors.**
- 5) **Buffer /Slip Resistors for Sugar Industries.**
- 6) **LA-SC-PT Panel for Generators**
- 7) **Battery Discharge Resistors.**
- 8) **Dynamic Breaking Resistors.**
- 9) **Neutral side cubicles with CTs /Isolators/Relays etc for DG sets.**
- 10) **Phase side cubicles with CT/PT/LA/SC etc. for DG sets.**

We are an ISO 9001-2008 certified firm and have a long standing experience in this field.

We enclose herewith our product leaflet for your reference.

Considering our expertise and technical know-how, we request you to send your enquiries and give us an opportunity to fulfill your requirements.

We assure you our best services at all the times!

**Looking forward to a long standing business association.**

**Thanking you.**

**For NATIONAL RESISTORS**

**Vishwanath Jetithor**

**Mrs. S. V. Patil.**

**CAST IRON GRID TYPE RESISTORS.****SALIENT FEATURES**

- 1) Cast Iron Grids are sprayed with heat resistant aluminium paint to have a heat resistant and anti-corrosive coating.
- 2) A high thermal time constant permits very high currents to pass in Resistors for short time durations.
- 3) Electrical contact surfaces are given a ground finish for better contact between grids to avoid sparking.
- 4) Mica tube is provided as an insulation between MS tie rod and grids & mica washers between alternate grids. Porcelain insulators are used as back - up insulation between live parts and enclosure in case of high voltages.
- 5) Temperature coefficient of resistance is 0.05% per °C Approx. for Cast Iron
- 6) While assembling tapping can be provided between any adjacent grids to have desired sectional resistance values.

**INFORMATION TO BE FURNISHED TO US.****1. FOR NEUTRAL GROUNDING RESISTOR**

- a) Material of Resistor
- b) Ohmic Value
- c) Current Rating
- d) Duty rating 10 sec., 30 sec., 60 sec., & continuous etc.
- e) If details against 'b' and 'c' cannot be given then inform details of transformer such as KVA rating, full load current, Primary & Secondary Voltage.
- f) System voltage / operating voltage.
- g) Type of Enclosure and material for enclosure (protection class as per IS-12063)
- h) Location : Indoor or outdoor.
- i) Temperature rise allowed over an ambient temperature.
- j) Whether space heater, current transformer, isolating switch on load / off load, manually / motorized, or any other accessories are required.  
Details of atmospheric conditions at site and height above sea level.

**2. FOR STARTING / SPEED CONTROL RESISTOR**

- a) Rotor volts at standstill
- b) Rotor Amp. at full load
- c) Duty Rating (Time on / off No of Cycles)
- d) Starting Torque in percentage of full load Torque.
- e) Material of Resistor.
- f) No of steps/sections & it's resistance values per phase.
- g) Type of enclosure (Protection class as per IS - 12063)
- h) Temperature rise allowed.
- i) Whether terminals should be brought down at one place.
- j) Details of atmospheric conditions at site.

**(Constant development may cause some variation in data)**



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# PROFILE

## NEUTRAL GROUNDING RESISTORS (NGR) FOR TRANSFORMERS & GEN. SETS.

NGRs are employed in AC distribution networks to limit the fault current which would flow from the transformer or generator neutral star point in the event of an earth fault in the systems. It is used when the neutral of supply transformer is accessible and its own impedance is not enough to limit fault current. The rating of the Resistor should be so chosen that the fault current is limited to that necessary to operate the protection relays within the required time.

For Grounding Neutral of Transformer or Generator, Resistors up to 66 KV are offered for fault of short duration like 10 sec., 30 sec., 60 sec., continuous etc. Material of resistor is normally Stainless Steel, FeCrAl, Cast Iron, Copper Nickel or Nichrome.

Temperature rise is normally 375° C/760°C or as required by customer.

### FEATURES:-

The metallic NGRs are designed for specific resistance values and voltages especially for shorter time ratings. The Metallic NGRs have the following advantages over a liquid type :-

1. Their resistance value is precise and determined at the manufacturing stage remaining constant throughout their life.
2. Their temperature Time constant is shorter allowing a resistor of shorter time rating to be used.
3. They are easier to install on site.
4. They require virtually no maintenance and have a longer useful life.
5. No anti frost heating is required nor anti condensation heaters generally.
6. Because of problem resulting from the evaporation of gel and electrolyte the liquid resistor require constant maintenance.
7. Invariably the type of cooling will be natural air-cooling.

### STARTING / SPEED CONTROL RESISTOR FOR MOTORS :-

For starting/speed control of A.C. or D.C. Motors, Resistors are manufactured as per customer's requirement. Rating can be 2 min, 5 min, 10 min, continuous or intermittent. Material of Resistor is normally Stainless steel AISI - 304, AISI-410 or AISI 430 or FeCrAl-AISI-406, Cast-Iron

### LOADING RESISTOR FOR UPS TESTING / DG SET LOADING.

### BATTERY DISCHARGE RESISTOR.

### DYNAMIC BREAKING RESISTOR FOR DRIVES & MOTORS ETC.

### BUFFER RESISTORS FOR SUGAR INDUSTRIES.

### OTHER TYPES OF PRODUCT MANUFACTURED :

### NEUTRAL ISOLATOR PANELS (NIS) WITH CT, RELAY.

### FEEDER PILLAR PANELS.

### DISTRIBUTION PANELS.

### VC PANELS.

### PHASE SIDE CUBICLES WITH CT / LA / SC / PT FOR DG SET.

### ALL TYPES OF FABRICATED ITEMS WITH MS / SS MATERIAL AS PER CUSTOMER'S DRAWING.

### ISOLATORS :

HT indoor isolators of following rating :

A) 3.3 KV./6.6 KV./12 KV./22 KV./33 KV. B) 400 Amp./630 Amp./1200 Amp./1800Amp./3200 Amp.

### FEATURES :

- ❖ Single Pole / Three Pole ❖ ON Load/OFF Load ❖ Motorised/Manual mode of operation.
- ❖ Availability of link drive/Aux. switch for switchboard operation/electrical indications and interlock purpose respectively. ❖ Can be mounted on walls, structures or in switchboards/panels. ❖ High operating reliability. ❖ Simple maintenance and Inspection.
- ❖ Used mechanically strong fiberglass link instead of epoxy link to avoid regular problem of breakage of epoxy link at site.



### STANDARD FOLLOWED :

1. IEEE - 32, IS-3043 and BS-162 For Neutral Grounding Resistors.
2. IS-12063-1987-or IS-13947 for degree of Protection for enclosure & IS-5 for paint Shade.

### QUALITY :

Each and every resistance unit is subjected to high standard Quality Control by our inspection Department, which is independent of production Department.

### TESTS :

#### A. ROUTINE TESTS :- FOLLOWING TESTS WILL CONDUCTED.

- 1) Visual and Dimensional
- 2) Insulation resistance value measurement by using 500V/1000 V megger before & after dielectric Test.
- 3) Resistance value measurement with  $\pm 10\%$  tolerance
- 4) H.V. Test of twice the rated voltage + 1000 volts for voltage class below 660 volts or 2.25 times of rated voltage + 2000 volts for voltages above 1100 volts.

#### B. TYPE TESTS :

Temperature rise test i.e. Heat Run Test if required will be conducted by passing equivalent / rated current for rated/equivalent time keeping  $I^2T$  Constant through a part of Resistor.

### TYPES OF RESISTANCE ELEMENTS / GRIDS :-

#### FORMED STAINLESS STEEL GRIDS/ROD GRIDS : (Tailor Made Design Is Done For Each Job)

#### SALIENT FEATURE :

1. Grids are formed of AISI - 304/AISI - 410 Stainless Steel material.
2. Temperature coefficient of resistance is 0.15% /°c for AISI-410 & 0.094% /°c for AISI-304.
3. Connection between adjacent grid is done by Arc Welding.
4. Galvanised M.S. washers will be used as spacer between grid element and the same is insulated from grids by using mica washers.

#### WIRE WOUND / WIRE GRID RESISTANCE :

#### SALIENT FEATURE :

1. Resistance wire is wound on ceramic insulator to form a coil for wire wound.
2. Tapping can be taken at any place.
3. These Resistors are economical for low current.
4. Available in ratings of 1Amp and above

#### PUNCHED STAINLESS STEEL GRIDS : (Tailor made design is done for each job)

#### SALIENT FEATURE :

1. Grids are punched out of AISI 304 / AISI 430 type stainless steel sheets or AISI - 406 i.e. FeCrAl Sheets
2. Temperature coefficient of resistance is 0.094% per degree C for stainless steel AISI - 304 & 0.15% per°C for AISI - 430 & 0.019% per°C for FeCrAl i.e. AISI-406.
3. Connection between the adjacent grids can be of following type :-
  - A) Adjacent grids will be connected by using galvanized Nut-Bolts using spring washers.
  - B) With Tig welded joints, which are totally secured against intense vibration.
4. Terminals can be brought down at the bottom for ease of connection if asked.
5. Each grid element is supported on Tie rods. Hence the assembly of resistance unit becomes very sturdy and it can absorb intense vibrations. Grids are insulated from M.S. tie rod by using Mica tube.
6. Galvanised / Aluminium pipe / MS Washers will be provided as spacer between grid elements and the same will be insulated from grids by using Mica washers.
7. These grids have wide range of current rating varying from 10 Amps to 200 Amps.

