# NIROU TABLO

## NTSAFE24 and NTSAFE36

Medium Voltage, air-insulated metal clad switchgear

Catalogue 2007 NTSAFE2436.85.10.23

benchmark IN QUALITY ISO 9001

گروه صنعتی نیرو
NIROU GROUP

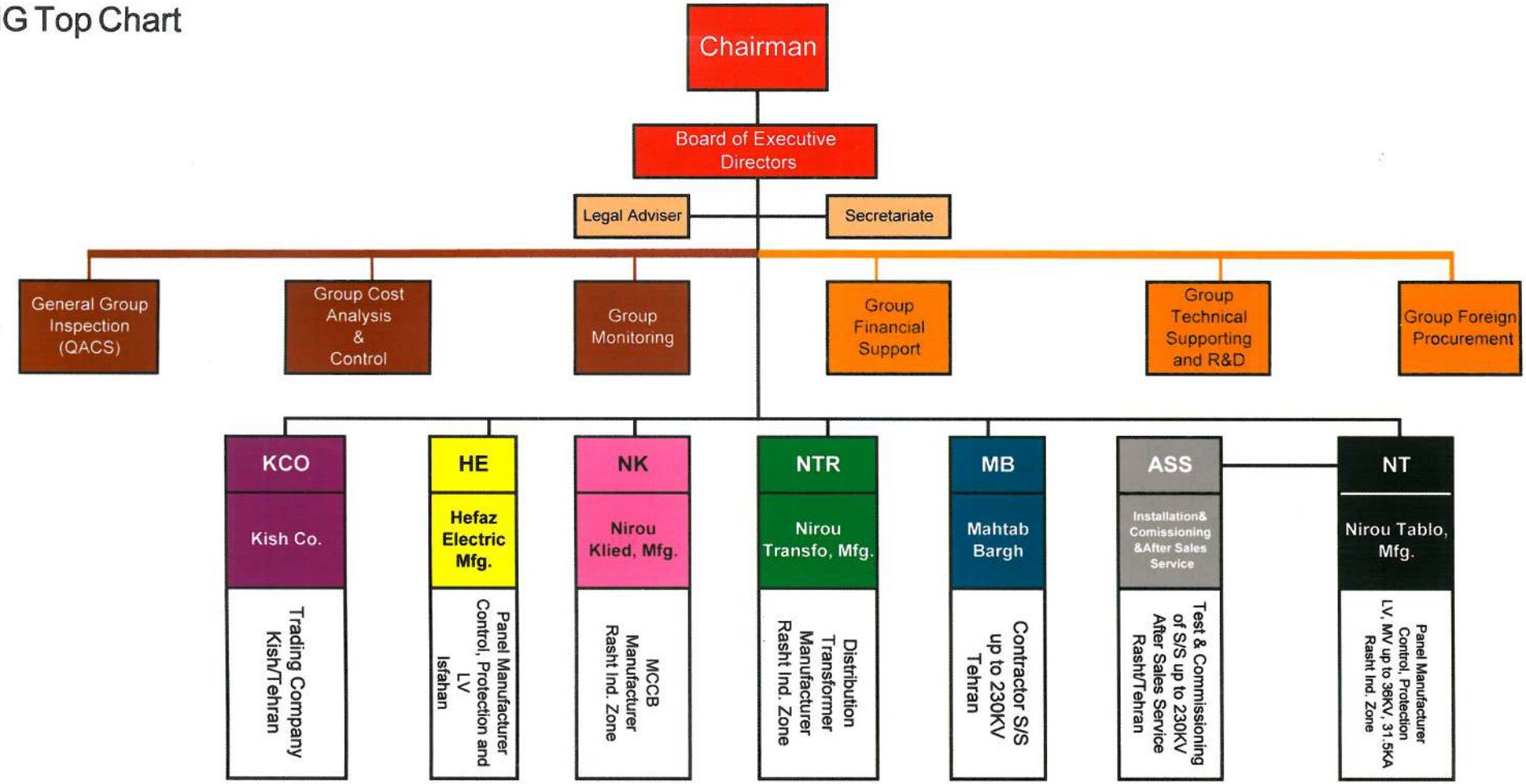
# Our company

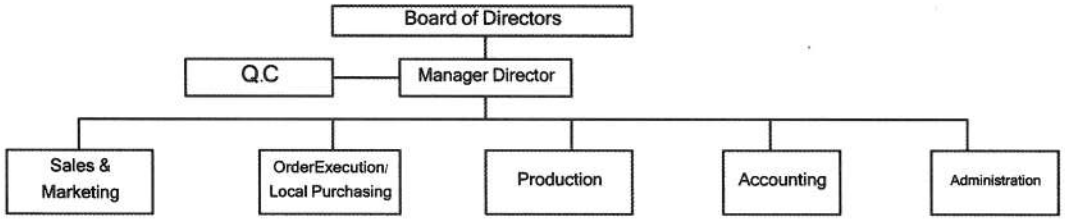
## NIROU TABLO

Nirou Tablo is one of the leading electrical panel manufactures in Iran, active in the field of design and manufacturing of low and medium voltage panels, in accordance to international standards (IEC298, IEC694, IEC56, etc).

The production facilities of Nirou Tablo are concentrated in Rasht Industrial Zone (17,000 square meters covered area), and are backed up by more than 200 personnel, engineers, high-skilled technicians and laborers, with more than 30 years of experience in related fields. Customer satisfaction and quality orientation of Nirou Tablo, which is a strategic policy, are reasons for the good reputation that the company has gained.

# NG Top Chart




NIROU GROUP

# CONTENT

## NT-Safe characteristics

- Metal-clad air-insulated switchboard
- Designed for medium voltage distribution
- Factory-tested for indoor installations
- Earthed metallic partitions between compartments
- Reduction in the use of insulating materials
- Mechanical safety interlocks
- Compartments could be made of pre-galvanised sheets on request.
- Front access for installation, maintenance and routine operations.
- Complete set of apparatus: gas and vacuum Circuit breakers, contactors and switch disconnectors.
- Wide range of functional units for any installation requirement
- Easy-to-assemble modular structure.

# CHARACTERISTICS

## Applications

### Utilities and Power Plants

- Power stations
- Transformer stations
- Switching stations
- Main and auxiliary switchboards.

NT-Safe is a medium voltage, metal-clad switchboard suitable for indoor applications.
It is a modular apparatus made of aligned standard units.
Metal sheets segregate each compartment and the energized components are air insulated.
The installation requires very simple civil works.
The switchboard can be wall-mounted.
The power cables branch connectors are accessible from the front.

## Protection degrees

The protection degrees in compliance with IEC 60529 Standards are :

- IP4X on the external housing
- IP2X inside the compartments.

On request, the external housing can be manufactured so as to guarantee different protection degrees up to a maximum of IP53.

## Main electrical characteristics

| Rated voltage | 12-17,5 kV | 24kV | 36kV |
|---|---|---|---|
| Rate current | ...2500 A | ...2000A | ...2500A |
| Rated short time withstand current | ...31,5 kA | ...25 kA | ...25 kA |

The electrical characteristics can change depending on different conditions or on protection degrees higher than the standard values.

Each unit consists of the following compartments:

1 Busbar compartment
2 Circuit breaker compartment
3 CT,PT compartment
4 LV compartment

## Standard color

RAL7032

## Compliance with Standards

The switchboard and its components comply with the following International and European Standards:

| | IEC |
|---|---|
| Switchboard | 60694<br>60298 |
| Circuit breakers | 60056 |
| SF6 Gas or Vacuum | 60376 |
| Earthing switches | 60129 |
| Contactors | 60470 |
| Switch disconnectors | 60265-1 |
| Fuses | 60282-1 |

## Ambient conditions

The switchboard ratings are guaranteed under the following ambient conditions:

| | |
|---|---|
| Minimum ambient temperature | -5°C |
| Maximum ambient temperature | + 40°C |
| Maximum relative humidity | 95 % |
| Maximum altitude | 1000 m a.s.l. |
| In presence of unpolluted and non corrosive atmosphere. | |

# APPARATUS

## Circuit breakers

NT-Safe switchboard can be equipped with both SF6 HD4 and Vacuum VD4 withdrawable circuit breakers.

The circuit breakers are fitted with a truck for the racking in and out with closed door.

The light and compact structure of both types guarantees sturdiness and high mechanical reliability. The stored energy, free-release mechanical operating mechanism allows opening and closing without the operator's intervention.

The operating mechanism and the poles are fixed to the metal structure, which acts also as a support for the kinematics automation of the moving contacts.

## HD4 SF6 circuit breakers

HD4 medium voltage circuit breakers use sulphur hexafluoride (SF6) for arc quenching and as an insulating medium.

HD4 breaking principle relies on compression and self-blast techniques in order to achieve the best performances at all service current values with minimum arc times and gradual arc extinction without chopping, restriking and operating overvoltages.

These features guarantee a long electrical life for the circuit breaker and limited dynamic, dielectric and thermal stresses on the network.

The poles, which form the breaking part, are maintenance-free, life-long sealed pressure systems in compliance with IEC 60056 standards.

**HD4** SF6 circuit breaker

## VD4 vacuum circuit breakers

VD4 circuit breakers installed in NT-Safe switchboards use vacuum as a breaking and insulating medium. Thanks to their advance construction techniques, VD4 circuit breakers ensure high performances under all service conditions.

The arcing chambers are vertically installed into the epoxy resin pole, which prevents any possible damage due to external conditions.

The pole acts as an insulator, ensuring an excellent distribution of the electrical field depending on the insulation voltages.

## V-Contact vacuum contactors

NT-Safe 12 KV can be equipped with V-Contact withdrawable contactors. The contactors are suitable for alternate current lines with a high number of operations. They are made of a resin monobloc that houses the vacuum interrupters, the moving equipment, the control electromagnetic device , the multivoltage control feeder and the auxiliary accessories.

The monobloc is also the fuseholder support, which is suitable for either DIN or BS fuses.

The closing of the main contacts is carried out by the electromagnet, whereas the opening is tripped by an opposing spring.

A compact and sturdy construction guarantees the apparatus a long electrical and mechanical life.
A versatile range of accessories offers tailor-made contactor appications.

The accessories can be promptly installed or replaced as the auxiliary circuits are mounted on an easily removable frame.

**VD4** vacuum circuit breaker

## Compartments

Each unit consists of three power compartments - busbars, feeder, and circuit breaker and three auxiliary compartments instruments, auxiliary circuit wiring duct and voltage transformers (where required).

The arc proof switchboard is equipped with a duct to release the gases resulting from a possible internal arc.

All the compartments are segregated from each other with metal Sheets.

## Main busbars

The busbar compartment houses the main busbar system, which is connected to the circuit breaker fixed insulating contacts by means of branches. The main busbars are made of electrolytic copper.

Up to 24 kV the system is made of air-insulated flat copper bars and it can be resin-insulated on request. 36 kV units are equipped with insulated round bars.

## Branch connectors

The feeder compartment houses the branch system for connecting the power cables to the circuit breaker fixed insulating contacts.

The branch connectors are made of electrolytic copper.

Up to 24 kV the connectors are made of air-insulated flat copper bars and they can be resin-insulated on request. 36 kV units are equipped with Insulated round connectors.

## Earthing switch

Each feeder unit can be equipped with an earthing switch for the earthing of the power cables.

The same device can also be used for the earthing of the busbar system (measuring, bus tie and rise units). The device has short circuit current making capacity.
On request, its opening and closing operations can be prevented by means of key or padlocks. The earthing switch is properly interlocked and manually operated from the front

## Earthing busbar

The earthing busbar is made of electrolytic copper.

It runs through the whole switchboard length thus guaranteeing a high safety degree both for the personnel and for installation purposes.

## Bushings and shutters

The bushings consist of insulating monoblocs, which house the power contacts for the connection between circuit breaker and feeder / busbar compartments.

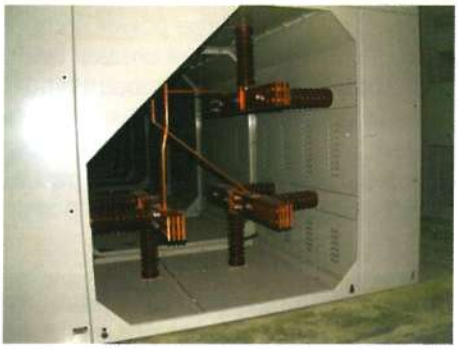
The metallic shutters are automatically operated when the circuit breaker is drawn from test to service position and vice versa.

The shutters can be equipped with a fail-safe device (on request) to prevent their manual opening when the circuit breaker is removed from the compartment and the door is open. On request, two independent padlocks can lock each shutter.

## Cables

The cable compartment is easily accessible from the front, thus making it possible to have a wall standing installation. The units can be equipped with single or three core cables up to a maximum of twelve per phase depending on the rated voltage, the unit dimensions and the cable cross section

## Interlocks



The switchboard is equipped with all the interlocks necessary to prevent incorrect operation that might jeopardize the personnel safety and put at risk the installation functionality.

In particular the following interlocks are provided to prevent these operations:

- -circuit breaker closing ( undefined truck position)
- -circuit breaker racking-out (circuit breaker closed)
- -circuit breaker racking-in (circuit breaker closed)
- -circuit breaker compartment door opening (truck in service or undefined position)
- -circuit breaker racking-in (circuit breaker compartment door open).

If the unit is equipped with an earthing switch, the following interlocks are also provided:

- -earthing switch closing (circuit breaker in service or undefined position)
- -circuit breaker racking-in (earthing switch closed)
- -feeder compartment door opening (earthing switch open)
- -earthing switch opening (feeder compartment door open).

## Voltage transformers

The resin-insulated voltage transformers are used for the feeding of measuring instruments and protections. They are suitable either for fixed installation or mounted on withdrawable trucks. They comply with IEC 60044-2 Standards. The dimensions of the fixed version comply with DIN Standards 42600 Narrow Type. The withdrawable version equipped with fuses is custom-made. The voltage transformers can be fitted either with one or two poles. Their performances and accuracy classes comply with the functional requirements of the apparatus they are connected to. The withdrawable version is equipped with medium voltage protection fuses. Their replacement can be carried out while the switchboard is in service.

**NT-SAFE36**
Medium Voltage **36 KV**, Air insulated metal clad Type Tested Switchgear.

**Withdrawable PT Cubicle:**

- **I**ndependent PT installation.
- **E**ase of maintenance.
- **S**imple adaptor for secure electrical connection.
- **A**daptable to any PT design.
- **C**hanging the fuse during the operation without switching any need to switch-off.

# SERVICE TRUCKS

The NT-Safe up to 24 kV range is fitted with all the service trucks required to complete the switchboard and needed in service operations and during maintenance work.
The trucks are divided into four different types:

- earthing without making capacity;
- earthing with making capacity;
- cables test;
- isolation.

## Earthing truck without making capacity

These trucks carry out the same function as the earthing switches without making capacity.
Therefore they do not have any capacity to earth the live circuits under fault conditions.
They are use to ensure fixed additional earthing, as required by the plant service and maintenance procedures, as a further guarantee for personnel.
The used of these trucks foresees removal of the switching device from the switchboard (circuit-breaker or contactor) and its replacement with the truck. The units preset for use of earthing trucks are fitted with a key lock which, if activated, prevents their racking-in.
This truck is available in two versions:

- main busbar system earthing;
- power cables earthing.

During the racking-in phase, the main busbar earthing truck only lifts the top shutter and earths the contacts connected to the top branches ( and therefore to the main busbar system) by means of the switchboard structure.

During the racking-in phase, the power cables earthing truck only lifts the bottom shutter and earths the contacts connected to the bottom branches (and therefore to the power cables) by means of the switchboard structure.
These trucks can also be used in the bus-tie units. In this case, they earth the two sides of the main busbar system.

## Earthing truck with making capacity

These trucks carry out the same function as the earthing switches with making capacity.
They consist of circuit-breakers only fitted with top (main busbar earthing) or bottom (power cables earthing) terminals. The contacts without terminals are short-circuited by means of a copper bar and connected to earth by means of the apparatus truck.

They keep all the characteristics of the circuit-breakers, such as full making capacity and opening of the live circuits under fault conditions.

They are used to ensure extremely efficacious earthing on circuits stressed by a fault. They allow opening and closing operations to be carried out rapidly with remote electric control.

The use of these trucks foresees removal of the switching device from the switchboard (circuit breaker or contactor) and its replacement with the truck. The units preset for use of earthing trucks are fitted with a key lock which, if activated, prevents their racking-in.

This truck is available in two versions:

- main busbar system earthing;
- power cables earthing.

During the racking-in phase, the main busbar earthing truck only lifts the top shutter and presets the contacts connected to the top branches (and therefore to the main busbar system) for closing to earth by means of a control.

During the racking-in phase, the power cables earthing truck only lifts the bottom shutter and presets the contacts connected to the bottom branches (and therefore to the power cables) for closing to earth by means of a control.

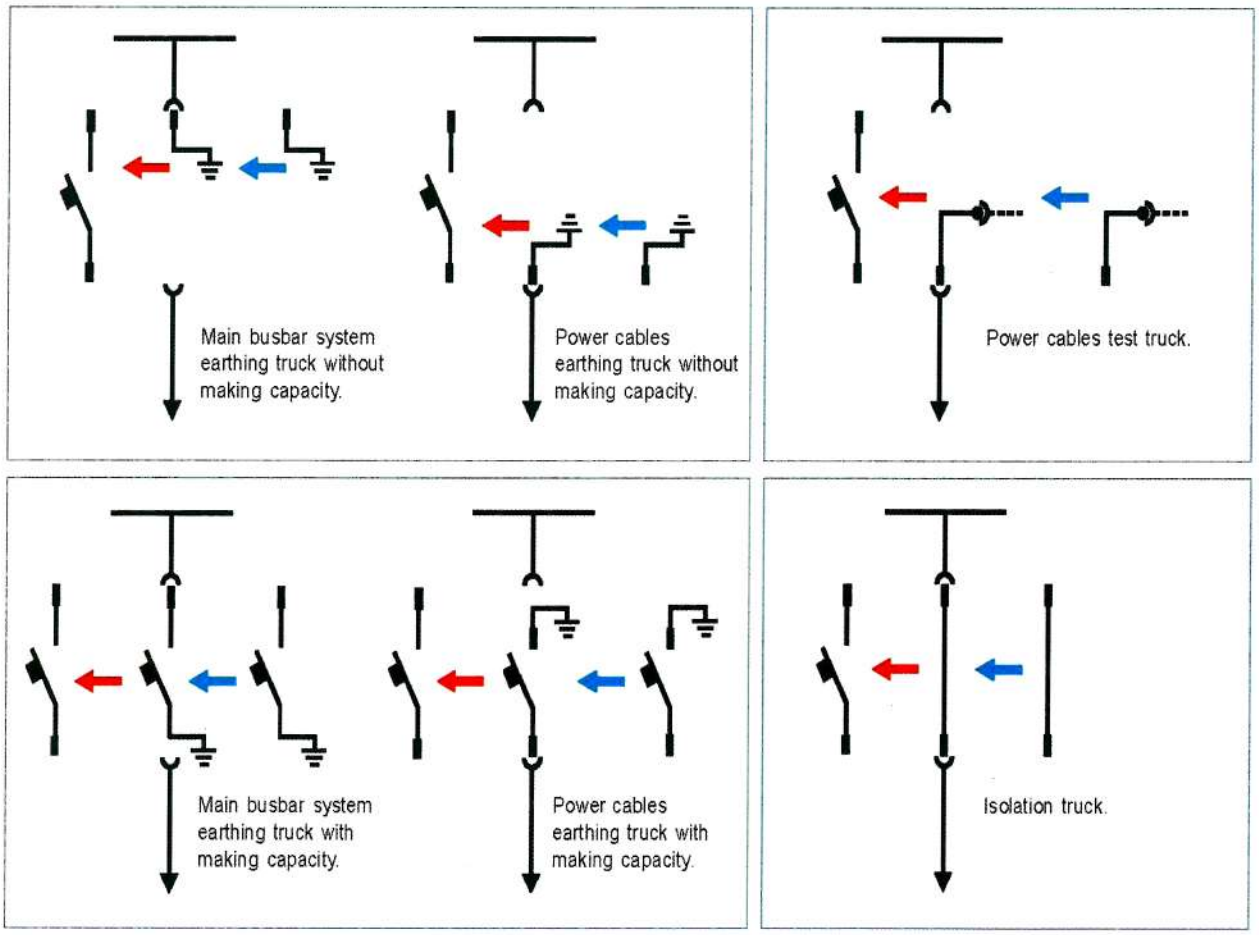
These trucks can also be used in bus-tie units.
In this case, they earth the two sides of the main busbar system.

## Power cables test truck

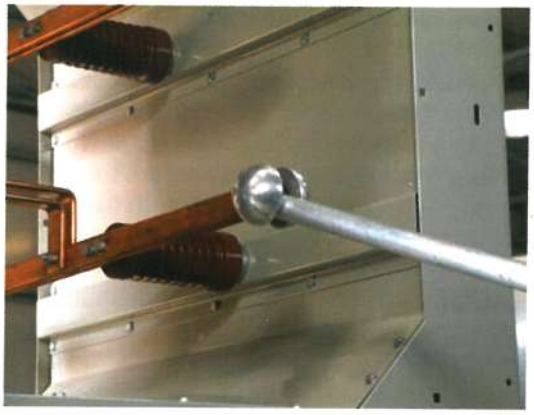
These trucks allow the insulation tests to be carried out on the power cables without accessing the feeder unit or disconnecting the cables from the switchboard. The use of these trucks foresees removal of the switching device from the switchboard (circuitbreaker or contactor) and its replacement with the truck. During the racking-in phase, the truck only lifts the bottom shutter and, by means of the connectors it is fitted with, allows connection of the test apparatus cables. This truck can only be used in the incoming/outgoing units.

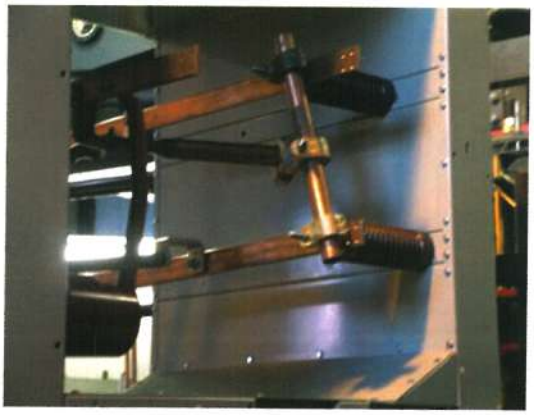
## Isolation truck

The isolation truck allows the switchboard top and bottom contacts to be connected directly. Connection is made extremely safe by using the poles of the HD4 circuit-breakers to insulate the connection bars from the external environment. In the incoming/outgoing units, it connects the main busbar system to the power cables, whereas in the bus-tie units, to the two sides of the busbar system. This truck is used in the NT-Safe switchboards to make incoming/outgoing units without circuit-breakers in radial networks, to make cable connections between two switchboards placed in front of each other, and for constructing interconnection units and creating bus-tie-riser units with double insulation (in this case, both the units are made from bus-ties, the first fitted with a circuit-breaker and the other with an isolation truck).



# TYPE TEST IN CESI LAB--MILAN






## Test Report

CESI TEST Testing Services

AT-A3/006518 p.1

| | | |
|---|---|---|
| client | NIROU Group, Tehran - Iran | |
| equipment under test | 24 kV - 1250 A metal-clad switchgear type NT-SAFE 24 | |
| tests performed | Dielectric tests<br>Partial discharge measurement | |
| normative documents | IEC 60298 (1990-12); IEC 60298/A1 (1994-11);<br>IEC 60694 (2001-05) | |
| receipt date of the sample | January 27, 2003 | |
| test date | from February 24, 2003 | to February 28, 2003 |
| no. of pages | 25 | no. of pages annexed 05 |

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| | | |
|---|---|---|
| first issue date | March 03, 2003 | |
| prepared | PeC/TEST - D. Pirola | |
| verified | PeC/TEST - A. Elli | |
| approved | PeC/TEST - V. Scarioni | |

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## Test Report

CESI TEST Testing Services

MP-A3/007974 p.1

| | |
|---|---|
| **client** | **NIROU Group, Tehran - Iran** |
| **equipment under test** | 24 kV - 1250 A metal-clad switchgear type NT-SAFE 24 |
| **tests performed** | temperature-rise test |
| **normative documents** | IEC 60298 (1990-12); IEC 60694 (2001-05) |
| **receipt date of the sample** | January 27, 2003 |
| **test date** | **from** March 10, 2003 **to** March 11, 2003 |
| **no. of pages** | 11 **no. of pages annexed** - |

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SINCERT n° 0030

| | | |
|---|---|---|
| **first issue date** | March 11, 2003 | |
| **prepared** | PeC/TEST - M. Assolari | |
| **verified** | PeC/TEST - A. Elli | |
| **approved** | PeC/TEST - V. Scarioni | |

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## Test Report

CESI TEST Testing Services

MP-A3/008619 p.1

| | | |
|---|---|---|
| **client** | **NIROU Group, Tehran - Iran** | |
| **equipment under test** | 24 kV - 1250 A metal-clad switchgear type NT-SAFE 24 | |
| **tests performed** | short-time and peak withstand current tests of the main and earthing circuits | |
| **normative documents** | IEC 60298 (1990-12); IEC 60694 (2001-05) | |
| **receipt date of the sample** | January 27, 2003 | |
| **test date** | **from** March 11, 2003 | **to** March 11, 2003 |
| **no. of pages** | 13 | **no. of pages annexed** 6 |

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**first issue date** March 12, 2003

| | | |
|---|---|---|
| **prepared** | PeC/TEST - M. Levati | M. Levati |
| **verified** | PeC/TEST - A. Elli | Martino Elli |
| **approved** | PeC/TEST - V. Scarioni | |

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## Test Report

CESI TEST Testing Service

MP-A3/007960 p.1

| | |
|---|---|
| client | NIROU Group, Tehran - Iran |
| equipment under test | 36 kV - 1250 A metal-clad switchgear type NT-SAFE 36 |
| tests performed | temperature-rise test |
| normative documents | IEC 60298 (1990-12); IEC 60694 (2001-05) |
| receipt date of the sample | January 27, 2003 |
| test date | from March 6, 2003 to March 7, 2003 |
| no. of pages | 11 no. of pages annexed - |

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| | | |
|---|---|---|
| first issue date | March 11, 2003 | |
| prepared | PeC/TEST - M. Assolari | |
| verified | PeC/TEST - A. Elli | |
| approved | PeC/TEST - V. Scarioni | |

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## Test Report

CESI TEST Testing Services

MP-A3/008269 p.1

| | |
|---|---|
| client | NIROU Group, Tehran - Iran |
| equipment under test | 36 kV - 1250 A metal-clad switchgear type NT-SAFE 36 |
| tests performed | short-time and peak withstand current tests of the main and earthing circuits |
| normative documents | IEC 60298 (1990-12); IEC 60694 (2001-05) |
| receipt date of the sample | January 27, 2003 |
| test date | from March 10, 2003 to March 10, 2003 |
| no. of pages | 11 no. of pages annexed 1 |

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SINCERT n° 0030

| | | |
|---|---|---|
| first issue date | March 11, 2003 | |
| prepared | PeC/TEST - M. Levati | M. Levati |
| verified | PeC/TEST - A. Elli | Agostino Elli |
| approved | PeC/TEST - V. Scarioni | |

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## Test Report

CESI TEST Testing Services

AT-A3/006756 p.1

| | |
|---|---|
| **client** | **NIROU Group, Tehran - Iran** |
| **equipment under test** | 36 kV - 1250 A metal-clad switchgear type NT-SAFE 36 |
| **tests performed** | Dielectric tests<br>Partial discharge measurement |
| **normative documents** | IEC 60298 (1990-12); IEC 60298/A1 (1994-11);<br>IEC 60694 (2001-05) |
| **receipt date of the sample** | January 27, 2003 |
| **test date** | **from** February 26, 2003 **to** February 27, 2003 |
| **no. of pages** | 21 **no. of pages annexed** 05 |



| | | |
|---|---|---|
| **first issue date** | February 28, 2003 | |
| **prepared** | PeC/TEST - D. Pirola | |
| **verified** | PeC/TEST - A. Elli | |
| **approved** | PeC/TEST - V. Scarioni | |

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# Type Test Certificate CESI

A4/510487

Approved



| | |
|---|---|
| **Type Test Certificate of** | Dielectric, temperature-rise and short-circuit performance |
| **Apparatus** | Metal-clad switchgear |
| **Designation** | NT-SAFE 36 |
| | Rated voltage 36 kV ; Rated normal current 1250 A ; Rated frequency 50 Hz |
| **Manufacturer** | NIROU GROUP – Teheran - IRAN |
| **Tested for** | NIROU GROUP – Teheran - IRAN |
| **Date(s) of tests** | **from** February 12, 2003 **to** August 25, 2003 |
| **Tested by** | CESI S.p.A. – Milano – ITALY |

The apparatus, constructed in accordance with the description, drawings and photographs incorporated in the reference documents, identified in this certificate, has been subjected to the series of proving tests in accordance with

**IEC 60298 (1990)**
Sub clauses 6.1, 6.3, 6.4, 6.5 and 6.101

**This Type Test Certificate has been issued by CESI following exclusively the STL Guides.**

**The results are shown in the record of Proving Tests and the oscillograms attached in the Test Reports. The values obtained and the general performance are considered to comply with the above Standards and to justify the ratings assigned by the Manufacturer as listed on page No.2 .**

**The Certificate applies only to the apparatus tested. The responsibility for conformity of any apparatus having the same designations with that tested rests with the Manufacturer.**



| | |
|---|---|
| **No. of pages** | 4 |
| **Issue date** | August 25, 2004 |
| **Prepared** | PeC - P. BECCARINI |
| **Verified** | PeC - A. ELLI |
| **Approved** | PeC - M. de NIGRIS |

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**1 - Ratings assigned by the Manufacturer as proved by the tests**

| | |
|---|---|
| **Metal-enclosed switchgear** | |
| Manufacturer | NIROU GROUP – Teheran - IRAN |
| Type | NT-SAFE 36 |
| Voltage | 36 kV |
| Insulation level | |
| Lightning impulse withstand voltage | 170 kV |
| Power frequency withstand voltage | 70 kV |
| Frequency | 50 Hz |
| Normal current | 1250 A |
| Short-time withstand current | 31,5 kA |
| Peak withstand current | 80 kA |
| Short-circuit duration | 1 s |
| Degree of protection | IP 2X |

**2 – This Certificate also verifies**
Mechanical operation tests
Verification of IP-coding

**3 – Reference documents**
*The following reference documents are integral part of this Certificate*

| No. | Description | CESI registration |
|---|---|---|
| 1 | Test Report | GPS-A3/014174 |
| 2 | Test Report | AT-A3/012043 |
| 3 | Test Report | MP-A3/029081 |
| 4 | Test Report | MP-A3/007960 |
| 5 | Test Report | GPS-A1/017215 |
| 6 | Manufacturer's drawings | A3/033671 |

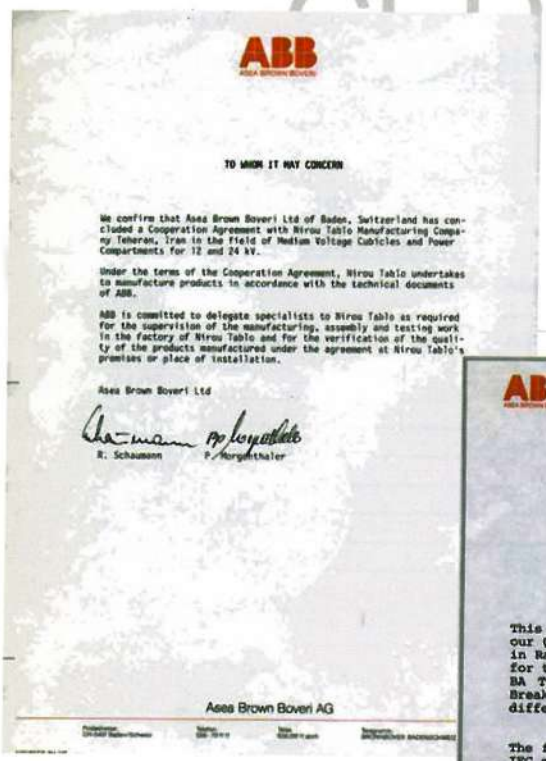
**4 – Additional references**
The conformity of the product is attested with reference to the Standard mentioned in the front sheet and to the following documents:
- Amendment No.1 to IEC 60298 (1990)

The verification of making and breaking capacities has been effected with reference to IEC 62271-100 (2001) Standard.

Activity code 36213V

# TYPE TESTS & CERTIFICATES

Certificates, technical Collaboration agreements and licenses from Companies Such as ABB and Dorman SMITH, always make the Companies Super-Structure and technical Core up to date.



ABB

TO WHOM IT MAY CONCERN

We confirm that Asea Brown Boveri Ltd of Baden, Switzerland has concluded a Cooperation Agreement with Nirou Tablo Manufacturing Company Teheran, Iran in the field of Medium Voltage Cubicles and Power Compartments for 12 and 24 kV.

Under the terms of the Cooperation Agreement, Nirou Tablo undertakes to manufacture products in accordance with the technical documents of ABB.

ABB is committed to delegate specialists to Nirou Tablo as required for the supervision of the manufacturing, assembly and testing work in the factory of Nirou Tablo and for the verification of the quality of the products manufactured under the agreement at Nirou Tablo's premises or place of installation.

Asea Brown Boveri Ltd

R. Schaumann P. Morgenthaler

Asea Brown Boveri AG

ABB

CERTIFICATE

To whom it may concern

This is to certify, that during the visit of an Inspector of our Quality Assurance Department to the Nirou Tablo Factory in Rasht, the 20 units of compartmented Switchgear Cubicles for the Shahid Babonar Project, similar in design to the ABB BA Type of Switchgear Cubicle and using its $SF_6$ Circuit Breakers Type HB 24.12.25 C, were inspected and tested in different stages of manufacture.

The following tests as per the requirements of the relevant IEC standard were carried out:

1. High voltage test at 50 kV, 50 c.p.s.
2. Auxiliary wiring test
3. Interlocking system
4. Test for electrical function
5. Test for mechanical function

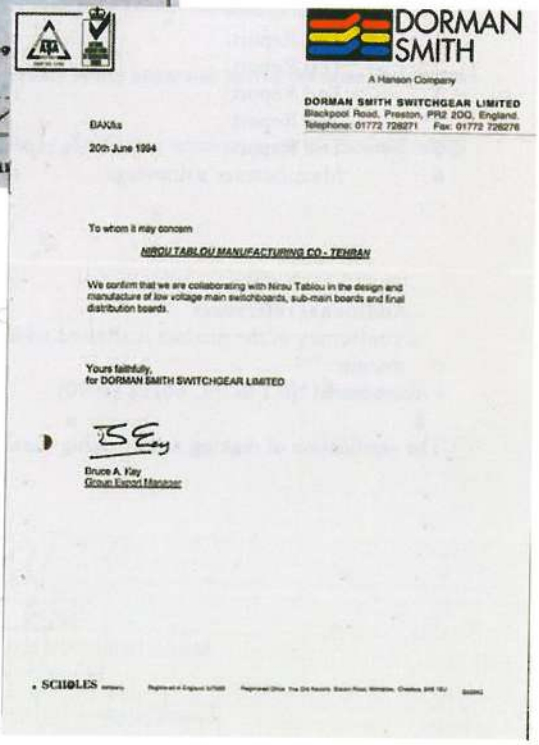
All the above tests were passed successfully and with good results.

The manufactured Switchgear Cubicles were found as being of good quality and therefore can be considered as approved.

Zürich-Oerlikon and Rasht
July 1989

ABB Medium Voltag

ABB Medium Voltage Equipment Ltd.Zuerich-Oerli



DORMAN SMITH

A Hanson Company

DORMAN SMITH SWITCHGEAR LIMITED
Blackpool Road, Preston, PR2 2DO, England.
Telephone: 01772 726271 Fax: 01772 726276

BAK/ks

20th June 1994

To whom it may concern

NIROU TABLOU MANUFACTURING CO - TEHRAN

We confirm that we are collaborating with Nirou Tablou in the design and manufacture of low voltage main switchboards, sub-main boards and final distribution boards.

Yours faithfully,
for DORMAN SMITH SWITCHGEAR LIMITED

Bruce A. Kay
Group Export Manager

SCHOLES

ABB Medium Voltage Equipment Ltd.Zuerich-Oerlikon, Switzerland

## 24 KV SWITCHGEAR

The medium voltage switchgear is of metal – clad type, designed for indoor Installation. The switchgear comprises NT SAFE - 24 type cubicles with Vacuum or SF6 ABB circuit breakers Type VD4 or HD4 .

The switchgear is delivered including basic accessories, without foundation Frame.

| | |
|---|---|
| **Rated voltage :** | **24 KV** |
| **Operating voltage :** | **20 KV** |
| **Rated frequency :** | **50 HZ** |
| **Impulse withstand voltage (at site) :** | **125KV, 1.2/50 $\mu$s** |
| **Power frequency withstand voltage :** | **50 KV,50Hz, 1 min** |
| **Rated current – busbars :** | **1250 A at 40 deg C** |
| **Rated short time withstand current :** | **25 KA/3s** |
| **Rated peak withstand current :** | **62.5 KA** |
| **Material of busbars :** | **copper** |
| **Auxiliary voltage for control and signaling circuits :** | **110V DC** |
| **Auxiliary voltage for heating & lighting :** | **400/230 V AC, 50Hz** |
| **Degree of protection :** | **IP 42** |
| **Design ambient temperature :** | **45** |
| **Standard :** | **IEC 298** |
| **Painting:** | **NT Standard** |
| **Manufacturer :** | **Nirou Tablo / IRAN** |

## 36 KV SWITCHGEAR

The medium voltage switchgear is of metal – clad type, designed for indoor installation. The switchgear comprises NT-SAFE 36 type cubicles with Vacuum or SF6 ABB circuit breakers Type VD4 or HD4.

The switchgear is delivered including basic accessories, without foundation frame.

| | |
|---|---|
| **Rated voltage :** | **36 KV** |
| **Operating voltage :** | **33 KV** |
| **Rated frequency :** | **50 HZ** |
| **Impulse withstand voltage (at site) :** | **170KV, 1.2/50 $\mu$s** |
| **Power frequency withstand voltage :** | **70 KV,50Hz, 1 min** |
| **Rated current – busbars :** | **1250 A at 40 deg C** |
| **Rated short time withstand current :** | **25 KA/3s** |
| **Rated peak withstand current :** | **62.5 KA** |
| **Material of busbars :** | **copper** |
| **Auxiliary voltage for control and signaling circuits :** | **110V DC** |
| **Auxiliary voltage for heating & lighting :** | **400/230 V AC, 50Hz** |
| **Degree of protection :** | **IP 42** |
| **Design ambient temperature :** | **45** |
| **Standard :** | **IEC 298** |
| **Painting:** | **NT Standard** |
| **Manufacturer :** | **Nirou Tablo / IRAN** |

# TECHNICAL DATA (Dimension & type Switchgears )

| 12 Kv | | Unit width | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | 600mm | | 1000mm | | | | | |
| HD4 | | 630 A | 1250 A | 630 A | 1250 A | 1600 A | 2000 A | 2500A | 2500 A |
| VD4 | | 630 A | 1250 A | 630 A | 1250 A | 1600 A | 2000 A | | 2500 A |
| V-Contact (1) (12 KV Only) | | 400 A | | | | | | | |
| IF | Incoming feeder | | | ● ● | ● ● | ● ● | ● ● | ● ● | ● ● |
| IFM | Incoming feeder with measurement | | | ● ● | ● ● | ● ● | ● ● | ● ● | ● ● |
| BT | Bus tie | | | ● ● | ● ● | ● ● | ● ● | ● ● | ● ● |
| BTM | Bus tie with measurement | | | ● ● | ● ● | ● ● | ● ● | ● ● | ● ● |
| R | Rise | | | | | | | ● ● | |
| RM | Rise with measurement | | | | | | | | |
| M | Measurement | | | ● ● | ● ● | ● ● | ● ● | ● ● | ● ● |
| IFD | Incoming feeder direct | | | ● ● | ● ● | ● ● | ● ● | ● ● | ● ● |
| IFDM | Incoming feeder direct with measurement | | | ● ● | ● ● | ● ● | ● ● | ● ● | ● ● |
| DF | Disconnector feeder | | | | | | | | |
| IFC | Incoming feeder with capacitor | | | | | | | | |

| 24 kV | | 1000 mm | | | | |
|---|---|---|---|---|---|---|
| HD4 | | 630 A | 1250 A | 630 A | 1250 A | 1600 A |
| VD4 | | 630 A | 1250 A | | | 1600 A |
| IF | Incoming feeder | | | ● ● | ● ● | ● ● |
| IFM | Incoming feeder with measurement | | | ● ● | ● ● | ● ● |
| BT | Bus tie | | | ● ● | ● ● | ● ● |
| BTM | Bus tie with measurement | | | | | |
| R | Rise | | ● ● | | | ● ● |
| RM | Rise with measurement | | | | | |
| M | Measurement | | | | | |
| IFD | Incoming feeder direct | | | ● ● | ● ● | ● ● |
| IFDM | Incoming feeder direct with measurement | | | ● ● | ● ● | ● ● |
| DF | Disconnector feeder | | | | | |
| IFC | Incoming feeder with capacitor | | | | | |

| 36 Kv | | 1200 mm | | | | |
|---|---|---|---|---|---|---|
| HD4 | | 630 A | 1250 A | 1600 A | 2000 A | 2500A |
| VD4 | | 630 A | 1250 A | 1600 A | 2000 A | 2500A |
| IF | Incoming feeder | ● ● | ● ● | ● ● | ● ● | ● ● |
| IFMB | Incoming feeder with busbar measurement | ● ● | ● ● | | | |
| BT | Bus tie | ● ● | ● ● | | | |
| R | Rise | ● ● | ● ● | | | |
| RM | Rise with measurement | ● ● | ● ● | | | |
| M | Measurement | ● ● | ● ● | | | |
| IFD | Incoming feeder direct | ● ● | ● ● | ● ● | ● ● | ● ● |
| IFDM | Incoming feeder direct with measurement | ● ● | ● ● | | | |

## ELECTRICAL CHARACTERISTICS

| Switchboard | | 12 kV | 17.5 kV | 24 kV | 36 kV |
|---|---|---|---|---|---|
| Rated voltage | kV | 12 | 17.5 | 24 | 36 |
| Rated insulation voltage | kV | 12 | 17.5 | 24 | 36 |
| Rated power frequency withstand voltage | kV (1 min ) | 28 (*) | 38 | 50 | 70 |
| Rated lightning impulse withstand voltage | kV | 75 | 95 | 125 | 170 |
| Rated short time withstand current | kA (3s) | 25 | 25 | 25 | 25 |
| Peak current | kA | 80 | 80 | 63 | 63 |
| Internal arc withstand current | kA (1s) | 31.5 | 31.5 | 25 | 25 |
| Main busbar rated currents | A | 1250<br>1600<br>2000<br>2500 | 1250<br>1600<br>2000<br>2500 | 1250<br>1600<br>2000<br>-- | 1250<br>1600<br>2000<br>2500 |
| Branch connector rated currents | A | 630<br>1250<br>1600<br>2000<br>2500 | 630<br>1250<br>1600<br>2000<br>2500 | 630<br>1250<br>1600<br>2000<br>-- | 630<br>1250<br>1600<br>2000<br>2500 |

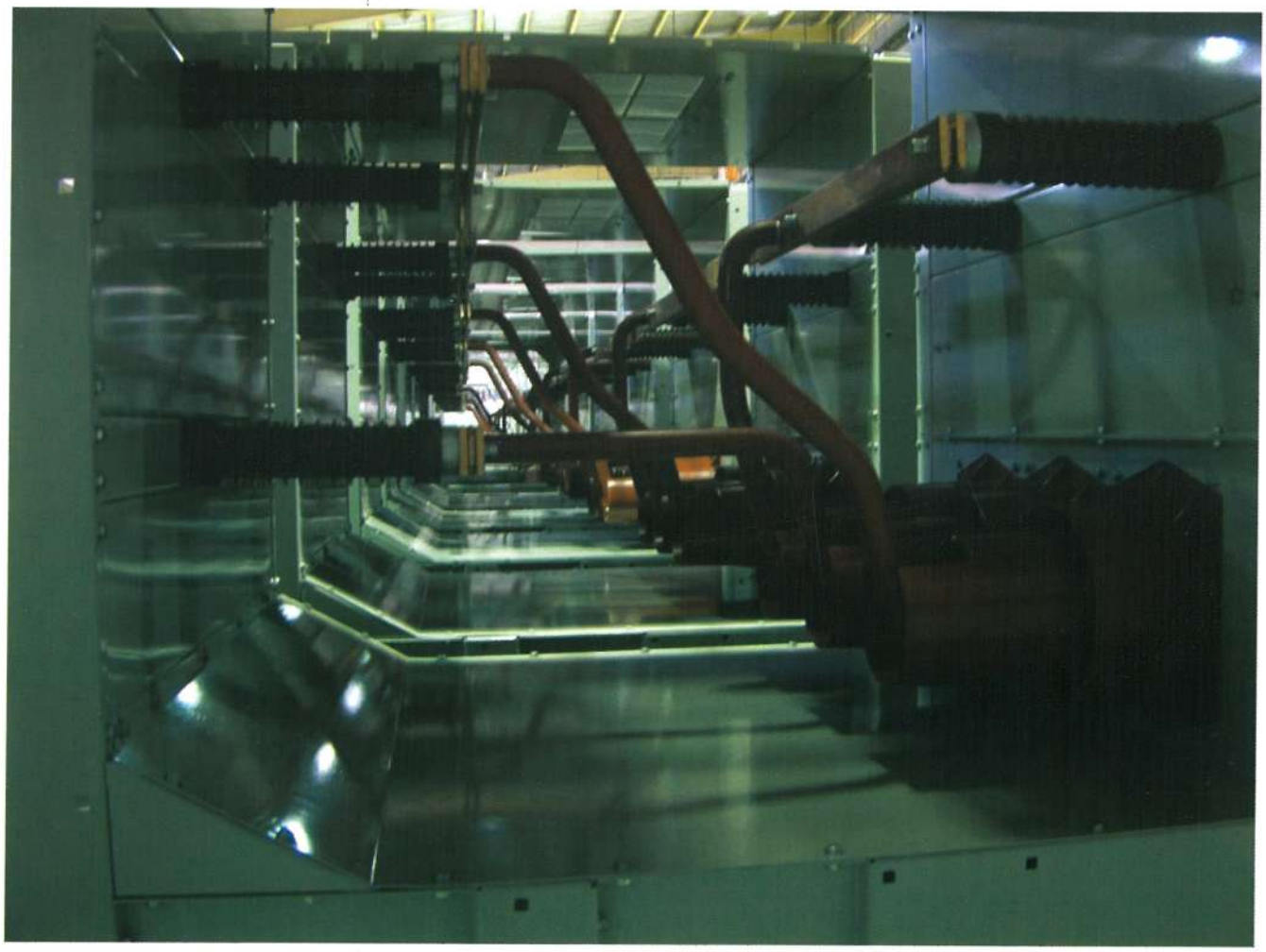
### Earthing switch

| Earthing switch with making capacity | | 12 kV | 17.5 kV | 24 kV | 36 kV |
|---|---|---|---|---|---|
| Rated short time withstand current | kA (3s)<br>kA (1s) | 25<br>31.5 | 25<br>31.5 | 25<br>-- | 25<br>-- |

**36 KV, 1250A ,25KA/3s**
NT-SAFE36 Type Tested withdrawable design

## APPLICATIONS

**36 KV, 1250A ,25KA/3s**
**Switchgears**
Khuzestan Province-IRAN



View from Busbar Compartment

Bus-Bar compartment

## Secondary distribution 24 Kv Compact Switchgears

- Type Tested.
- 24KV,20KA,1250A
- Compact Design.
- Easy to assemble.
- Extension is possible from both sides.
- Latest technology.
- Secondary protection relay

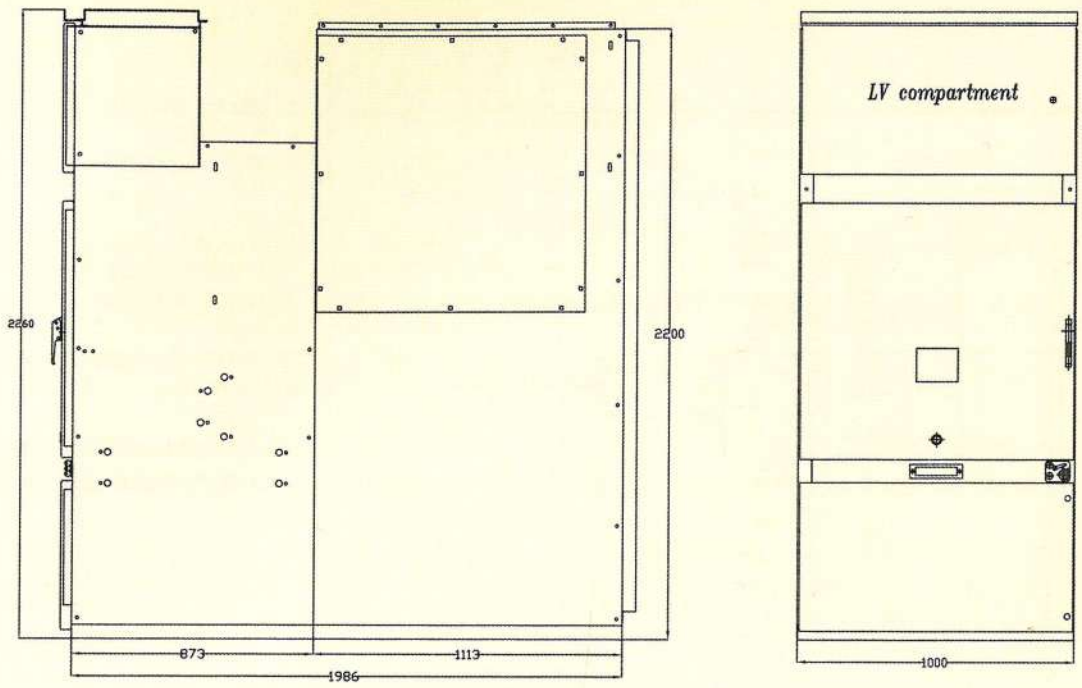
## APPLICATIONS

Bus-Bar Compartment
with PT

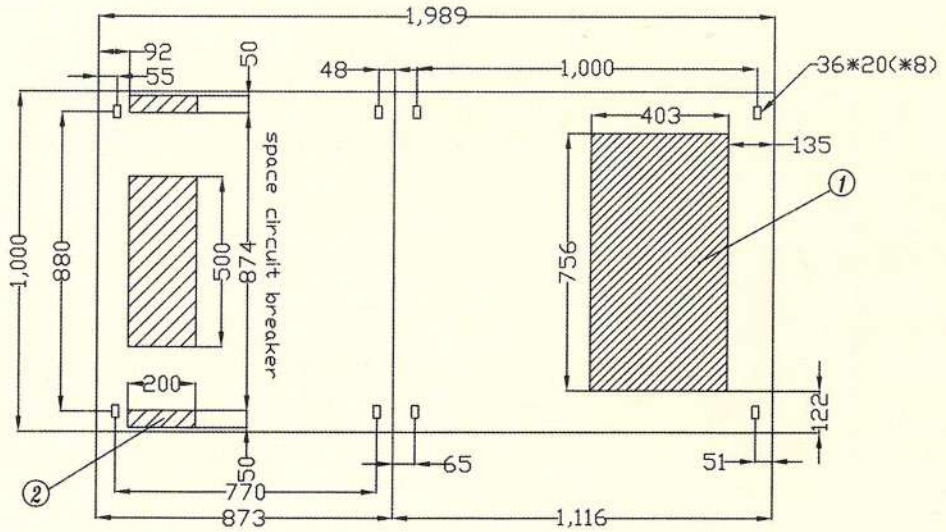

Earthing Switch
Installation

## Secondary distribution 24 Kv Compact Switchgears

- Type Tested.
- 24KV,20KA,1250A
- Compact Design.
- Easy to assemble.
- Extension is possible from both sides.
- Latest technology.
- Secondary protection relay



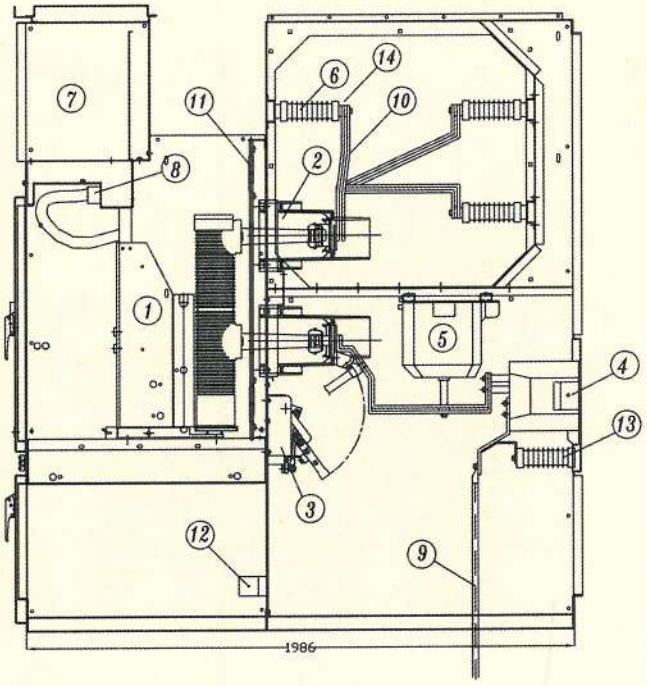

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| C | | PROJECT TITLE : NTSAFE 24KV | NIROU GROUP MFG.CO. | TITLE SHEET: front & side view of 24KV panel 1250A | | DATE | SIG | SHEET: |
| B | | | | | designed by | 81/2/20 | NOR | |
| A | | | | | drawn by | 81/2/20 | A.R | |
| 0 | | DWG.NO: UHDBJ08 | | | checked by | 81/3/10 | NOR | SCALE: --- PAG 1/7 REV |




## Note ...

1. space for input & output power cable
2. space for input & output control cable

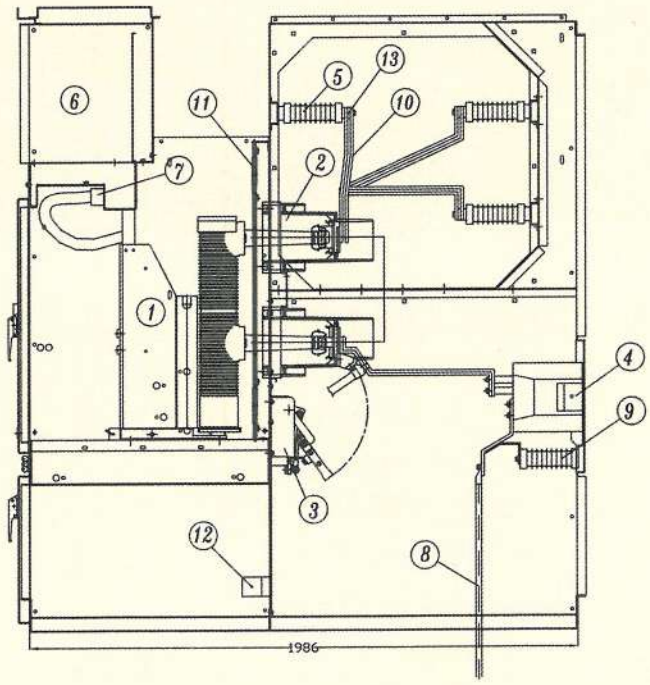
| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| C | | PROJECT TITLE : NTSAFE 24KV | NIROU TABLO MFG.CO. NT | TITLE SHEET: foundation view of 24KV panel 1250 A | | DATE | SIG | SHEET: |
| B | | | | | Designed by | 81/2/20 | NOR | |
| A | | | | | Drawn by | 81/2/20 | SHZ | |
| 0 | | DWG.NO: UHDBJ15 | | | Checked by | 81/3/10 | NOR | SCALE: ---- PAG 15/15 REV C |




NOTE :

1- CIRCUIT BREAKER HD4 24KV 2500A
2- CONTACT BOX
3- EARTHING SWITCH
4- C.T.
5- P.T.
6- INSULATOR
7- LV COMPARTMENT
8- SOCKET CONNECTOR
9- CABLE
10- COPPER CONNECTION DOUBLE (40*10)
11- SHUTTER
12- HEATER
13- CAPACITOR SUPPORTING INSULATOR
14- MAIN BUSBAR DOUBLE (40*10)

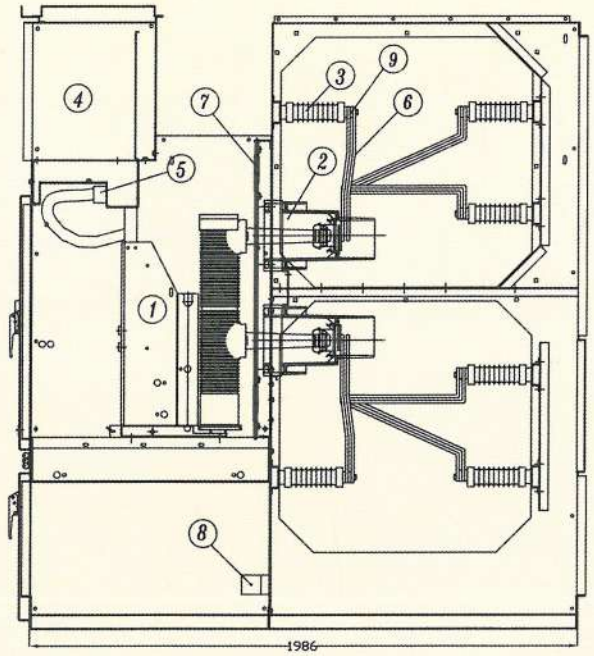
| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| C | | PROJECT TITLE : NTSAFE 24KV | NIROU GROUP MFG.CO. | TITLE SHEET: Section view of incoming panel 24KV panel 1250A | | DATE | SIG | SHEET: | |
| B | | | | | designed by | 81/2/20 | NOR | | |
| A | | | | | drawn by | 81/2/20 | A.R | | |
| 0 | | DWG.NO: UHDBJ10 | | | checked by | 81/3/10 | NOR | SCALE: --- | PAG 3/7 REV |




NOTE :

1- CIRCUIT BREAKER HD4 24KV 1250A
2- CONTACT BOX
3- EARTHING SWITCH
4- C.T.
5- INSULATOR
6- LV COMPARTMENT
7- SOCKET CONNECTOR
8- CABLE
9- CAPACITOR SUPPORTING INSULATOR
10- COPPER CONNECTION DOUBLE (40*10)
11- SHUTTER
12- HEATER
13- MAIN BUSBAR DOUBLE (40*10)

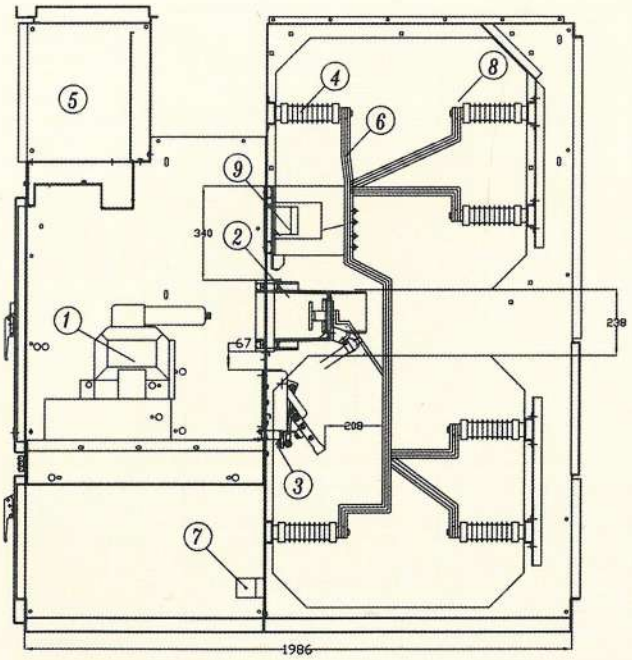
| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| C | | PROJECT TITLE : NTSAFE 24KV | NIROU GROUP MFG.CO. | TITLE SHEET: Section view of outgoing panel 24KV panel 1250A | | DATE | SIG | SHEET: | |
| B | | | | | designed by | 81/2/20 | NOR | | |
| A | | | | | drawn by | 81/2/20 | A.R | | |
| 0 | | DWG.NO: UHDBJ11 | | | checked by | 81/3/10 | NOR | SCALE: --- | PAG 4/7 REV |




NOTE :

1- CIRCUIT BREAKER HD4 24KV 3150A
2- CONTACT BOX
3- INSULATOR
4- LV COMPARTMENT
5- SOCKET CONNECTOR
6- COPPER CONNECTION DOUBLE (40*10)
7- SHUTTER
8- HEATER
9- MAIN BUSBAR DOUBLE (40*10)

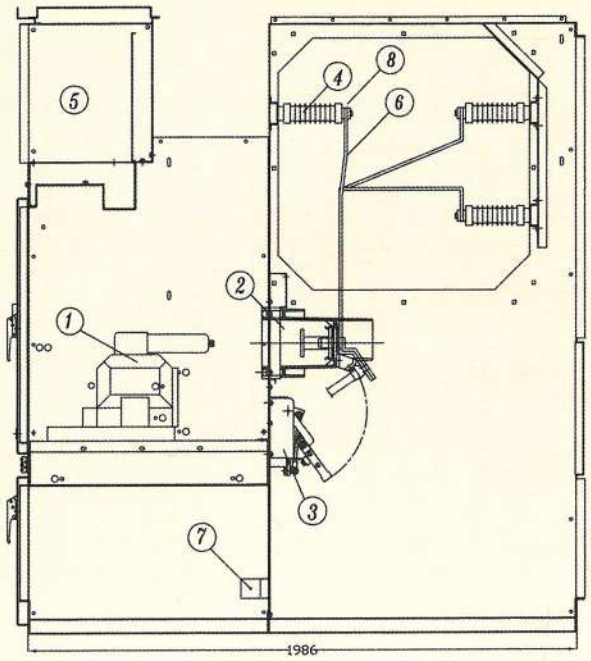
| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| C | | PROJECT TITLE : NTSAFE 24KV | NIROU GROUP MFG.CO. | TITLE SHEET: Section view of coupler panel 24KV panel 1250A | | DATE | SIG | SHEET: | | |
| B | | | | | designed by | 81/2/20 | NOR | | | |
| A | | | | | drawn by | 81/2/20 | A.R | | | |
| 0 | | DWG.NO: UHDBJ13 | | | checked by | 81/3/10 | NOR | SCALE: --- | PAG 6/7 | REV |




NOTE :

1- P.T WITH FUSE DRAW-OUT
2- CONTACT BOX
3- EARTHING SWITCH
4- INSULATOR
5- LV COMPARTMENT
6- COPPER CONNECTION DOUBLE (40*10)
7- HEATER
8- MAIN BUSBAR DOUBLE (40*10)
9- C.T

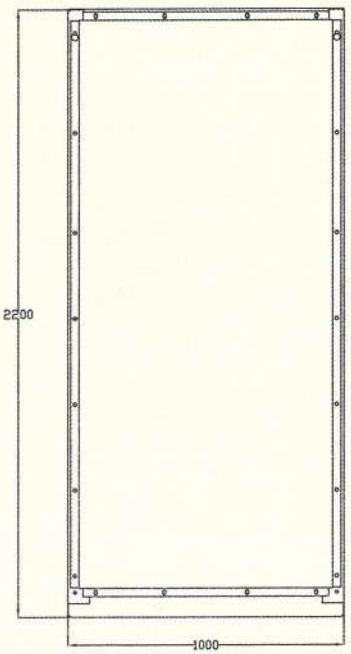
| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| C | | PROJECT TITLE : NTSAFE 24KV | NIROU GROUP MFG.CO. | TITLE SHEET: Section view of riser panel 24KV panel 1250A | | DATE | SIG | SHEET: | | |
| B | | | | | designed by | 81/2/20 | NOR | | | |
| A | | | | | drawn by | 81/2/20 | A.R | | | |
| 0 | | DWG.NO: UHDBJ12 | | | checked by | 81/3/10 | NOR | SCALE: --- | PAG 5/7 | REV |

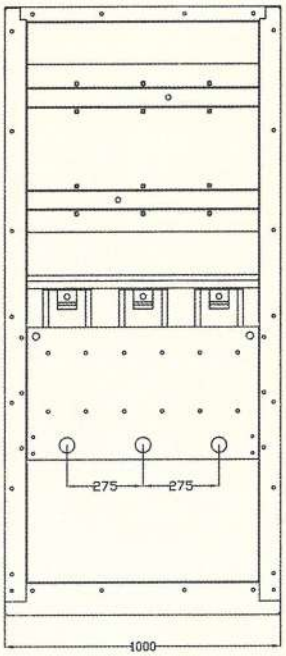



NOTE :

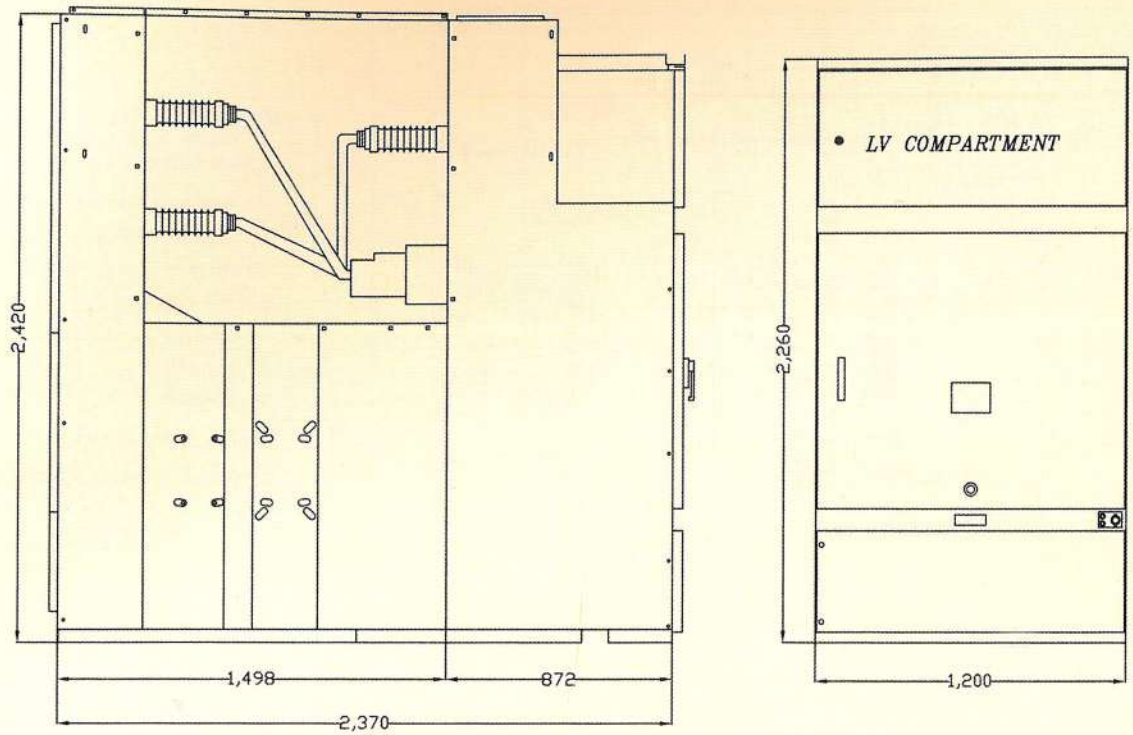
1- P.T WITH FUSE DRAW-OUT
2- CONTACT BOX
3- EARTHING SWITCH
4- INSULATOR
5- LV COMPARTMENT
6- COPPER CONNECTION (40*10)
7- HEATER
8- MAIN BUSBAR DOUBLE (40*10)

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| C | | PROJECT TITLE : NTSAFE 24KV | NIROU GROUP MFG.CO. | TITLE SHEET: Section view of measuring panel 24KV panel 1250A | | DATE | SIG | SHEET: | |
| B | | | | | designed by | 81/2/20 | NOR | | |
| A | | | | | drawn by | 81/2/20 | A.R | | |
| 0 | | DWG.NO: UHDBJ14 | | | checked by | 81/3/10 | NOR | SCALE: --- | PAG 7/7 REV |

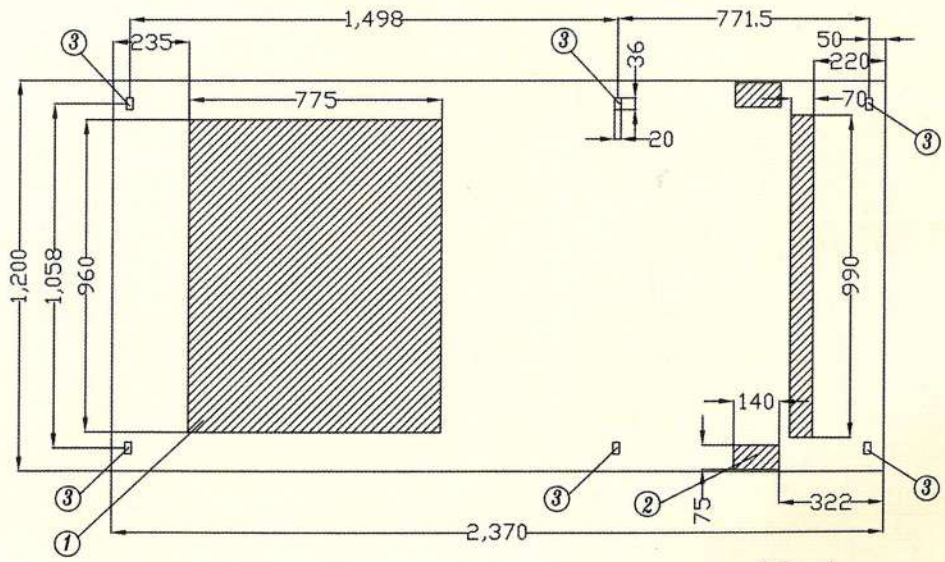



| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| C | | PROJECT TITLE : NTSAFE 24KV | NIROU GROUP MFG.CO. | TITLE SHEET: Rear view of 24KV panel 1250A | | DATE | SIG | SHEET: | |
| B | | | | | designed by | 81/2/20 | NOR | | |
| A | | | | | drawn by | 81/2/20 | A.R | | |
| 0 | | DWG.NO: UHDBJ09 | | | checked by | 81/3/10 | NOR | SCALE: --- | PAG 2/7 REV |



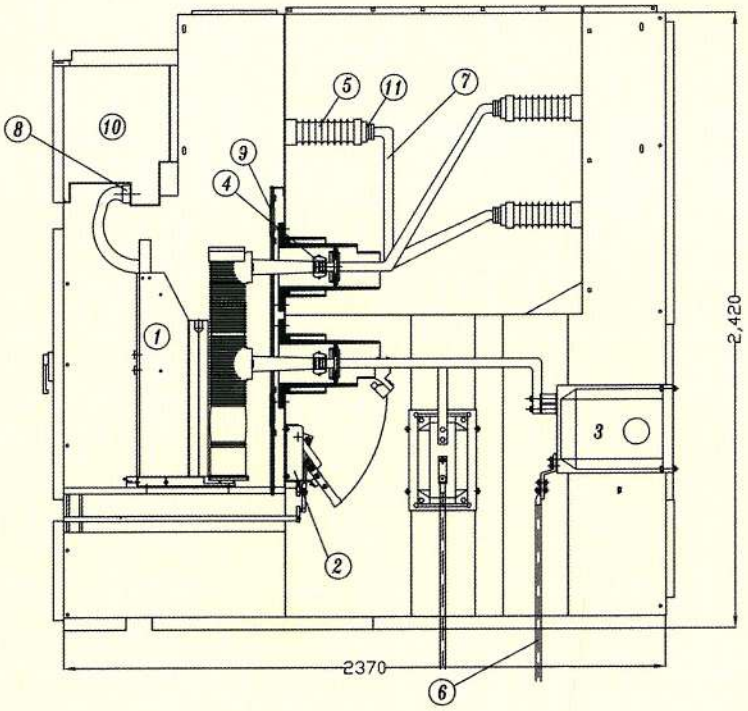

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| C | | PROJECT TITLE : NT SAFE 36KV | NIROU TABLO MFG.CO. | TITLE SHEET: FRONT & SIDE view 36KV 1250A TAYPE B | | DATE | SIG | SHEET : | |
| B | | | | | Designed by | 81/2/20 | NOR | | |
| A | | | | | Drawn by | 81/2/20 | SHZ | | |
| 0 | | DWG.NO: jC-B-SE-01 | | | Checked by | 83/3/31 | NOR | SCALE: ---- PAG 1/6 | REV |




## Note ...

1. space for input & output cable
2. space for control cable
3. hole for fixing the panel

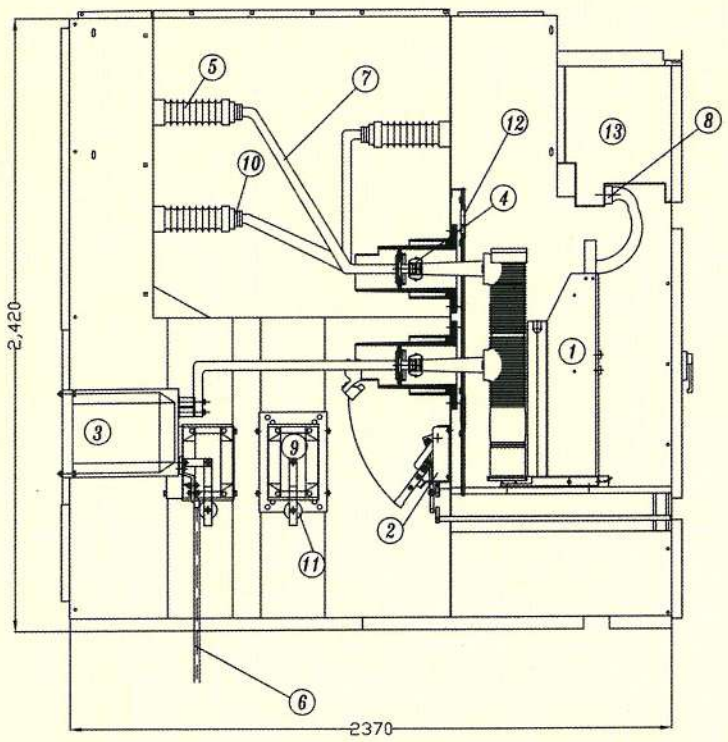
| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| C | | PROJECT TITLE : NT SAFE 36 | NIROU TABLO MFG.CO. | TITLE SHEET: fundation view outgoing and incoming 36kv | | DATE | SIG | SHEET : | |
| B | | | | | Designed by | | NOR | | |
| A | | | | | Drawn by | 82/11/4 | NOR | | |
| 0 | | DWG.NO: j83070123 | | | Checked by | 83/3/31 | NOR | SCALE: ---- PAG 1/1 | REV A |




## Note...

1> circuit breaker
type HD4 (1250A) (36kv)
2> earthing switch
3> current transformer
4> finger and bolt
5> supporting insulator
6> HV cable
7> copper connection ø35
8> socket
9> shutter
10> LV compartment
11> main busbar double (40*10)

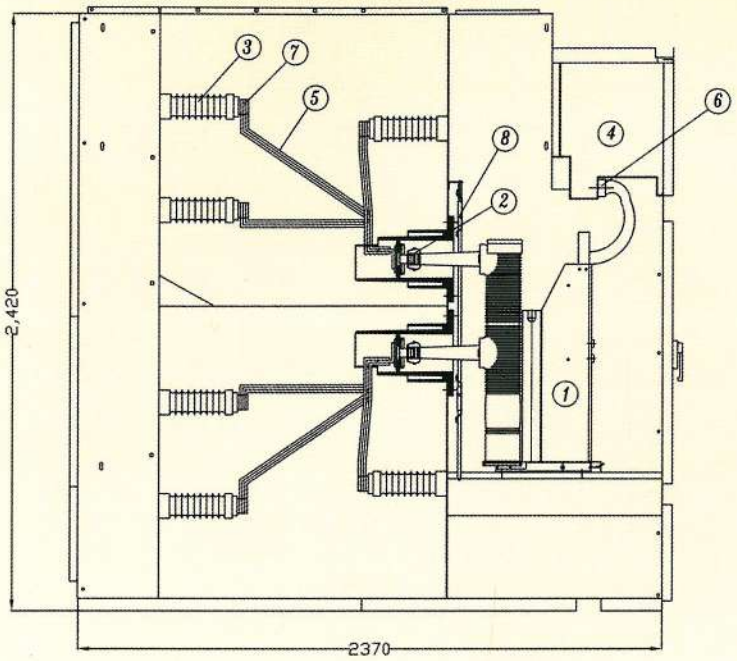
| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| C | | PROJECT TITLE : NT SAFE 36KV | NIROU TABLO MFG.CO. | TITLE SHEET: section view of OUTCOING feeder 36KV 1250A TAYPE B | | DATE | SIG | SHEET : | | |
| B | | | | | Designed by | 81/2/20 | NOR | | | |
| A | | | | | Drawn by | 81/2/20 | SHZ | | | |
| 0 | | DWG.NO: jC-B-SE-03 | | | Checked by | 83/3/31 | NOR | SCALE: ---- | PAG 3/6 | REV |




## Note...

1> circuit breaker
type HD4 (1250A) (36kv)
2> earthing switch
3> current transformer
4> finger and bolt
5> supporting insulator
6> HV cable
7> copper connection ø35
8> socket
9> P.T.
10> main busbar double (40*10)
11> capacitor insulator
12> shutter
13> LV compartment

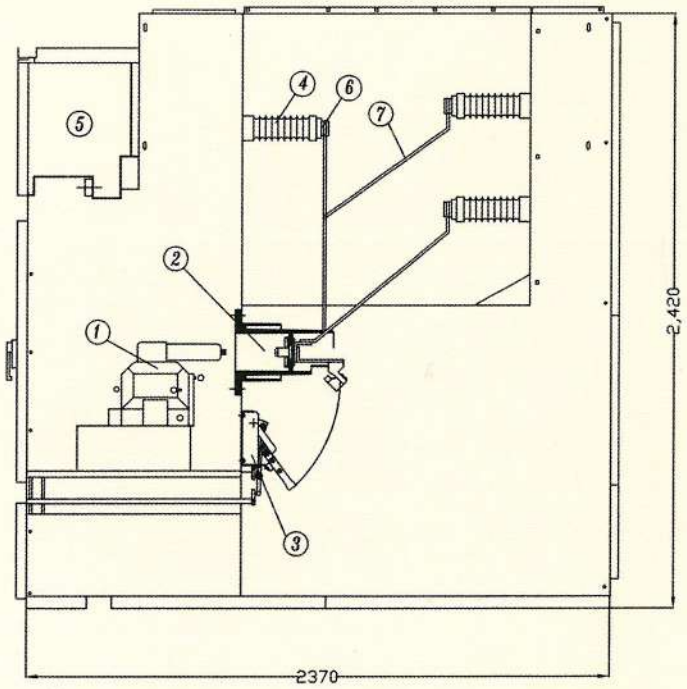
| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| C | | PROJECT TITLE : NT SAFE 36KV | NIROU TABLO MFG.CO. | TITLE SHEET: section view of INCOMING feeder 36KV 1250A TAYPE B | | DATE | SIG | SHEET : | | |
| B | | | | | Designed by | 81/2/20 | NOR | | | |
| A | | | | | Drawn by | 81/2/20 | SHZ | | | |
| 0 | | DWG.NO: jC-B-SE-02 | | | Checked by | 83/3/31 | NOR | SCALE: ---- | PAG 2/6 | REV |




## Note...

1> circuit breaker type HD4 (1250A) (36kv)
2> finger and bolt
3> supporting insulators
4> LV compartment
5> copper connection double (40*10)
6> socket
7> main busbar double(40*10)
8> shutter

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| C | | PROJECT TITLE : NT SAFE 36KV | NIROU TABLO MFG.CO. | TITLE SHEET: sections view of COUPLER feeder 36KV 1250A TAYPE B | | DATE | SIG | SHEET : | | |
| B | | | | | Designed by | 81/2/20 | NOR | | | |
| A | | | | | Drawn by | 81/2/20 | SHZ | | | |
| 0 | | DWG.NO: jC-B-SE-05 | | | Checked by | 83/3/31 | NOR | SCALE: ---- | PAG 5/6 | REV |




NOTE :

1- DROW-OUT P.T WITH FUSE
2- CONTACT BOX
3- EARTHING SWITCH
4- INSULATOR
5- LV COMPARTMENT
6-main busbar double (40*10)
7-copper connection (40*10)

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| C | | PROJECT TITLE : NT SAFE 36KV | NIROU TABLO MFG.CO. | TITLE SHEET: Section view of MEASURING panel 36KV 1250A TAYPE B | | DATE | SIG | SHEET : | | |
| B | | | | | Designed by | 81/2/20 | NOR | | | |
| A | | | | | Drawn by | 81/2/20 | SHZ | | | |
| 0 | | DWG.NO: jC-B-SE-06 | | | Checked by | 83/3/31 | NOR | SCALE: ---- | PAG 6/6 | REV |

# NIROU TABLO

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