



# NES-H MEDIUM VOLTAGE SWITCHGEAR



Approved by  
**SEC**



ISO 9001:2000  
Certificate No. 3409



A high-angle photograph of a construction worker wearing a red hard hat and a safety vest, looking down at a large set of blueprints held in their hands. The worker is positioned on a large, rusted metal surface, possibly a wall or ceiling. The lighting is dramatic, casting a long, dark shadow of the worker onto the metal below. The overall tone is industrial and emphasizes safety and precision.

**PARTNERSHIP**

**SAFETY**

**DURABILITY**

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NES-H Switchgear offers you high personal and operating safety, optimal availability, secure engineering, easy operation and high efficiency through low lifecycle costs. Take our word for it! Our engineers give you competent support, advice and see your project through from design all the way to commissioning.

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## ● APPLICATION

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Power plants, transformer substations, distribution systems and industrial operations such as:

- Energy and infrastructures
- Industrial sites
- Residential
- Buildings
- Etc.





## ● THE SWITCHGEAR

NES-H systems are draw-out, air-insulated, tested for resistance to internal arc faults IAC AFLR in cable, busbar and CB compartment and are metal enclosed with a fourfold compartment. These are developed and manufactured by **alfanar** in its own Industrial Complex located in the 3rd Industrial City on Al Kharj Road, Riyadh, KSA.

The switchgears comply with the highest quality requirements. They are factory-assembled and type-tested in accordance with the latest IEC standards and SEC specifications.



## ● THE STANDARDS

- Construction of the switchgear is as per IEC 62271-1 and 62271-200
- NES-H switchgear's loss of service continuity classification is LSC2B (metalclad type) with metallic partitions (PM) as per IEC 6227-200
- IEC 60529 Classification of degree of protection provided by enclosures
- IEC 60694 Common specifications for HV switchgear and control gear standards



## ● FEATURES

**Compact, type-tested switchgear for indoor installation in accordance with IEC 62271-1 and 62271-200**

- Five individually metalclad compartments for: the main busbar, the switching device, the cable connection, low voltage devices and VT's compartment
- Arc proof
- Different panel widths: 1000 mm, 800 mm
- **alfanar** switchgear is designed to release the arc pressure upwards in all compartments
- Optional: delivered with a pressure release cover



# alfanar

## 17.5kV Draw-out Type Medium Voltage Switchgear Type NES-H

### High personal and operating safety

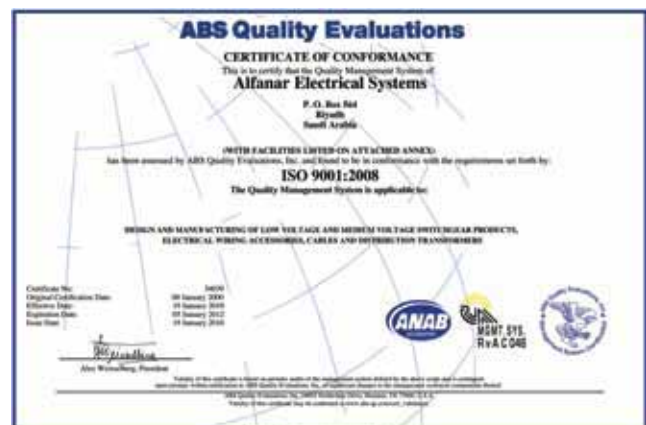
- All electrical and mechanical operating procedures take place when the enclosure is closed
- Maximized operating safety owing to serial production, complete mechanical interlocking system
- Shutters automatically protect the isolating contacts when the unit is withdrawn
- Make-proof earthing switches
- High availability resulting from the quick exchange of the withdrawable units by means of the universal trolley

### Durable and geared for the future

- Panels are air-insulated and use a minimum amount of insulant volumes
- Ideal assembly is possible due to technical and economical factors
- One can obtain spare parts easily by virtue of the use of standard insulators, standard instrument transformers, standard switching devices and standard copper sections

### Highest quality requirements

- State-of-the-art manufacturing techniques thanks to a high precision laser cutting system which guarantees perfect dimensional accuracy
- Distortion resistant cubicle frame made of top quality aluzinc/GI sheet steel that is bolted together
- Internal arc resistant double sheet steel partitions between panels
- Busbar partitioning from panel to panel
- Electrostatic powder coating of the front door and side panels
- Engineering and manufacturing is in accordance with the quality management system EN ISO 9001



## ● TECHNICAL DATA

### NES-H Switchgear

<b>Rated voltage (kV)</b>	
	17.5
<b>Rated insulation level</b>	
Power frequency withstand voltage 60Hz - 1 min (rms kV)	38
Lightning impulse withstand voltage 1.2/50 $\mu$ s (kV peak)	95
Rated current (A)	630
	1250
	2500
	3150*
Rated short circuit breaking current (kA)	25
Short time withstand current (kA/3s)	25
<b>Internal arc withstand</b>	
IAC - AFLR (kA/1sec.)	25

\* Up to 4300 with force cooling (type tested and approved by SEC)

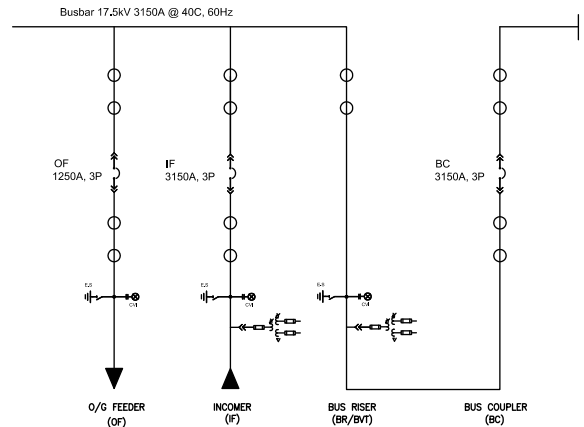
The high-performance switchgear that meets the highest requirements:

- Draw-out type switchgear system for the indoor installation, type-tested, factory assembled, air-insulated, metal-enclosed with a fourfold compartment
- Application as a single bus system

The following variations are possible for the conduction of hot gases that result from arc faults:

- Deflector plate
- Pressure release duct or cover

The compartments are in accordance with the standard availability class LSC2B.



### A. Busbar compartment

The busbars are made of standard flat copper with rounded edges. The main busbars are screwed together panel-to-panel and are segregated by cast-resin bushings panel-to-panel. The electric strength of the main busbar is guaranteed without additional insulation.



### B. Circuit breaker compartment

The withdraw-able unit is equipped with vacuum type switching technology. The operation of the withdraw-able unit can only be done behind closed doors. Mechanical interlocks prevent mal-operation. When removing the withdraw-able unit, all live parts are automatically protected by metal shutters.



### C. Cable compartment

The cable compartment is accessible from rear. The panel's entire depth can be used for the installation of instrument transformers, earthing switches, surge arresters and cable connections up to 4x1C 630mm<sup>2</sup>/phase or 4x3C 300mm<sup>2</sup>/panel.





#### D. Low voltage compartment

The low voltage compartment provides adequate space for all the necessary secondary components. The distortion resistant door is adequate for the protective relays, measuring instruments, controllers and signaling units.



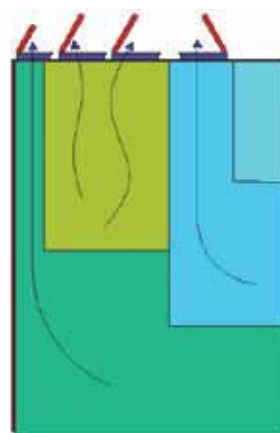
#### E. Voltage transformer compartment

An individual VT compartment with metallic partition. When removing the withdraw-able VT, all live parts are automatically protected by metallic shutters. The operation of the withdraw-able VT can only be done behind closed doors. The mechanical interlock is provided with the door to protect mal-operation.



#### Pressure relief

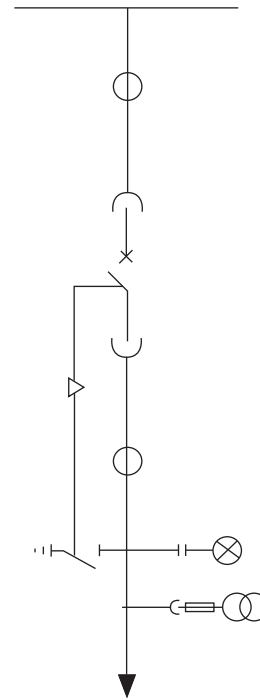
Pressure is generally released upward in our switchgear panels. We recommend that you use a pressure release duct or cover for the targeted release in the switchgear building because of its utmost personal safety. The hot gases that result from arc faults can be conducted out of the switchgear building through the duct. The arc cover, on the other hand, will contain the spread of debris within the close surrounding of the switchgear.



### ● PANEL DESCRIPTION

#### Incomer and Feeder OF / IF

Rated voltage (kV)		
	17.5	
Rated insulation level		
Power frequency withstand voltage 60Hz - 1 min (rms kV)	38	
Lightning impulse withstand voltage 1.2/50 $\mu$ s (kV peak)	95	
Rated current (A)	630	
	1250	
		2500
		3150
Rated short circuit breaking current (kA)	25	
Short time withstand current (kA/3s)	25	
Dimensions (mm)		
Width (W)	OF	IF
	800	1000
Height (H)	2600	
Depth (D)	1880	



### Compartments

#### Busbar compartment

- Horizontal main busbars
- Inter-panel busbar bushings
- Set of CT
- T-OFF busbar droppers

#### Circuit breaker compartment

- Vacuum type pro-MEC Range

#### MV cable compartment

- Bottom entry
- Rear access
- Set of CT
- Earthing switch
- Anti-condensation heater

#### Low voltage compartment

- Standard height
- Customized according to protection devices used
- Control and metering components
- Capacitive voltage indication

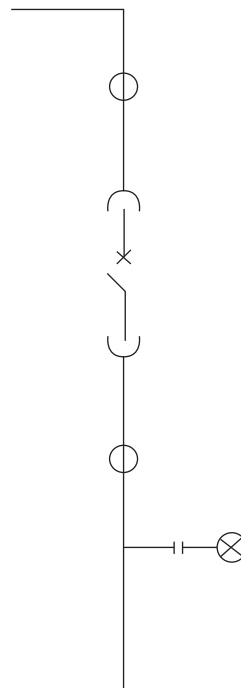
#### VT compartment

- 3 VTs integrated with fuses
- VT housing
- Metallic shutters



## Bus coupler BC

Rated voltage (kV)	
	17.5
Rated insulation level	
Power frequency withstand voltage 60Hz - 1 min (rms kV)	38
Lightning impulse withstand voltage 1.2/50 $\mu$ s (kV peak)	95
Rated current (A)	2500
	3150
Rated short circuit breaking current (kA)	25
Short time withstand current (kA/3s)	25
Dimensions (mm)	
Width (W)	1000
Height (H)	2600
Depth (D)	1880



## Compartments

### Upper busbar compartment

- Horizontal main busbars
- Inter-panel busbar bushings
- Set of CT
- T-OFF busbar droppers

### Circuit breaker compartment

- Vacuum type pro-MEC Range

### Lower busbar compartment

- Set of CT
- Anti-condensation heater
- T-OFF busbar droppers

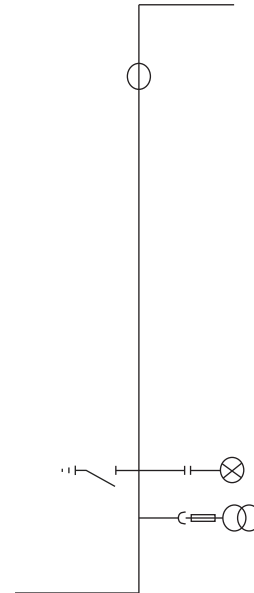
### Low voltage compartment

- Standard height
- Customized according to protection devices used
- Control and metering components
- Capacitive voltage indication



### Bus riser BR

Rated voltage (kV)	
	17.5
Rated insulation level	
Power frequency withstand voltage 60Hz - 1 min (rms kV)	38
Lightning impulse withstand voltage 1.2/50 $\mu$ s (kV peak)	95
Rated current (A)	2500
	3150
Short time withstand current (kA/3s)	25
Dimensions (mm)	
Width (W)	1000
Height (H)	2600
Depth (D)	1880



### Compartments

#### Busbar compartment

- Horizontal main busbars
- Inter-panel busbar bushings
- Set of CT
- T-OFF busbar droppers
- Anti-condensation heater
- Set of VT with fuses
- Earthing switch

#### Low voltage compartment

- Standard height
- Customized according to protection devices used
- Control and metering components
- Capacitive voltage indication

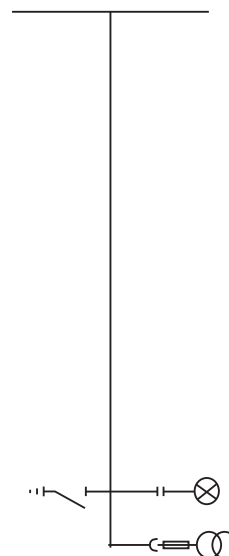
#### VT compartment

- 3 VTs integrated with fuses
- VT housing
- Metallic shutters



## Bus VT BVT

Rated voltage (kV)	
	17.5
Rated insulation level	
Power frequency withstand voltage 60Hz - 1 min (rms kV)	38
Lightning impulse withstand voltage 1.2/50 $\mu$ s (kV peak)	95
Short time withstand current (kA/3s)	25
Dimensions (mm)	
Width (W)	1000
Height (H)	2600
Depth (D)	1880



## Compartments

### Busbar compartment

- Horizontal main busbars
- Inter-panel busbar bushings
- T-OFF busbar droppers
- Anti-condensation heater
- Earthing switch

### Low voltage compartment

- Standard height
- Customized according to protection devices used
- Control and metering components
- Capacitive voltage indication

### VT compartment

- 3 VTs integrated with fuses
- VT housing
- Metallic shutters





### ● COMPONENTS AVAILABLE

#### Vacuum Circuit Breaker

IEC 62271-100

High-voltage alternating-current circuit breakers

LS Pro-MEC VCB is user-friendly to give more convenience and safety by providing high speed interrupting time (3cycles), adopting the rapid auto-reclosing method, and having wide range of accessories.

#### High reliability of the operating mechanism:

- Separate design of the main circuit from the operating mechanism.
- Adopt the toggle link method.
- Improve the reliability of electric circuit.
- Adopt the rapid auto-reclosing method as a standard option. (O-0.3sec.-CO-3min.-CO)

#### High interrupting performance

- Make short of the interrupting time. (3cycles)
- Increase the rated short-circuit withstand characteristics (1sec. to 3sec.)

#### Great operational safety

- Reinforce the insulation in the conduct, by adopting the molded housing in each phase.
- Built in the device making the contacts open first when draw in and out.
- Adopt the tulip-shape connection between the cradle busbar and the VCB.

#### Vacuum Interrupter

##### Features

- Small Size and Light Weight
- High performance, reliability, and long life are assured.
- Maintains High Vacuum
- High-alumina ceramics provide superior mechanical strength and easy degassing.
- High speed interruption and short arcing time.
- The LS Vacuum Interrupter can meet all IEC, ANSI and NEMA performance standards.

#### Operating characteristics

In the closed position, normal current flows through the interrupter. When a fault occurs and interruption is required, the contacts are quickly separated. The arc drawn between the surfaces of contacts is rapidly moved around the slotted contact surface by self induced magnetic effects, preventing gross contact erosion and the formation of hot spot on the surface. The arc burns in an ionized metal vapor,



Which condenses on the surrounding metal shield. At current zero the arc extinguishes and vapor production ceases. The metal vapor plasma is very rapidly dispersed, cooled, recombined, and deionized, and the metal vapor products are quickly condensed so that the contacts withstand the transient recovery voltage.

### Protection relays

NES-H switchgear can accommodate various types of relays as per requirement and according to the approved and listed types by SEC.

**alfanar** is able to meet the electrical network protection requirements of its customers. Being an OEM of switchgear, selection of protection relay manufacturers is not limited, thus flexible to end user's preference.

### Instrument transformers and other accessories

Current and voltage transformers form part of the protection chain in a switchgear. It serves as intermediary sensors which give information, proportional to primary side high value parameters, to protection devices as well as metering for analysis.

The instrument transformers used in NES-H switchgear are made of cast resin type as per IEC standards.

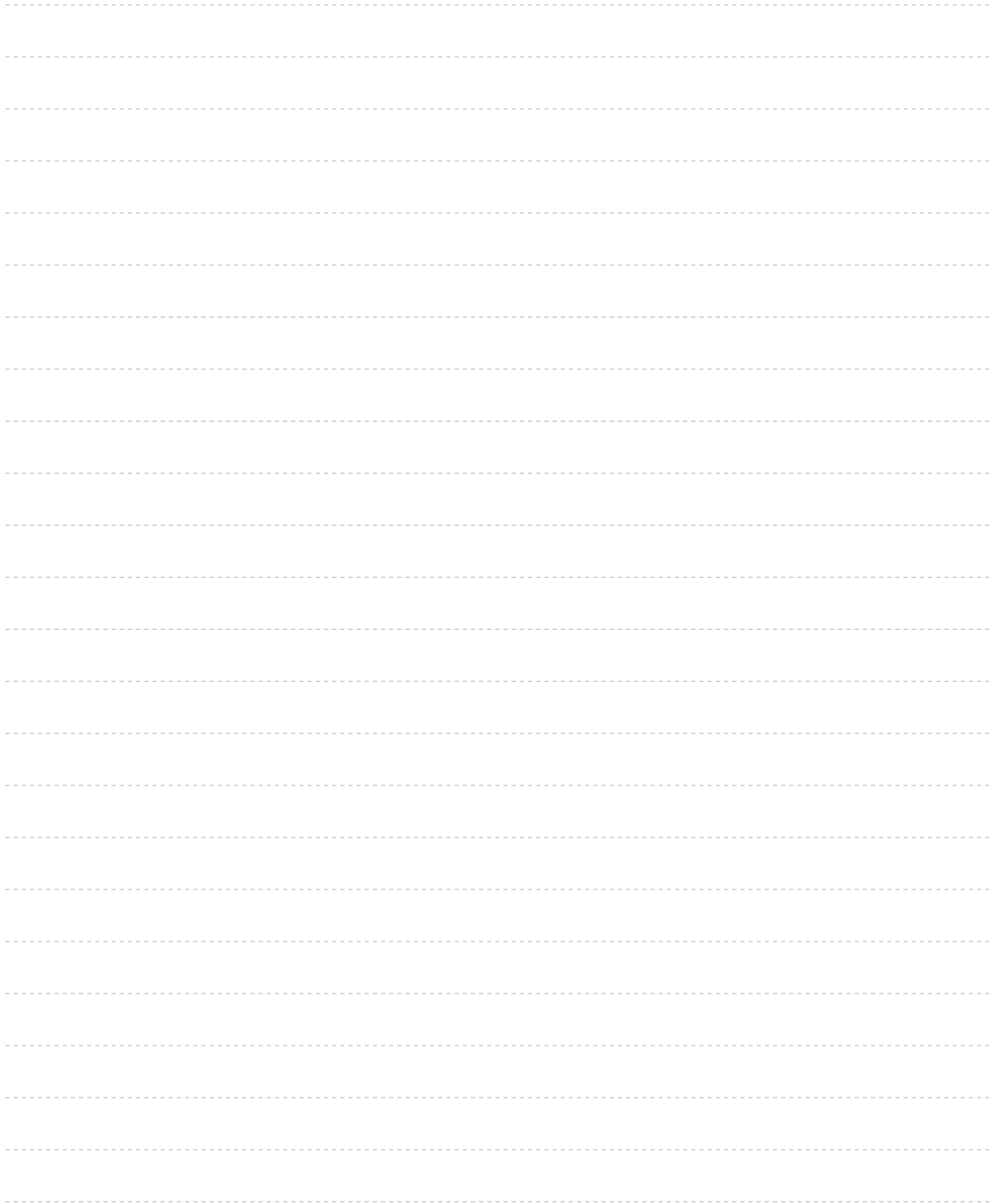
- **Current transformers**, which conform to IEC 60044-1 standard, are installed in busbar and cable sides of the panel as per suitable protection functional location requirements.
- **Voltage transformers**, which has its own compartment in the switchgear, are isolated from MV section. The insulation between the primary contacts of the transformer is also ascertained to avoid direct and accidental contact to the medium voltage live parts.  
The voltage transformers with built in primary protection fuses conform to IEC 60044-2 standard.
- **Earthing switch** is used to connect the cables or busbar to the earth for safety during maintenance and other works necessary to be executed on the switchgear. It has a fast acting mechanism independent to the operator, interlocking provision and voltage capacitive divider insulators. The switch has a making capacity and it complies with the applicable IEC standard.



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17.5kV Draw-out Type Medium Voltage

## Switchgear Type NES-H



Safe energy distribution that meets the highest industrial requirements

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**alfanar**

17.5kV Draw-out Type Medium Voltage

**Switchgear Type NES-H**

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# ABS Quality Evaluations

## CERTIFICATE OF CONFORMANCE

This is to certify that the Quality Management System of:

### Alfanar Electrical Systems

P. O. Box 564  
Riyadh  
Saudi Arabia

(WITH FACILITIES LISTED ON ATTACHED ANNEX)

has been assessed by ABS Quality Evaluations, Inc. and found to be in conformance with the requirements set forth by:

### ISO 9001:2008

The Quality Management System is applicable to:

DESIGN AND MANUFACTURING OF LOW VOLTAGE AND MEDIUM VOLTAGE SWITCHGEAR PRODUCTS,  
ELECTRICAL WIRING ACCESSORIES, CABLES AND DISTRIBUTION TRANSFORMERS

Certificate No: 34039  
Original Certification Date: 06 January 2000  
Effective Date: 19 January 2010  
Expiration Date: 05 January 2012  
Issue Date: 19 January 2010

  
Alex Weisselberg, President



Validity of this certificate is based on periodic audits of the management system defined by the above scope and is contingent upon prompt, written notification to ABS Quality Evaluations, Inc. of significant changes to the management system or components thereof.

ABS Quality Evaluations, Inc. 16855 Northchase Drive, Houston, TX 77060, U.S.A.  
Validity of this certificate may be confirmed at [www.abs-qe.com/cert\\_validation](http://www.abs-qe.com/cert_validation).

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## QUALITY POLICY

The Quality Policy of alfanar is to:

- Provide products conforming to governing standards and of consistent quality
- Excel in all our operations to achieve customer's satisfaction for products and services through continual improvement
- Develop and maintain a motivated team of competent employees and vendors
- Redefine and execute new processes and systems that meet the changing market requirements.

## OUR OBJECTIVE

We reach exacting standards in the safety and distribution of power and go well beyond a customer's expectations. This is done by focusing our technology and expertise on the ultimate reward we can get, complete satisfaction of our customers.

## alfanar PRODUCTS

- Oil-Immersed Distribution Transformers
- Switches and Socket Boxes
- Junction Boxes
- Service Enclosures IP65
- Stainless Steel Enclosures NEMA-4X
- Telephone Enclosures
- Circuit Breaker Enclosures – NEMA 1 & NEMA 3R Types with Multiple Outlets
- Modular Enclosures
- Load Centres
  - NEMA Type LA Load Centres
  - IEC Type LD Load Centres
  - Split Busbar Unit Type LAS/LDS Load Centres
- MCCB Distribution Boards
- Pump Control Panels
- Motor Control Centres
- LV Switchboards up to 6300A, Tested for 100KA, 1 Sec Short Circuit Withstand
- Package Substations
- Control and Automation Panels
- Relay and Control Panels
- Medium Voltage Switchgears
- Pole Mounted Metering Structures
- AC/DC Panels up to 5000A, Tested for 85kA, 1 Sec Short Circuit Withstand
- Extendable and Non-Extendable Ring Main Units



K.S.A. Toll Free: 800 124 1333  
[www.alfanar.com](http://www.alfanar.com)

As improvement of alfanar products is an ongoing process, technical specifications and other details shown in this catalogue may change from time to time