

# OIL-IMMERSED DISTRIBUTION TRANSFORMERS

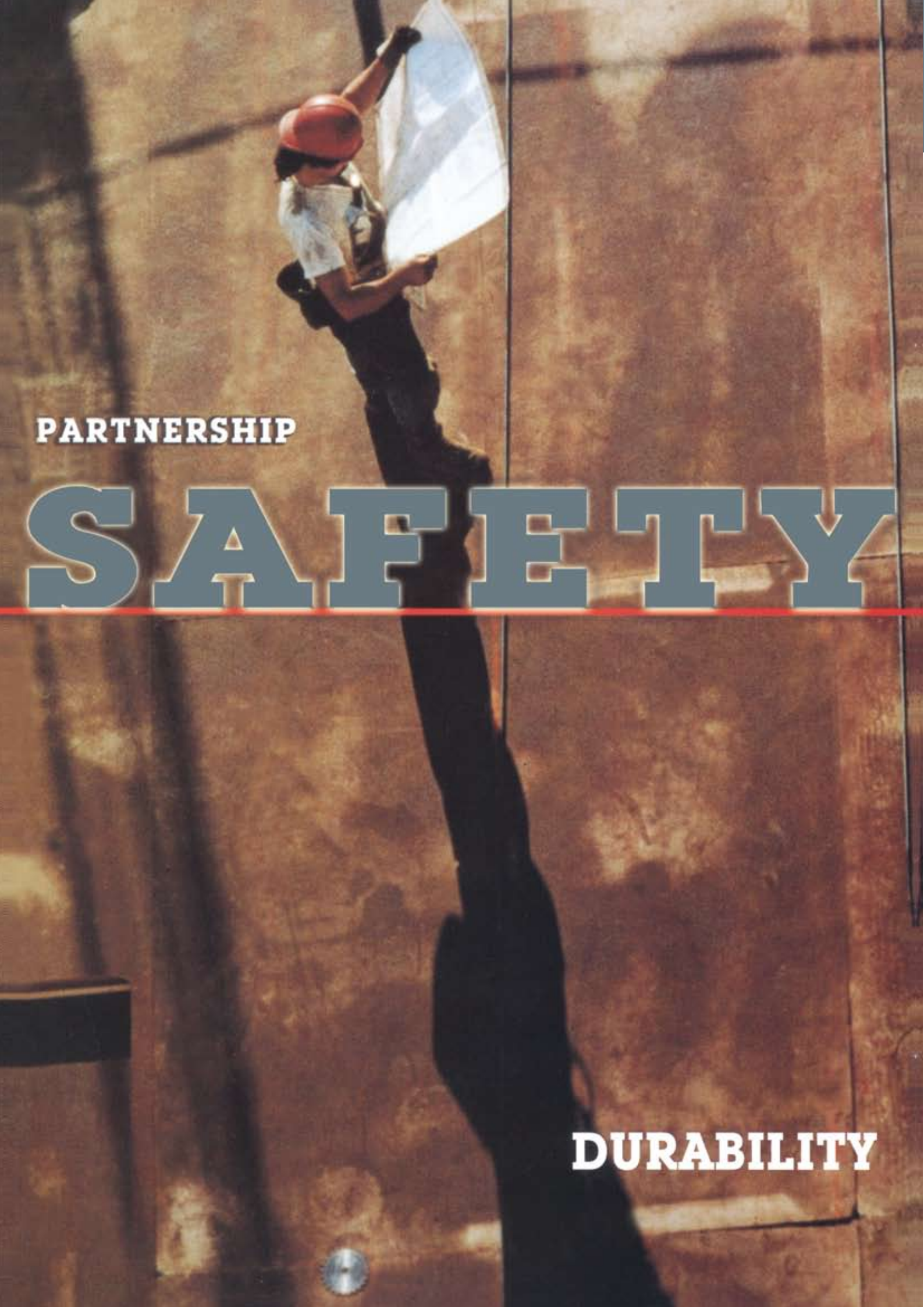
50 - 3150 KVA



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







**PARTNERSHIP**

**SAFETY**

**DURABILITY**

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# Standard Product Features

Backed by decades of experience and expertise in electrical products' manufacturing, **ELETRA** entered the field of making Distribution Transformers in order to complete and perfect its range of electrical products and systems.

Joining the class of world's leading transformer manufacturers, **ELETRA** uses the latest designing and manufacturing facilities and employs highly-qualified designers, researchers and technical experts.

## Features

**ELETRA** manufactures a wide range of Three-Phase Oil-Immersed Distribution Transformers, **pole and pad mounted**.

The main characteristics of the **ELETRA** Transformers are:

- Rated power: From 50kVA to 3150kVA
- Rated voltage: Up to 36 kV
- Type of cooling: Oil Natural, Air Natural Cooling System (ONAN)



**ELETRA** Transformers can be provided with two types of tanks:

- Free breathing with conservator
- Hermetically sealed without conservator

All **ELETRA** Transformers are fitted with Off-Load Tap Changer connected to the High Voltage side suitable for various tapping range as required by customers.

**ELETRA** Transformers' unique, special shaped core design reduces Load Losses and No-Load Losses thereby allowing maximum transformer efficiency.

Transformers with other Power Ratings (up to 5 MVA) are manufactured on request.

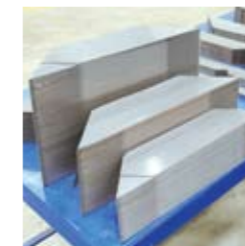
# Transformer Manufacturing Process

1- Core Slitting



Sophisticated slitting machine.

2- Core Cutting



Simple overlapping arrangement (step-lapped joints) for reduction in No-Load Current, No-Load Losses and Sound Level.

3- Core Assembly



Special assembly benches for perfectly aligning the cores to the right positioning references.

4- Low Voltage Winding



Using foil copper conductor which has "No Effect" of axial short circuit compressing forces and to reduce the losses resulting from skin effect.

5- High Voltage Winding



Special flattener HV winding machine for space saving and minimization of load losses.

6- Core Coil Assembly



Unique, oval-shaped core and winding design to reduce Load Losses and No-Load Losses thereby allowing maximum transformer efficiency.

7- Drying Out



Programmable drying out process.

8- Oil Filling



Controllable oil filling under vacuum.

1- Rib Manufacture



2- Spot Welding



3- Rib Welding



4- Final Assembly



5- Leakage Testing



6- Shot Blasting



7- Tank Painting



In order to ensure conformity to national and international standards, the **ELETRA** Transformers are subjected to Routine Tests, Type Tests and Special Tests as described below:

**a. Routine Tests**

Following tests are performed on every transformer in accordance with IEC 60076 standard:

- Measurement of winding resistance
- Measurement of voltage ratio and phase displacement check
- Measurement of short-circuit impedance and load loss
- Measurement of no-load loss and current
- Dielectric routine tests (separate source AC voltage withstand test and short duration induced over-voltage withstand test)
- Measurement of insulation resistance.

**b. Type Tests**

For transformers of new type or design, **ELETRA** carries out the following Type Tests on at least two units:

- Temperature-rise test (in accordance with IEC 60076-2)
- Dielectric type tests (Lightning impulse test in accordance with IEC 60076-3)

**c. Special Tests**

These tests are carried out after signing a contract with a client:

- Measurement of zero-sequence impedance(s) on three-phase transformers
- Short-circuit withstand test\* (as per IEC 60076-5)
- Determination of sound levels (as per IEC 60076-10)
- Measurement of the harmonics of the no-load current

\*All the above tests are performed at **ELETRA**'s Transformer Test Field except Short-Circuit Withstand Test, which is carried out at any of the international testing laboratories like KEMA, CESI, IPH or other labs.



Fully Automatic Control Panel For Testing Lab



High Voltage Testing Transformer 100KV



Impulse Generator 400KV



Delivering quality products has always been ELETRA's top priority.

To us, quality means absolute congruity and compliance with our customers' requirements and international standards.

This is why our experienced engineers and technicians put their best efforts at every stage from raw material procuring to the final finish of transformers.

Right from product designing to manufacturing, our highly qualified quality control/assurance experts apply stringent measures to deliver only the best.



Transformer Oil B.D.V Tester



Transformer Oil Water Content (P.P.M)



Abrasion Resistance Tester For Copper Conductor



Copper B.D.V Tester

Table 1

Common Data for domestic market:

Three phase, Oil Immersed Distribution Transformers for Continuous Service for Indoor or Outdoor Installation

Standard	-	IEC60076
Rated frequency	Hz	60
Connection and Vector group	-	DYn11
Max Temp Rise	Top Oil	°C 45
	Average Winding	°C 50
Type of cooling	Natural Cooling	- ONAN
(HV) High Voltage Rating	kV	3.3, 4.16, 6.6, 11, 13.8, 33 and 34.5
(LV) Low Voltage Rating	At no load	kV Up to 1
HV Tapping	Off-Circuit Tapping changer, 5 Options	% ± 2×2.5
Winding	Copper Conductors	-
Noise level	dB	48
Impulse Voltage Insulation Level	Primary Winding, Voltage 13.8	kV 95 or 110
Peak Value	Primary Winding, Voltage 36	kV 170

Table 2

Common Data for export market :

Three phase, Oil Immersed Distribution Transformers for Continuous Service for Indoor or Outdoor Installation

Standard	-	IEC60076
Rated frequency	Hz	50 or 60
Connection and Vector group	-	DYn11*
Max Temp Rise	Top Oil	°C 50*
	Average Winding	°C 55*
Type of cooling	Natural Cooling	- ONAN
(HV) High Voltage Rating	kV	Up to 36 kV
(LV) Low Voltage Rating	As per a customer's request	kV Up to 1
HV Tapping	Off-Circuit Tapping changer, 5 Options	% ± 2×2.5
Winding	Copper Conductors	-
Impulse Voltage Insulation Level	Primary Winding, Voltage 11	kV 75
Peak Value	Primary Winding, Voltage 20, 22	kV 125
	Primary Winding, Voltage 36 KV	kV 170

\* Subject to change according to a customer's requirement

# TECHNICAL INFORMATION

(Compatible with SEC requirements)

## Transformer Accessories & Protection Devices

Table 3

Technical Specification of Standard Transformer ( 13.8 / 0.4 KV )								
Rated power (KVA)	100	200	300	500	1000	1500	2000	3150
HV taps %	±5%	±5%	±5%	±5%	±5%	±5%	±5%	±5%
Vector group	DYn11	DYn11	DYn11	DYn11	DYn11	DYn11	DYn11	DYn11
Voltage impedance (%)	4	4	4	5	6	6	6	6.5
Max ambient temp (°C)	55	55	55	55	55	55	55	55
Rated HV current (A)	4.18	8.37	12.55	20.92	41.84	62.76	83.68	131.79
Rated LV current (A)	144.34	288.68	433.03	721.71	1443.42	2165.13	2886.84	4546.77
*Max. No load losses (W)	250	380	520	750	1100	1700	2400	3000
*Max. Load losses at 75°C (W)	1500	2200	3200	4700	9000	14000	18000	28000
Insulation level (kV)	38/95	38/95	38/95	38/95	38/95	38/95	38/95	38/95

\*For private sector, other values of losses upon request

### Standard Accessories :

#### Parts

Off-load tap changer

Pressure relief valve

Oil level indicator

Earthing terminal on tank

Draining valve

Roller

High & Low Voltage bushing

Thermometer

Oil temperature indicator (Dial Type)

Marking plate

Thermometer pocket

HV & LV box

Lifting lugs

### Additional Accessories :

#### Parts

Winding temperature indicator

D.G.P.T

Current transformer

Skid base

LV bus duct

- Any other requested accessory

### Ambient temperature and Temperature Rise

The Standard Transformers are designed for the following :

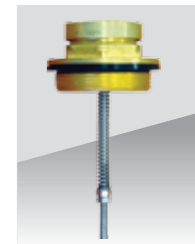
Ambient temperature of cooling air (max)	°C	55
Temperature rise of windings	°C	50
Temperature rise of oil	°C	45



HV Bushing



LV Bushing



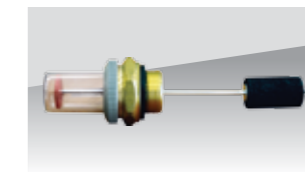
Pressure Relief Valve



Oil Temperature Indicator With Two Contacts



Oil temperature indicator (Dial Type)



Oil Level Indicator



Off-load Tap Changer

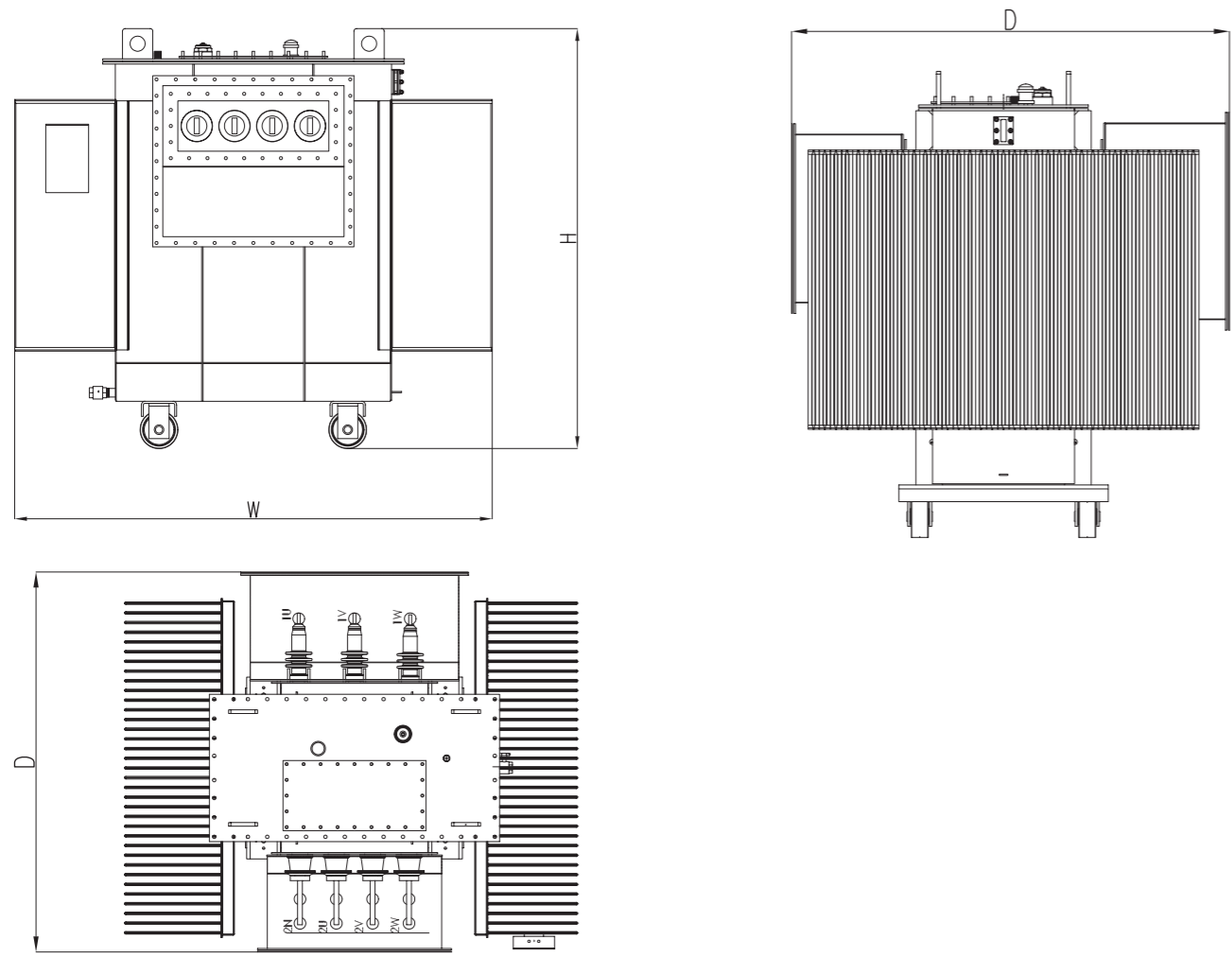


D.G.P.T



Winding Temperature Indicator

# Outline Drawing and Dimensions



power (KVA)	Weight (KG)			Max Dimensions (mm)		
	OIL	Active part	Total	Width w	Depth D	Height H
100	110	290	600	1350	900	1450
200	200	450	1000	1350	900	1450
300	290	700	1300	1450	1100	1700
500	400	875	1920	1700	1400	1600
1000	650	1375	3150	1900	1600	1900
1500	1080	1600	4530	1920	1700	2000
2000	1350	2500	5500	1950	1750	2100
3150	1800	3400	7300	2000	1800	2200

Other requirement for dimensions upon request

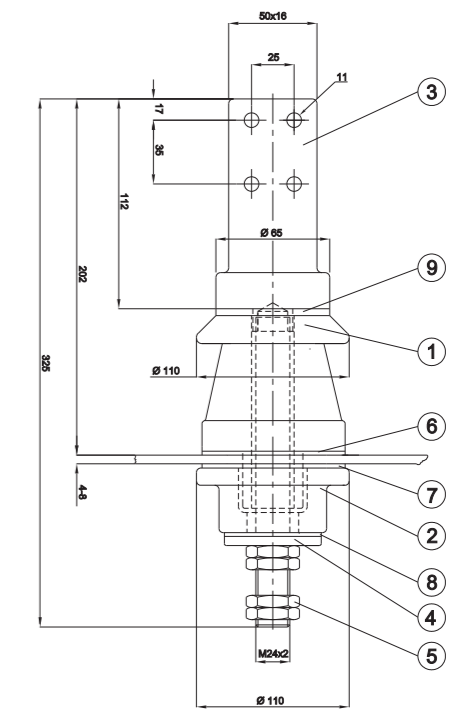
# Technical Data of Bushings

## LV Bushings

### LV BAR BUSHING 3.6KV/850 – A - B 7896 - 1M

Cover Hole:  $\phi 56\text{mm}$

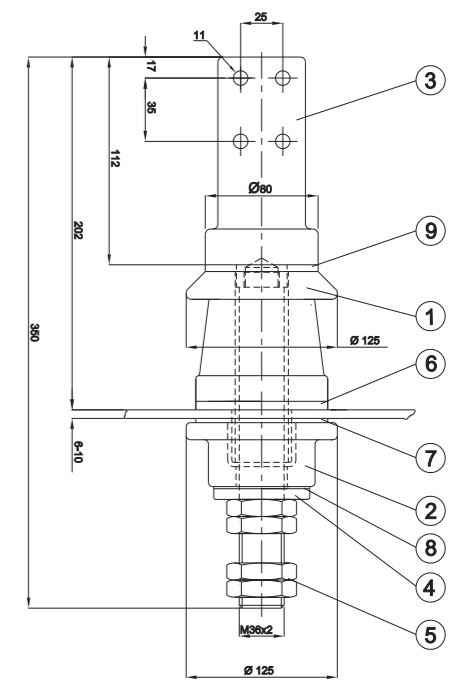
Pos.	Qty.	Name of the material	Description
1	1	Top porcelain	A-1000 DIN 42539
2	1	Bottom porcelain	B-1000 DIN 42539
3	1	Stem + Flag	Copper + Brass
4	1	Brass washer "E"	Brass
5	4	Brass nut	M24 ISO 4035
6	1	Flange gasket "N"	DT 1000 DIN 42539
7	1	Internal gasket (O)	DT 1000 DIN 42539
8	1	Internal gasket (P)	DT 1000 DIN 42539
9	1	Plain gasket (M)	DT 1000 DIN 42539



### LV BAR BUSHING 3.6KV/1600 – A - B 7897 - 1M

Cover Hole:  $\phi 70\text{mm}$

Pos.	Qty.	Name of the material	Description
1	1	Top porcelain	A-2000 DIN 42539
2	1	Bottom porcelain	B-2000 DIN 42539
3	1	Stem + Flag	Copper + Brass
4	1	Brass washer "E"	Brass
5	4	Brass nut M36	M36 ISO 4035
6	1	Flange gasket "N"	DT 2000 DIN 42539
7	1	Internal gasket (O)	DT 2000 DIN 42539
8	1	Internal gasket (P)	DT 2000 DIN 42539
9	1	Plain gasket (M)	DT 2000 DIN 42539



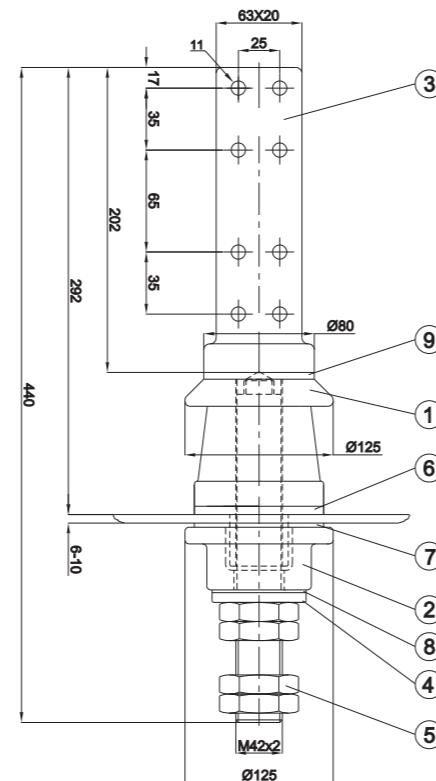
# Technical Data of Bushings

## LV Bushings

### LV BAR BUSHING 3.6KV/2500 – A - B 7897 - 2M

Cover Hole:  $\phi 70\text{mm}$

Pos.	Qty.	Name of the material	Description
1	1	Top porcelain	A-2000 DIN 42539
2	1	Bottom porcelain	B-2000 DIN 42539
3	1	Stem + Flag	Copper + Brass
4	1	Brass washer "E"	Brass
5	1	Brass nut	M42 ISO 4035
6	1	Flange gasket "N"	DT 2000 DIN 42539
7	1	Internal gasket (O)	DT 2000 DIN 42539
8	1	Internal gasket (P)	DT 2000 DIN 42539
9	1	Plain gasket (M)	DT 2000 DIN 42539



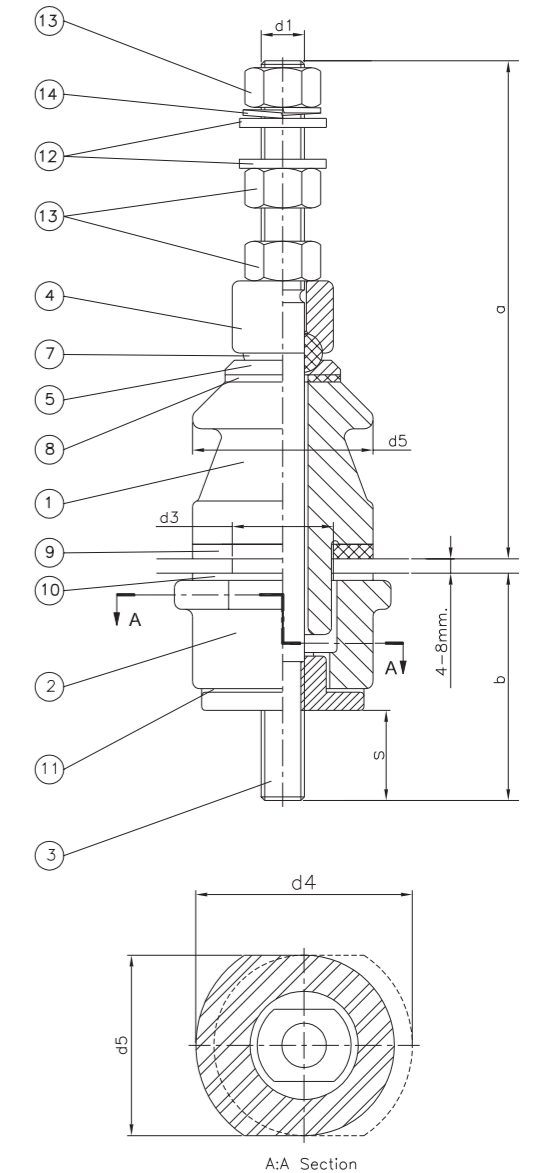
# Technical Data of Bushings

## LV Bushings

### LV DIN BUSHING 1KV/250-630A

Cover Hole:  $\phi 70\text{mm}$

Pos.	Qty.	Description
1	1	Top porcelain "A"
2	1	Bottom porcelain "B"
3	1	Brass Stem
4	1	Brass washer "E"
5	1	Brass washer "G"
7	1	Ring gasket "J"
8	1	Plain gasket (M1)
9	1	Flange gasket (N)
10	1	Internal gasket (O)
11	1	Internal gasket (P)
12	2	Brass washer DIN 125
13	3	Brass Nut ISO 4032
14	1	Spring washer DIN 127



Type	Rated Current (A)	a max	b max	s $\pm 0.3$	d1	d3	d4	d5
1/250	250	138	68	25	M12	28	60	50
1/630	630	178	82	37	M20	45	85	70



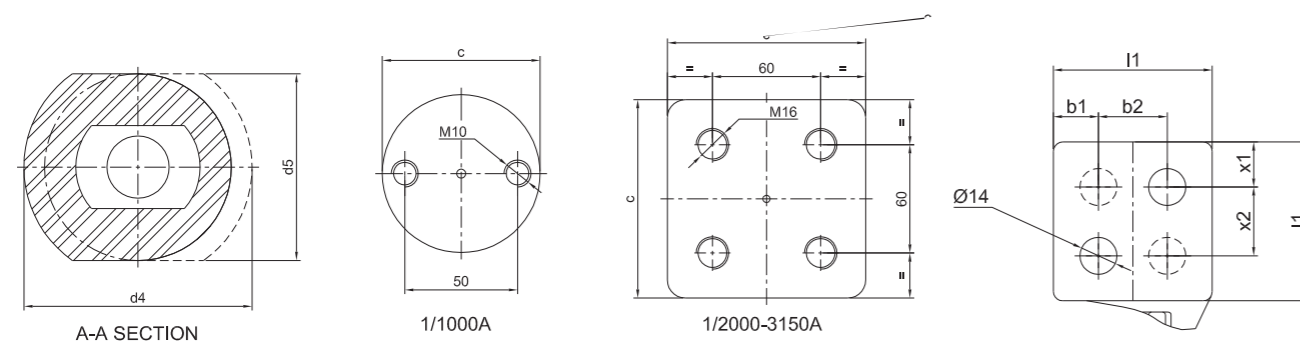
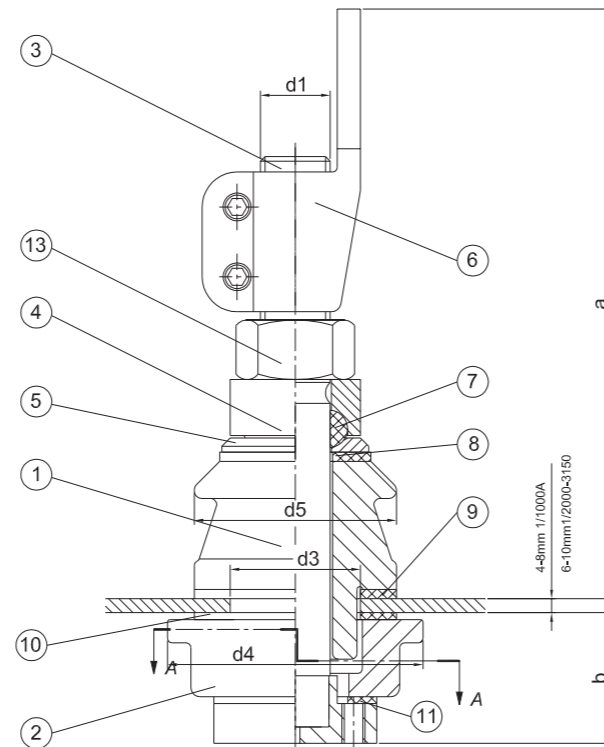
# Technical Data of Bushings

## LV Bushings

### LV DIN BUSHING 1KV/1000 – 2000 – 3150 A

Cover Hole:  $\phi 70\text{mm}$

Pos.	Qty.	Description
1	1	Top porcelain "A"
2	1	Bottom porcelain "B"
3	1	Stem
4	1	Brass washer "E"
5	1	Brass washer "G"
6	1	Brass flag DIN 43675-EP
7	1	Ring gasket "J"
8	1	Plain gasket (M)
9	1	Flange gasket (N)
10	1	Internal gasket (X)
11	1	Internal gasket (R)
13	1	Brass Nut ISO 4032
15	1	Brass closing piece
16	2	Bolt ISO 4017
18	2	Washer DIN 125



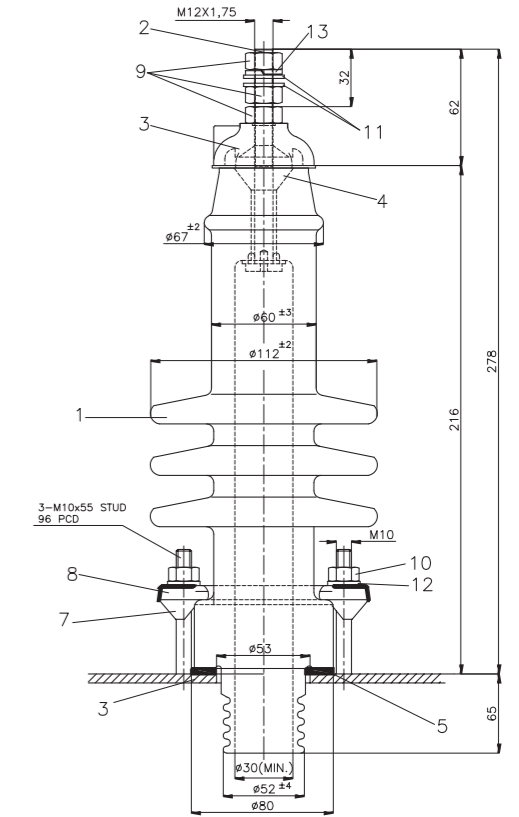
Type	Rated Current(A)	a max	b max	c	d1	d3	d4	d5	X1	X2	b1	b2	l1
1/1000	1250	263	60	70	M30x2	56	110	90	17	26	17	26	60
1/2000	2000	340	70	100	M42x3	70	125	104	20	40	25	50	100
1/3150	3150	372	75	110	M48x3	90	150	125	20	40	30	60	120

# Technical Data of Bushings

## High Voltage Bushings

### HV SHRINKABLE BUSHING 10-17.5KV/250 – A- B 7405 – 1M

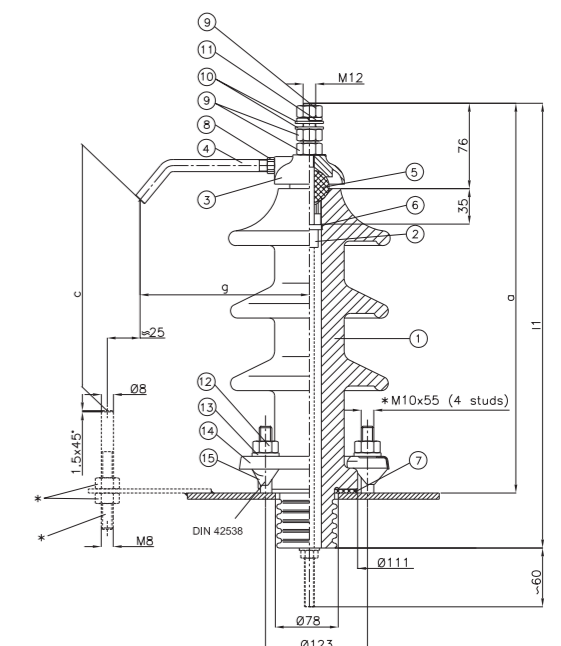
Pos.	Qty.	Description
1	1	Top porcelain
2	1	Stem
3	1	Brass Cap "E"
4	1	"J" Gasket 30x12x18
5	1	Gasket "N" 80x53x6
6	1	Gasket "O" 32x15x2
7	3	ALU. Clamping
8	1	Fixing Ring
9	3	M12 Nut
10	3	M10 Nut
11	2	Washer for M12
12	3	Washer for M10
13	1	Spring Washer M12



### HV DIN BUSHING 10-17.5KV/250 A

TYPE	CLASS		a	c	g	l1
	Outdoor (f)	Indoor (i)				
10 Ni 250	-	10 N	260	85	135	321
10 Nf 250	10 N	-	310	85	150	371
20 Ni 250	-	20 N	310	155	135	371
20 Nf 250	20 N	-	385	155	150	461
30 Ni 250	-	30 N	385	220	135	461
30 Nf 250	30 N	-	485	220	170	561

\*All Dimensions in mm



# Information For Order

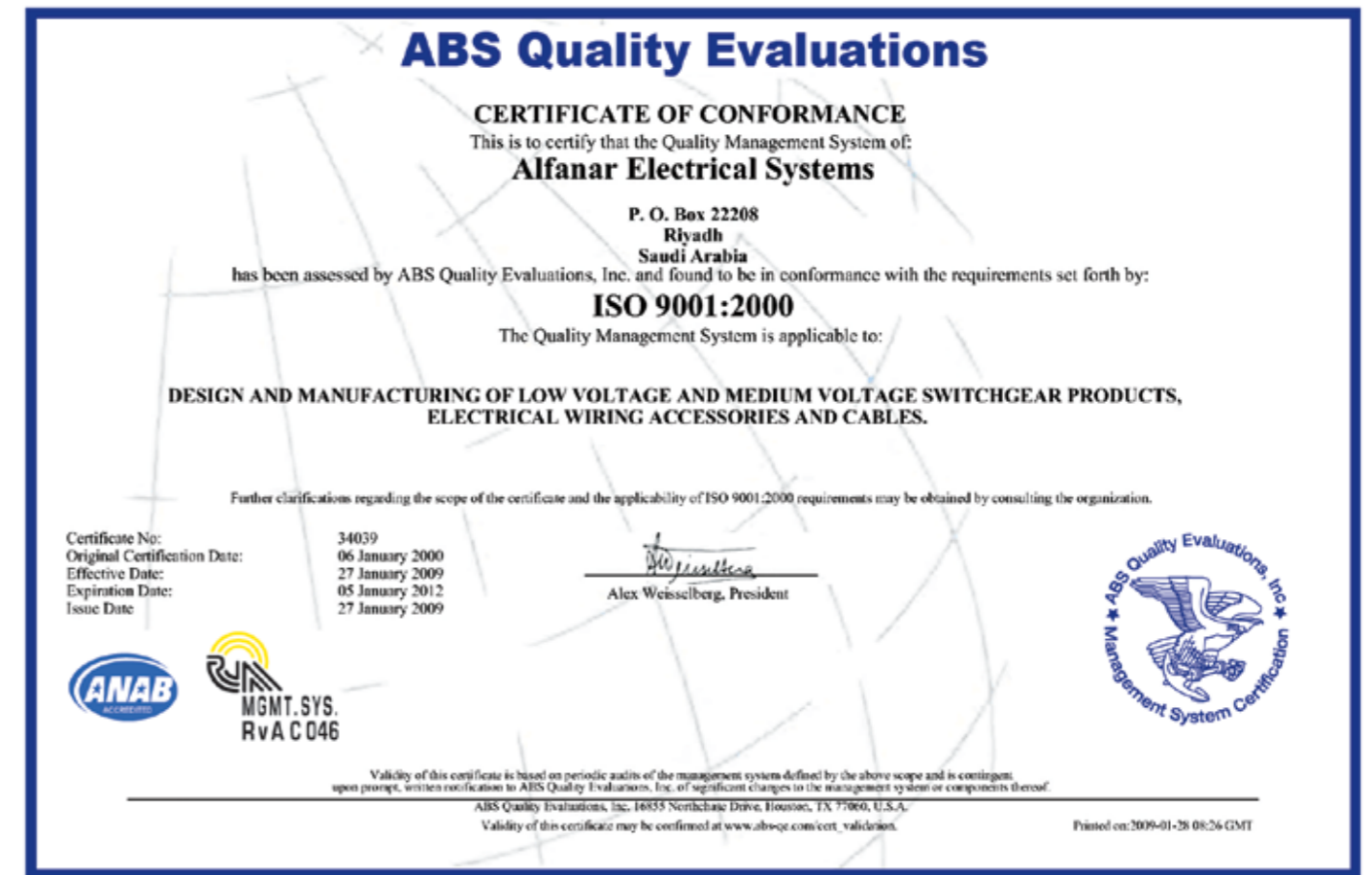
Dear Customer:

In order for us to present better services, please provide the below parameters:

SR.NO	FEATURES / CHARACTERISTICS / PARAMETERS					
1*	Installation location	<input type="checkbox"/>	Indoor	or	<input type="checkbox"/>	Outdoor
2*	Rated power kVA					
3*	Rated primary voltage					
4*	Rated secondary voltage					
5*	Rated frequency					
6*	Vector group	<input type="checkbox"/>	Dyn11	If any other? Specify		
7*	Off-load tap changer details	Total No. of Taps		+ Variation	%	
8*	No Load loss in Watts			- Variation	%	
9*	Load Loss in Watts at reference temperature					
10*	% impedance at reference temperature					
11*	Temperature rise of top oil					
12*	Temperature rise of winding					
13*	Type of oil sealing	<input type="checkbox"/>	Hermetically Sealed	or	<input type="checkbox"/>	With Conservator
14*	Ambient maximum temperature					
15*	Maximum altitude from the sea level of the transformer's operating location					
16*	Reference standard	<input type="checkbox"/>	IEC 60076	If any other? Specify		
17*	Parallel operation required with another transformer	<input type="checkbox"/>	Yes	or	<input type="checkbox"/>	No
<i>If yes, please attach (1* to 7*) details for another transformer.</i>						
18	Any other remark? Specify in detail					
19	Optional accessories required?	<input type="checkbox"/>	Bi-directional rollers	<input type="checkbox"/>	<input type="checkbox"/>	Mercury Thermometer
		<input type="checkbox"/>	Dial type thermometer	<input type="checkbox"/>	<input type="checkbox"/>	Buchholz Relay
		<input type="checkbox"/>	DGPT	<input type="checkbox"/>	<input type="checkbox"/>	C.T.

Note:

The points marked \* are mandatory. However, it is recommended that a customer provides the above information completely. Your other remarks will also be highly appreciated.



## QUALITY POLICY

The Quality Policy of ELETRA 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.

## ELETRA 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