

FOR SALE

170 MW Combined Cycle Co-generation Power Plant

**Burning Blast Furnace Gas / Coke
Oven Gas / Natural Gas**

**For sale – in continued operation, or
for relocation - as a whole, or in parts**



Commissioned: January 2001

Shutdown: 31st December 2013

~ 110,000 service hours

Life-time Maintenance by OEM

Recent Plant Overhaul (August 2013)

**Fully operable condition, under long term
preservation**



Year of Manufacture:	2001
Year Retired:	2013
Condition	Excellent
Operating Hours:	~ 110,000
Status:	Installed on foundation

PLANT CONFIGURATION

MAJOR EQUIPMENT

Gas Turbine-Generator Set, process gas fuelled, producing:
120 MWe @ 15 kV

Fuel Gas Compressor (Blast Furnace Gas / Coke Oven Gas), comprising of;
LP Axial Compressor / HP Centrifugal Compressor, 21 MW

Heat Recovery Steam Generator (without supplementary firing), producing:
196.56 t/h (Nominal) of steam @ 78.5 bar absolute / 520 C

Condensing Steam Turbine-Generator Set, producing:
70.2 MWe @ 11.5 kV

Transformer, 100/150 MVA / 132/15 kV

Transformer, 62/95 MVA / 132/11.5 kV

Transformer, 20/25 MVA / 15/10.6 kV

Transformer, 20/25 MVA / 11.5/10.6 kV

145 kV Gas Insulated Switchgear

120 MWe GAS TURBINE-GENERATOR SET

A large industrial gas turbine generator set is shown in a factory setting. The machine is massive, with a large cylindrical section in the foreground and a complex network of pipes and structural steel in the background. The lighting is industrial, with bright spots and deep shadows.

HISTORY

☐ Commissioned:	1999
☐ Decommissioned:	31 st December 2013
☐ Lifetime Service Hours:	108,242
☐ Lifetime Hot Starts:	716 (incl. failed starts)
☐ Lifetime Cold Starts:	510 (121 @ high rate ramp)
☐ Last Major Overhaul:	October 2012
☐ Overhauled By:	Ansaldo Energia
☐ Type of Overhaul:	Hot Gas Path Inspection
☐ Service Hours - After Overhaul:	8,684
☐ Hot Starts - After Overhaul:	63 (incl. failed starts)
☐ Cold Starts - After Overhaul:	60 (26 @ high rate ramp)
☐ Preservation Procedure:	Machine preserved at shutdown Preservation maintained



GAS TURBINE

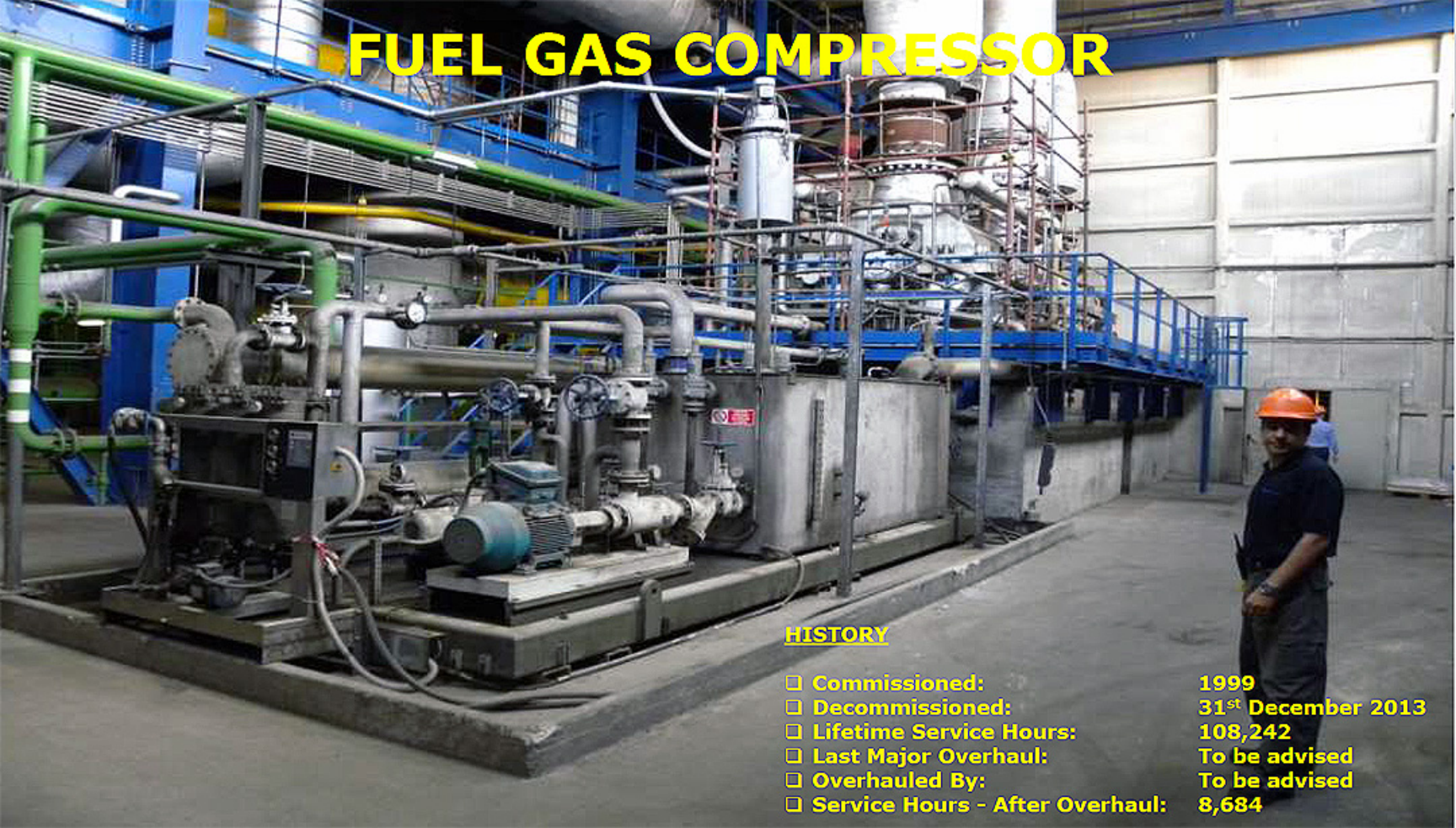
Manufacturer:	Ansaldo Energia S.p.A. (Genoa, Italy)
Model:	V94.2 "K"
Licensors:	Siemens AG, Germany
Type:	Heavy duty gas turbine
Fuel:	Blast Furnace Gas, Coke Oven Gas & Natural Gas mixture
Base Load Rating:	
Dry Operation;	
Power:	112,000 kW _e
Heat Input:	380 MW _t
Fuel:	
AFO:	112,000 Nm ³ /h
COKE Oven Gas:	19,000 Nm ³ /h
Natural Gas:	18,740 Nm ³ /h
Fuel LHV:	2,180 kcal/Nm ³
With steam inj.;	
Power:	120,000 kW _e
Heat Input:	480 MW _t
Fuel:	
AFO:	56,000 – 120,000 Nm ³ /h
COKE Oven Gas:	15,000 – 22,000 Nm ³ /h
Natural Gas:	As necessary to achieve required Heat Input.
Fuel LHV:	2,200 – 3,300 kcal/Nm ³
Fuel Gas Comp.:	~ 23 MW (driven off turbine shaft)
Speed:	3,000 rpm

GENERATOR

Manufacturer:	Ansaldo Energia s.p.a., Genoa, Italy
Model:	WY21Z-073LLT
Apparent Power:	141,000 kVA
Active Power:	112,800 kW
Power Factor:	0.8
Rated Speed:	3,000 rpm
Voltage:	15,000 V
Current:	5,427 A
Phases:	3
Connection:	Y
Frequency:	50 Hz
Standard:	IEC 34.1 (1987) / CEI 2-3 (1988)
Service:	S1
Protection:	IP 54
Insulation Class:	F / F



FUEL GAS COMPRESSOR

A large industrial fuel gas compressor unit is the central focus of the image. It consists of a large, rectangular, light-colored metal housing with various pipes, valves, and a green electric motor attached to the front. The unit is mounted on a concrete base. In the background, there are blue structural beams, green pipes, and a large white storage tank. A worker wearing an orange hard hat and a dark blue shirt stands to the right of the unit, providing a sense of scale. The overall environment is an industrial facility with concrete floors and various pipes and structures.

HISTORY

☐ Commissioned:	1999
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☐ Lifetime Service Hours:	108,242
☐ Last Major Overhaul:	To be advised
☐ Overhauled By:	To be advised
☐ Service Hours - After Overhaul:	8,684

PROCESS GAS COMPRESSOR

Gas: Blast Furnace Gas (AFO)
Coke Oven Gas (COG)

Normal Flow Rate;
AFO: 112,000 Nm³/h
COG: 19,000 Nm³/h

Mass Flow: 190,400 kg/h

Rated Speed: 6,900 rpm

LP COMPRESSOR

Manufacturer: Sulzer Turbo

Type: Axial Compressor

Model #: AV 50-15

Inlet Pressure: ~ 1 bara

Discharge Pressure: 7 bar abs

Absorbed Power: 13,770 kW

HP COMPRESSOR

Manufacturer: Sulzer Turbo

Type: Centrifugal Compressor

Model #: R 71-6

Inlet Pressure: 6 bar abs.

Discharge Pressure: 26 bar abs.

Absorbed Power: 12,070 Kw



196 t/h HEAT RECOVERY STEAM GENERATOR



HISTORY

☐ Commissioned:	1999
☐ Decommissioned:	31 st December 2013
☐ Lifetime Service Hours:	To be advised
☐ Last Major Overhaul:	To be advised
☐ Overhauled By:	To be advised
☐ Service Hours - After Overhaul:	To be advised



HRSG

Manufacturer: Ansaldo Energia S.p.A.

Type: HRSG, natural circulation

HP Steam Production;

Steam Flow: 54.6 kg/s (196,560 kg/h)

Steam Pressure: 78.5 bar abs.

Steam Temp.: 520 C

MP Steam Production;

Steam Flow: 12.8 kg/s (46,080 kg/h)

Steam Pressure: 11.6 bar abs.

Steam Temp.: 285 C

LP Steam Production;

Steam Flow: To be advised

Steam Pressure: 1.7 bar abs

Steam Temp.: Saturated

180 t/h STEAM GENERATOR

Blast Furnace Gas / Coke Oven Gas / Natural Gas Fuelled



HISTORY

☐ Commissioned:	1999
☐ Decommissioned:	31st December 2015
☐ Lifetime Service Hours:	To be advised
☐ Last Major Overhaul:	To be advised
☐ Overhauled By:	To be advised
☐ Service Hours - After Overhaul:	To be advised

AUXILIARY BOILER

Manufacturer: Ansaldo Energia S.p.A.

Type: Radiant furnace, natural circulation, bi-drum boiler

Fuel: Blast Furnace Gas / Coke Oven Gas / Natural Gas

Nominal Steam Prod.:

Steam Flow: 50 kg/s (180,000 kg/h)

Steam Pressure: 73 bar abs.

Steam Temp.: 520 °C

Number of Burners:

Blast Furnace (AFO) Gas: 2

Coke Oven Gas (COG): 2

Natural Gas (NG): 2

Operating Cases:

Case 1:

AFO Gas Flow: 72,500 Nm³/h

AFO Gas Thermal Input: 63.1 MWt

COG Gas Flow: 15,235 Nm³/h

COG Thermal Input: 72.2 MWt

NG Flow: 1,960 Nm³/h

NG Thermal Input: 18.8 MWt

Total Thermal Input: 154.1 MWt

Steam Flow: 156,000 kg/h

Case 2:

AFO Gas Flow: 59,180 Nm³/h

AFO Gas Thermal Input: 54.8 MWt

COG Gas Flow: 12,480 Nm³/h

COG Thermal Input: 59.9 MWt

NG Flow: 2,151 Nm³/h

NG Thermal Input: 20.7 MWt

Total Thermal Input: 135.4 MWt

Steam Flow: 134,000 kg/h



70 MWe CONDENSING STEAM TURBINE-GENERATOR SET



HISTORY

☐ Commissioned:	November 2002
☐ Decommissioned:	31 st December 2015
☐ Lifetime Service Hours:	To be advised
☐ Last Major Overhaul:	To be advised
☐ Overhauled By:	To be advised
☐ Service Hours - After Overhaul:	To be advised

STEAM TURBINE

Manufacturer:	Ansaldo Energia S.p.A.
Serial Number:	2183
Model:	SCSF
Type:	Single cylinder reaction steam turbine
Nominal Rating:	70,204 kW _e
Normal Inlet Flow:	180,000 kg/h
Normal Inlet Pressure:	76 bar abs.
Normal Inlet Temperature:	517 C
Normal Exhaust Pressure:	0.043 bar abs.
Speed:	3,000 rpm





GENERATOR

Manufacturer:	Ansaldo Energia S.p.A., Genoa, Italy
Apparent Power:	94,000 kVA
Active Power:	75,200 kW
Power Factor:	0.8
Rated Speed:	3,000 rpm
Voltage:	11,500 V
Current:	4,719 A
Phases:	3
Connection:	Y
Frequency:	50 Hz
Standard:	IEC 34.1 (1987) / CEI 2-3 (1988)
Service:	S1
Protection:	IP 54
Insulation Class:	F / F

152 MVA STEP-UP TRANSFORMER

HISTORY

☐ Commissioned:	1999
☐ Decommissioned:	31 st December 2013
☐ Lifetime Service Hours:	To be advised
☐ Last Major Overhaul:	To be advised
☐ Overhauled By:	To be advised
☐ Service Hours - After Overhaul:	To be advised

TRANSFORMER

Manufacturer: **ABB Trasformatori S.p.A., Italy**

Serial Number: **16009A**

Type: **Step-up Transformer**

Standard: **CEI 14-4**

Cooling Method: **ONAN / ONAF**

Vector Group: **YNd11**

Rating: **100,000 / 150,000 kVA**

Primary Voltage: **132,000 V**

Primary Current: **665 A**

Secondary Voltage: **15,000 V**

Secondary Current: **5,850 A**

Phases: **3**

Frequency: **50 Hz**

Regulation: **On-line Tap Changer**

Number of Positions +/-: **10 / 10**

Increment: **1.5%**

Temperature Rise:
Windings: **65 °C**
Oil: **60 °C**



ABB Trasformatori S.p.A.

NORME
CEI 14-4
NUMERO DI COSTRUZIONE
16009A

TRASFORMATORE TRIFASE ELEVATORE

ANNO DI COSTRUZIONE: 1999

MODO DI RAFFREDDAMENTO: ONAN / ONAF

SOVRATEMPERATURE (AVVOLGIMENTI 65 K OILO 60 K)

FREQUENZA NOMINALE: 50 Hz

TENSIONI NOMINALI

AT 132000 V

BT 15000 V

CORRENTI NOMINALI

665 A

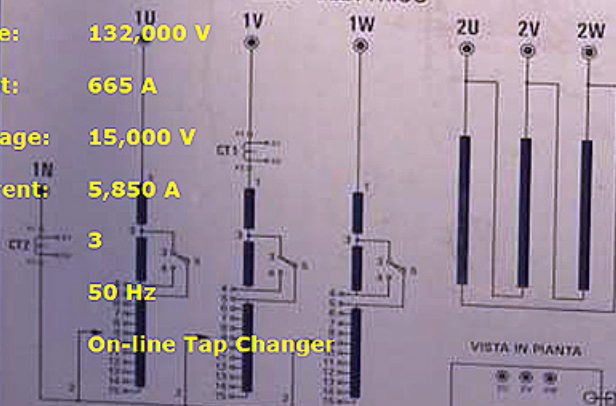
5850 A

LIVELLI DI ISOLAMENTO

IA 650 FI 275

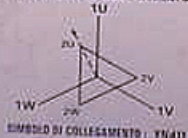
IA 95 FI 38

SCHEMA ELETTRICO



IMPEDENZA DI CORTOCIRCUITO		
POTENZA DI RIFERIMENTO (S10 MVA)	IMPEDENZA DI C.C. (Ω)	IMPEDENZA DI C.C. (%)
100000	0.0012	0.0012
150000	0.0018	0.0018

DIAGRAMMA DI COLLEGAMENTO



Simbolo di collegamento: YNd11

VISTA IN PIANTE

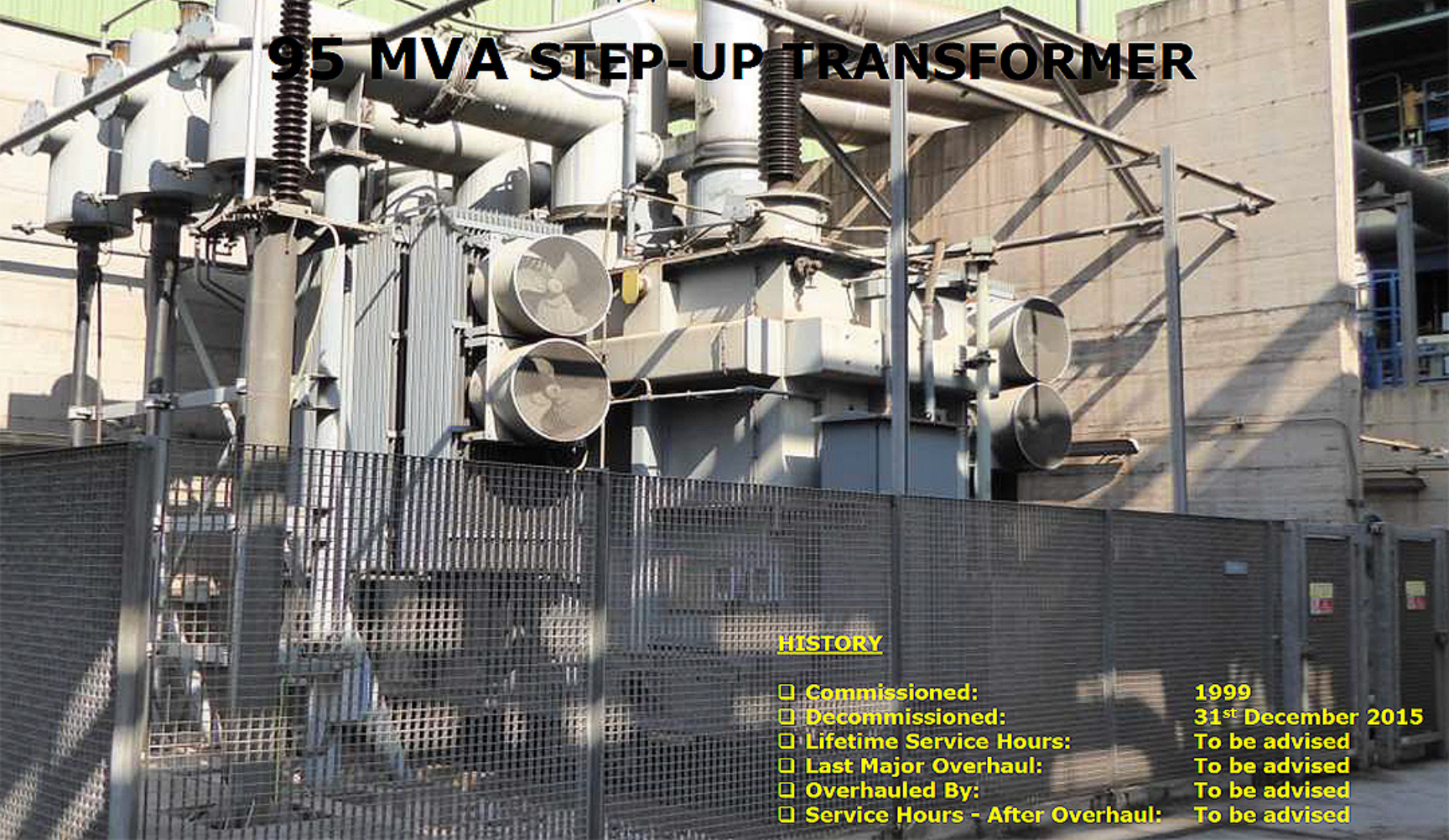


POTENZA (kVA)	AT LINEA IN (U, V, W)	BT LINEA IN (U, V, W)	BT LINEA IN (U, V, W)
1	2-18 181200	578	
2	2-14 140820	550	
3	2-12 147840	534	
4	2-12 148860	502	
5	2-11 142880	510	
6	2-10 141500	518	
7	2-9 139920	527	
8	2-8 137940	536	
9	2-7 135960	545	
10	2-6 133980	555	
11	2-5 132000	565	
12	2-4 130020	575	
13	2-3 128040	585	
14	2-2 126060	595	
15	2-1 124080	605	
16	2-0 122100	615	
17	2-0 120120	625	
18	2-0 118140	635	
19	2-0 116160	645	
20	2-0 114180	655	
21	2-0 112200	665	

TRASFORMATORE DI CORRENTE (secondo CEI 38-11)				
ITEM	ANNO DI RIFERIMENTO (A)	TEMPERATURA DEL RIFERIMENTO (°C)	CLASSE DI PRECISIONE	SCOPPO
CEI	100000	65 ± 0.5	B1	REGOLAZIONE TENSIONE
CEI	150000	65 ± 0.5	B1	PROTEZIONE

CONTRUITO IN ITALIA

95 MVA STEP-UP TRANSFORMER



HISTORY

❑ Commissioned:	1999
❑ Decommissioned:	31 st December 2015
❑ Lifetime Service Hours:	To be advised
❑ Last Major Overhaul:	To be advised
❑ Overhauled By:	To be advised
❑ Service Hours - After Overhaul:	To be advised

TRANSFORMER

Manufacturer: **ABB Trasformatori S.p.A., Italy**

Serial Number: **h6006A**

Type: **Step-up Transformer**

Standard: **CEI 14-4**

Cooling Method: **ONAN / ONAF**

Vector Group: **YNd11**

Rating: **100,000 / 150,000 kVA**

Primary Voltage: **132,000 V**

Primary Current: **416 A**

Secondary Voltage: **11,500 V**

Secondary Current: **4,769 A**

Phases: **3**

Frequency: **50 Hz**

Regulation: **On-line Tap Changer**

Number of Positions +/-: **10 / 10**

Increment: **1.5%**

Temperature Rise:
Windings: **65 °C**
Oil: **60 °C**

ABB Trasformatori S.p.A.

NORME
CEI
14-4

NUMERO
H6006A
PER ESTERNO

TRASFORMATORE TRIFASE ELEVATORE

ANNO DI COSTRUZIONE: 1999

MODO DI RAFFREDDAMENTO: ONAN / ONAF

SOVRATEMPERATURE (AVVOLGIMENTI 85 K 60 K)

FREQUENZA NOMINALE: 50 Hz

POTENZA NOMINALE ONAN / ONAF 62000 / 95000 kVA

CORRENTI NOMINALI

LIVELLI DI ISOLAMENTO

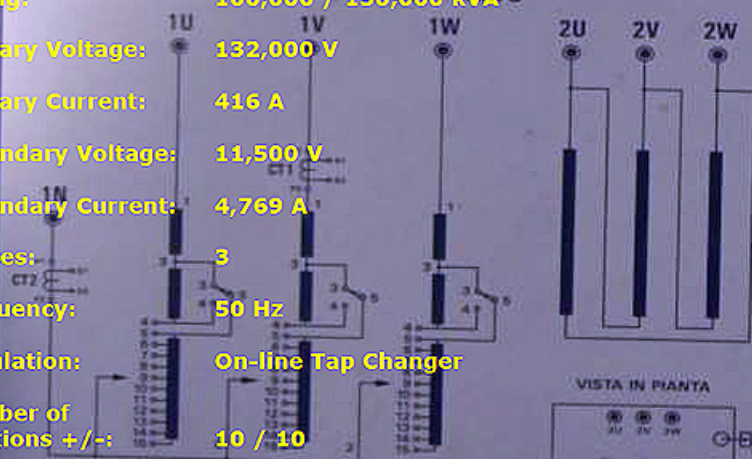
416 A

IA 650 FI 275

4769 A

IA 95 FI 38

SCHEMA ELETTRICO



AVVOLGIMENTO	RAFFREDDAMENTO	RAFFREDDAMENTO IN S.C.
1	ONAN	ONAN
2	ONAF	ONAF
3	ONAN	ONAN
4	ONAF	ONAF
5	ONAN	ONAN
6	ONAF	ONAF
7	ONAN	ONAN
8	ONAF	ONAF
9	ONAN	ONAN
10	ONAF	ONAF

DIAGRAMMA DI COLLEGAMENTO



VISTA IN PIANTA



ORDINE DEI CAVI
CABLO ADATTA AL VOTO

POTENZA (kVA)	AVVOLGIMENTO	RAFFREDDAMENTO	RAFFREDDAMENTO IN S.C.
1	2-10	ONAN	ONAN
2	2-14	ONAF	ONAF
3	2-18	ONAN	ONAN
4	2-22	ONAF	ONAF
5	2-26	ONAN	ONAN
6	2-30	ONAF	ONAF
7	2-34	ONAN	ONAN
8	2-38	ONAF	ONAF
9	2-42	ONAN	ONAN
10	2-46	ONAF	ONAF
11	2-50	ONAN	ONAN
12	2-54	ONAF	ONAF
13	2-58	ONAN	ONAN
14	2-62	ONAF	ONAF
15	2-66	ONAN	ONAN
16	2-70	ONAF	ONAF
17	2-74	ONAN	ONAN
18	2-78	ONAF	ONAF
19	2-82	ONAN	ONAN
20	2-86	ONAF	ONAF
21	2-90	ONAN	ONAN

ITEM	AVVOLGIMENTO	RAFFREDDAMENTO	RAFFREDDAMENTO IN S.C.
CT1	ONAN	ONAN	ONAN
CT2	ONAF	ONAF	ONAF

CONSTRUITO IN ITALIA

25 MVA STEP-DOWN TRANSFORMER



HISTORY

☐ Commissioned:	1999
☐ Decommissioned:	31 st December 2015
☐ Lifetime Service Hours:	To be advised
☐ Last Major Overhaul:	To be advised
☐ Overhauled By:	To be advised
☐ Service Hours - After Overhaul:	To be advised

TRANSFORMER



Manufacturer:	GETRA S.p.A., Italy
Serial Number:	To be advised
Type:	Step-down Transformer
Standard:	CEI 4712
Cooling Method:	ONAN / ONAF
Vector Group:	Dd0
Rating:	20,000 / 25,000 kVA
Primary Voltage:	15,000 V
Primary Current:	700 A
Secondary Voltage:	10,600 V
Secondary Current:	1,089 A
Phases:	3
Frequency:	50 Hz
Regulation:	Off-Line Tap Changer
Number of Positions +/-:	2
Increment:	2.38 %
Temperature Rise, Windings:	65 C
Oil:	60 C

25 MVA STEP-DOWN TRANSFORMER



HISTORY

☐ Commissioned:	1999
☐ Decommissioned:	31 st December 2015
☐ Lifetime Service Hours:	To be advised
☐ Last Major Overhaul:	To be advised
☐ Overhauled By:	To be advised
☐ Service Hours - After Overhaul:	To be advised



TRANSFORMER

Manufacturer:	GETRA., Italy
Serial Number:	To be advised
Type:	Step-down Transformer
Standard:	CEI 4712
Coating Method:	ONAN / ONAF
Vector Group:	Dd0
Rating:	20,000 / 25,000 kVA
Primary Voltage:	11,500 V
Primary Current:	1,004 A
Secondary Voltage:	10,600 V
Secondary Current:	1,089 A
Phases:	3
Frequency:	50 Hz
Regulation:	Off-line Tap Chnager
Number of Positions +/-:	2
Increment:	2.17 %
Temperature Rise;	
Windings:	65 C
Oil:	60 C

145 kV GAS INSULATED SWITCHGEAR



HISTORY

☐ Commissioned:	1999
☐ Decommissioned:	31 st December 2013
☐ Lifetime Service Hours:	To be advised
☐ Last Major Overhaul:	To be advised
☐ Overhauled By:	To be advised
☐ Service Hours - After Overhaul:	To be advised



**GAS INSULATED
SWITCHGEAR**

Manufacturer: ABB ADDA, Italy

Serial Number: 85800

Type: AGB 145-170S

Normal Voltage: 145,000 V

Breaking Capacity: 31,5 kA (@ 145 kV)

Interruption Factor: 1.5

Normal Current: 1,250 A

Frequency: 50 Hz

Gas: SF6

Gas Pressure: 6 bar

Weight of Gas: 12 kg / pole

Weight of Pole: 250 kg