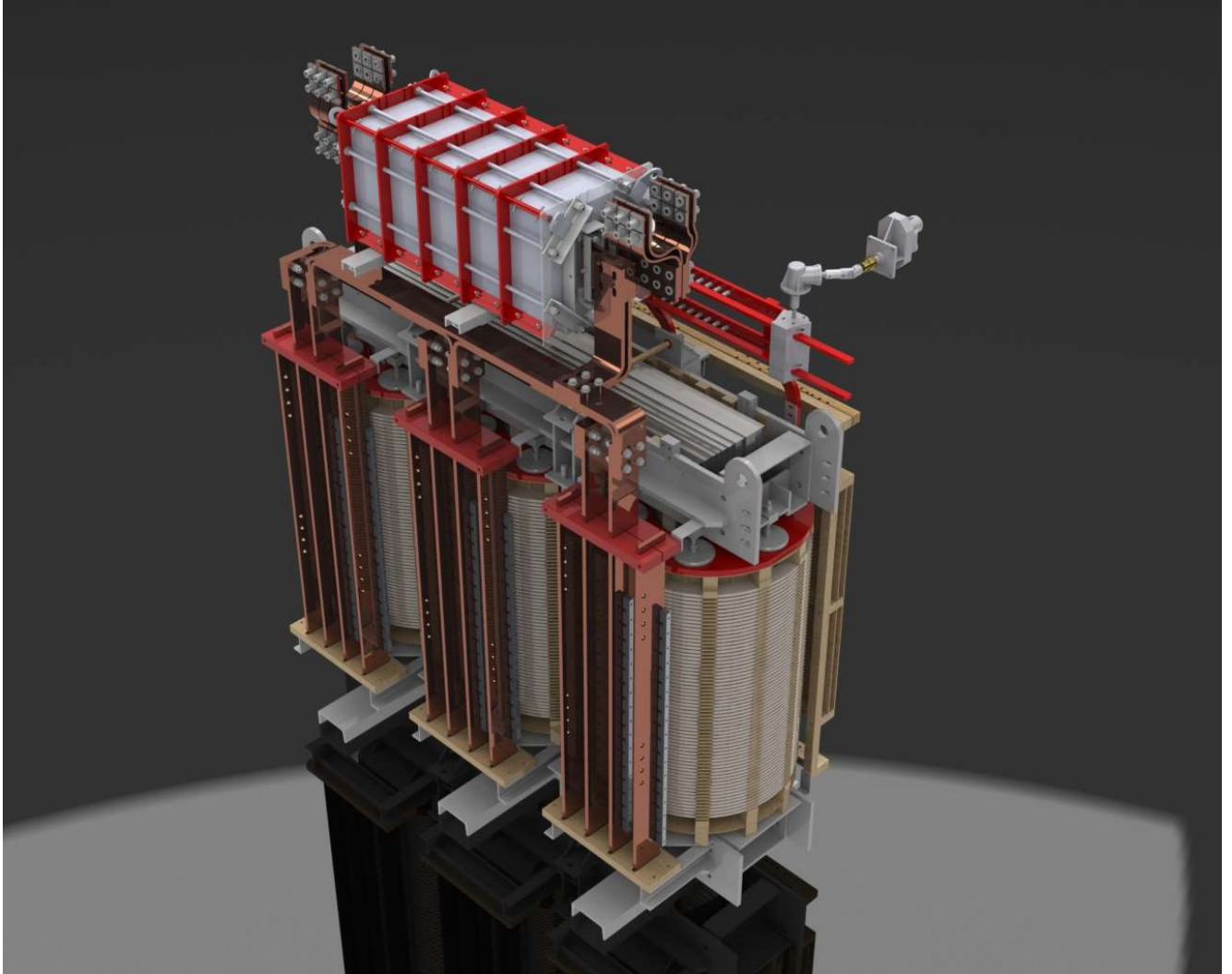


Form No. RTF0065R28

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RadianTRC
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Introduction

We are specialist power transformer manufacturers. Our core strengths are in the design and manufacture of rectifier transformers furnace transformers and convertor transformers.

Product Overview

We focus in the range of 50 kVA to 20 MVA, and will consider ratings outside of that range. Typically our customers require HV voltages in the 3.3 kV to 33 kV range, though we can offer higher values.

Mineral extraction from ores is generally performed by electrolytic reduction (e.g. base metals, copper) or smelting (Ferro-chrome). Our transformers are a mission critical part of the extraction process.

Rectifier Transformers

The electrolytic process requires large regulated DC currents. These currents are supplied and regulated by high power rectifiers, which are in turn supplied by bespoke rectifier transformers. The transformers are rated for 100% duty in harsh environments.

Furnace Transformers

The smelting industry uses an AC or DC process depending on the Arc Furnace application. DC Electric Arc Furnace (EAF) transformers are similar in design to rectifier transformers, but have many more taps and on-load tap-changers. AC EAF transformers are subject to repeated short circuit conditions, and require a far more conservative design approach. They typically have many taps and on-load tap-changers. AC EAF transformers are very often built as single phase units which allow the furnace design and process to be optimised.

We have recently completed a complete rewind of two shell-type ACEAF transformers. They are both back in service and performing flawlessly.

Convertor Transformers

Convertor transformers are optimised to supply variable speed drives (VSD) for motor control. A VSD typically injects a whole spectrum of harmonics into the supply lines, and the transformer design needs to accommodate these harmonics. A convertor transformer is typically rated at 100% capacity where a distribution transformer is typically rated at 80% capacity.

VSD drives are based on power electronics in higher frequency domain and special attention must be paid to eddy current losses.

Multi-level drives require isolated secondary connections to supply the cascaded rectifier bridges inside the drive.

Manufacturing Philosophy

Our internal quality control procedures motivate each employee to contribute to a culture that promotes taking pride in accurate, high quality work.

Facilities include a 60 ton crane, vacuum drying oven, an oil filtration plant, winding machines, and a fully-equipped CNC workshop for the manufacture of special components.

We have built our own testing facilities to handle all the routine tests required for the final witnessed testing of all our transformers.

References

The following pages are a selection from our reference list of operating plants.

Sublime

Sublime Furnace 3 : 850Vdc 70 kA : Sublime Technologies : Matla, Mpumalanga, South Africa



No. of units	2
Configuration	A series/parallel switchable rectifier allowing constant power delivery over a large voltage range. 12 pulse rectifier.
Taps	21 taps on load
Process	Propriety SiC furnace
Rating	10288 / 19440 kVA
Interesting items	Diode rectifier with transducer control. Inter-phase Transformer (IPT)
Vector groups	Dy5y11, Yy0y6
Cooling	OFWF
Weight & dimensions	45 Tons, Length=4060, Width=3240, Height=4870

Amplats

Amplats : 715 Vdc 10.5 kA: Amplats RBMR : Rustenberg, North West, South Africa



No. of units	6
Configuration	12 pulse rectifier.
Process	Electro-winning
Rating	9200 kVA
Interesting items	Star – Delta Optional BARS on LV side
Vector group	Dy11/d0 $\pm 15^\circ$ two identical units for 12 pulse operation
Cooling	ONAN with fans cooling
Weight & dimensions	20 Tons, Length=3020, Width=3090 excluding radiators, Height=3650

MidCDR

MidCDR : 324Vdc 25 kA : Samancor : Middelburg, South Africa



No. of units	1
Configuration	12 pulse rectifier.
Process	DC EA Furnace
Rating	2 x 4000 kVA in common tank
Taps	6 taps, off load
Interesting items	Star – Delta switch on LV side
Vector group	Dy5, Yy0
Cooling	OFWF
Weight & dimensions	30 Tons, Length=3390, Width=3130, Height=3365, excluding radiators

Kanshanshi

Kanshanshi : 185 Vdc 60 kA : First Quantum : Kanshanshi, Copper Belt, Zambia



No. of units	1
Configuration	12 pulse rectifier.
Process	Electro-winning
Rating	7200 / 10167 kVA
Taps	7 taps, off load
Interesting items	Inter-phase Transformer (IPT)
Vector group	Dy5y11 $\pm 15^\circ$
Cooling	ONAN with auxiliary fans
Weight & dimensions	34 Tons, Length=2375, Width=2926, Height=4207, excluding radiators

Kolwezi

Kolwezi : 185 Vdc 60 kA : First Quantum : Kolwezi, DRC



No. of units	4
Configuration	12 pulse rectifier.
Process	Electro-winning
Rating	7200 / 10167 kVA
Taps	7 taps, off load
Interesting items	Inter-phase Transformer (IPT)
Vector group	Dy5y11 $\pm 15^\circ$
Cooling	ONAN with auxiliary fans
Weight & dimensions	34 Tons, Length=2375, Width=2926, Height=4207, excluding radiators

Khutala

Khutala : 700 kVA : Khutala Coal Mine : Witbank, Mpumalanga, South Africa



No. units	1
Configuration	6 pulse convertor
Process	Drive
Rating	700 kVA
Taps	3 taps, off load
Interesting items	None
Vector group	Dyn11
Cooling	ONAN
Weight & dimensions	4 Tons, Length=2090, Width=1720, Height=2395

Palabora

Palabora : 145 Vdc 16 kA : PCM : Phalaborwa, Mpumalanga, South Africa



No. units	1
Configuration	12 pulse rectifier
Process	Electro-winning
Rating	2 x 1435 kVA
Interesting items	Dual windings on primary and secondary sides on a common core.
Vector group	Dy11d0
Cooling	OFWF with internal ducting
Weight & dimensions	12 Tons, Length=2150, Width=2730, Height=3370, excluding radiators

KCM

KCM : 600 Vdc 25 kA : KCM : Kitwe, Copper Belt, Zambia



No. units	2
Configuration	12 pulse rectifier
Process	Electro-winning
Rating	6198 kVA
Taps	3
Interesting items	Dual windings on primary and secondary sides on a common core.
Vector group	Dy11d0
Cooling	OFAF with internal ducting
Weight & dimensions	17 Tons, Length=2510, Width=2230, Height=3750, excluding heat exchanger

TWP

TWP : 145 Vdc 16 kA : ENRC : Luita, DRC



No. units	4
Configuration	12 pulse rectifier DB12
Process	Electro-winning
Rating	6765 kVA
Taps	5
Interesting items	Interleaved star and delta windings on secondary
Vector group	Dy11d0
Cooling	OFAF
Weight & dimensions	19 Tons, Length=2490, Width=4240, Height=3700, excluding radiators

ADS

ADS : 1900 Vac 825 A : AfriSam : Gauteng, South Africa



No. units	1
Configuration	12 pulse convertor
Process	Convertor Supply
Rating	Dual rating 4000 : 5400 kVA
Taps	2 – Dual voltage
Interesting items	Interleaved star and delta windings on secondary. Dual voltage primary.
Vector group	Yy0d11
Cooling	ONAN
Weight & dimensions	15 Tons, Length=2655, Width=2106, Height=2705, including radiators

EMIS

EMIS : 525 Vac : Undisclosed : Gauteng, South Africa



No. units	3
Configuration	Distribution
Process	Distribution
Rating	500 kVA, 315 kVA
Taps	5 – 0, $\pm 2.5\%$, $\pm 5.0\%$
Vector group	Dyn11
Cooling	ONAN

Mogale Repair

Mogale : 180 Vac 85.5 kA : Mogale Alloys : Gauteng, South Africa



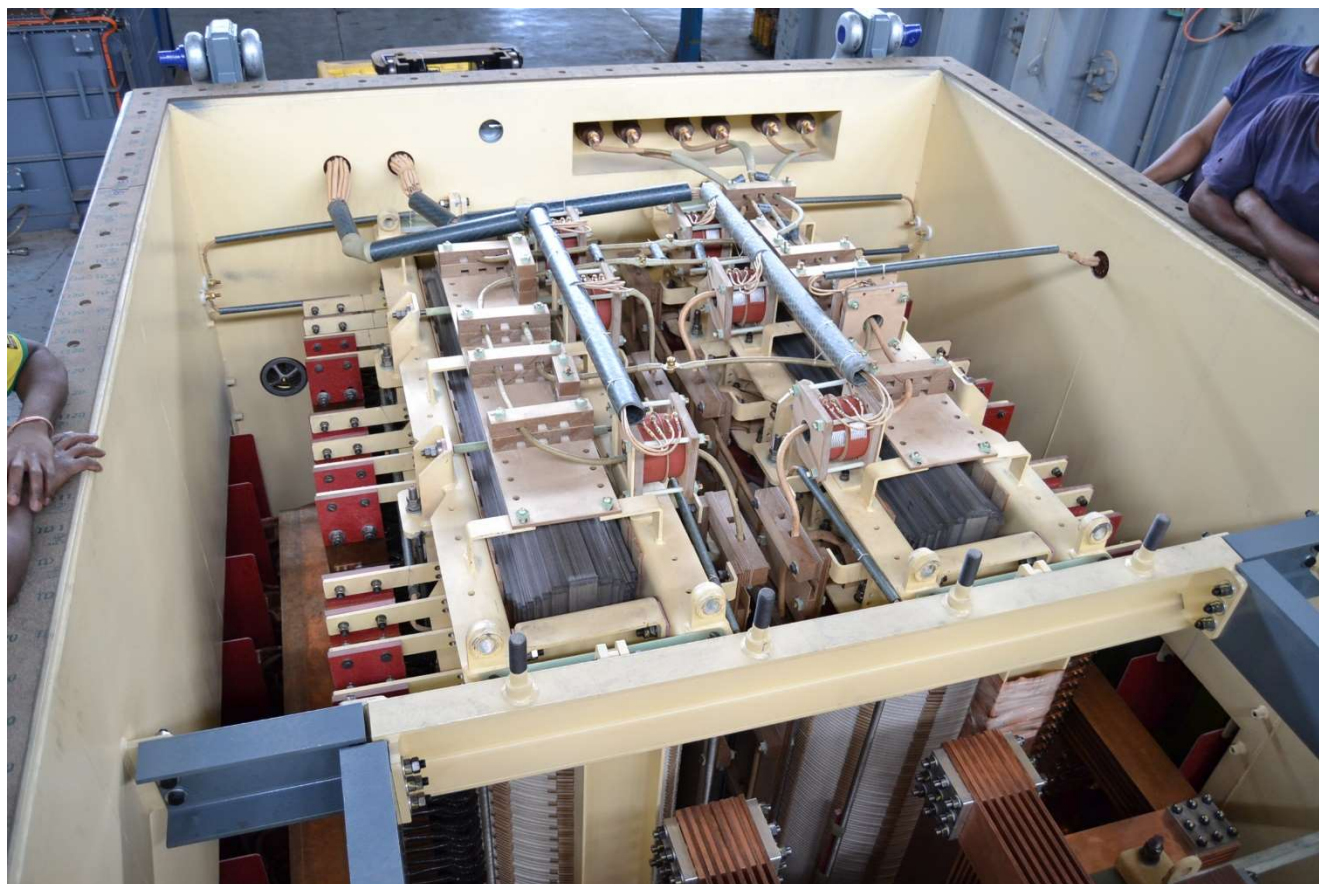


No. units	2
Configuration	AC Arc furnace
Process	AC Arc Furnace
Rating	20000 kVA
Taps	17
Vector group	Dd0
Interesting Items	Pancake HV windings in a sandwich configuration
Cooling	OFWF
Weight & dimensions	36 Tons

Mondi Chlor Alkali

Mondi : 84 Vdc 97 kA : Mondi : Kwa-Zulu Natal, South Africa





No. units	1
Configuration	12 pulse rectifier transformer with 3 rd IPT
Process	Chlorine
Rating	11020 / 19090 kVA
Vector group	Yyn4yn10 - 7.5°, Dyn5yn11 - 7.5°
Cooling	ONAN
Weight	72 Tons,

KCM PCR4

ABB : 600 Vdc 25 kA : KCM : Copperbelt, Zambia



No. units	2
Configuration	12 pulse rectifier
Process	Electro-winning
Rating	6198 kVA
Taps	3
Vector group	Dd0, Yd11
Cooling	OFAF with internal oil directed cooling
Weight & dimensions	17 Tons, Length=2510, Width=2230, Height=3750, excluding heat exchanger

Palabora Repeat

Palabora : 145 Vdc 16 kA : PCM : Phalaborwa, Mpumalanga, South Africa



No. units	1
Configuration	12 pulse rectifier DB12
Process	Electro-winning
Rating	2864 / 2x1435 kVA
Vector group	Dy11d0
Cooling	OFWF with internal duct cooling
Weight & dimensions	11 Tons

Roan Tailings

Roan Tailings : 185 Vdc 60 kA : ENRC : Kanshanshi, Copper Belt, Zambia



No. of units	4
Configuration	12 Pulse Rectifier
Process	Electro Winning
Rating	2 x 7200 / 10167 kVA
Taps	7 taps, off load
Interesting items	Inter-phase transformer (IPT) Top Mounted
Vector group	XDy5y11 Extended Delta with 15deg shift.
Cooling	ONAN with auxiliary fans
Weight & dimensions	34 Tons

Transnet

Transnet: Refurbishment, Traction Transformer 4950KVA, Heidelberg, Gauteng



No. of units	1
Configuration	Traction transformer
Process	Railways
Rating	4950 kVA
Taps	5
Voltage	132 000V / 1200-1200
Vector group	Yd7d11 -15°
Cooling	O.N.A.N
Weight & dimensions	-

Katanga

Katanga: Rectifier transformer rated 7145Kva, Copper Belt, Zambia



No. of units	4
Configuration	DSS with IPT
Process	Copper winning
Rating	7145 / 10104
Taps	None
Interesting items	Lid mount Trafo & IPT
Vector group	Dy5y11 – 15 deg
Cooling	OFWF
Weight	25 Tons

Chambishi Rewind

No. of units	2
Configuration	12 Pulse Rectifier DB12 with two units
Process	Copper winning
Rating	2x8652
Taps	None
Interesting items	Two units in one tank
Vector group	Yd1, Dd0
Cooling	OFWF
Weight	65 Tons

Tschudi

No. of units	2
Configuration	DSS with IPT
Process	Copper winning
Rating	3946 / 5580
Taps	None
Interesting items	Lid mount Trafo & IPT
Vector group	Dy5y11 – 15 deg
Cooling	ONAN
Weight	22 Tons

Chingola 2A

No. of units	2
Configuration	2 x 6 Pulse =12 pulse DB12
Process	Copper winning
Rating	2 x 8925
Taps	None
Interesting items	Lid mount Trafo.
Vector group	XDd0 – 15 deg Extended Delta
Cooling	OFAF
Weight	24 Tons

Namzinc Rewind 370Vdc 55kA

Before:



After:



Loading:



Air Cooled IPT's Before:



Air Cooled IPT after rebuild:



IPT's Loading:



No. of units	4
Configuration	2 x 6 Pulse =12 pulse DSS12 per transformer tank
Process	Zinc Electro winning
Rating	2 x 12763/18049kVA 66kV/600V rewind to revised output voltage
Taps	None
Interesting items	Air Cooled IPT's
Vector group	Dyy11 + Yyy0
Cooling	OFWF Coolers refurbished
Weight	89 Tons Per Transformer Tank

KCM 1A and 1B 2 x 18kA 200Vdc



No. of units	1
Configuration	2 x 6 Pulse =12 pulse DSS12
Process	Copper Electro winning
Rating	2 x 4528/6404
Taps	None
Interesting items	Retrofit. Side Mounted IPT's Nomex Windings
Vector group	XDdyn -15deg Identical units producing 12 pulse operation
Cooling	OFAF Coolers
Weight	20 Tons each

Impala Platinum 3 x 20ka Transformers

Impala Platinum 105Vdc 20kA, Impala Platinum Refinery, Springs, Gauteng

Impala Platinum Unit 1 factory test setup:



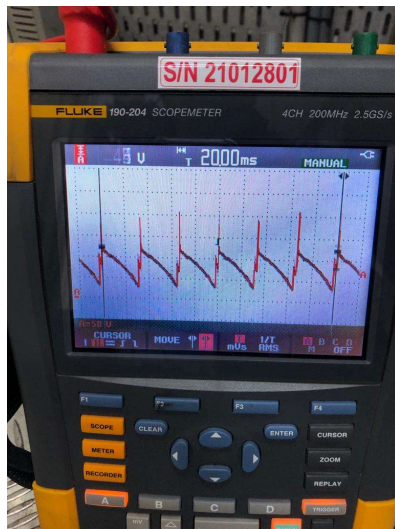
Wound IPT core:



Wound IPT Complete:



Exceptional Balanced 6 Pulse operation:



No. of units	3 (3 rd unit completed September 2021) Replacement of Existing units
Configuration	6 pulse DSS12
Process	Copper Electro winning
Rating	2483/3611 20kA 105Vdc
Taps	None
Interesting items	Side Mounted Wound IPT's delivering perfect balanced operation due to much improved magnetic coupling between star group neutrals and low noise operation. Client will pay back cost of all 3 replacement units within 7 years purely on electricity cost saving as against the previous units.
Vector group	Yy0y6
Cooling	OFAF Coolers
Weight	15 Tons each

Metix 2 off 2273kVA Furnace Transformers

Northam Platinum 130Vdc 25kA, Northam Platinum Zondereinde, Limpopo, South Africa

Metix: 2 off 3 Phase Furnace Transformers for Northam Platinum



1Unit Packed for Delivery



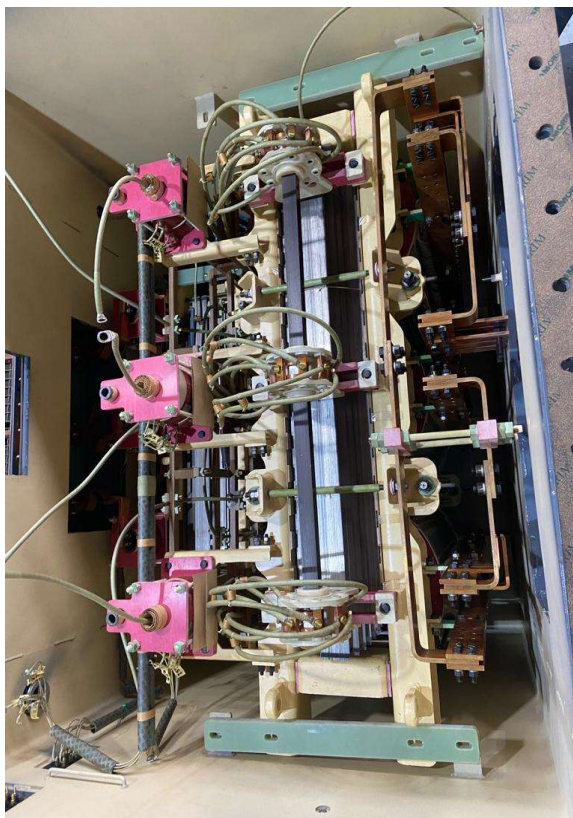
Factory Assembly Verification



No. of units	2 Units delivered March 2022
Configuration	Open Delta 3 Phase AC Furnace
Process	AC Arc Smelting
Rating	2273kVA 12kA-20kA at 110Vac – 65Vac
Taps	7 taps Offload
Vector group	Dd0
Cooling	OFAF Coolers 100% redundant
Weight	13 Tons each

XRAM 3 Phase Furnace Transformer for Hydrogen Smelter in USA

XRAM 800Vdc 4kA, USA



No. of units	1 Unit delivered December 2023
Configuration	3 Phase DC Furnace

Process	DC Arc Smelting
Rating	1057kVA 4kA at 800Vdc
Taps	7 taps Offload
Vector group	Yd1
Cooling	ONAF Coolers
Weight	18 Tons

ESDC 5.5 MVA Traction Transformers

ESDC 130Vdc 25kA, Chile



No. of units	2 Units delivered December 2023
Configuration	3 Phase
Process	Traction Transformers
Rating	5500kVA 23000V/713V
Taps	5 taps Offload
Vector group	Dd0
Cooling	ONAN Coolers
Weight	18 Tons

Elfu Furnace Transformer

Elfu 270Vdc, 18kA, Cape Town, South Africa



No. of units	1 Unit delivered Feb 2023
Configuration	3 Phase
Process	AC Furnace Transformer
Rating	1000kVA 11000V/277-600V
Taps	10 taps Motorised Offload Tapchanger
Vector group	Yd1
Cooling	ONAN Coolers
Weight	7 Tons

Elfu Furnace Transformer

Elfu 374kVA 11000V/277-600V, Cape Town, South Africa





No. of units	1 Unit delivered Oct 2023
Configuration	3 Phase
Process	AC Furnace Transformer
Rating	374kVA 11000V/277-600V
Taps	7 taps Via Bushings
Vector group	Dy11
Cooling	ONAF Coolers
Weight	3 Tons

ABB: 2 off Rectifier Transformers

ABB 630Vdc 34kA, MMC Nelspruit, Mpumalanga, South Africa





No. of units	2 Units delivered Mar 2022
Configuration	3 Phase
Process	DC Rectifier Transformer
Rating	12716kVA 34kA 630Vdc
Taps	None
Vector group	Dd0 -15°
Cooling	OFAF Coolers
Weight	29 Tons

Northam Furnace Transformer with Motorised On Load Tap Changer

Northam Platinum 130Vdc 25kA, Northam Platinum Zondereinde, Limpopo, South Africa





No. of units	1 Unit delivered Jul 2024
Configuration	3 Phase
Process	Furnace Transformer
Rating	2452kVA
Taps	7 Position on load motorised tap changer vacuum type
Vector group	Dd0
Cooling	OFAF Coolers
Weight	19 Tons

MMC Nelspruit Direct

630Vdc 34kA Dual Unit in one Tank, MMC Nelspruit, Mpumalanga, South Africa





LV Bushings Manufactured in House:



No. of units	2
Configuration	2 x 6 Pulse =12 pulse DB12 in one tank
Process	Manganese Electro winning
Rating	2 x 12718kVA 17kA 630Vdc each
Taps	None
Vector group	Dd0 + Yd1 units producing 12 pulse operation from one tank
Cooling	OFAF Coolers
Weight	68 Tons each

Contact Details



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