3 Description of Equipment Supplied

3.1 General Description

The transformer shown in the General Arrangement drawing is a 600MVA, 22/300kV, three phase, 50Hz Spare Generator Transformer.

The transformer is ODWF cooled by means of the existing 3 x 50% transformer oil / water coolers, and 3 x 50% oil circulating pumps.

The existing free-standing marshalling kiosk contains cooler control equipment and alarm and trip terminations.

3.2 Equipment Specification

Customer:	Keadby Generation Ltd
Customer's Order Number:	FC612
Site:	Ferrybridge & Fiddler's Ferry
AREVA T&D Contract:	3417P0022
Equipment Supplied:	Four 600MVA 22/300kV three phase 50Hz Spare Generator Transformers
Type of Cooling:	ODWF
Specifications:	AEP Doc 2004/S42-036968 BSEN 60076 Power Transformers BEBS T2 Transformer Specification
Paint Finish:	Dark Admiralty Grey to BS381C Shade 632

Electrical Data

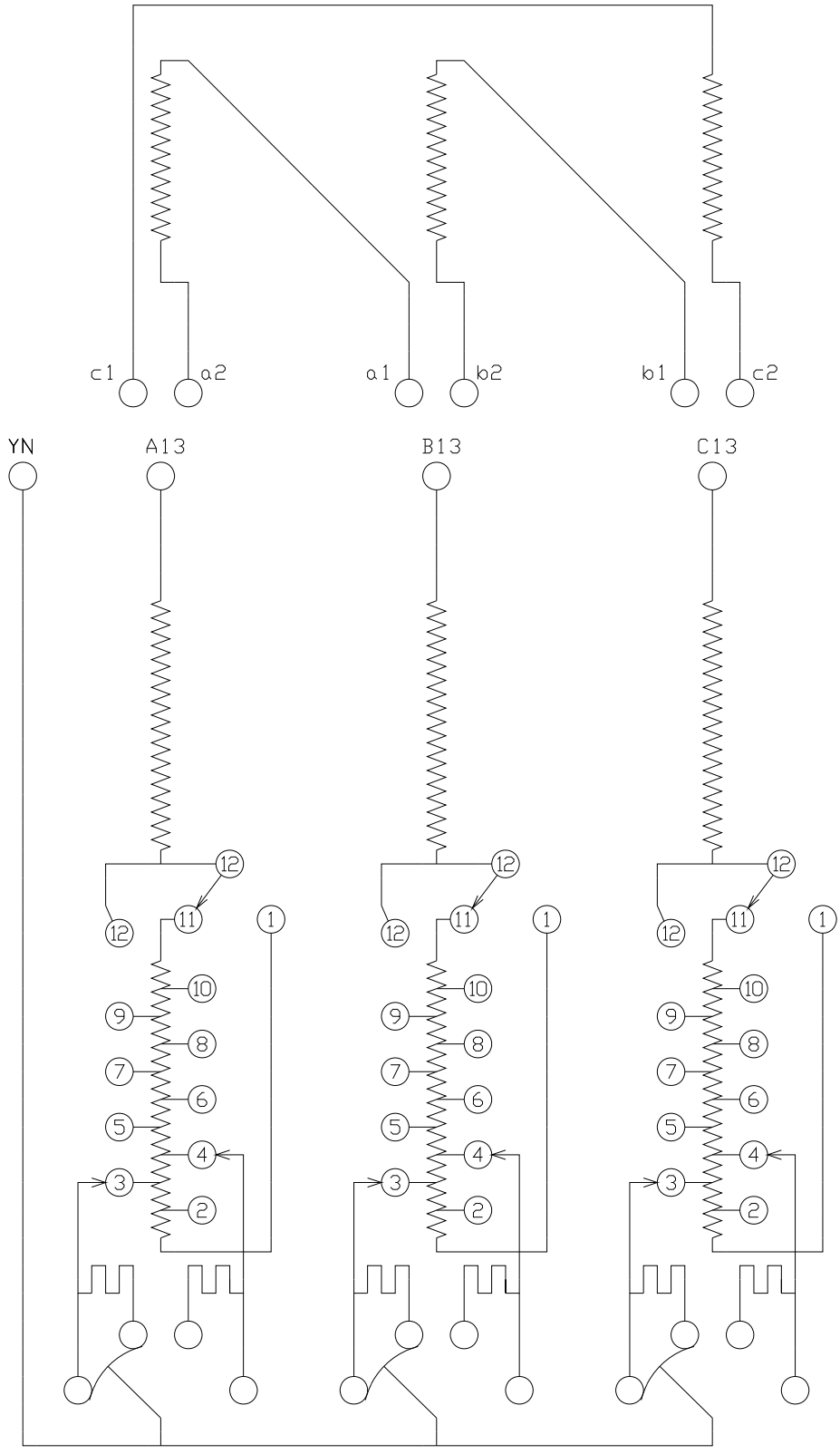
Rating:	600 MVA	
Normal Voltage (no load):	HV:	300 kV
	LV:	22 kV
Current:	HV:	1155 A
	LV:	15746 A
Connections:	HV:	Star
	LV:	Delta
Vector Symbols:	YNd1	

Insulation Level:	HV: 1050 kVp LV: 170 kVp
Temperature Rise (ºK):	Oil: 60 Winding: 65
Impedance volts on tap position 6 at 600MVA and at 75ºC:	16% (Guaranteed)

Electrical Characteristics

Tap Posn. No.	Switch Connects	High Voltage across A13 B13 C13		Low Voltage across a2 b2 c2	
		kV	Amps	kV	Amps
1	12-11, N- 2	321.00	1079.2		
2	12-11, N- 3	316.83	1093.4		
3	12-11, N- 4	312.67	1107.9		
4	12-11, N- 5	308.50	1122.9		
5	12-11, N- 6	304.33	1138.3		
6	12-11, N- 7	300.17	1154.1	22.00	15746
7	12-11, N- 8	296.00	1170.3		
8	12-11, N- 9	291.83	1187.0		
9	12-11, N-10	287.67	1204.2		
10	12-11/12- 1, N-12	283.50	1221.9		
11	12- 1, N- 2	279.33	1240.1		
12	12- 1, N- 3	275.17	1258.9		
13	12- 1, N- 4	271.00	1278.3		
14	12- 1, N- 5	266.83	1298.2		
15	12- 1, N- 6	262.67	1318.8		
16	12- 1, N- 7	258.50	1340.1		
17	12- 1, N- 8	254.33	1362.0		
18	12- 1, N- 9	250.17	1384.7		
19	12- 1, N-10	246.00	1408.2		

Diagram of Connections



Windings

Item	Winding	Conductor	Oil Flow
LV	Helical spiral	CTC	Directed
HV	Intershielded disc	CTC	Directed
Taps	Continuous disc	CTC	Natural

Tapping Range

Tap Range:	Plus 7% Minus 18%
Tap Steps:	18
Tap Positions:	19
Tap Selector Type:	On-load tapchangers
Winding Turns Varied:	HV

Tapchanger

Manufacturer:	Maschinenfabrik Reinhausen
Type:	RM I 1502-72.5/C-10 19 1WP
Quantity:	Three
Connection:	Star
Tapping Type:	Reversing
Tapping Location:	Neutral End
Number of Steps/Positions:	18/19
Normal Load Current:	1155 Amps
Maximum Load Current:	1408 Amps
Volts/Step:	2405.6 Volts
Motor Drive Unit:	ED 200 S
OLTC Monitoring:	TAPGUARD™ 240
Protective Relay:	RS 2001

Note: The tapchanger may be controlled locally by the Raise and Lower Tap No. Control Switch at the tapchanger motor drive unit or from a remote facility. The control selection is carried out at the tapchanger motor drive unit by the setting of the LOCAL/REMOTE Selector Switch.

Bushings

Item	Manufacturer	Quantity	Drawing	Type
HV	Passoni & Villa	3	I.11585.27	Condenser
LV	Passoni & Villa	6	I.11441.23	Condenser
HVN	Webster Wilkinson Ltd	1	B9346-12M	Non-condenser

Coolers

Existing

Oil Circulating Pumps

Existing

Oil Flow Indicators

Existing

LV Winding Temperature Indicator

Manufacturer:	AKM Qualitrol
Type:	Series 35
Quantity:	One
Purpose:	LV winding temperature indication
Scale Range:	0°C to 150°C
Switches:	Two fixed differential Two adjustable differential
Transmitter:	AKM TD111
Transmitter Output:	4-20 mA over scale
Pocket:	AKM 44595
Matching Resistance:	AKM 44677 Alt. A <5.0 Amps
Calibration ODWF:	Hot Spot Gradient: 45ºC at 5 A
Settings:	WTI Alarm: 110ºC WTI Trip: 125ºC

HV Winding Temperature Indicator

Manufacturer:	AKM Qualitrol
Type:	Series 35
Quantity:	One
Purpose:	HV winding temperature indication
Scale Range:	0°C to 150ºC
Switches:	Two fixed differential Two adjustable differential
Transmitter:	AKM TD111
Transmitter Output:	4-20 mA over scale
Pocket:	AKM 44595
Matching Resistance:	AKM 44678 Alt. A <2.0 Amps
Calibration ODWF:	Hot Spot Gradient: 42ºC at 2 A
Settings:	WTI Alarm: 110ºC WTI Trip: 125ºC

Current Transformers

Purpose:	LV Winding Temperature Indication
Location:	In LV cleatbar under oil
Manufacturer:	Instrument Transformers Ltd
Ratio:	9100/5A
Rated Output:	30VA
Accuracy Class:	5
Quantity:	Two

Purpose:	HV Winding Temperature Indication
Location:	In HV cleatbar under oil
Manufacturer:	Instrument Transformers Ltd
Ratio:	1410/2A
Rated Output:	30VA
Accuracy Class:	5
Quantity:	One

Purpose:	HV Tapchanger Monitoring
Location:	In HV cleatbar under oil
Manufacturer:	Instrument Transformers Ltd
Ratio:	2000/5A
Rated Output:	30VA
Accuracy Class:	5
Quantity:	One

Gas and Oil Operated Relay

Existing

Tapchanger Protective Relay

Manufacturer:	Maschinenfabrik Reinhausen (MR)
Type:	RS 2001
Quantity:	Three
Location:	Tapchanger feed pipework

Pressure Relief Devices

Manufacturer:	Qualitrol Corporation
Operating Pressure:	1035 mbar (15 psi)
Type:	Series 208
Switch:	SWT-679-1
Shield:	SLD-602-1
Location:	Diagonally opposite corners of the tank
Quantity:	Two

Oil Preservation System

Existing main expansion vessel complete with Drycol breather and a magnetic oil gauge with low oil level alarm switch.

The tapchangers are provided with a separate expansion vessel complete with silica gel breather, prismatic oil gauge and oil level switch.

Main Oil Level Gauge

Existing

Tapchanger Oil Level Switch

Manufacturer:	Bayham Ltd
Type:	Series 2000
Switch:	Low oil level alarm
Location:	Tapchanger expansion vessel
Quantity:	One

Transformer Drycol Breather

Existing

Tapchanger Desiccant Breather

Manufacturer:	Brownell Ltd
Type:	Envirogel Size ‘S’
Location:	Tapchanger expansion vessel
Quantity:	One

Transformer Moisture Management System

Manufacturer:	Rotek Engineering
Type:	RT9 DryKeep
Purpose:	Continuous removal of moisture from oil
Method:	Utilising molecular sieve technology
Location:	Piped between top and bottom oil take off valves
Quantity:	One

Transformer Incipient Fault Monitor

Provision only

3.2.1 Weights and Oil Quantities

Weight Data

Item	Weight
HV bushings:	350 kg each
HV N bushing:	14 kg
LV bushings:	110 kg each
HV turrets:	830 kg each (empty)
LV turrets:	520 kg each (empty)
Tapchangers:	430 kg each
Core and windings in lower tank section:	203 tonnes
Tank upper section:	19 tonnes
Total weight of transformer:	307 tonnes (with oil)
Transformer shipping weight:	231 tonnes (without oil)

Method of Shipping

The transformer is shipped in dry gas at positive pressure.

Oil Data

Item	Volume
Tapchanger diverters and expansion vessel:	620 litres
Transformer:	72,380 litres
Total oil quantity:	73,000 litres

System of Filling

See Section 6 - Oil Filling

3.2.2 Maximum Allowable Vacuum and Pressure Values

Item	Vacuum	Pressure
Main tank (except Hydran sensor if fitted)	0 mbar	1155mbar at tank base
Main expansion vessel (except Drycol breather)	0 mbar	-

Warning: Vacuum **must not** be applied to the oil/water coolers or Drycol breather at any time.

Tapchanger diverter chambers MUST be equalised when applying vacuum to the transformer tank.

The 50mm bore Hydran sensor mounting valve MUST be closed, the Hydran sensor removed and the valve blanked off, when there is any possibility that the Hydran sensor, if fitted, could be subjected to vacuum.

The Drycol breather MUST be blanked off, by inserting blanks between the Drycol and the breather pipe flanges, before applying vacuum to the transformer.

3.2.3 Specification for Water Based Paint System

Primer (80μm):	Hydroversal Primer HV 186 (grey zinc phosphate) - single component
Finishing Coat (80μm):	Hydrogloss Finish HV 47 - single component Final colour is Dark Admiralty Grey Shade 632 to BS381C

Note: The minimum dry film thickness (DFT) will be 160μm.

3.3 Description of Transformer

The transformer is forced oil cooled, and has a three phase winding assembly mounted on a five limb core located within a fabricated steel tank.

The HV terminations are three 300kV, 2000 amp oil/air bushings, near vertically mounted in turrets on the transformer tank cover.

The LV terminations are six 36kV, 12000 amp oil/air bushings, vertically mounted two in a turret on the transformer tank cover.

The HVN termination is an 12kV, 1250 amp oil/air bushing, horizontally mounted on the transformer tank side.

Tappings are provided on the HV winding to vary the HV voltage from +7% to -18% in 18 steps by means of three single phase, on-load, in-tank tapchangers mounted from the cover at one end of the transformer tank.

Three thermometer pockets are provided on the transformer tank cover. These are for HV and LV winding temperature indicators and one spare for use with a clinical check thermometer.

3.3.1 Core

The core of this three phase transformer has three wound limbs and two unwound limbs. The yoke areas are 50/50% of the wound limb area. The core

is clamped using polyester bands round the yokes and limbs. All joints between laminations are mitred.

The material of the core is grain oriented steel cut to width, cropped and punched using tungsten carbide tools, which create very few burrs therefore de-burring is unnecessary. The laminations are insulated by the core steel manufacturer with a glass coating, and no additional insulation or annealing is required. The core material is grade 30M5X.

Cooling ducts parallel with the laminations are formed by the introduction of insulating spacers. The cooling ducts split the core into packets earthed by copper connections inserted between laminations and bridging the insulated duct at only one point.

The core and winding clamping frames are independently earthed to the tank, enabling the insulation of each to be checked. These earth connections are made in a terminal box, external to the transformer tank, for ease of testing at site.

At an early stage of manufacture, the core is secured in the base of the low flanged tank, before the windings are mounted. Access to the core and windings is gained by lifting the tank upper section which, being much lighter than the active part of the transformer, simplifies full access if required. Non-magnetic steel tie rods between the base of the tank and the winding clamping frames ensure the windings are clamped and maintained under pressure in service. The winding clamping frames are secured to the tank cover to complete the location of the transformer for transport.

3.3.2 Windings

The windings are cylindrical and concentric with each other and the core.

The arrangement is: Core/LV/HV/Taps

The windings are designed to withstand the effects of an external short circuit. The radial, axial compressive and axial end forces have been calculated and the insulation supports, together with the strengths of the materials used, selected to contain those forces whilst providing adequate oil channels for effective cooling.

The cooling of the LV and HV windings is by forced oil flow into a matrix of axial and radial ducts with suitably placed washers in the axial ducts to ensure that all ducts receive adequate oil flow. The Tap winding is cooled by natural oil circulation.

The amount of insulation used, for all windings, is empirically based and related to the working voltage to ensure dielectric integrity of the winding over the lifetime of the transformer.

The LV winding is a single layer, spaced spiral coil, wound with several continuously transposed cables (CTC) with multiple parallel strands. Each cable is insulated with enamel, epoxy resin and high quality electrical grade

paper. The parallel cables are transposed during winding of the coil to reduce circulating stray losses to a minimum.

The HV winding is an intershielded disc coil, wound with a single continuously transposed cable (CTC) with multiple parallel strands. Shielding conductors, integral to the winding are introduced to improve the distribution of voltage stresses under winding impulse test conditions. The CTC cable is insulated with enamel and high quality electrical grade paper.

The Tap winding is a disc coil, wound with a single continuously transposed cable (CTC) with multiple parallel strands. The CTC cable is insulated with enamel and high quality electrical grade paper. Connections are brought out from specified turns for connection to the on-load tapchangers.

3.3.3 Major Insulation Structures

Radially between the core and the innermost winding insulation is provided by the SRBP cylinder and the oil duct inside the coil. Between subsequent windings pressboard barriers and axial strips are used to give a multi-ducted oil and pressboard insulation system. The barriers are separated by the axial pressboard strips spaced circumferentially on a fixed angular pitch to provide radial support for the outer windings. Similarly, flat pressboard barriers are used between phases and between the windings and the unwound limbs.

Axially at the ends of each winding pressboard block and washer assemblies provide support, cooling ducts and insulation structures.

The pressboard used is wood pulp and/or cotton based and all the items are positively located within the structure.

3.3.4 Coil Assembly and Processing

The windings and insulation structures are dried, sized and assembled between top and bottom laminated wood clamping rings, using tie rods to apply the design clamping pressure. The complete stack of coils is then assembled onto the core limb and the clamping pressure transferred to the non magnetic steel tie rods located in the base of the tank. After fitting the connections to the tapping and coil ends the complete core and windings are dried once more, either in the autoclave or the transformer tank. The assembly is heated before vacuum is applied and the moisture drawn off. The insulation is impregnated with oil whilst under vacuum thus ensuring its highest performance.

3.3.5 Transformer Tank

The transformer tank and HV turrets are fabricated from steel plate. The LV turrets are fabricated from aluminium. Tank fittings include main lifting bollards, transport platforms, jacking pads, haulage holes and lashing down lugs. The tank has site earth connection points near the base.

The tank and cover are designed and built to withstand full vacuum.

The flange, of this low flanged tank, is welded to provide an oil tight joint. A Nitrile rubber gasket seals the flange and prevents welding debris from entering the tank.

The tank is fitted with two pressure relief devices mounted at diagonally opposite corners of the transformer tank. Each device is fitted with an activation alarm switch and oil deflection shield.

An oil sampling device is provided, on the HV side upper section of the transformer tank, for taking periodic oil samples for moisture, acidity, dielectric tests and for gas-in-oil analysis.

3.3.6 Pressure Relief Devices

The two devices for oil pressure relief of the transformer tank are both fitted with an activation alarm switch and oil deflection shield. The transformer pressure relief devices are located at diagonally opposite corners of the transformer tank.

The pressure relief device allows for the instant release of excessive pressure that may occur as a result of a serious fault.

A pressure relief device is a spring loaded valve which provides rapid amplification of its actuating force. The time of complete operation for the device is two milliseconds. The valve disc is spring loaded and sealed against an inner and outer seal by two concentric springs. Valve operation is effected when the pressure on the valve disc within the inner seal exceeds the opening pressure established by the inner spring. As the disc moves upwards from the inner seal the transformer pressure then quickly becomes exposed to the disc area within the diameter of the outer seal resulting in a greatly increased force, and causing immediate full opening of the valve. The transformer pressure is rapidly reduced to normal and the inner and outer springs return the valve to the closed position.

A bright yellow PVC indicator pin in the cover, although not fastened to the valve disc, moves with it during operation and is left protruding 50mm through the valve cover. This can be manually reset
The relief device has an electrical indicator system which is for remote indication of valve operation. This is provided by means of a manually resetable switch assembly which on operation of the relief device can be used to initiate an alarm.

For full details see Appendix D - Auxiliary Equipment Supplier Literature.

3.3.7 Oil Sampling Device

An oil sampling device is provided on the HV side upper section of the transformer tank, for taking periodic samples for moisture, acidity, dielectric tests and gas-in-oil analysis.

The boss mounted device comprises of an internally threaded cylindrical housing welded to a flange. This assembly is sealed to the mounting boss by a Nebar gasket. A sealed spindle is screwed into the cylinder to form the opening

and closing mechanism. A tubular plug is inserted into the underside of the cylinder for the attachment of a 10mm bore, clear plastic, sampling tube.

For detail drawing see Appendix C - Reference Drawings.

3.3.8 Valves

The valves fitted to the transformer are for oil management and are used for isolating, draining and filtering of the various oil containing compartments.

Unless stated otherwise all valves provided are gate type, with indicator and locking devices (padlocks are not provided).

The valves are as follows:

- One off 250mm bore tank inlet valve
- One off 250mm bore tank outlet valve
- One off 80mm bore upper tank draining valve
- One off 50mm bore lower tank draining and filtering valve
- One off 50mm bore upper tank bottom filtering valve
- One off 50mm bore upper tank top filtering valve
- One off 50mm bore Hydran sensor isolating valve
- One off 25mm bore tapchanger expansion vessel draining valve
- One off 25mm bore tapchanger expansion vessel isolating valve
- One off 25mm bore tapchanger diverter processing valve
- One off 25mm bore tapchanger diverter equalising valve
- One off 25mm bore tapchanger diverter isolating valve

All 50mm bore filtering valves are fitted with 2” BSP hose adaptors.

3.4 Description of Cooling System

The transformer cooling system is ODWF by means of the existing 3 x 50% oil water coolers, complete with 3 x 50% oil circulating pumps. The cooling equipment is mounted on a skid base.

It is most important that the existing coolers are thoroughly flushed before being put into service with the spare transformer.

It is a requirement to throttle the cooling oil flow rate to the transformer when used with the AEI coolers. The transformer is designed for an oil flow of 62 litres/second from EEC coolers, the AEI coolers give an oil flow of 300 litres/second. This oil flow must be throttled back to at least 120 litres/second.

3.4.1 Expansion Vessels

The existing main expansion vessel is for the expansion and contraction of the oil in the transformer. It has a magnetic oil gauge incorporating a low oil level switch and a Drycol breather.

A small independently mounted expansion vessel is provided for the expansion and contraction of the oil in the tapchanger diverter chambers. It has a prismatic oil level gauge, an oil level switch and a desiccant breather.

3.4.2 Desiccant Breather

The tapchanger diverter chambers have their own separate expansion vessel, which requires a desiccant breather, to control the moisture content of the airspace above the oil.

The desiccant breather provides a means of absorbing the moisture in the air, drawn into the airspace in the expansion vessel, during a change in oil volume, caused by temperature gradients.

A two-way low pressure valve is fitted in the base of the breather to ensure that atmospheric air enters the desiccant charge when a negative pressure differential occurs in the expansion vessel.

The desiccant in the breather is self-indicating beaded silica gel. This desiccant is impregnated with non-carcinogenic dye and is orange in colour when active, but turns to green when saturated.

It is recommended that the desiccant charge is replaced with fresh desiccant when two thirds of the charge has turned green. Failure to do this will severely retard the drying efficiency of the breather.

For full details see Appendix D - Auxiliary Equipment Supplier Literature.

3.4.3 Transformer Moisture Management System

The DryKeep system utilises advanced molecular sieve technology to continuously remove moisture from the oil and paper insulation of the transformer, whilst it is on line. DryKeep is piped between the top and bottom take off valves, and the oil is pumped through three cylinders in series, containing the molecular sieve. The ceramic silo-beads are unique in structure, and will readily absorb moisture, but will only surrender water when subjected to a temperature in excess of 200ºC, which only occurs during the heating cycle of 'Regeneration'.

As oil flows from the tank, over the sieve, water is gradually extracted, but in turn is replaced by the water from the winding insulation to maintain the equilibrium. Because the process is continuous, the water in the windings is gradually reduced, along with the associated risk of breakdown of the paper insulation at the critical paper/oil interface. An RT9 DryKeep will typically remove 9 litres of water in a 12 month period.

So long as a top of tank temperature reading is taken at the same time as oil samples, using the industry standard Phiper Chart, the percentage saturation of the winding insulation can be extrapolated, and the total water content of the transformer calculated. With a consistent programme of oil sampling, a trend can be established to maintain the transformer at an optimum level of water content.

The 'wet' cylinders are sent to the regeneration plant, where six cylinders can be processed in one 24 hour cycle. Oil is removed from the cylinders and purged with Kerosol prior to a hot nitrogen cycle, at a temperature in excess of 200ºC, they are then refilled with clean oil and capped, ready for reuse.

For full details see Appendix E - Auxiliary Equipment Supplier Literature.

3.5 Control and Monitoring System

The local control and monitoring of the coolers and alarm and trip indications is carried out at the existing marshalling kiosk. The local control of the tapchanger is carried out at the tapchanger motor drive unit. The remote control of the coolers and tapchanger is carried out at a remote facility.

3.5.1 Winding Temperature Indicators

Two winding temperature indicators are provided for mounting in the marshalling kiosk. These are for HV and LV winding temperature indication. The winding temperature indicators are provided with test links, in the marshalling kiosk, for checking oil temperature and testing the thermal imaging circuit.

The winding temperature indicator is provided with a sensing bulb, which is inserted into an oil filled thermometer pocket located on the transformer tank cover. This bulb is connected to expansion bellows via a fluid filled capillary tube. The change in volume of the fluid, due to temperature variations, causes the bellows to act on a mechanical linkage which rotates a switch plate and an indicator pointer, thus providing a measurement of top oil temperature. The switch plate is capable of accommodating up to four switches, which can be independently set.

Thermal imaging is achieved by fitting a heating element around the measuring bellows. The heating element is fed by the current transformer on the loaded winding. The temperature increase of the heating element is proportional to the increase in temperature of the winding over the top oil temperature. The temperature of the fluid in the bellows is modified to provide an indication of the temperature in the hottest part of the winding.

For full details see Appendix D - Auxiliary Equipment Supplier Literature.

3.5.2 Tapchangers

The three single phase on-load tapchangers are manufactured by (MR) Reinhausen and are type RMI 1502Y-72.5/C-10 19 1WP. The tapchangers are suspended inside the transformer tank by attachment to the tank cover. The tapchangers have a self-contained diverter switch chamber to isolate the diverter switch oil from that in the transformer. The three single phase tapchangers have 19 tap positions for on-load operation using reversing tapping connections.

The transformer tapping connections pass to the tapchanger selector terminals via paper insulated cables direct from the windings.

The tapchangers each have a protective relay type RS 2001 mounted in the tapchanger feed pipework.

The motor drive unit is type ED 200 S.

The tapchanger is provided with a monitoring system type TAPGUARD^{TM} 240.

For full details see Appendix D - Auxiliary Equipment Supplier Literature.

3.5.3 Tapchanger Control

The primary control of the tapchanger is electrical, with a hand crank operation for emergency and adjustment purposes.

Electrical control of the tapchanger is determined by the setting of the Changeover Switch S32 LOCAL - REMOTE at the tapchanger motor drive unit.

S32 set to LOCAL:	Control at the tapchanger motor drive unit by the Raise and Lower Tap No. Control Switch S3
S32 set to REMOTE:	Controlled by a 50 volt DC one second pulse from a remote facility

3.5.4 Tapchanger Protective Relay

A protective relay is fitted in the feed pipework from the tapchanger expansion vessel to the tapchanger diverter chamber for the purpose of tapchanger protection. In the event of a serious fault the trip contacts will be operated by an oil surge towards the tapchanger expansion vessel.

For full details see Appendix D - Auxiliary Equipment Supplier Literature.

3.6 Bushings

The following bushings are provided on the transformer.

3.6.1 HV Bushings

The three HV bushings are mounted near vertically in turrets off the transformer tank cover.

The bushings have a rated voltage of 300 kV and a maximum rated continuous current of 2000 amps. They are oil impregnated paper condenser type, designed for oil/air outdoor use.

The bushings 180mm diameter top terminal is drilled with 4 holes 20mm diameter on 127mm PCD.

The bushings are supplied complete with power factor tap, prismatic oil level gauge and oil end corona shield.

3.6.2 LV Bushings

The six LV bushings are mounted vertically two in a turret on the transformer tank cover.

The bushings have a rated voltage of 36 kV and a maximum rated continuous current of 12000 amps. They are epoxy resin impregnated paper condenser type, designed for oil/air use in bus ducting.

The bushings 4 flat palms 120mm wide 85mm high are each drilled with 4 holes 18mm diameter on 60mm x 40mm centres.

3.6.3 HVN Bushing

The HVN bushing is mounted horizontally on the transformer tank side.

The bushing has a rated voltage of 12 kV and a maximum rated continuous current for 1250 amps. It is an oil filled porcelain type, designed for oil/air outdoor use.

The bushing has a 30mm diameter 80mm long plain stem.

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