Item No	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
	BILL NO 2 **INSTALLATION OF ANCILLARIES** **PREAMBLES FOR TRADES**				
	Supplementary preambles are incorporated in these bills of quantities to satisfy the requirements of this project. Such supplementary preambles shall take precedence over the provisions of the said Model Preambles				
	The contractor's prices for all items throughout these bills of quantities must take account of and include for all of the obligations, requirements and specifications given in the said Model Preambles and in any supplementary preambles.				
	Where brand or trade names are referred to in this bill of quantities, these shall indicate the quality and type of material or fitting required and no substitution of material or fitting required and no substitution of materials so specified will be permitted for tender purposes. Approval must be obtained from the principal agent for other material of equal quality before Tender Clising.				
	Bidder is referred to KwaZulu Natal Department of Health Policy Document For the Design of Mechanical Installations 2013.				
2	**Compressor:**				
2.1	**Supply Sufficiently Sized Compressor**				
2.1.1	Supply, deliver and install 22Kw Screw Type Compressor with two dryers, one on the outside and one on the inside and electrical isolator	Item	1	R	R
2.1.2	Install automatic start/stop controller to allow the compressor to kick in at 6 bar and cut off once 8 bar is reached.	Item	1	R	R
2.1.3	Supply,deliver and install 1000L Air Reciver with a pressure guage, pressure relief valve and dyers	Item	1	R	R
2.1.4	The reciever shall have an automatic blowdown valve with timer, to allow automatic blow down at set intervals.			R	R
2.1.5	Connect new compressor to existing compressed air line	Item	1	R	R
2.2	**Existing Air Reciever**				
2.2.1	Determine the volume of the Air Reciver	Item	1	R	R
2.2.2	Pressure test the Air Reciever and issue a pressure test certificate	Item	1	R	R
2.2.3	Issue a name plate and affix the name plate to the Air Reciever	Item	1	R	R
2.2.4	Provide, install and set control to auto start and stop at 6 and 8 bar respectively.	Item	1	R	R
2.2.5	Install a new isolation valve on air line	Item	1	R	R
2.3	**Commissioning**				
	Commision and intergrate the system to efficiently supply compressed air to the machines.	Item	1	R	R
2.4	**Training**				
2.4.1	Provide training to operators and maintenance personel	Item	1	R	R

2.5	**Deliverables**				
	Provide :				
2.5.1	1-Year Maintenance for both scheduled and unscheduled works	Item	1	R	R
2.5.2	Operating and Maintenance Manuals (In English) 1 soft copy and 3 hard copies)	Item	1	R	R
2.5.3	Installation Certificate of Conformity signed by OEM and trained installer	Item	1	R	R
2.5.4	Pressure test certificates of Air Reciever	Item	1	R	R
2.6	**Hot Water**	Item	1	R	R
2.6.1	Supply, deliver and install 1000L hot water vessel **(See Annexure A for full specification)**				
2.6.2	Supply, deliver and install 15 Kw plated Heat Exchanger				
2.6.3	Erect a wire mesh plant room with a concrete plinth, a drain, a lockable door and roof sheeting with gutter.				
2.6.4	Connect the Heat Exchanger to existing services, i.e steam and portable water, allow for condensation to return to the boiler house and connect to the existing hot water line to the ablutions.				
2.7	**Commissioning and Optimisation**				
2.7.1	Commision the intergrated hot water system	Item	1	R	R
2.8	**Training**				
2.8.1	Provide training to maintenance personel	Item	1	R	R
2.9	**Extraction**				
2.9.1	Service Existing Extractor Fans and Restore to Functionality	Item	11	R	R
2.9.2	Service Existing Canopy and Restore to Functionality				
2.10.	**Deliverables**				
	Provide :				
2.10.1	1-Year Maintenance for both scheduled and unscheduled works (to cover 12 months retention period)	Item	1	R	R
2.10.2	Operating and Maintenance Manuals (In English) 1 soft copy and 3 hard copies)	Item	1	R	R
2.10.3	Pressure test certificates of Hot water vessel	Item	1	R	R
	Carried Forward to Summary Page				R

Item No	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
	BILL NO . 3 **BUILDING WORKS** **PREAMBLES FOR TRADES** The Model Preambles for Trades (2008 edition) as published by the Association of South African Quantity Surveyors shall be deemed to be incorporated in these bills of quantities and no claims arising from brevity of description of items fully described in the said Model Preambles will be entertained. Supplementary preambles are incorporated in these bills of quantities to satisfy the requirements of this project. Such supplementary preambles shall take precedence over the provisions of the said Model Preambles The contractor's prices for all items throughout these bills of quantities must take account of and include for all of the obligations, requirements and specifications given in the said Model Preambles and in any supplementary preambles.				
3	**Builders Work**				
3.1	Remove Existing Floor Coverings .	m2	1109.08	R	R
3.2	Prepare the floor with self leveling screed , re-lay Polyurethane floor screed and clearly mark the floors.	m2	1109.08	R	R
3.3	Re-routing of services, i.e electricity, steam, water, drainage system and compressed air.	Item	1	R	R
3.4	Scrape and re-paint internal walls (white,washable, enamel , matte paint).	m2	1061.41	R	R
3.5	Erect a brick wall to separate clean and dirty areas, the wall shall be plastered and painted with white,washable, enamel, matte paint. The wall must have two (2) door openings on either end to allow for 2032 x 900mm solid commercial veneer doors. Supply and install two (2) 2032 x 900mm solid commercial veneer doors (white,washable,enamel,matte painted).	Item	2	R	R
3.6	Provide an Electrical Certificate of Compliance for the building	Item	1	R	R
3.7	Provide approved as built drawings derived from the proposed floor layout	Item	1	R	R
3.8	Re-route condensate back to hot well tank	Item	1	R	R
3.9	Do building alterations to proposed detergent plant room	Item	1	R	R
	Carried Forward to Summary Page				R

ANNEXURE A

Laundry Equipment

Barrier Washer Extractor

The Barrier Washer Extractor shall be a 140Kg Heavy Duty Industrial microprocessor (steam heated), with front loading and rear unloading, two compartment. Suitable for 380/50/3 electricity supply. Machine dimensions are not to exceed:

Tumble Dryers

The Tumble Dryers shall be 180Kg Heavy Duty Industrial microprocessor (Steam heated), with over dry prevention technology. Suitable for 380V electricity supply.

Roller Ironers

The ironer shall consist of at least 2 (two) rolls, each having a minimum diameter of 1200mm and a working width of 3000mm. It shall have a theoretical evaporative capacity equivalent of at least 1200 large cotton sheets (as detailed below) per hour when supplied with steam at 850KPa and accounting for the installation altitude and the coverage of the ironer rolls.

a) Large cotton sheets (in a single lane operation)
   Each weighing 700g and measuring 2750 x 1800mm

b) Cotton draw sheets (in a two lane operation handfed)
   Each weighing 210g and measuring 1800 x 900mm

c) Green Theatre lotions (in a two lane operation handfed)
   Each weighing 210g and measuring 1350 x 900mm

All having a moisture retention of 40% down to approximately 2% relative moisture.

The covered ironing surface **(Including a distance between the sheets of 200mm for calculation purposes.)**

Special Features

The ironer shall have the following features, which are all important to achieve optimum throughput and quality.

1) Tested Pressure
   The ironer bed shall be approved for at least 1300KPa operating pressure and shall be tested up to 2900KPa.

2) Rolls
   The ironer shall have at least 2 (two) rolls each and not less than 1200mm diameter.

3) Service and Stand-by
   To facilitate that the covering material is not unduly stressed when the ironer is not ironing work, the rolls shall automatically be raised to ensure no contact with the bed when not in use.

4) Maintenance
It must be possible to lift the rolls adequately out of the beds for cleaning bed surfaces and/or service work. **(Bidders are to indicate the height that the rollers can be lifted out of the beds.)**

5) Insulation
To provide for acceptable working conditions and higher productivity for personnel working near the ironer as well as lower heating costs, the ironer shall be encased by insulated steel paneling on all six sides, i.e top, sides, front, back and bottom of the ironer. Top panel and the side panel shall be adequately insulated to ensure hand warm external panel temperatures.

Ancillary Equipment

Hot Water Storage Tank

Hot water storage tanks shall be of the vertical type. The tank shall be manufactured from a 6mm mild steel, and the dish ends must be 8mm mild steel.

The vessel shall be internally treated with at least three coats of epoxy and externally painted with a primer and two coats paint.

The vessel shall be insulated with 50mm thick mineral wool lagging and covered with 0.8mm thick
stainless steel cladding.

The working pressure shall be 400 kPa, maximum of 600kPa. The vessel shall be tested to a pressure not exceeding 600kPa for a minimum of 1 hour. The manufacturer shall issue a test certificate in this regard.

The vessel must be mounted on the concrete slab (plinth) at the same height as current installation.

The vessel must be fitted with a man hole (inspection hole) held down by bolts and nuts. When the vessel is pressurised (max pressure), no water must leak from the man hole.

The vessel must be fitted with a safety valve on top, which will blow off at pressure above 600kPA, a
temperature gauge (0 – 100^{0}C), pressure gauge (0 – 1000kPa) and a drain outlet with a valve.

The vessel must be fitted (pop riveted onto the cladding) with name plate showing the following details:

Tank capacity in m^3,
Working Pressure in kPa,
Maximum Pressure in kPa,
Test Pressure in kPa,
Installation date,
Hydraulic Pressure Testing date,
Manufactures Details,
Date of manufacture,
Maximum Allowable temperature in ^{0}C,
Vessel wall thickness in mm,

Hot Water Piping

Interconnecting piping shall be copper to SANS 460 Class 0 with capillary soldered fittings.

All hot water piping shall be insulated with preformed resin bonded glass fibre or mineral wool insulation, having a density of not less than 60 kg/m^3.

Exposed piping shall be further covered with galvanized sheet metal cladding of 0.7mm thickness.

All piping shall be colour coded to SANS 1091, specifically as follows:

- Hot water – brilliant green (H10) and crimson (A03)
- Cold water – brilliant green (H10) and cornflower (F26)

The piping shall be arranged that normal servicing of the equipment is not obstructed.

Water strainers shall be of the angle type with bronze or stainless steel screens. Perforation size shall not be larger than 0.8mm.

Isolating valves shall comply with SANS 664 and SANS 776.

All hot water piping shall be hydraulically tested to a pressure equal to 3 times the working pressures but not less than 1000kPa held for 60 minutes or as long as it takes to inspect every joint in the section being tested, whichever is the greater.

Insulation

The hot water piping shall be insulated with pre-formed mineral wool insulation with a suitable water proof wrapping, and shall have a density of not less than 60 kg/m^3. This insulation shall be at least 25mm thick.

All exposed insulation shall further be covered with painted galvanised sheet metal or aluminium cladding, at least 0.7mm thick.

Valves, gauges and controls are not to be insulated.

Heat Exchanger

The heat exchanger shall be a 15Kw Brazed plate heat exchanger.

Compressor

The compressor shall be of the oil injected Rotary Screw type designed for continuous industrial operation providing consistent performance, reliability and easy maintenance. The compressor shall consist of a compression element, belt driven by a 4 pole, 50Hz IP55 drive electric motor protected with thermistors and an overloaded relay.

The compressor shall be of the "Atlas Copco" or "Ingersoll Rand" range or other approved rotary screw type with the following technical criteria:

Technical Data

Type:	***Rotary screw.***
Manufacture other approved	*"Atlas Copco", "Abac" or "Ingersoll Rand" or*
Peak Pressure	*10 bar*
Working Pressure	*8 bar*
Free Air Delivery	*3,54m³/min (measured to ISO1217annex C)*
Nominal power of drive motor	*22 kW*
Drive motor speed	*1475 1/min*
Protection/isolation class	*IP55/F*
Operating Voltage/frequency	*400/50 V/Hz*
Residual oil content	*2-4mg/m³*
Cooling air flow	*55.2m³/min*
Sound pressure level (DIN 45635T.13)	*69+3db (A)*
Compressed air connection:	*1 ½ G*

Compressed air outlet temperature above inlet temperature approx.13° C.

The air cooled compressors are designed to operate at a minimum ambient temperature of 40° C complete with cooler.

The compressor shall be Stop _ Start controlled to restart automatically after electrical power failure. Star delta starter shall be enclosed in an IP 55 rated insulated cabinet.

The compressor shall be rated at 800 kPa gauge working pressure and operate at line pressure regulated between 700 kPa and 750 kPa gauge measured downstream of the final oil/condensate separator.

The compressor shall be equipped with static oil/water separator to provide 90% clean discharge of condensate directly into the drain system.

The compressor shall come with three refrigerated compressed air dryer which maximum pressure of 16 bar and at least 120CFM.Each compressor in the plant shall be connected to its dryer.

The air receiver tank shall be made of mild steel.

Air receiver tank shall be of the vertical type with three foot. The tank shall be manufactured from a 6mm mild steel, and the dish ends must be 8mm mild steel.

The working pressure shall be 800 kPa, maximum of 1000kPa. The vessel shall be tested to a pressure of 1.25*1000kPa for a minimum of 1 hour. The manufacturer shall issue a test certificate in this regard.

Air Receiver

The vessel must be mounted on the concrete slab (plinth).

The vessel must be fitted with a man hole (inspection hole) held down by bolts and nuts. When the vessel is pressurised (max pressure), no air must leak from the man hole.

The vessel must be fitted with a safety valve on top, which will blow off at pressure above 800kPA, a temperature gauge (0 – 100^{0}C), pressure gauge (0 – 1000kPa) and a drain outlet with a valve.

The vessel must be fitted (pop riveted onto the cladding) with name plate showing the following details:

Tank capacity in m^3,

Working Pressure in kPa,

Maximum Pressure in kPa,

Test Pressure in kPa,

Installation date,

Hydraulic Pressure Testing date,

Manufactures Details,

Date of manufacture,

Maximum Allowable temperature in ^{0}C,

Vessel wall thickness in mm,

Cooling System

- Oil circulation through the compressor shall cool, lubricate and seal thus shall come complete with suitable sized finned radiator, combined with the oil cooler, to cool the oil and the compressed air. The airflow produced by an electrical fan placed inside the air centre moves towards the radiator and provides cooling.
- The air separator and electronic drain sensor shall be supplied as standard equipment.
- Compressed air at the outlet shall be lower than 10K above the ambient temperature.
- A thermostatically controlled oil bypass valve shall be fitted to ensure that the compressor reaches normal operating temperature as soon as possible and maintains at the optimum level.
- The separate lightweight aluminium air-cooled oil cooler and after cooler shall be manufactured using high performance extended surface heat exchange tubing.
- The air cooled compressor shall be designed to operate at a minimum ambient temperature of 40ºC complete with after cooler.
- The compressor shall be suitable for connection to a 380volt, 3 phase, and 50Hz power supply. The motor shall be rated at 22 kW at 1475 rpm directly coupled to the compressor via a flexible coupling.
- The compressor shall be Stop- Start controlled to restart automatically after electrical power failure.
- The compressor shall be rated at 800 KPa gauge working pressure and operate at line pressure regulated between 700kPa and 750kPa gauge measured downstream of the final oil /condensate separator.
- The compressor shall be equipped with static oil/water separator to provide a 90% clean discharge to condensate directly into the drain system.

Microprocessor Control

- The compressor shall be equipped with a microprocessor based, electronic control system with an illuminated touch sensitive control panel
- A typical feature of the compressor microprocessor shall be cycle modulation with automatic stop/start regulation.
- The automatic and continuous capacity regulation system shall work according to the delivery air pressure.

- When the oil pressure increases due to a fall in demand and the valve reaches the 'modulating range' the intake shall be partialised so as to make the compressor deliver only the quantity of air needed
-

In automatic mode, the compressor shall stop on zero requirements and shall restart automatically when necessary.

Controller system shall provide information such as:

- Air exit temperature
- Air delivery temperature
- Separator internal temperature
- On and off load running time
- Set pressure and line pressure
- Oil chamber pressure
- Air/oil pressure
- Oil change
- Replacement of oil separator equipment
- Weekly and hourly programming of starts and stops

In the event of compressor shut down or tripping the controller shall record the following events.

- Total operating hours Air discharge temperature
- Oil pressure
- Oil level
- Tripping current

Instrument panel shall include;

- Continuous start button
- Automatic start button
- Stop button Reset button
- Emergency button

Drive and control panel in a metallic box /IP54 protected, including

- Star delta starter
- Motor thermal protection 110V transformer for auxiliary circuits
- Protection fuses for auxiliary circuits

5.7 ELECTRICAL:

- Supply and install a 16mm² x 4 core SWA PVC ECC cable, fed from DB situated in the compressor plant room to the compressor isolator.

OVER/UNDER VOLTAGE

Each unit shall be fitted with an over/under voltage monitor, incorporating phase failure and phase rotation (such as Electro V3EN or other approved), which is to disconnect or single phase condition the equipment if the voltage is outside a range of plus or minus 10% of a nominal voltage (400volts). This is to automatically re-set once the voltage returns to within he normal range.

NOTE:

- All equipment is to be rated for continuous operation at all voltages within this range (360 – 440 V) and (230 – 240V) without suffering any damage.
- All electrical equipment shall comply with NER Regulation of voltage.
- During commissioning, equipment will be subjected to single phase condition to ensure compliance.

Flooring

The floors shall be heavy duty antimicrobial slip resistant polyurethane screed. This shall be 6 to 9mm in thickness.