



OPERATION AND MAINTENANCE MANUAL

B.L Gilbert (BAE)

Serial Number: FFO13-021642

Electric Bogie Hearth Furnace

Stork Technical Services

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Introduction

The purpose of this manual is to provide the necessary information to enable the equipment described herein to be operated and maintained safely and efficiently.

The equipment described herein is for Industrial use only.

1.0 Product Information



Electric Bogie hearth furnace

Function Heat Treatment Furnace

Date of Manufacture: March 2015

Location of Manufacture: Southport, UK

Equipment Supplied

- 1 Electric furnace for bogie hearth (not supplied by stork)
- 1 Control Panel

Product Description:

Process.	Heat treatment of BAE Barrow components
Maximum Operating Temp.	550 °C
Temperature Uniformity.	±10 °C, at soak temperature
Maximum Load Weight.	1400kg (Including load supports)
Internal Dimensions	1.3m long x 1.3m wide x 3.5m high
Number of Control Zones.	1
Number of Thermocouples	1 Control, 1 Over temperature and 6 Load
Control thermocouples	Two, 6mm ϕ x 300 long mineral insulated Inconel sheath and Six 3mm Stainless Steel type
Maximum Rating.	48kW
Maximum Rate of Climb.	50 °C per hour
Power Supply	400 Volts, 3 phase, 50Hz.
Control Voltage	110 Volts
Control Instrument	Eurotherm 3508
Overtemperature Instrument	Eurotherm 3216i
Recording Instrument	Eurotherm 6100A
Bogie	Manually Operated

Design features:

- Mineral Insulated heating elements
- 5.5kW Recirculating fan in the roof to ensure good temperature uniformity
- Thermal insulation (Non RCF)
- Thyristor Alarm
- Heater trip indicator
- Manual door clamp
- Control Thermocouple
- Over-temperature thermocouple
- Load thermocouples
- Door Closed Limit Switch
- Bogie hearth 'IN' position limit switch

2.0 Safety Information

All operating personnel should read the operating instructions carefully and pay special attention to the safety warnings and cautions and the safety labelling placed on the equipment.

SAFETY FEATURES

- Furnace over temperature protection
- Door Closed Limit Switch
- Bogie 'IN' position limit switch
- Door clamp
- Emergency stop button on the control panel
- Emergency stop reset on the control panel
- Audible and visual warning in alarm conditions
- Safety Warnings and Labels

Furnace Safety Checks

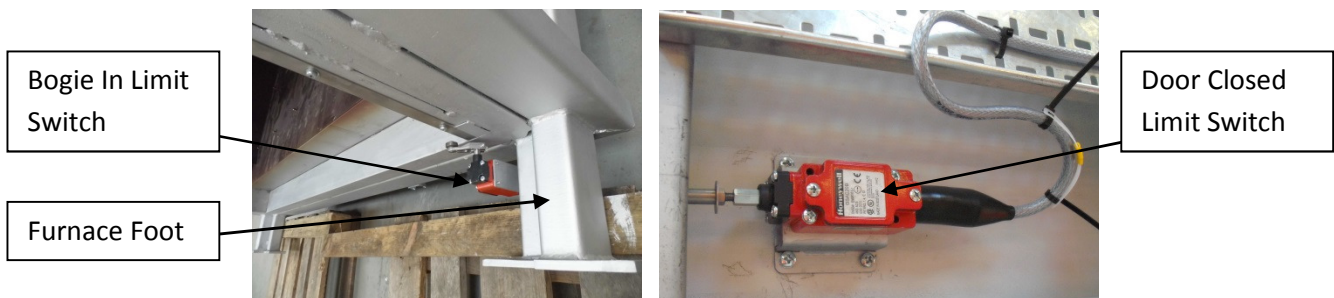
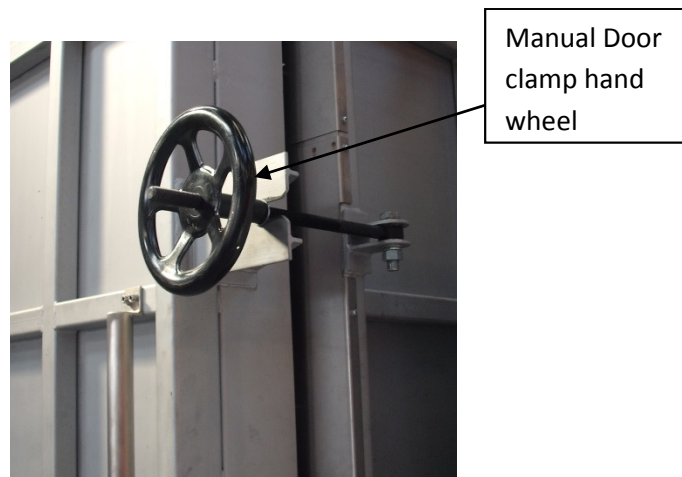
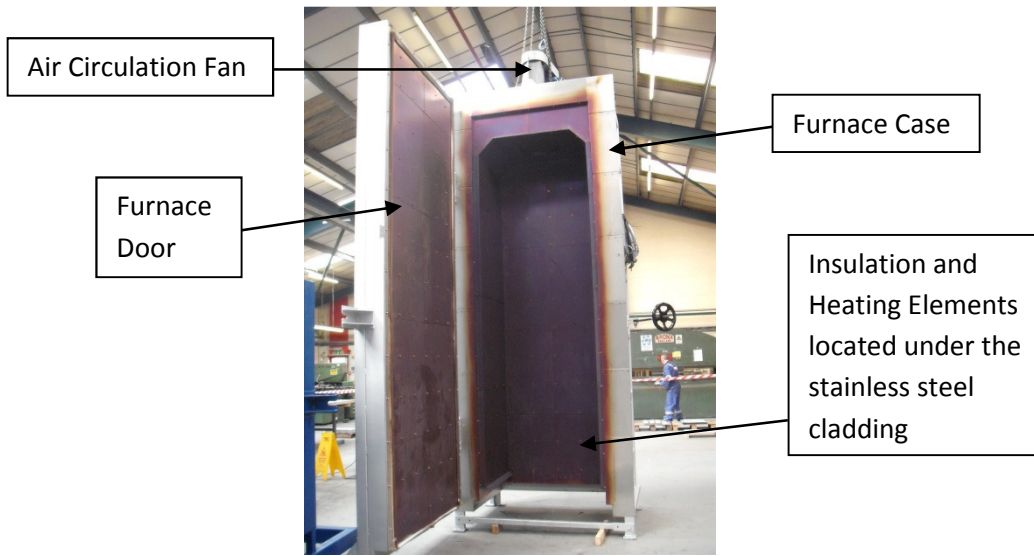
- It is essential that all supplies are isolated before working on the panel.
- Do not work inside the furnace unless the control panel is isolated and an approved safety assessment is in place.
- No special tools are required to service the panel.
- This equipment must always be connected to earth.
- This equipment is designed to operate as described in this manual, and must not be used for any other purpose.
- The Over temperature unit protects the furnace from overheating and is recommended to be set at approximately 20°C above the maximum operating temperature.
- Failure to heed the safety precautions could lead to injury.
- Appropriate PPE should be worn at all times.
- This equipment must be maintained as necessary and a log kept, see section 6.

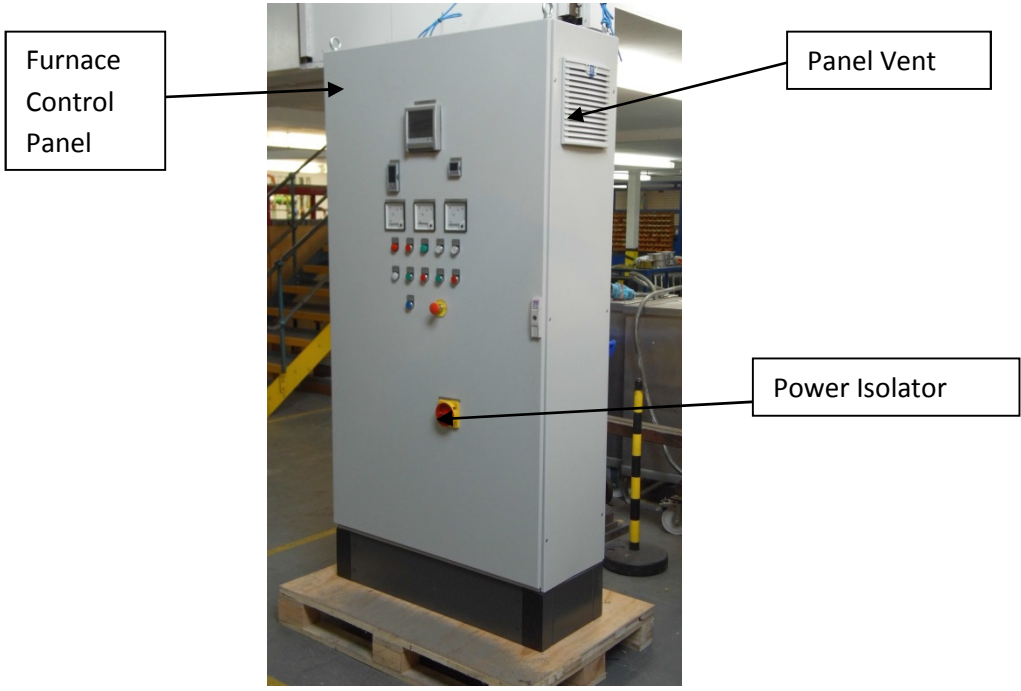
DECOMMISSIONING

Decommissioning should be carried out with due regard to safety and taking care to dispose of material in a safe manner to cause no environmental damage. No special knowledge is required for the task.

3.0 Assembly

Please take time to familiarise yourself with the components on this equipment.

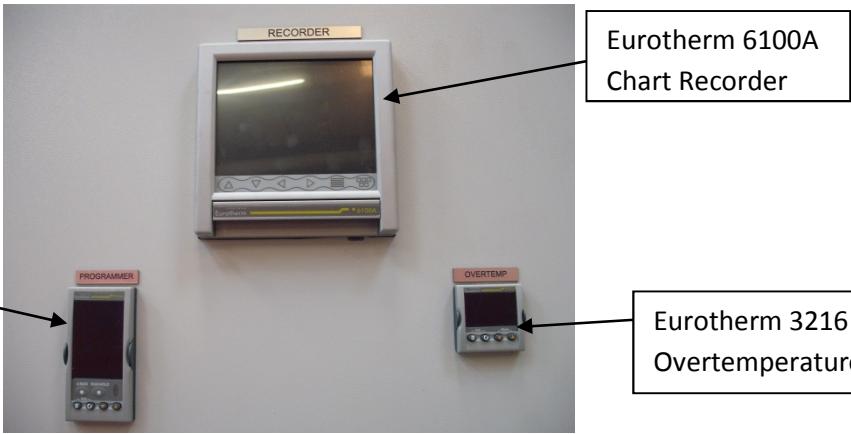




Furnace Control Panel

Panel Vent

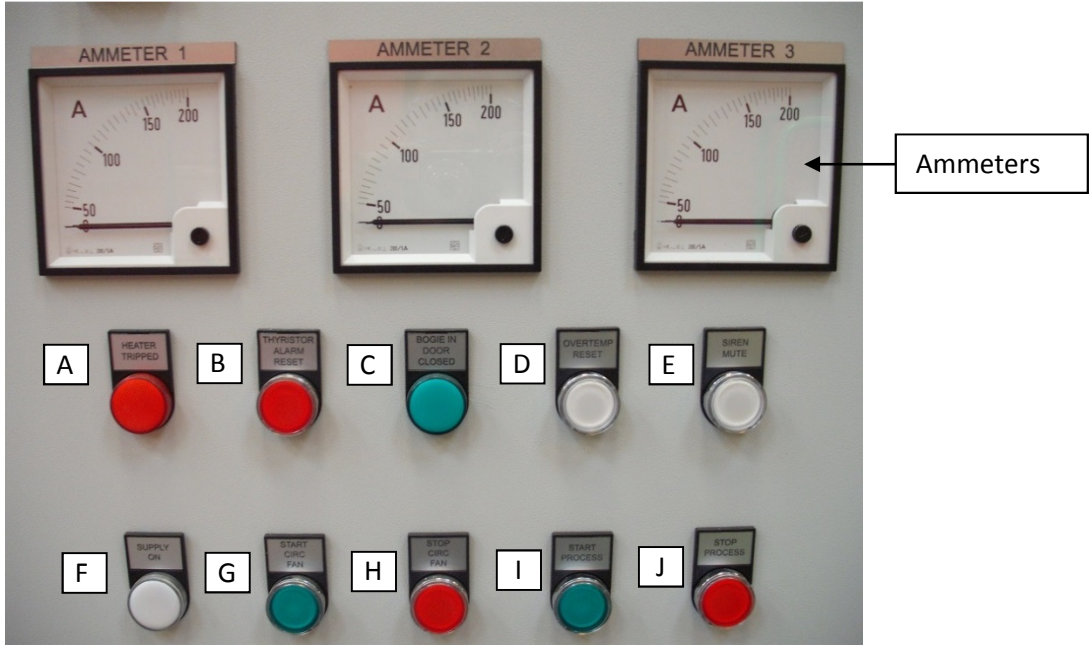
Power Isolator



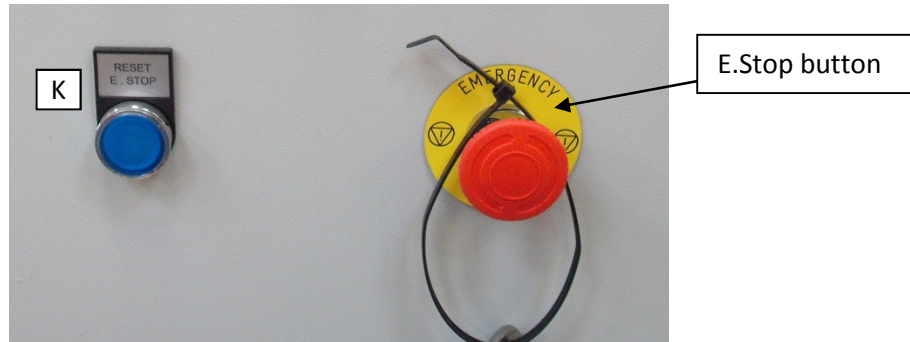
Eurotherm 3508 Temperature Controller

Eurotherm 6100A Chart Recorder

Eurotherm 3216 Overtemperature Controller



Ammeters



Item	Label	Function
A	Heater Tripped	Indicates that a heater has tripped.
B	Thyristor Alarm/reset	Indicates when the Thyristor alarm is triggered and resets the circuit when pressed.
C	Bogie In Door Closed	Indicates that the bogie is fully in and the door is closed, ready to start the furnace.
D	Overtemp Reset	Indicates when an overtemperature has occurred. Resets the circuit when pressed.
E	Siren Mute	Indicates when the siren is activated and Mutes siren when pressed.
F	Supply On	Indicates that the power supply is on.
G	Start Circ Fan	Starts Circulation fan and indicates that it is running.
H	Stop Circ Fan	Stops the circulation fan and illuminates when the fan is tripped.
I	Start Process	Press to start the process and indicates that the process is running.
J	Stop Process	Press to Stop the process (prior to starting the furnace)
K	Reset E.Stop	Resets the E.Stop once activated

4.0 Installation

Pre –Installation Checks

Check for loose connections.

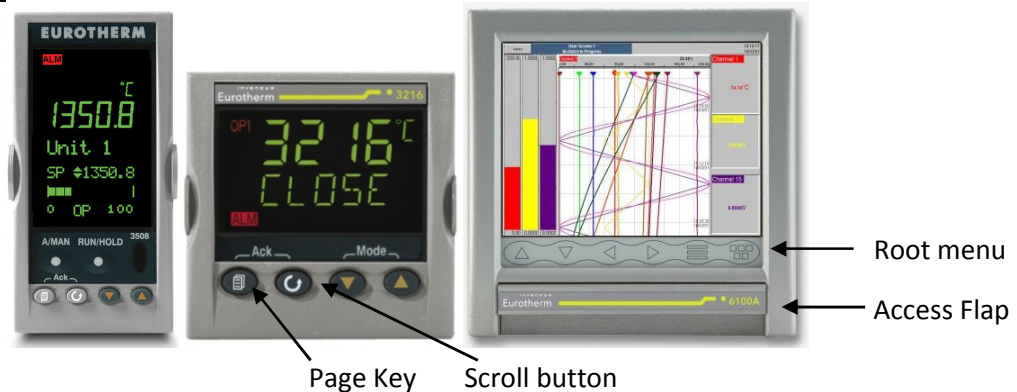
Installation and Commissioning

Furnace is installed by B.L Gilbert and commissioned by Stork Technical Services.

5.0 Operation

Only Trained Operators approved by client’s plant manager should attempt to operate this equipment.

Instruments



5.1 How to start the furnace

Ensure the bogie is fully in and the door is closed with the clamp tightly secured.

- 1) Turn the isolator into the 'ON' position.
- 2) The 'Supply On' and 'Bogie in door closed' lamps will illuminate.
- 3) Press the 'Siren Mute' to silence the alarm.
- 4) Press the 'Overtemp reset' button and then the light will turn on.
- 5) Ensure the E-stop is not pressed (check if button head is not locked in)
- 6) Press the 'Reset E.stop' button and ensure the light turns on.
- 7) Press 'Start Circ Fan' and the light will turn on when successfully started
- 8) Check and Load the desired program on the 3508 temperature controller by:
 - a. Press the 'page key' once
 - b. Use arrows to select the program number
- 9) Press 'Start Process' which starts the selected program and shows 'RUN' on the controller.

5.2 How to use Create a Program on the Temperature Controller

Please refer to the Eurotherm 3508 Guide and if required, the original supplier's manual (can be found on the CD).

5.3 How to set the Overtemperature Controller

The overtemperature should be set to 50°C above the max operating temperature in order to protect the furnace.

- 1) Use the up and down arrows to set the temperature.
- 2) After 3s the temperature value will flash and acknowledge the change.

5.4 How to create Personalised Batch Names

The batch label can be personalised by being logged in as 'Engineer'

- 1) Press the logged out icon on the top left of the screen
- 2) Select 'Engineer' as the username from the drop down menu
- 3) Select 100 as the password
- 4) Select 'log in'
- 5) Press the blue group 1 icon located next to the Engineer icon on the top left of the screen.
- 6) Select 'New'
- 7) Type in the desired name of batch using the on-screen key boards (lower case, capitals, numbers and characters)
- 8) Press ok
- 9) Press 'Start' and an entry onto the chart will appear on the home screen.
- 10) Press the Engineer icon on the top left of the screen and log out.

5.5 How to extract the chart data from the recorder

The data can be extracted locally using a USB stick and in Engineer mode.

- 1) Open the access flap and insert the USB into the slot
- 2) Repeat the first 4 steps of section 5.4 and log in as Engineer
- 3) Press the root menu icon select operator
- 4) Select 'Archive'
- 5) Select 'local' from the drop down menu
- 6) Select 'USB' from drop down menu
- 7) Select the time period of data to archive
- 8) Press apply and wait archiving to finish.

Note: Eurotherm have Instruction videos available on the Eurotherm website

6.0 Maintenance

6.1 Maintenance Operation

The following maintenance instructions are to be carried out in accordance with the time scales and following tables prescribed by a competent qualified technician. These maintenance instructions apply to the general operation of the furnace. Please refer to the relative equipment manuals, drawings and data sheets on the CD.



SAFETY NOTE: Disconnect power supplies before any inspection or maintenance is carried out on any equipment.

6.1.1 Routine Inspection:

1. Overheating
2. Ingress of dirt or moisture
3. Check all screws and fixings are tight
4. Check all moving parts for ease of operation
5. Check Controlling and recording instruments
6. Check Fan is functioning correctly.
7. Examine all wiring, particularly near metal parts. Should any wiring appear damaged, replace it.
8. Check cladding for damage
9. Check panel door seals are free from damage
10. Check Door clamp for functionality and limit switches are working
11. Check incoming and outgoing cables are securely fastened to the enclosure
12. Check all earth connections are tight and free from corrosion
13. Check fuses are of the correct size and check for signs of overheating
14. Ensure all instruments are in calibration
15. Spares are available from Stork Technical Services



NOTE! These maintenance instructions apply to the general operation of the furnace Please refer to the relative equipment manuals, drawings and data sheets on the CD.

NOTE: FAILURE TO EXECUTE THE REPLACEMENT OF BADLY DAMAGED MATERIALS CAN AFFECT FURNACE PERFORMANCE AND NULLIFY GUARANTEES

6.1.2 Frequency of operator checks

Item	Inspection	Process hrs	100	1000	2000	3000	4000	8000
		Months	-	3	6	9	12	24
Air Fan	▪ Fan	Functionality		•				
		Dirt						
	▪ Bearings	Lubrication		•				
Cladding	▪ Fixings	Bolts			•			
Bogie position	▪ Limit Switch	Functionality	•					
Door	▪ Limit Switch	Functionality	•					
Controllers	▪ Heating ability	Signal		•				
	▪ Thermocouples	Signal	•					
Recorder	▪ Recording	Functionality		•				
Heating	▪ Elements	Failure or terminations		•				
	▪ Thyristor	Performance		•				
Insulation and insulation seals	▪ Damage	Visual	•					
System	▪ Control Panel	Visual	•					
	▪ Safety Relay	Functionality	•					
	▪ Periodic Inspection	Test	•					

6.2 Maintenance Log

Below is an example of a maintenance log that is recommended to be kept in order to manage changes and durability of the equipment. Please add information columns as deemed appropriate by the client.

DATE	DETAILS OF WORK CARRIED OUT	ENGINEER

6.3 FAULT FINDING TROUBLESHOOTING



WARNING: Fault finding and correction should only be carried out by trained personnel.

SAFETY NOTE: Disconnect power before any inspection or maintenance is carried out on any equipment.

Faults

Circulation fan does not start.	Mechanical damage or fault.	Check fan for signs of damage or faults and correct as necessary. Note: Alterations to fan may require re-balancing
	Motor	Check functionality of motor.
	Electrical field wiring damage or fault.	Check Fan field wiring for signs of damage or faults and correct as necessary.
	Limit Switch	Check the functionality and the lamp is activated when the bogie is in and door is closed
Process does not heat correctly (as per profile)	Controller	Check the profile parameters on the instrument and output signal.
	Elements	Check all elements are functioning correctly.
	Thyristor	Check that Thyristor is functioning correctly.

If having followed the above procedure the fault has not been rectified, check any status screen for the parts that have been identified as being faulty and respond as described in the Suppliers manual located on the cd manual.

Contact Stork Technical Services if:

- If the fault identified is not detailed and cannot be resolved using the corrective actions detailed.
- If for any reason a fault on the furnace cannot be resolved locally.

7.0 General Arrangement

See Attached Arrangement ref: FFO13-021642-GA-01
FFO13-021642-CIV-01
FFO13-021642-SA-01

8.0 Electrical Schematics

See attached schematics ref: 13-021642_BL Gilbert (BAE)

9.0 Supplier Manuals

Located on CD Manual

Controller and Chart Recorder; Eurotherm 3508 Manual

Over temperature; Eurotherm 3216i Manual

Chart recorder; Eurotherm 6100A Manual

10.0 Service and Support

Inspection and maintenance services are available separate to the purchase of this equipment after a period of service. Please contact Stork Technical Services (RBG) Ltd for more information and price quote (see cover page of the manual)

11.0 Spares

Contact Stork Technical Services for more information.

Spare parts		
Description	Estimated Delivery	Recommended Qty
Fan bearing	2 Weeks	2
Fan belt	2 Weeks	1
Fan impellor	3 Weeks	1
Limit Switch	1 week	2
Insulation Superwool	1 week	-
Insulation Rockwool	1 week	-
Hand wheel for clamp	1 week	1
Control Thermocouple (6mm ϕ)	1-2 weeks	1
Load thermocouple (3mm ϕ)	1 week	2

Electrical Spare parts		
Description	Estimated Delivery	Recommended Qty
Temperature Controller Unit	2-3 Weeks	1
Overtemperature Unit	2-3 Weeks	1
Chart Recorder	2-3 Weeks	1
Thyristor Fuses	2 to 3 Weeks	1
Ammeter	2 weeks	2
Push button	1 Week	2
Relays	1 Week	2

Note: Safety feature related components should be replaced as required or before 2025, whichever is sooner.(limit switches, safety relays, alarms etc)

12.0 Guarantee

Warranty

The equipment and services offered are guaranteed against faulty workmanship or design for a period of 12 months as from commissioning or 18 months from date of readiness to ship, whichever is the sooner. Some components are consumable and so are excluded from the warranty; these include but are not limited to fuses, limit switches and thermocouples. Also excluded from warranty is normal wear and tear and damages due to reasons beyond our normal reasonable control.

Warranty on proprietary components is limited to that offered by the component supplier.

In the unlikely event of a claim under warranty, initial contact should be made via telephone; a written detail of the claim should be posted or faxed within 24 hours of the verbal claim.

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Stork Technical Services will endeavour to assist all its clients with any technical queries; this assistance is not limited to the warranty period.

